A Systematic Mapping Study on **Usability and User Experience Evaluation of Touchable Holograms:** Technical Report

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Abstract

This technical report brings the results of the execution of a Systematic Mapping Study (SMS) with the objective of identifying and characterizing the usability and user experience (UX) evaluation technologies applied to touchable holographic solutions. The list of publications obtained from digital libraries, the inclusion, and exclusion criteria applied in each publication selection phase, and it presents the final list of selected publications. This report also presents the results for the sub questions of the MSL searches and the full data extraction for each publication. This report documents the entire MSL process and serves as a reference for publications and for a doctoral thesis that will present results or analyzes of this MSL.

Resumo

Este relatório técnico traz os resultados da execução de um Mapeamento Sistemático da Literatura (MSL) com objetivo de identificar e caracterizar as tecnologias de avaliação de usabilidade e da experiência do usuário (*User eXperience*, UX) aplicadas a soluções holográficas tocáveis. São apresentadas a lista das publicações obtidas junto às bibliotecas digitais, os critérios de inclusão e exclusão aplicados em cada fase de seleção de publicações e a lista final de publicações selecionadas. Este relatório também apresenta os resultados para as subquestões de pesquisas do MSL e a extração completa dos dados de cada publicação. Este relatório documenta todo o processo do MSL e serve de referência para publicações e para tese de doutorado que apresentará resultados ou análises deste MSL.

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Study Selection

Criteria

Code	Type	Description
E1	Exclude	Publication not available in English or Portuguese.
E2	Exclude	Publication is not peer-reviewed, that is, it was not published on a journal or scientific event preceded by review. It also applies to a book, book chapter, note, report, technical publication, among others.
E3	Exclude	Publication is not a full paper and may not contain research details. Applies to short papers and posters.
E4	Exclude	Publication is not a single article. The result can be a reference to a collection of articles or other types of publications, such as proceedings, books, event calls, among others.
E5	Exclude	Publication requires payment for access and is not accessible by the institutional proxies available to MSL authors. Also, there is no copy of publication publicly available on the internet in other legal sharing sites, such as, for example, in the library of the institution to which the authors of the publications are linked or on internet pages maintained by the authors themselves, or research groups.
E6	Exclude	Publication has already been included by another digital library (source) used in this MSL. It is a duplicate publication.
E7	Exclude	Publication does not report a primary study, but it is a secondary study (systematic review or mapping, or other surveys).
E8	Exclude	Publication does not meet any inclusion criteria, that is, it does not meet the scope and main research question.
I1	Include	Publication evaluates touchable holographic solution in terms of UX or usability.
I2	Include	Publication brings a new UX and/or Usability evaluation proposal for a touchable holographic solution.
I3	Include	Publication evaluates a new UX and/or Usability evaluation proposal for a touchable holographic solution.

First Filter

The string submission took place on April 25, 2021, and obtained 3,531 publications, being 1026 from ACM Digital Library, 692 from IEEExplore and 1813 from Scopus.

For the complete listing of all publications and the respective code resulting from the first filter, see Appendix 1.

Second Filter

Id	Criteria
1	E8
3	E8
5	E5
8	E8
9	E8
10	E8
12	E8
14	I1
19	I1
20	E8
24	E8
29	I1

Id	Criteria
33	E8
36	I1
37	E8
40	E8
44	E8
46	E8
52	E8
61	E8
62	E8
74	E7
81	E8
82	E8

Id	Criteria
98	I1
99	E8
100	E8
105	E8
110	E8
114	E8
130	E8
131	E8
133	E8
137	E8
138	E8
141	E8

Id	Criteria
152	E8
157	E8
171	I1
183	E8
192	E8
195	E8
197	E8
199	E8
208	E8
211	E8
242	E8
246	E8
248	E8
250	I1
256	E8
267	E8
268	I1
298	E8
300	E8
301	E8
304	E8
306	E8
308	E3
314	E8
330	E8
347	E8
349	E8
357	E8
366	E8
368	E8
375	I1
376	I1
384	I2
388	E5
412	E8
422	E8
428	E8
431	E8
435	I1
436	E8
442	E8
453	I1
454	E8
456	I1
465	E8
473	I1
476	I1

Id	Criteria
493	I1
505	E8
506	I1
508	E8
510	E8
518	E8
519	E8
526	E8
528	E8
531	E8
549	E8
584	I1
596	E8
617	E8
621	E5
623	E8
624	I1
628	E8
638	E8
653	E8
703	I1
708	E8
716	E8
717	E8
720	E8
733	E8
748	E8
754	E8
755	E8
756	I1
765	E8
766	E8
811	E8
824	E8
825	E8
827	E8
828	I1
847	E8
851	E8
904	E3
908	E8
931	E8
972	E8
975	E8
977	E8
982	I1
1004	E8

Id	Criteria
1006	E8
1031	I1
1036	E8
1084	E8
1085	E8
1099	I1
1100	E8
1102	I1
1104	E8
1113	E8
1118	E8
1128	E8
1133	E8
1157	E8
1183	E8
1212	E8
1214	E8
1219	E8
1222	E8
1225	E8
1228	I1
1245	E8
1246	I1
1257	I1
1282	E8
1317	E8
1335	E8
1336	E8
1340	E8
1346	E8
1348	E8
1349	E8
1356	E3
1361	E8
1365	E8
1371	E8
1378	E8
1380	E8
1391	E8
1407	E8
1427	E8
1431	E8
1446	E8
1447	E8
1467	E8
1472	E1
1478	E8

Id	Criteria
1485	E8
1489	E8
1507	E8
1510	E8
1525	E8
1534	E8
1536	E8
1547	E8
1564	E8
1569	E8
1633	E8
1658	E8
1675	E8
1717	E8
1727	E8
1732	E8
1735	E8
1744	E8
1750	E8
1778	E8
1780	E8
1814	E8
1816	E8
1831	E8
1832	E8
1847	E8
1853	E8
1856	E3
1862	E8
1874	E8

Id	Criteria
1884	E8
1885	I1
1887	E8
1900	E8
1908	E8
1915	E8
1926	E8
1928	I1
1930	E8
1944	E8
1946	I1
1948	E8
1959	E8
1962	E8
1969	E8
1978	E8
1992	E8
2010	I1
2013	E8
2025	E8
2026	E8
2040	E8
2047	E8
2059	E3
2064	E3
2067	E8
2081	E8
2122	E8
2144	E8
2149	E8

Id	Criteria
2163	E8
2212	E8
2236	E8
2526	E8
2532	E8
2533	E8
2547	E8
2552	I1
2556	E8
2578	E8
2582	E8
2583	E8
2595	E8
2616	E8
2618	E8
2628	E3
2637	I1
2642	E8
2674	E8
2678	I1
2682	E8
2684	E3
2723	E8
2725	I1
2857	I1
2889	I1
2916	E3
2989	E8
3152	E8

Publications vs Evaluation Technologies

Porifera ID	Pub ID	Reference	Evaluation Technology ID	Count
14	P01	Williams et al. (2020)	ET01	1
19	P02	Dehghani et al. (2020)	ET02	1
29	P03	Jasche e Ludwig (2020)	ET03, ET04, ET05	3
36	P04	Kim et al. (2020)	ET06, ET07, ET08	3
98	P05	Lee et al. (2020)	ET09	1
171	P06	Whitlock et al. (2020)	ET10, ET11	2
250	P07	Vaquero-Melchor e Bernardos (2019)	ET12, ET13	2
268	P08	Seiger et al. (2021)	ET14, ET15, ET16	3
375	P09	Xu et al. (2020)	ET17, ET18, ET19, ET20, ET21, ET22, ET23	7
376	P10	Kang et al. (2020)	ET24, ET25, ET26, ET27, ET28, ET29	6
384	P11	Mahajan et al. (2020)	ET30, ET31	2
435	P12	Plasson et al. (2019)	ET32, ET33	2
453	P13	Aslan et al. (2019)	ET34, ET35	2
456	P14	Qian et al. (2019)	ET36, ET37, ET38, ET39, ET40	5
473	P15	Matsumaru et al. (2019)	ET41, ET42, ET43	3
476	P16	Xu et al. (2019)	ET44, ET45, ET46, ET47, ET48	5
493	P17	Munsinger et al. (2019)	ET49	1
506	P18	Kim et al. (2019)	ET50, ET51, ET52, ET53	4
584	P19	Becker et al. (2019)	ET54, ET55, ET56	3
624	P20	Frutos-Pascual et al. (2019)	ET57, ET58, ET59, ET60	4
703	P21	Dudley et al. (2018)	ET61, ET62, ET63, ET64	4
756	P22	Whitlock et al. (2018)	ET65, ET66	2
828	P23	Cao et al. (2018)	ET67, ET68, ET69, ET70	4
982	P24	Lin et al. (2017)	ET71, ET72, ET73	3
1031	P25	Kim e Lee (2016)	ET74, ET75	2
1099	P26	Shim et al. (2016)	ET76	1
1102	P27	Brancati et al. (2015)	ET77, ET78, ET79, ET80, ET81	5
1228	P28	Caruso et al. (2015)	ET82	1
1246	P29	Adhikarla et al. (2015)	ET83, ET84, ET85	3
1257	P30	Ha et al. (2014)	ET86, ET87	2
1885	P31	Sand et al. (2015)	ET88, ET89	2
1928	P32	Lee et al. (2019b)	ET90, ET91	2
1946	P33	Wright et al. (2019)	ET92	1
2010	P34	Mau-Tsuen Yang e Wan-Che Liao (2014)	ET93	1
2552	P35	Zhu e Grossman (2020)	ET94, ET95	2
2637	P36	Weichel et al. (2014)	ET96, ET97	2
2678	P37	Lee et al. (2019a)	ET98, ET99	2
2725	P38	Higuchi e Komuro (2013)	ET100, ET101, ET102, ET103	4
2857	P39	Lee et al. (2013)	ET104	1
2889	P40	Huang et al. (2015)	ET105, ET106	2

SQ1. What this the type of contribution of the article?

Options: *A) evaluation research; B) proposal of Solution; C) validation Research; D) philosophical paper; E) opinion paper and; F) personal experience paper;*

SQ2. Which area was the research conducted?

Open question.

Pub ID	Research Type (SQ1)						Field (SQ2)
	A	B	C	D	E	F	
P01			×				Computer Science
P02		×	×				Others
P03			×				Computer Science
P04			×				Electronic/Engineering
P05			×				Computer Science
P06			×				Computer Science
P07			×				Electronic/Engineering
P08			×				Computer Science
P09			×				Computer Science
P10			×				Others
P11			×				Electronic/Engineering
P12			×				Computer Science
P13			×				Computer Science
P14			×				Computer Science
P15			×				Computer Science
P16			×				Computer Science
P17			×				Computer Science
P18			×				Electronic/Engineering
P19			×				Computer Science
P20			×				Computer Science
P21			×				Electronic/Engineering
P22			×				Computer Science
P23			×				Electronic/Engineering
P24			×				Computer Science
P25			×				Electronic/Engineering
P26			×				Computer Science
P27			×				Computer Science
P28			×				Computer Science
P29			×				Electronic/Engineering
P30			×				Others
P31			×				Computer Science
P32			×				Computer Science
P33			×				Electronic/Engineering
P34			×				Computer Science
P35			×				Computer Science
P36			×				Computer Science
P37			×				Electronic/Engineering
P38			×				Electronic/Engineering
P39			×				Computer Science
P40			×				Computer Science

SQ3. What quality criteria is the focus of the evaluation technology?

Options: *Usability; User Experience (UX)*

SQ4. What type of evaluation technology?

Options: *From A to E, usability; From F to H, UX. A) Testing; B) Inspection; C) Inquiry; D) Analytical Modeling; E) Simulation; F) Field Study; G) Survey; H) Expert Evaluation.*

Evaluation Technology	Quality Criteria (SQ3)		Type of evaluation technology (SQ4)							
	usability	UX	A	B	C	D	E	F	G	H
ET01	×				×					
ET02	×	×			×				×	
ET03	×		×							
ET04	×				×					
ET05	×			×						
ET06	×				×					
ET07	×				×					
ET08	×		×							
ET09	×		×							
ET10	×				×					
ET11	×				×					
ET12	×		×							
ET13	×				×					
ET14	×				×					
ET15	×				×					
ET16	×		×							
ET17	×		×							
ET18	×		×							
ET19	×				×					
ET20	×				×					
ET21	×				×					
ET22	×				×					
ET23		×							×	
ET24	×		×							
ET25	×				×					
ET26	×				×					
ET27		×							×	
ET28		×							×	
ET29		×							×	
ET30	×		×							
ET31	×				×					
ET32	×		×							
ET33	×				×					
ET34	×		×							
ET35		×							×	
ET36	×		×							
ET37		×							×	
ET38	×		×							
ET39	×				×					
ET40		×							×	

Evaluation Technology	Quality Criteria (SQ3)		Type of evaluation technology (SQ4)							
	usability	UX	A	B	C	D	E	F	G	H
ET41	×		×							
ET42	×				×					
ET43	×				×					
ET44	×		×							
ET45	×				×					
ET46	×				×					
ET47		×							×	
ET48		×							×	
ET49	×		×							
ET50	×		×							
ET51	×				×					
ET52	×				×					
ET53	×				×					
ET54	×		×							
ET55	×				×					
ET56		×							×	
ET57	×		×							
ET58	×				×					
ET59	×				×					
ET60	×				×					
ET61	×		×							
ET62	×				×					
ET63	×				×					
ET64		×							×	
ET65	×		×							
ET66	×				×					
ET67	×		×							
ET68	×				×					
ET69	×				×					
ET70		×							×	
ET71	×		×							
ET72	×				×					
ET73		×							×	
ET74	×		×							
ET75		×							×	
ET76	×				×					
ET77	×		×							
ET78	×				×					
ET79		×							×	
ET80	×				×					
ET81	×				×					
ET82	×				×					
ET83	×		×							
ET84	×				×					
ET85		×							×	
ET86	×		×							

Evaluation Technology	Quality Criteria (SQ3)		Type of evaluation technology (SQ4)							
	usability	UX	A	B	C	D	E	F	G	H
ET87	×				×					
ET88	×		×							
ET89	×				×					
ET90	×		×							
ET91	×				×					
ET92	×		×							
ET93	×				×					
ET94		×							×	
ET95		×							×	
ET96	×				×					
ET97	×				×					
ET98	×		×							
ET99	×				×					
ET100	×		×							
ET101	×				×					
ET102	×				×					
ET103		×							×	
ET104	×				×					
ET105	×		×							
ET106		×							×	

SQ5. Did the evaluation technology consider what aspects or metrics?

Open question

Pre-classification

Evaluation Technology	Aspects or Metrics (SQ5)			
	Usability		**UX**	
	List	**Count**	**List**	**Count**
ET01	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET02	perceived functional benefits, perceived visual appeal, interactivity, user satisfaction	4	perceived trust, perceived immersion, behavioral intention, perceived autonomy	4
ET03	overall usability	1		
ET04	potential issues, liked/disliked, what would change, features would like to add, felt about support 3D printing	5		
ET05	view points, improvements	2		
ET06	general exertion and pain	1		
ET07	perceived comfort, overall usability	2		
ET08	performance	1		
ET09	min completion time, max completion time, average completion time, words per minute, number of errors	5		
ET10	overall usability	1		
ET11	participant feedback	1		
ET12	size error, time to perform the process	2		
ET13	how intuitive the process is, whether the haptic feedback helped them for the manipulation process	2		
ET14	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET15	advantages/disadvantages, experienced troubles, potential improvements	3		
ET16	task completion time	1		
ET17	what challenges they had, possible improvements	2		
ET18	speed, accuracy	2		
ET19	overall usability	1		
ET20	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET21	general exertion and pain	1		
ET22	visual health	1		
ET23			attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	6
ET24	discoverability, efficiency, accuracy	3		
ET25	overall usability	1		
ET26	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET27			perceived level of naturalism	1
ET28			perceived level of enjoyment	1
ET29			user experience in general	1
ET30	Student Performance via Problem-Solving Policies, manipulation time, gaze concentration	3		

Evaluation Technology	Aspects or Metrics (SQ5)			
	Usability		UX	
	List	Count	List	Count
ET31	overall usability	1		
ET32	completion time of task	1		
ET33	easy to understand, easy to select, quickly performing, physical demand, mentally demand, frustration	6		
ET34	task complete, overall usability	2		
ET35			Expectations of a future	1
ET36	user issues, participant feedback	2		
ET37			overall experience, enjoyment, discovered perception, manipulation, behavior issues	5
ET38	completion time, success rate, scale of task quality	3		
ET39	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET40			helpfulness	1
ET41	execution time for performing task	1		
ET42	comfort, fatigue	2		
ET43	ease of learning, satisfaction	2		
ET44	text entry performance	1		
ET45	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET46	motion sickness	1		
ET47			presence	1
ET48			attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	6
ET49	total number of input errors, time taken to complete the tasks in tutorial, time taken to complete the tasks in game	3		
ET50	completion time of each task	1		
ET51	overall usability	1		
ET52	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET53	participant feedback	1		
ET54	task completion time	1		
ET55	easy to understand, fast, appealing, physically demand, mentally demand, comfortable, felt in control of the devices, imagine to use in my day life	8		
ET56			attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	6
ET57	time to completion, accuracy	2		
ET58	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET59	overall usability	1		
ET60	ease of use, perceived FOV, hand recognition, tracking accuracy	4		
ET61	entry rate, error rate	2		
ET62	perception of typing speed, accuracy, comfort	3		
ET63	overall usability	1		
ET64			participant feedback on the UX	1

Evaluation Technology	Aspects or Metrics (SQ5)			
	Usability		UX	
	List	Count	List	Count
ET65	performance	1		
ET66	perceived effectiveness, overall usability, naturalness, concentration, frustration, social acceptability, user feedback	7		
ET67	overall usability	1		
ET68	easy of follow, can freely observe, active visual feedback, helpful to find solution, time saving, risk-free, physical with virtual, intuitive interaction, expressive UI Design, easy programming, high controllability, MR NOT distraction, clear visualization, easy to animate, environment interaction	15		
ET69	overall usability	1		
ET70			overall experience, user feedback	2
ET71	task completion time, success rate	2		
ET72	overall usability	1		
ET73			participant feedback	1
ET74	task completion time, failure rate	2		
ET75			Learnability, usefulness, ease of use, intuitiveness, natural behavior	5
ET76	usefulness, ease of use, ease of learning, satisfaction	4		
ET77	possible impressions of her/his experience (intentions and possible difficulties)	1		
ET78	overall usability	1		
ET79			attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	6
ET80	usefulness, ease of use, ease of learning, satisfaction perceived	4		
ET81	physical effort, velocity, accuracy, physical comfort, overall usability, mental effort	6		
ET82	quality of the visualization, stereoscopic issues, task easiness, tracking quality, tracking delay, perspective image quality, coherence of the perspective during the head movements	7		
ET83	task completion times	1		
ET84	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET85			attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	6
ET86	task completion, distance error, completion time, clutching count (number of grasping motions)	4		
ET87	accuracy, speed, easiness, perception about completion task	4		
ET88	performance	1		
ET89	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET90	performance	1		
ET91	mental demand, physical demand, temporal demand, performance, effort, frustration	6		
ET92	performance	1		
ET93	overall usability	1		

Evaluation Technology	Aspects or Metrics (SQ5)			
	Usability		UX	
	List	Count	List	Count
ET94			Overall experience	1
ET95			Favorite aspects of experience	1
ET96	usefulness of existing objects, usefulness of gestual icons, immersion, no arm fatigue, sense of size, sense of location, easy to use, not capable with other systems	8		
ET97	overall usability	1		
ET98	performance	1		
ET99	accuracy, real-time, aware of slight deviation, ease-of-use, useful	5		
ET100	task completion time, the number of mistypes, mistyped characters, words per minute	4		
ET101	operability, tiredness, visibility	3		
ET102	wideness of operating area	1		
ET103			Reality, Amusement	2
ET104	easy of learning, slower than baseline, less accurate than the baseline	3		
ET105	task completion time, failed trials	2		
ET106			perceived enjoyment, perceived usefulness, perceived ease of use and, intention to use	4

Classification process

Aspect or Metric	ET	Known Technology	Definition	Match with
accuracy	ET18	No, testing with recorded data	metric itself	effectiveness \ accuracy
accuracy	ET24	No, testing with recorded data	Accuracy and Efficiency: which interaction mechanism offers the user an increased efficiency and accuracy to complete the task?	effectiveness \ accuracy
accuracy	ET57	No, testing with recorded data	metric itself	effectiveness \ accuracy
accuracy	ET62	No, testing with recorded data	metric itself	effectiveness \ accuracy
accuracy	ET81	No, testing with recorded data	metric itself	effectiveness \ accuracy
accuracy	ET87	No, testing with recorded data	metric itself	effectiveness \ accuracy
accuracy	ET99	No, testing with recorded data	metric itself	effectiveness \ accuracy
active visual feedback	ET68	No, questionnaire with Likert scale	We found that the virtual feedback for confirming the assembly correctness was particularly appreciated by the users. “The color change feedback really assures me about my assembly and makes me confident.”	satisfaction \ trust
advantages/disadvantages	ET15	No, open question	It also included individual questions with free form text answers regarding the personal opinion about: (1) advantages/disadvantages of each tool; (2) experienced troubles with each tool; (3) advantages/disadvantages of modelling with desktop-based tools; (4) advantages/disadvantages of modelling in AR/MR; as well as (5) potential improvements of the HoloFlows app.	satisfaction \ usefulness
amusement	ET103	No, questionnaire with Likert scale	n/d	Pleasure / Fun
appealing	ET55	No, questionnaire with Likert scale	See questionnaire questions	satisfaction \ pleasurable

attractiveness	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Overall impression of the product. Do users like or dislike it?	Generic UX
average completion time	ET09	No, testing with recorded data	metric itself	efficiency \ time
aware of slight deviation	ET99	No, questionnaire with Likert scale	See questionnaire questions	effectiveness \ accuracy
behavior issues	ET37	No, interview	I4: Participants lack a general mental model for free-hand direct manipulation on the smartphone.	Usability
behavioral intention	ET02	No, questionnaire with Likert scale	"Use intention "	Desirability
can freely observe	ET68	No, questionnaire with Likert scale	n/d	controllability
clear visualization	ET68	No, questionnaire with Likert scale	n/d	effectiveness
clutching count (number of grasping motions)	ET86	No, testing with recorded data	n/d	efficiency \ physical effort
coherence of the perspective during the head movements	ET82	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
comfort	ET42	Sim, ISO/TS 9241-411, Annex C	force required, smoothness, effort required, operation speed, general comfort	efficiency \ physical effort
comfort	ET62	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ physical effort
comfortable	ET55	No, questionnaire with Likert scale	It felt comfortable	satisfaction \ comfort
completion time	ET38	No, testing with recorded data	metric itself	efficiency \ time
completion time	ET86	No, testing with recorded data	metric itself	efficiency \ time
completion time of each task	ET50	No, testing with recorded data	metric itself	efficiency \ time
completion time of task	ET32	No, testing with recorded data	metric itself	efficiency \ time
concentration	ET66	No, questionnaire with Likert scale	combining responses to questions on difficulty in translation and whether translation required heavy concentration into a second scale (ease of interaction, 1 = easy, 0 = difficult).	learnability, efficiency \ mental effort
dependability	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Does the user feel in control of the interaction? Is it secure and predictable?	Usability, Trustworthiness
discoverability	ET24	No, testing with recorded data	Discoverability: which interaction design requires a greater time investment to understand the mechanism without instructions?	learnability
discovered perception	ET37	No, interview	I1: Participants hesitated when approaching distant virtual objects. I2: Participants were uncertain how to map the spatial distance to virtual objects.	Usability
distance error	ET86	No, testing with recorded data	metric itself	effectiveness \ accuracy
ease of learning	ET104	No, questionnaire with Likert scale	n/d	learnability
ease of learning	ET43, ET76, ET80	Sim, USE (2x full, 1x extended)	See USE questions	learnability, memorability
ease of use	ET99	No, questionnaire with Likert scale	The second, ease of use, assessed how fast and easy it was to author AR content and to operate the system.	efficiency \ time
ease of use	ET60	No, questionnaire with Likert scale	n/d	overall usability
ease of use	ET75	No, questionnaire with Likert scale	The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior	Usability
ease of use	ET76, ET80	Sim, USE (2x)	See USE questions	efficiency \ mental effort, prevent and recovery errors
easiness	ET87	No, questionnaire with Likert scale	How easy was it to complete the task?	effectiveness
easy of follow	ET68	No, questionnaire with Likert scale	n/d	effectiveness
easy programming	ET68	No, questionnaire with Likert scale	n/d	effectiveness
easy to animate	ET68	No, questionnaire with Likert scale	n/d	effectiveness
easy to select	ET33	Sim, NASA-TLX extended	I found it easy to select the target	effectiveness

easy to understand	ET33	Sim, NASA-TLX extended	I found the selection technique easy to understand	learnability
easy to understand	ET55	No, questionnaire with Likert scale	See questionnaire questions	learnability
easy to use	ET96	No, questionnaire with Likert scale	Overall, users agreed that the system was easy to use (Figure 12).	overall usability
efficiency	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Can users solve their tasks without unnecessary effort? Does it react fast?	Usability
efficiency	ET24	No, testing with recorded data	Accuracy and Efficiency: which interaction mechanism offers the user an increased efficiency and accuracy to complete the task?	efficiency
effort	ET01, ET14, ET20, ET26, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x)	How hard did you have to work (mentally and physically) to accomplish your level of performance?	efficiency \ physical effort, efficiency \ mental effort
enjoyment	ET37	No, interview	n/d	Pleasure / Fun
entry rate	ET61	No, testing with recorded data	words per minute	efficiency \ time
environment interaction	ET68	No, questionnaire with Likert scale	n/d	effectiveness
error rate	ET61	No, testing with recorded data	metric itself	effectiveness \ accuracy
execution time for performing task	ET41	No, testing with recorded data	metric itself	efficiency \ time
expectations of a future	ET35	No, interview	querying for example participants' anticipated expectations of a future where holograms were pervasively displayed	Generic UX
experienced troubles	ET15	No, open question	It also included individual questions with free form text answers regarding the personal opinion about: (1) advantages / disadvantages of each tool; (2) experienced troubles with each tool; (3) advantages/disadvantages of modelling with desktop-based tools; (4) advantages / disadvantages of modelling in AR/MR; as well as (5) potential improvements of the HoloFlows app. During a session an observer took times and additional notes regarding a participant's performance and remarks	overall usability
expressive UI Design	ET68	No, questionnaire with Likert scale	n/d	satisfaction \ pleasurable
failed trials	ET105	No, testing with recorded data	metric itself	effectiveness \ accuracy
failure rate	ET74	No, testing with recorded data	metric itself	effectiveness \ accuracy
fast	ET55	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ time
fatigue	ET42	Sim, ISO/TS 9241-411, Annex C	finger, wrist, arm, shoulder, neck fatigue	satisfaction \ comfort
favorite aspects of experience	ET95	No, interview	n/d	Generic UX
features would like to add	ET04	No, interview	n/d	effectiveness \ completeness
felt about support 3D printing	ET04	No, interview	n/d	satisfaction \ usefulness
frustration	ET01, ET14, ET20, ET26, ET33, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x) and NASA-TLX extended (1x)	How insecure, discouraged, irritated, stressed and annoyed versus secure, gratified, content, relaxed and complacent did you feel during the task?	satisfaction
frustration	ET66	No, questionnaire with Likert scale	combing responses about whether translation was tiring, frustrating, and annoying (fatigue/frustration)	satisfaction, satisfaction \ comfort
gaze concentration	ET30	No, testing with recorded data	n/d	satisfaction \ comfort
general exertion and pain	ET06, ET21	Sim, Borg CR-10 (2x)	n/d	efficiency \ physical effort
hand recognition	ET60	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
helpful to find solution	ET68	No, questionnaire with Likert scale	n/d	satisfaction \ usefulness
helpfulness	ET40	No, questionnaire with Likert scale	Sound was less preferred, as five participants noted the sound was "annoying" and like an	Usefulness

			alarm, though they still rated it highly on helpfulness. P1 specifically mentioned that "the changing frequency helps me knowing the object is getting closer, but it also makes me nervous." These five participants all believed that the choice of specific sound used might have a different impact on their preferences.	
high controllability	ET68	No, questionnaire with Likert scale	n/d	controllability
how intuitive the process is	ET13	No, questionnaire with Likert scale	In Task 3, users are proposed to resize some of the figures above (octahedron, cylinder, pyramid, cube, and sphere) with the help of a haptic reference that is of the size to be reached. From there, they have labeled the difficulty of manipulation process with a 3.57 on average (s :1.04) and a 3.71 (s : 1.03) regarding how intuitive the process is (1 is not intuitive at all, and 5 is very intuitive).	learnability
I felt I was in control of the devices	ET55	No, questionnaire with Likert scale	I felt that I was in control of the devices.	controllability
I imagine to use in my day life	ET55	No, questionnaire with Likert scale	I can imagine to use this method in my daily life	effectiveness
immersion	ET96	No, questionnaire with Likert scale	For interaction to be natural users to feel immersed and have a sense of object size and location... Immersion could likely be increased by providing a more realistic object representation taking environmental lighting, proper material appearance and texture into account. Stereoscopy, in combination with the head-tracking, would further improve realism	overall usability
improvements	ET05	No, inspection	n/d	overall usability
intention to use	ET106	Sim, UAHIS	See questionnaire questions	Desirability
intuitive interaction	ET68	No, questionnaire with Likert scale	Visually intuitive. The system's MRUI should be informative, provide active feedback, and be self-explanatory. Moreover, it should not be distractive and obstructive between users and their robots	learnability
intuitiveness	ET75	No, questionnaire with Likert scale	The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior	Usability
learnability	ET75	No, questionnaire with Likert scale	The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior	Usability
less accurate than the baseline	ET104	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
liked/disliked	ET04	No, interview	n/d	satisfaction
manipulation	ET37	No, interview	I3: Participants experienced difficulties picking up and releasing virtual objects, aggravated by unintentional dropping	Usability
manipulation time	ET30	No, testing with recorded data	metric itself	efficiency \ time
max completion time	ET09	No, testing with recorded data	metric itself	efficiency \ time
mental demand	ET01, ET14, ET20, ET26, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x)	How much mental and perceptual activity was required (e.g. thinking, deciding, calculating, remembering, looking, searching, etc.)? Was the task easy or demanding, simple or complex, exciting or forgiving?	efficiency \ mental effort
mental effort	ET81	Sim, DAQ ISO 9241-9	n/d	efficiency \ mental effort
mentally demand	ET33	Sim, NASA-TLX extended	I found using this technique mentally demanding, It was not mentally demanding	efficiency \ mental effort
mentally demand	ET55	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ mental effort
min completion time	ET09	No, testing with recorded data	metric itself	efficiency \ time
mistyped characters	ET100	No, testing with recorded data	metric itself	effectiveness \ accuracy
motion sickness	ET46	Sim, MSAQ	n/d	satisfaction \ comfort
natural behavior	ET75	No, questionnaire with Likert scale	The proposed interaction can lead to a better user experience with respect to learnability,	Usability

			usefulness, ease of use, intuitiveness and natural behavior	
naturalness	ET66	No, questionnaire with Likert scale	Enjoyment: Responses to whether interactions felt natural and fun formed an enjoyment scale.	satisfaction \ pleasurable
no arm fatigue	ET96	No, questionnaire with Likert scale	n/d	satisfaction \ comfort
not capable with other systems	ET96	No, questionnaire with Likert scale	Our study participants had no experience with CAD and modeling tools. When asked if they would be able to design the items they designed during the study with other systems, 40% answered that they would be capable of doing so, despite no prior experience. Some users expected our system to be the way items are commonly designed: "I have never used any of the CAD tools, but I think it's kind of like this one" (U7).	learnability
not distraction	ET68	No, questionnaire with Likert scale	The two users who disagreed felt that the overlaying virtual model was distracting and they suggested a switch function to toggle the MR interface. "I am having some trouble differentiating the virtual model from the real one (U2)."	effectiveness
novelty	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Is the design of the product creative? Does it catch the interest of users?	Creative and Novelty, Stimulation
number of errors	ET09	No, testing with recorded data	metric itself	effectiveness \ accuracy
number of mistypes	ET100	No, testing with recorded data	metric itself	effectiveness \ accuracy
operability	ET101	No, questionnaire with Likert scale	About operability, many subjects felt easier to operate in Mode A than the others, which is in consistency with the result of quantitative evaluation.	controllability
overall experience	ET37	No, interview	n/d	Generic UX
overall experience	ET70	No, questionnaire with Likert scale	n/d	Generic UX
overall experience	ET94	No, questionnaire with Likert scale	n/d	Generic UX
overall usability	ET03	Sim, Think Aloud	express their impressions	overall usability
overall usability	ET07	Sim, IKC-Q ISO 9241-410 (extended)	n/d	overall usability
overall usability	ET10, ET19, ET25, ET31, ET51, ET59, ET63, ET69, ET72, ET78, ET81, ET93	Sim, SUS (12x)	SUS does not show construct division	overall usability
overall usability	ET34	Sim, Think Aloud	n/d	overall usability
overall usability	ET66	Sim, SUS	refers to the contained SUS	overall usability
overall usability	ET67	Sim, Think Aloud	n/d	overall usability
overall usability	ET81	Sim, DAQ ISO 9241-9	n/d	overall usability
overall usability	ET97	No, interview	n/d	overall usability
participant feedback	ET11	No, questionnaire with Likert scale	n/d	overall usability
participant feedback	ET36	Sim, Think Aloud	n/d	overall usability
participant feedback	ET53	No, interview	n/d	overall usability
participant feedback	ET73	No, questionnaire with open questions	See questionnaire question	Generic UX
participant feedback on the UX	ET64	No, interview	n/d	Generic UX
perceived autonomy	ET02	No, questionnaire with Likert scale	Perceived Autonomy speaks to the degree to which a person feels that his or her actions were solely influenced by themselves without any external involvement. Creating an environment that nurtures autonomy allows individuals to believe that their choices are entirely theirs and creates a sense of freedom and intrinsic motivation that leads to continuance intention [84].	Trustworthiness
perceived comfort	ET07	Sim, IKC-Q ISO 9241-410 (extended)	n/d	satisfaction \ comfort

perceived ease of use	ET106	Sim, UAHIS	See questionnaire questions	Usability
perceived effectiveness	ET66	Sim, SUS	refers to the contained SUS	overall usability
perceived enjoyment	ET106	Sim, UAHIS	See questionnaire questions	Pleasure / Fun
perceived FOV	ET60	No, questionnaire with Likert scale	Both devices currently offer direct freehand interaction [20], however each supports different interaction paradigms and form factors that may have an effect on their perceived usability (i.e. the position of AR objects, the headset Field Of View (FOV) and also the recommended user interaction space). Post-test. After each of the conditions were completed, participants were asked to fill in the NASA TLX [23], the System Usability Scale (SUS) [11] and a post-test questionnaire asking about their experience with the device and their opinion on device specifics (FOV, tracking accuracy, hand tracking accuracy, preferred interaction).	controllability
perceived functional benefits	ET02	No, questionnaire with Likert scale	Perceived functional benefits are defined as the consumers' perception of the technology's utilitarian benefits while factoring in costs, proficiency, and effectiveness [49]. It reflects the superiority of functions and abilities that the technology is capable of.	satisfaction \ usefulness
perceived immersion	ET02	No, questionnaire with Likert scale	Immersion is defined as the deep involvement of users with virtual systems that allow them to feel encompassed by and absorbed in the virtual stimuli [82] and a sense that they are disconnected from the stimuli of the real World [83]. Perceived immersion is originally derived from the concept of cognitive absorption and, in particular, it encompasses total engagement with technology where other attentional demands are ignored [1]. Also, it describes the level of engagement with any immersive media that facilitates deep absorption, interaction, and involvement in the virtual stimuli while disconnecting one from the real World [82,83]. To get a sense of immersion, users need to feel that they can freely and realistically interact with virtual items [61].	Presence
perceived interactivity	ET02	No, questionnaire with Likert scale	Perceived interactivity is based on "efficacy which is composed of two dimensions: firstly, the users' sense or perception of efficacy and secondly, the users' sense of interactivity provided by the media.	effectiveness
perceived level of enjoyment	ET28	Yes, extended TAM	n/d	Pleasure / Fun
perceived level of naturalism	ET27	No, questionnaire with Likert scale	To measure the perceived level of naturalism, we used five-point Likert scale questionnaires. The questionnaire includes three items: "interaction with a virtual object was similar to how I would interact with an object in a real-world," "interaction with a virtual object felt familiar," "interaction with a virtual object seems intuitive and natural."	Presence
perceived trust	ET02	No, questionnaire with Likert scale	Perceived trust is defined as the attitudinal confidence for reliability, safety and credibility of mobile applications as well as the empathetic and valuable customer service when necessitated [49]. The continuous advancement of technology can establish a threatened consumer perception of privacy [77].	Trustworthiness
perceived usefulness	ET106	Sim, UAHIS	See questionnaire questions	Usefulness
perceived visual appeal	ET02	No, questionnaire with Likert scale	Perceived visual appeal (PVA) speaks to how much a user finds the technology interface to be aesthetically appealing [8]. Visual appeal refers to the attractiveness of the visual components, such as fonts and graphics, which heightens interest in the information system [9]. It also satisfies consumer desire in terms of emotional appeal, and it manifests in its shape, colour, and screen layout [80].	satisfaction \ pleasurable
perception about completion task	ET87	No, questionnaire with Likert scale	How visually understandable was it to complete the task?	effectiveness \ completeness

perception of typing speed	ET62	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ time
performance	ET01, ET14, ET20, ET26, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x)	How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)? How satisfied were you with your performance in accomplishing these goals?	efficiency
performance	ET08	No, testing with recorded data	speed	efficiency \ time
performance	ET65	No, testing with recorded data	We used three objective measures to capture user performance: completion time, accuracy, and the number of times participants attempted each interaction.	effectiveness, effectiveness \ accuracy, efficiency \ time
performance	ET88	No, testing with recorded data	Text entry rate and error rate	effectiveness \ accuracy, efficiency \ time
performance	ET90	No, testing with recorded data	We design a text entry task to evaluate the system performance of HIBEY in terms of text entry speed and error rate.	effectiveness \ accuracy, efficiency \ time
performance	ET92	No, testing with recorded data	The analysis of user performance was measured utilizing several metrics. Distance from the tip of the index finger to the center of the sphere in three dimensions and the time the user took to complete the task were selected as the user performance measurements.	effectiveness \ accuracy, efficiency \ time
performance	ET98	No, testing with recorded data	Min completion time, max completion time, average completion time	efficiency \ time
perspective image quality	ET82	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
perspicuity	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Is it easy to get familiar with the product and to learn how to use it?	Usability
physical comfort	ET81	Sim, ISO 9241-9 annex C	n/d	satisfaction \ comfort
physical demand	ET01, ET14, ET20, ET26, ET33, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x) and NASA-TLX extended (1x)	How much physical activity was required (e.g. pushing, pulling, turning, controlling, activating, etc.)? Was the task easy or demanding slow or brisk, slack or strenuous, restful or laborious?	efficiency \ physical effort
physical effort	ET81	Sim, ISO 9241-9 annex C	n/d	efficiency \ physical effort
physical with virtual	ET68	No, questionnaire with Likert scale	They particularly liked the grafting of the virtual model on the physical modules, while both moved together corresponding to users' simulating manipulation. "I think the virtual/reality simulation really helps me to understand the dynamics of the robot (U7).".	learnability
physically demand	ET55	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ physical effort
possible impressions of her/his experience (intentions and possible difficulties)	ET77	Sim, Think Aloud	n/d	overall usability
possible improvements	ET17	Sim, Think Aloud	They were asked to talk about what they saw, what challenges they had, and possible improvements by having a boundary awareness method to guide their interaction explicitly	effectiveness \ completeness
potential improvements	ET15	No, open question	It also included individual questions with free form text answers regarding the personal opinion about: (1) advantages/disadvantages of each tool; (2) experienced troubles with each tool; (3) advantages/disadvantages of modelling with desktop-based tools; (4) advantages/disadvantages of modelling in AR/MR; as well as (5) potential improvements of the HoloFlows app. During a session an observer took times and additional notes regarding a participant's performance and remarks	effectiveness \ completeness
potential issues	ET04	No, interview	n/d	overall usability
presence	ET47	Sim, Slater-Usoh-Steed	Slater-Usoh-Steed	Presence
quality of the visualization	ET82	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
quickly performing	ET33	Sim, NASA-TLX extended	I feel that I performed quickly with this technique	efficiency \ time

reality	ET103	No, questionnaire with Likert scale	Also, the AR technology makes it possible to provide the user with a greater sense of reality in operating the device. The user would feel natural when manipulating the virtual objects with his/her hand because the viewing directions of the camera and the user's eyes are the same. From this result, it can be said that clarity of top-bottom relationship between the finger and the virtual object affects a sense of reality. Without overlaying the finger image on the virtual object, the finger is hidden behind the virtual object when the finger moves onto the virtual object. Since the virtual object is transparent and is overlaid on the captured image, the user can see the finger even in that situation. Nevertheless, the user feels like the finger is behind the virtual object. When the user tries to press the button, the button moves to the back according to the finger movement but the user feels like pressing the space behind the button. This inconsistency makes the user feel unnatural. The user does not feel such unnaturalness if the finger image is overlaid on the button. That would be the reason why the subjects felt a greater sense of reality in the mode of overlaying the finger image.	Presence
real-time	ET99	No, questionnaire with Likert scale	See questionnaire questions	efficiency \ time
risk-free	ET68	No, questionnaire with Likert scale	n/d	prevent and recovery errors
satisfaction	ET43, ET76, ET80	Sim, USE (2x full, 1x extended)	See USE questions	satisfaction, satisfaction \ pleasure
scale of task quality	ET38	No, testing with recorded data	metric itself	effectiveness \ accuracy
sense of location	ET96	No, questionnaire with Likert scale	For interaction to be natural users to feel immersed and have a sense of object size and location.	overall usability
sense of size	ET96	No, questionnaire with Likert scale	For interaction to be natural users to feel immersed and have a sense of object size and location.	overall usability
size error	ET12	No, testing with recorded data	metric itself	effectiveness \ accuracy
slower than baseline	ET104	No, questionnaire with Likert scale	n/d	efficiency \ time
social acceptability	ET66	No, questionnaire with Likert scale	Comfort in Social Setting: Responses to how comfortable participants would feel using the system in shared spaces (e.g., workplace) or public spaces (e.g., a mall or store) formed a social comfort scale.	satisfaction \ comfort
speed	ET18	No, testing with recorded data	metric itself	efficiency \ time
speed	ET87	No, testing with recorded data	metric itself	efficiency \ time
stereoscopic issues	ET82	No, questionnaire with Likert scale	n/d	controllability
stimulation	ET23, ET48, ET56, ET79, ET85	Sim, UEQ	UEQ: Is it exciting and motivating to use the product? Is it fun to use?	Stimulation, Pleasure / Fun
student performance via problem-solving policies	ET30	No, testing with recorded data	n/d	efficiency
success rate	ET38	No, testing with recorded data	metric itself	effectiveness \ accuracy
success rate	ET71	No, testing with recorded data	metric itself	effectiveness \ accuracy
task complete	ET34	Sim, Think Aloud	n/d	effectiveness
task completion	ET86	No, testing with recorded data	metric itself	effectiveness
task completion time	ET100	No, testing with recorded data	metric itself	efficiency \ time
task completion time	ET105	No, testing with recorded data	metric itself	efficiency \ time
task completion time	ET16	No, testing with recorded data	metric itself	efficiency \ time
task completion time	ET54	No, testing with recorded data	metric itself	efficiency \ time
task completion time	ET71	No, testing with recorded data	metric itself	efficiency \ time
task completion time	ET74	No, testing with recorded data	metric itself	efficiency \ time

task completion times	ET83	No, testing with recorded data	metric itself	efficiency \ time
task easiness	ET82	No, questionnaire with Likert scale	n/d	overall usability
temporal demand	ET01, ET14, ET20, ET26, ET39, ET45, ET52, ET58, ET84, ET89, ET91	Sim, NASA-TLX (11x)	How much time pressure did you feel due to the rate or pace at which the tasks or task elements occurred? Was the pace slow and leisurely, or rapid and frantic?	satisfaction \ comfort
text entry performance	ET44	No, testing with recorded data	Word Per Minute, Total Error Rate, Corrected Error Rate	effectiveness \ accuracy, efficiency \ time
time saving	ET68	No, questionnaire with Likert scale	n/d	efficiency \ time
time taken to complete the tasks in game	ET49	No, testing with recorded data	metric itself	efficiency \ time
time taken to complete the tasks in tutorial	ET49	No, testing with recorded data	metric itself	efficiency \ time
time to completion	ET57	No, testing with recorded data	metric itself	efficiency \ time
time to perform the process	ET12	No, testing with recorded data	metric itself	efficiency \ time
tiredness	ET101	No, questionnaire with Likert scale	About tiredness, the subjects felt tired on the whole. About tiredness, the current system does not recognize a bending finger and the user has to keep his/her finger unbended, which may cause the subject to feel tired.	satisfaction \ comfort
total number of input errors	ET49	No, testing with recorded data	metric itself	effectiveness \ accuracy
tracking accuracy	ET60	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
tracking delay	ET82	No, questionnaire with Likert scale	n/d	efficiency \ time
tracking quality	ET82	No, questionnaire with Likert scale	n/d	effectiveness \ accuracy
useful	ET99	No, questionnaire with Likert scale	Finally, 24 out of 25 participants agree that TiPoint is a useful interaction technique and is applicable to other applications that relies on the WIMP paradigm.	satisfaction \ usefulness
usefulness	ET75	No, questionnaire with Likert scale	The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior	Usefulness
usefulness	ET76, ET80	Sim, USE (2x)	See USE questions	effectiveness, satisfaction \ usefulness, efficiency \ time, satisfaction \ trust
usefulness of existing objects	ET96	No, questionnaire with Likert scale	n/d	satisfaction \ usefulness
usefulness of gestural icons	ET96	No, questionnaire with Likert scale	n/d	satisfaction \ usefulness
user experience in general	ET29	No, interview	n/d	Generic UX
user feedback	ET66	No, questionnaire with Likert scale	intuitiveness of actions: combining responses to questions on difficulty in translation and whether translation required heavy concentration into a second scale (ease of interaction, 1 = easy, 0 = difficult).	learnability, efficiency \ mental effort
user feedback	ET70	No, questionnaire with Likert scale	n/d	Generic UX
user issues	ET36	Sim, Think Aloud	n/d	overall usability
user satisfaction	ET02	No, questionnaire with Likert scale	defines satisfaction as the pleasurableness of the [consumption] experience, it is the evaluation rendered that the experience was at least as good as it was supposed to be. Behavioral intention is a result of user satisfaction and is one's conscious intention to achieve something or not. The lack of congruence between expectation and reality usually results in dissatisfaction.	satisfaction, satisfaction \ pleasurable
velocity	ET81	Sim, DAQ ISO 9241-9	n/d	efficiency \ time
view points	ET05	No, inspection	n/d	overall usability

visibility	ET101	No, questionnaire with Likert scale	About visibility, the subjects felt easy to see on the whole, but felt easier without AR. About visibility, since our system is possible to operate with the user's face close to the display, the subject could see even small and semi-transparent keys clearly, which might a ect the whole visibility.	controllability
visual health	ET22	Sim, CVS-Q	n/d	satisfaction \ comfort
what challenges they had	ET17	Sim, Think Aloud	They were asked to talk about what they saw, what challenges they had, and possible improvements by having a boundary awareness method to guide their interaction explicitly	overall usability
what would change	ET04	No, interview	n/d	satisfaction \ usefulness
whether the haptic feedback helped them for the manipulation process	ET13	No, questionnaire with Likert scale	n/d	satisfaction \ usefulness
wideness of operating area	ET102	No, questionnaire with Likert scale	We also asked the subjects about the operation area of the system both in button pressing and keyboard typing. The subjects were asked to evaluate whether the operation area of the proposed system was large or small on a 5-point scale (a higher score means larger area and 3 means the same as that of a standard smartphone).	controllability
words per minute	ET09	No, testing with recorded data	metric itself	efficiency \ time
words per minute	ET100	No, testing with recorded data	metric itself	efficiency \ time

Post-classification

ET	usability aspect	count	UX aspect	count
ET01	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET02	effectiveness, satisfaction, satisfaction \ usefulness, satisfaction \ pleasurable	4	Trustworthiness, Presence, Desirability	3
ET03	overall usability	1		
ET04	overall usability, effectiveness \ completeness, satisfaction, satisfaction \ usefulness	4		
ET05	overall usability	1		
ET06	efficiency \ physical effort	1		
ET07	overall usability, satisfaction \ comfort	2		
ET08	efficiency \ time	1		
ET09	effectiveness \ accuracy, efficiency \ time	2		
ET10	overall usability	1		
ET11	overall usability	1		
ET12	effectiveness \ accuracy, efficiency \ time	2		
ET13	learnability, satisfaction \ usefulness	2		
ET14	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET15	overall usability, effectiveness \ completeness, satisfaction \ usefulness	3		
ET16	efficiency \ time	1		
ET17	overall usability, effectiveness \ completeness	2		
ET18	effectiveness \ accuracy, efficiency \ time	2		
ET19	overall usability	1		
ET20	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET21	efficiency \ physical effort	1		
ET22	satisfaction \ comfort	1		

ET	usability aspect	count	UX aspect	count
ET23			Generic UX, Usability, Trustworthiness, Creative and Novelty, Stimulation, Pleasure/Fun	6
ET24	effectiveness \ accuracy, efficiency \ time, learnability	3		
ET25	overall usability	1		
ET26	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET27			Presence	1
ET28			Pleasure/Fun	1
ET29			Generic UX	1
ET30	efficiency, efficiency \ time, satisfaction \ comfort, satisfaction \ pleasurable	4		
ET31	overall usability	1		
ET32	efficiency \ time	1		
ET33	overall usability, learnability, efficiency \ time, efficiency \ physical effort, efficiency \ mental effort, satisfaction	6		
ET34	overall usability, effectiveness	2		
ET35			Generic UX	1
ET36	overall usability	1		
ET37			Generic UX, Pleasure/Fun, Usability	3
ET38	effectiveness \ accuracy, efficiency \ time	2		
ET39	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET40			Usefulness	1
ET41	efficiency \ time	1		
ET42	satisfaction \ comfort	1		
ET43	learnability, memorability, satisfaction, s-pleasurable	4		
ET44	effectiveness \ accuracy. efficiency \ time	1		
ET45	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET46	satisfaction \ comfort	1		
ET47			Presence	1
ET48			Generic UX, Usability, Trustworthiness, Creative and Novelty, Stimulation, Pleasure/Fun	6
ET49	effectiveness \ accuracy, efficiency \ time	2		
ET50	efficiency \ time	1		
ET51	overall usability	1		
ET52	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET53	overall usability	1		
ET54	efficiency \ time	1		
ET55	overall usability	1		
ET56			Generic UX, Usability, Trustworthiness, Creative and Novelty, Stimulation, Pleasure/Fun	6
ET57	effectiveness \ accuracy, efficiency \ time	2		
ET58	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET59	overall usability	1		
ET60	effectiveness \ accuracy, controllability, overall usability	3		

ET	usability aspect	count	UX aspect	count
ET61	effectiveness \ accuracy, efficiency \ time	2		
ET62	effectiveness \ accuracy, efficiency \ time, satisfaction \ comfort	3		
ET63	overall usability	1		
ET64			Generic UX	1
ET65	effectiveness, effectiveness \ accuracy, efficiency \ time	3		
ET66	overall usability, efficiency \ mental effort, learnability, satisfaction, satisfaction \ comfort, satisfaction \ pleasurable	6		
ET67	overall usability	1		
ET68	effectiveness, efficiency \ time, controllability, learnability, prevent and recovery errors, satisfaction \ pleasurable, satisfaction \ trust, satisfaction \ usefulness	8		
ET69	overall usability	1		
ET70			Generic UX	1
ET71	effectiveness \ accuracy, efficiency \ time	2		
ET72	overall usability	1		
ET73			Generic UX	1
ET74	effectiveness \ accuracy, efficiency \ time	2		
ET75			Usability, Usefulness	2
ET76	effectiveness, efficiency \ time, efficiency \ physical effort, efficiency \ mental effort, learnability, memorability, prevent and recovery errors, satisfaction, satisfaction \ usefulness, satisfaction \ trust, satisfaction \ pleasurable	11		
ET77	overall usability	1		
ET78	overall usability	1		
ET79			Generic UX, Usability, Trustworthiness, Creative and Novelty, Stimulation, Pleasure/Fun	6
ET80	effectiveness, efficiency \ time, efficiency \ physical effort, efficiency \ mental effort, learnability, memorability, prevent and recovery errors, satisfaction, satisfaction \ usefulness, satisfaction \ trust, satisfaction \ pleasurable	11		
ET81	overall usability, effectiveness \ accuracy, efficiency \ time, efficiency \ physical effort, efficiency \ mental effort, satisfaction \ comfort	6		
ET82	overall usability, effectiveness \ accuracy, efficiency \ time, controllability	4		
ET83	efficiency \ time	1		
ET84	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET85			Generic UX, Usability, Trustworthiness, Creative and Novelty, Stimulation, Pleasure/Fun	6
ET86	effectiveness, effectiveness \ accuracy, efficiency \ time, efficiency \ physical effort	4		
ET87	effectiveness, effectiveness \ accuracy, effectiveness \ completeness, efficiency \ time	4		
ET88	effectiveness \ accuracy, efficiency \ time	2		
ET89	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET90	effectiveness \ accuracy, efficiency \ time	2		
ET91	efficiency, efficiency \ mental effort, efficiency \ physical effort, satisfaction \ comfort, satisfaction	5		
ET92	effectiveness \ accuracy, efficiency \ time	2		
ET93	overall usability	1		
ET94			Generic UX	1
ET95			Generic UX	1
ET96	overall usability, learnability, satisfaction \ comfort, satisfaction \ usefulness	4		

ET	usability aspect	count	UX aspect	count
ET97	overall usability	1		
ET98	efficiency \ time	1		
ET99	effectiveness \ accuracy, efficiency \ time, satisfaction \ usefulness	3		
ET100	effectiveness \ accuracy, efficiency \ time	2		
ET101	controllability, satisfaction \ comfort	2		
ET102	controllability	1		
ET103			Presence, Pleasure/Fun	2
ET104	effectiveness \ accuracy, efficiency \ time, learnability	3		
ET105	efficiency	1		
ET106			Pleasure/Fun, Usefulness, Usability, Desirability	4

SQ6. Was the identified assessment technology based on existing technology or was it created for the study?

Options: *No; Yes, totally; Yes, partially*

SQ7. Has the technology did empirically evaluate?

Options: *Yes or No*

Evaluation Technology	Based on Known Technology (SQ6)					Empirically Evaluated (SQ7)	
	No	Yes, totally	Yes, partially	Known Technology	Observation	No	Yes
ET01		×		NASA-TLX		×	
ET02			×	CAMBS, REE, RNGVT, DVE, RSPPA, IVP, CAUIT			×
ET03		×		Think Aloud		×	
ET04	×				interview	×	
ET05	×				no known heuristic	×	
ET06		×		Borg CR-10		×	
ET07			×	IKC-Q (ISO 9241-410)		×	
ET08	×				record data	×	
ET09	×				record data	×	
ET10		×		SUS		×	
ET11	×				Likert scale	×	
ET12	×				record data	×	
ET13	×				Likert scale	×	
ET14		×		NASA-TLX		×	
ET15	×				free form text	×	
ET16	×				record data	×	
ET17		×		Think Aloud		×	
ET18	×				record data	×	
ET19		×		SUS		×	
ET20		×		NASA-TLX		×	
ET21		×		Borg CR-10		×	
ET22		×		CSV-Q		×	
ET23		×		UEQ		×	
ET24	×				record data	×	
ET25		×		SUS		×	
ET26		×		NASA-TLX		×	
E27	×				Likert scale	×	
ET28			×	TAM		×	
ET29	×				Interview	×	
ET30	×				record data	×	
ET31		×		SUS		×	
ET32	×				record data	×	
ET33			×	NASA-TLX		×	
ET34		×		Think Aloud		×	
ET35	×				interview	×	
ET36		×		Think Aloud		×	
ET37	×				interview	×	
ET38	×				record data	×	
ET39		×		NASA-TLX		×	

Evaluation Technology	Based on Known Technology (SQ6)					Empirically Evaluated (SQ7)	
	No	Yes, totally	Yes, partially	Known Technology	Observation	No	Yes
ET40	×				Likert scale	×	
ET41	×				record data	×	
ET42			×	ISO/TS 9241-411, Annex C		×	
ET43			×	USE		×	
ET44	×				record data	×	
ET45		×		NASA-TLX		×	
ET46		×		MSAQ		×	
ET47		×		Slater-Usoh-Steed		×	
ET48		×		UEQ		×	
ET49	×				record data	×	
ET50	×				record data	×	
ET51		×		SUS		×	
ET52		×		NASA-TLX		×	
ET53	×				interview	×	
ET54	×				record data	×	
ET55	×				Likert scale	×	
ET56		×		UEQ		×	
ET57	×				record data	×	
ET58		×		NASA-TLX		×	
ET59		×		SUS		×	
ET60	×				Likert scale	×	
ET61	×				record data	×	
ET62	×				Likert scale	×	
ET63		×		SUS		×	
ET64	×				interview	×	
ET65	×				record data	×	
ET66			×	SUS		×	
ET67		×		Think Aloud		×	
ET68	×				Likert scale	×	
ET69		×		SUS		×	
ET70	×				no details	×	
ET71	×				record data	×	
ET72		×		SUS		×	
ET73	×				Open-ended questions	×	
ET74	×				record data	×	
ET75	×				Likert scale	×	
ET76		×		USE		×	
ET77		×		Think Aloud		×	
ET78		×		SUS		×	
ET79		×		UEQ		×	
ET80		×		USE		×	
ET81		×		DAQ, ISO 9241-9:2000 part 9 annex C		×	
ET82	×				Likert scale	×	
ET83	×				record data	×	

Evaluation Technology	Based on Known Technology (SQ6)					Empirically Evaluated (SQ7)	
	No	Yes, totally	Yes, partially	Known Technology	Observation	No	Yes
ET84		×		NASA-TLX		×	
ET85		×		UEQ		×	
ET86	×				record data	×	
ET87	×				Likert scale	×	
ET88	×				record data	×	
ET89		×		NASA-TLX		×	
ET90	×				record data	×	
ET91		×		NASA-TLX		×	
ET92	×				record data	×	
ET93		×		SUS		×	
ET94	×				Likert scale	×	
ET95	×				interview	×	
ET96	×				Likert scale	×	
ET97	×				interview	×	
ET98	×				record data	×	
ET99	×				Likert scale	×	
ET100	×				record data	×	
ET101	×				Likert scale	×	
ET102	×				Likert scale	×	
ET103	×				Likert scale	×	
ET104	×				Likert scale	×	
ET105	×				record data	×	
ET106		×		UAHIS		×	

SQ8. Did the holographic solution subject to an empirical study? ***Options:*** *No or Yes*

SQ8.1. What is the empirical method used? (EASTERBROOK et al., 2008)

Options: *A) survey; B) controlled experiment; C) case study, D) ethnography, E) research-action*

SQ8.2. How many people participated in the study? *Numeric value.*

SQ8.3. What was the type of analysis of the study results? ***Options:*** *quantitative; qualitative*

Pub ID	SQ8		Empirical Method (SQ8.1)					How many (SQ 8.2)	Type of Analysis (SQ8.3)	
	Yes	No	A	B	C	D	E		Quantitative	Qualitative
P01	×			×				24	×	
P02	×			×				98	×	
P03	×				×			5, 12, 5		×
P04	×			×				20	×	
P05	×			×				5, 25	×	
P06	×				×			14	×	×
P07	×			×				9	×	
P08	×			×				13	×	×
P09	×			×				6	×	×
P10	×			×				21	×	×
P11	×			×				9	×	
P12	×			×				12	×	×
P13	×				×			12	×	×
P14	×			×				24, 12	×	×
P15	×				×			5	×	
P16	×			×				24	×	
P17	×			×				29	×	
P18	×			×				20, 7	×	×
P19	×			×				25	×	×
P20	×			×				20	×	
P21	×			×				12, 4	×	
P22	×			×				20	×	×
P23	×				×			20	×	×
P24	×				×			11	×	×
P25	×			×				20	×	
P26	×			×				28	×	
P27	×				×			35	×	
P28	×			×				44	×	
P29	×			×				12	×	
P30	×			×				14	×	
P31	×				×			12	×	
P32	×			×				18	×	
P33	×				×			7	×	
P34	×			×				n/a	×	×
P35	×				×			12	×	×
P36	×				×			10	×	×
P37	×				×			25	×	
P38	×			×				15	×	
P39	×				×			10	×	×
P40	×				×			10	×	

SQ9. What was holography called?

Options: *Augmented Reality (AR); Mixed Reality (MR) or other.*

SQ10. How is holography presented to the user?

Options: *A) screen projection; B) optical physical phenomena*

SQ13. For what purpose the solution was holographic created? *Opened question.*

Pub Id	What was holography called (SQ9)			Holography is presented by (SQ10)		Solution Purpose (SQ13)
	AR	MR	Other	A	B	
P01	×			×		interaction study
P02		×		×		retail service
P03	×			×		3D printing
P04	×			×		interaction study
P05	×			×		keyboard input
P06	×			×		prototyping of museum exhibition
P07	×			×		interaction study
P08		×		×		IoT devices or appliance control
P09	×			×		interaction study
P10		×		×		architecture, interior design
P11		×		×		programming learning
P12	×			×		GIS (geographic information system)
P13		×		×		input devices preference
P14	×			×		input devices preference
P15			3DAII		×	input devices preference
P16	×			×		input devices preference
P17	×			×		game, entertainment
P18	×			×		robot user interface
P19	×			×		IoT devices or appliance control
P20	×			×		interaction study
P21	×			×		keyboard input
P22	×			×		IoT devices or appliance control
P23		×		×		robot user interface
P24	×			×		office: file transfer, pairing, printing, and copying files
P25	×			×		assembly
P26	×			×		interaction study
P27	×			×		points of interest visualization
P28	×				×	interaction study
P29			LFD	×		interaction study
P30	×			×		interaction study
P31		×			×	keyboard input
P32	×			×		keyboard input
P33	×			×		interaction study
P34	×			×		map manipulation
P35	×			×		interaction study
P36		×			×	3D printing
P37		×		×		keyboard input
P38	×			×		data input
P39	×			×		interaction study
P40	×			×		office: copy files, printing, projecting, and sharing documents

SQ11. What type of technology is used to (re)produce holography?

Options: *A) HMD; B) Smart glass; C) Smartphone/Tablet; D) Fogscreen+Projector; E) Reflexive Material; F) Holographic Display; G) Other*

SQ11.1. What manufacturer and model of the technology(s) used for projection? *Opened question.*

Pub ID	Type of Technology (SQ11)							Holographic Device (SQ11)
	A	B	C	D	E	F	G	
P01	×							Magic Leap One
P02	×							MS Hololens
P03	×							MS Hololens
P04	×							MS Hololens
P05		×						Google Glass, Mad Gaze ARES Glass
P06	×							MS Hololens
P07	×							MS Hololens
P08	×							MS Hololens
P09	×							Magic Leap One
P10	×							Oculus Rift with ZED Mini
P11	×							MS Hololens
P12	×							MS Hololens
P13	×							MS Hololens
P14			×					Samsung S9+
P15					×			Set 1: Flat-panel display + Pyramid reflector + parabolic mirrors
P16	×							Meta 2 AR
P17	×							MS Hololens
P18		×						Epson Moverio BT-200
P19	×							MS Hololens
P20	×							MS Hololens, Meta 2 AR
P21	×							MS Hololens
P22	×							MS Hololens
P23	×							MS Hololens
P24		×						Google Glass
P25			×					Samsung Galaxy Tab S 10.5
P26	×							Oculus Rift VR HMD
P27		×						Meta 1 Developer Kit
P28				×				Set 2: Fog Screen AR + NEC V300X + Shutter Glasses 3D Vision kit by NVIDIA
P29						×		Holografika
P30	×							ACCUPIX mybud
P31				×				Set 3: Fog Screen prototype + Microvision ShowWX+ / Optima ML750
P32	×							MS Hololens
P33			×					Nexus 5
P34		×						n/a
P35	×							MS Hololens
P36					×			Set 4: Display + half mirror (Holodesk-like structure)
P37		×						Google Glass, Mad Gaze ARES Glass
P38							×	Century Corporation 4.3" LCD
P39							×	Samsung Transparent Display prototype
P40		×						Google Glass

SQ12. What kind of technology used to detect interaction (touch)?

Options: *A) Built-in RGB Camera; B) External RGB Camera C) Built-in RGB-D Camera; D) External RGB-D Camera; E) External Infrared Stereo Camera*

SQ12.1. Wich manufacturer and model of the technology(s) used to detect interaction? *Opened Question*

Pub ID	Type of Technology (SQ12)					Interaction Detect Device (SQ 12.1)
	A	B	C	D	E	
P01			×			Magic Leap One
P02			×			MS Hololens
P03			×			MS Hololens
P04			×	×		MS Hololens, Flex 13 Optitrack
P05	×					Google Glass Camera + Computer Vision, Mad Gaze ARES Glass Camera + Computer Vision
P06			×			MS Hololens
P07					×	Leap Motion
P08			×			MS Hololens
P09			×			Magic Leap One
P10					×	Leap Motion
P11			×			MS Hololens
P12				×		Optitrack
P13			×			MS Hololens
P14					×	Leap Motion
P15					×	Leap Motion
P16			×			Meta 2 AR
P17			×			MS Hololens
P18					×	Leap Motion
P19			×			MS Hololens
P20			×			MS Hololens, Meta 2 AR
P21			×			MS Hololens
P22			×			MS Hololens
P23			×			MS Hololens
P24	×					Google Glass Camera + Computer Vision
P25					×	Leap Motion
P26				×		Softkinect DephSense DS325
P27			×			Meta 1
P28				×		MS Kinect for Windows
P29					×	Leap Motion
P30				×		Creative Interaction Gesture Camera, ASUS Xtion Pro Live
P31					×	Leap Motion
P32			×			MS Hololens
P33					×	Leap Motion
P34		×				n/a
P35			×			MS Hololens
P36				×		MS Kinect for Windows
P37	×	×				Google Glass Camera + Computer Vision, Mad Gaze ARES Glass Camera + Computer Vision
P38		×				Firefly MV from Point Grey Research Inc. + Computer Vision
P39				×		MS Kinect for Windows
P40	×					Google Glass Camera + Computer Vision, Mad Gaze ARES Glass Camera + Computer Vision

SQ14. What is the type/styles of gestures with touch allowed by the solution?

Options: *A) pointing; B) manipulation; C) pantomimic*

SQ15. What is the image quality?

Options: *A) WIMP; B) 3D RAW; C) 3D enhanced (with lights, shadow, or texture)*

SQ16. There is action feedback touch. By what means?

Options: *A) visual; B) audio; C) ultrasound; D) other*

Pub ID	Style of Gestures (SQ14)			Image Quality (SQ15)			Feedback Means (SQ16)			
	A	B	C	A	B	C	A	B	C	D
P01	×	×			×		×			
P02	×	×		n/a	n/a	n/a	n/a	n/a	n/a	n/a
P03	×			×	×		×			
P04	×	×	×	×	×		×			
P05	×	×		×			×			
P06	×	×	×	×		×	×			
P07	×		×		×		×		×	
P08	×	×		×			×			
P09	×		×		×		×			
P10	×	×	×	×		×	×			
P11	×		×	×	×		×			
P12	×				×		×			
P13	×		×		×		×			
P14	×		×			×	×			
P15	×		×		×		×	×		
P16	×			×			×			
P17	×					×	×			
P18	×		×	×			×			
P19	×		×	×			×			
P20	×	×	×		×		×			
P21	×			×			×			
P22	×		×	×			×			
P23	×		×	×	×		×			
P24	×	×	×	×			×			
P25	×		×		×		×			
P26	×	×	×		×		×			
P27	×		×	×			×			
P28	×		×		×		×			
P29	×			×			×			
P30	×	×	×	×	×		×			
P31	×			×			×		×	
P32	×		×	×			×			
P33	×				×		×			
P34	×	×	×			×	×			
P35	×		×			×	×			
P36	×	×	×		×		×			
P37	×			×			×			
P38	×			×			×			
P39	×	×	×	×			×			
P40	×	×	×	×			×			

References

EASTERBROOK, S. et al. Selecting Empirical Methods for Software Engineering Research. Em: SHULL, F.; SINGER, J.; SJØBERG, D. I. K. (Eds.). **Guide to Advanced Empirical Software Engineering**. London: Springer, 2008. p. 285–311.

Appendix 1 – Publications and First Filter

Sco = Sco, ACM = ACM, IEEE = IEEE | S = source | C = Criteria

Id	Title	Authors	Year	DOI	S	C
1	Educational Robotics for Creating “Tangible Simulations”: A Mixed Reality Space for Learning the Day/Night Cycle	Xefteris S., Palaigeorgiou G., Zoumpourtikoudi H.	2021	10.1007/978-3-030-49932-7_90	Sco	I1
2	A Participative Framework Covering Urban Planning Process with A Parametric Approach	Daher E., Kubicki S.	2021	10.1007/978-3-030-51295-8_87	Sco	E5
3	Exploring the benefits and limitations of augmented reality for palletization	Plewan T., Mättig B., Kretschmer V., Rinkenauer G.	2021	10.1016/j.apergo.2020.103250	Sco	I1
4	YaniWawa: An Innovative Tool for Teaching Using Programmable Models over Augmented Reality Sandbox	Cárdenas-Delgado S., Padilla Almeida O., Loachamín-Valencia M., Rivera H., Escobar L.	2021	10.1007/978-3-030-59194-6_31	Sco	E5
5	Gamifying Early Foreign Language Learning: Using Digital Storytelling and Augmented Reality to Enhance Vocabulary Learning	Korosidou E., Bratitsis T.	2021	10.1007/978-3-030-49932-7_68	Sco	I1
6	Implementing Virtual Reality technology for safety training in the precast/ prestressed concrete industry	Joshi S., Hamilton M., Warren R., Faucett D., Tian W., Wang Y., Ma J.	2021	10.1016/j.apergo.2020.103286	Sco	E8
7	Technology product coolness and its implication for brand love	Tiwari A.A., Chakraborty A., Maity M.	2021	10.1016/j.jretconser.2020.102258	Sco	E8
8	Dream-Experiment: A MR User Interface with Natural Multi-channel Interaction for Virtual Experiments	Luo T., Zhang M., Pan Z., Li Z., Cai N., Miao J., Chen Y., Xu M.	2020	10.1109/TVCG.2020.3023602	Sco	I1
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497	Real-world oriented smartphone AR Supported Learning system based on planetarium contents for seasonal constellation observation	Tian K., Urata M., Endo M., Mouri K., Yasuda T., Kato J.	2019	10.3390/app9173508	Sco	E8
498	3D interaction with virtual objects in real water	Costa R., Quarles J.	2019	10.1109/VS-Games.2019.8864574	Sco	E8
499	Guidetomeasure-OT: A mobile 3D application to improve the accuracy, consistency, and efficiency of clinician-led home-based falls-risk assessments	Hamm J., Money A.	2019	10.1016/j.ijmedinf.2019.07.004	Sco	E8
500	Systematic literature review of hand gestures used in human computer interaction interfaces	Vuletic T., Duffy A., Hay L., McTeague C., Campbell G., Grealy M.	2019	10.1016/j.ijhcs.2019.03.011	Sco	E7
501	Hover: Exploring cognitive maps and mid-air pointing for television control	Popovici I., Schipor O.-A., Vatavu R.-D.	2019	10.1016/j.ijhcs.2019.03.012	Sco	E8
502	Effects of Travel Modes on Performances and User Comfort: A Comparison between ArmSwinger and Teleporting	Loup G., Loup-Escande E.	2019	10.1080/10447318.2018.1519164	Sco	E5
503	Seven HCI Grand Challenges	Stephanidis C., Salvendy G., Antona M., Chen J.Y.C., Dong J., Duffy V.G., Fang X., Fidopiastis C., Fragomeni G., Fu L.P., Guo Y., Harris D., Ioannou A., Jeong K.-A.K., Konomi S., Krömker H., Kurosu M., Lewis J.R., Marcus A., Meiselwitz G., Moallem A., Mori H., Fui-Hoon Nah F., Ntoa S., Rau P.-L.P., Schmorrow D., Siau K., Streitz N., Wang W., Yamamoto S., Zaphiris P., Zhou J.	2019	10.1080/10447318.2019.1619259	Sco	E8
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505	Creating different learning experiences: assessment of usability factors in an interactive three-dimensional holographic projection system for experiential learning	Huang H., Chen C.-W.	2019	10.1007/s10209-019-00671-0	Sco	I1
506	User interactions for augmented reality smart glasses: A comparative evaluation of visual contexts and interaction gestures	Kim M., Choi S.H., Park K.-B., Lee J.Y.	2019	10.3390/app9153171	Sco	I1
507	Toy user interfaces: Systematic and industrial mapping	de Albuquerque A.P., Kelner J.	2019	10.1016/j.sysarc.2018.12.001	Sco	E8
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510	Physical dimensions of children's touchscreen interactions: Lessons from five years of study on the MTAGIC project	Anthony L.	2019	10.1016/j.ijhcs.2019.02.005	Sco	I1
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517	Hifinger: One-handed text entry technique for virtual environments based on touches between fingers	Jiang H., Weng D., Zhang Z., Chen F.	2019	10.3390/s19143063	Sco	E8
518	Touchless selection schemes for intelligent automotive user interfaces with predictive mid-air touch	Ahmad B.I., Hare C., Singh H., Shabani A., Lindsay B., Skrypchuk L., Langdon P., Godsill S.	2019	10.4018/IJMHCI.2019070102	Sco	I1
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521	Development of in-browser simulators for medical education: Introduction of a novel software toolchain	Šilar J., Polák D., Mládek A., Ježek F., Kurtz T.W., DiCarlo S.E., Živný J., Kofranek J.	2019	10.2196/14160	Sco	E8
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526	Exploring tangible interaction and diegetic feedback in an ar math game for children	Li J., Van Der Spek E., Hu J., Feijs L.	2019	10.1145/3311927.3325333	Sco	I1
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619	The vive controllers vs. leap motion for interactions in virtual environments: A comparative evaluation	Caggianese G., Gallo L., Neroni P.	2019	10.1007/978-3-319-92231-7_3	Sco	E8
620	16th International Conference on Virtual Reality and Augmented Reality, EuroVR 2019	[No author name available]	2019		Sco	E2
621	Usability of Direct Manipulation Interaction Methods for Augmented Reality Environments Using Smartphones and Smartglasses	Ohlei A., Wessel D., Herczeg M.	2019	10.1007/978-3-030-25999-0_8	Sco	I2
622	The Potential of User Experience (UX) as an Approach of Evaluation in Tangible User Interfaces (TUI)	da Costa V.K., Sias Rodrigues A., Agostini L.B., Machado M.B., Darley N.T., da Cunha Cardoso R., Tavares T.A.	2019	10.1007/978-3-030-23535-2_3	Sco	E8
623	Applicability of Immersive Analytics in Mixed Reality: Usability Study	Hoppenstedt B., Probst T., Reichert M., Schlee W., Kammerer K., Spiliopoulou M., Schobel J., Winter M., Felnhofer A., Kothgassner O.D., Pryss R.	2019	10.1109/ACCESS.2019.2919162	Sco	I1
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625	Augmented reality aided medical device design	Garfield M.R., Dupont A.	2019	10.1115/DMD2019-3215	Sco	E8
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630	Estimation of the smartphone user' satisfaction and customer intention on the social networking service	Lee Y.-H., Kim R.-H.	2019	10.1007/978-3-319-94947-5_26	Sco	E8
631	Optimization of 3D Object Placement in Augmented Reality Settings in Museum Contexts	Ohlei A., Bundt L., Bouck-Standen D., Herczeg M.	2019	10.1007/978-3-030-25999-0_18	Sco	E8
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636	3D object manipulation techniques in handheld mobile augmented reality interface: A review	Goh E.S., Sunar M.S., Ismail A.W.	2019	10.1109/ACCESS.2019.2906394	Sco	E7
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662	Crosside: A cross-surface collaboration by sketching design space	Pérez-Medina J.-L., Vanderdonckt J., Villarreal-Narvaez S.	2019	10.18293/dmsviva2019-016	Sco	E8
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664	New technologies for spatial learning in visually impaired people [Les nouvelles technologies pour les apprentissages spatiaux chez les personnes déficientes visuelles]	Macé M.J.-M., Bardot S., Brock A., Brulé E., Ducasse J., Giraud S., Oriola B., Serrano M., Denis G., Jouffrais C.	2019		Sco	E8
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678	Musical Instruments for Novices: Comparing NIME, HCI and Crowdfunding Approaches	McPherson A., Morreale F., Harrison J.	2019	10.1007/978-3-319-92069-6_12	Sco	E8
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746	Myotilt: A target selection method for smartwatches using the tilting operation and electromyography	Kurosawa H., Sakamoto D., Ono T.	2018	10.1145/3229434.3229457	Sco	E8
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757	What tabletop players think about augmented tabletop games: A content analysis	Kosa M., Spronck P.	2018	10.1145/3235765.3235782	Sco	E8
758	A review of existing and potential computer user interfaces for modern radiology	Iannessi A., Marcy P.-Y., Clatz O., Bertrand A.-S., Sugimoto M.	2018	10.1007/s13244-018-0620-7	Sco	E8
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764	RESonance: Lightweight, Room-Scale Audio-Visual Biofeedback for Immersive Relaxation Training	Yu B., Hu J., Funk M., Liang R.-H., Xue M., Feijs L.	2018	10.1109/ACCESS.2018.2853406	Sco	E8
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783	Flow state feedback through sports wearables: A case study on tennis	Havlucu H., Onbaşli M.C., Eskenazi T., Coşkun A., Akgün B., Özcan O.	2018	10.1145/3196709.3196807	Sco	E8
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792	VirtualDesk: A Comfortable and Efficient Immersive Information Visualization Approach	Wagner Filho J.A., Freitas C.M.D.S., Nedel L.	2018	10.1111/cgf.13430	Sco	E8
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797	Design guideline for developing safe systems that apply electricity to the human body	Kono M., Takahashi T., Nakamura H., Miyaki T., Rekimoto J.	2018	10.1145/3184743	Sco	E8
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804	HoloBox: Augmented Visualization and Presentation with Spatially Integrated Presenter	Kim M., Wohn K.	2018	10.1093/iwc/iwy007	Sco	E8
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814	Towards a multisensory augmented reality map for blind and low vision people: A participatory design approach	Albouys-Perrois J., Laviole J., Briant C., Brock A.M.	2018	10.1145/3173574.3174203	Sco	E8
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817	FaceDisplay: Towards asymmetric multi-user interaction for nomadic virtual reality	Gugenheimer J., Stemasov E., Sareen H., Rukzio E.	2018	10.1145/3173574.3173628	Sco	E8
818	Wearables for learning: Examining the smartwatch as a tool for situated science reflection	Garcia B., Chu S.L., Nam B., Banigan C.	2018	10.1145/3173574.3173830	Sco	E8
819	Designing future social wearables with live action role play (larp) designers	Segura E.M., Fey J., Dagan E., Jhaveri S.N., Pettitt J., Flores M., Isbister K.	2018	10.1145/3173574.3174036	Sco	E8
820	Are you dreaming? A phenomenological study on understanding lucid dreams as a tool for introspection in Virtual reality	Kitson A., Schiphorst T., Riecke B.E.	2018	10.1145/3173574.3173917	Sco	E8
821	Breathvr: Leveraging breathing as a directly controlled interface for virtual reality games	Sra M., Xu X., Maes P.	2018	10.1145/3173574.3173914	Sco	E8
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829	Prototyping and simulating complex systems with paper craft and augmented reality: An initial investigation	Kang S., Norooz L., Byrne V., Clegg T., Froehlich J.E.	2018	10.1145/3173225.3173264	Sco	E8
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832	Sensory VR: Smelling, touching, and eating virtual reality	Harley D., Verni A., Willis M., Ng A., Bozzo L., Mazalek A.	2018	10.1145/3173225.3173241	Sco	E8
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840	AVATAREX: Telexistence system based on virtual avatars	Koskela T., Mazouzi M., Alavesa P., Pakanen M., Minyaev I., Paavola E., Tuliniemi J.	2018	10.1145/3174910.3174926	Sco	E8
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849	Design of Evaluation Areas Based on Type of Mobile-Based Virtual Reality Training Content	Jin M.K., Yun H.J., Lee H.S.	2018	10.1155/2018/2489149	Sco	E8
850	Virtual and mixed prototyping techniques and technologies for consumer product design within a blended learning design environment	Bordegoni M., Ferrise F., Wendrich R., Barone S.	2018	10.21278/idc.2018.0428	Sco	E8
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993	Adjunct Proceedings of the 2016 IEEE International Symposium on Mixed and Augmented Reality, ISMAR-Adjunct 2016	[No author name available]	2017		Sco	E4
994	DualCAD: Integrating Augmented Reality with a Desktop GUI and Smartphone Interaction	Millette A., McGuffin M.J.	2017	10.1109/ISMAR-Adjunct.2016.0030	Sco	E8
995	Evaluating WaveWatch: An ambient display of web traffic	Shelton B., Nesbitt K.	2017	10.1145/3014812.3014821	Sco	E8
996	The fishtank paradigm of experience: Merging time, space, activities, emotions, and people	Torsi S.	2017	10.4018/978-1-5225-2061-0.ch006	Sco	E8
997	Advanced displays and natural user interfaces to support learning	Martin-SanJose J.-F., Juan M.-C., Mollá R., Vivó R.	2017	10.1080/10494820.2015.1090455	Sco	E8
998	Augmented reality design heuristics: Designing for dynamic interactions	Endsley T.C., Sprehn K.A., Brill R.M., Ryan K.J., Vincent E.C., Martin J.M.	2017	10.1177/1541931213602007	Sco	E8
999	The smartkuber case study: Lessons learned from the development of an augmented reality serious game for cognitive screening	Boletsis C., McCallum S.	2017	10.1007/978-3-319-60922-5_36	Sco	E8

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1001	Learning by imagining history: Staged representations in location-based augmented reality	Winzer P., Spierling U., Massarczyk E., Neurohr K.	2017	10.1007/978-3-319-71940-5_16	Sco	E8
1002	Developing online illustrative and participatory tools for urban planning: towards open innovation and co-production through citizen engagement	Oksman V., Kulju M.	2017	10.1504/IJSTM.2017.10009857	Sco	E8
1003	A review on making things see: Augmented reality for futuristic virtual educator	Iqbal J., Sidhu M.S.	2017	10.1080/2331186X.2017.1287392	Sco	E8
1004	Investigating natural interaction in augmented reality environments using motion qualities	Chessa M., Noceti N.	2017	10.5220/0006268401100117	Sco	I1
1005	Design and evaluation of a human-like puppet as an input device for ergonomic simulation	Wiegmann D., Brüggemann H., Rausch A.	2017	10.1007/978-3-319-58463-8_33	Sco	E8
1006	Immersive Augmented Reality Environment for the Teleoperation of Maintenance Robots	Yew A.W.W., Ong S.K., Nee A.Y.C.	2017	10.1016/j.procir.2016.11.183	Sco	I1
1007	Mobile Augmented Reality Survey: From Where We Are to Where We Go	Chatzopoulos D., Bermejo C., Huang Z., Hui P.	2017	10.1109/ACCESS.2017.2698164	Sco	E8
1008	Performance characteristics of a camera-based tangible input device for manipulation of 3D information	Chen Z., Healey C.G., St Amant R.	2017		Sco	E8
1009	Robust unconventional interaction design and hybrid tool environments for design and engineering processes	Wendrich R.E., Kruiper R.	2017	10.1115/DETC2017-67240	Sco	E8
1010	Freehand gesture-based 3D manipulation methods for interaction with large displays	Dias P., Cardoso J., Ferreira B.Q., Ferreira C., Santos B.S.	2017	10.1007/978-3-319-58697-7_10	Sco	E8
1011	User interface agents for guiding interaction with augmented virtual mirrors	Lee G., Rudhru O., Park H.S., Kim H.W., Billinghurst M.	2017	10.2312/egve.20171347	Sco	E8
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1014	Guiding human behavior through alternate reality experience	Ishizawa F., Nakajima T.	2017	10.1007/978-3-319-58637-3_3	Sco	E8
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1016	A utility scale development for gesture interfaces: Applied to visual display products	Choi E., Ryu T., Kang B., Chung M.K.	2017		Sco	E8
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1018	Task-oriented performance evaluation for assistive robotic manipulators: A pilot study	Chung C.-S., Wang H., Hannan M.J., Ding D., Kelleher A.R., Cooper R.A.	2017	10.1097/PHM.0000000000000634	Sco	E8
1019	Activities and evaluations for technology-based upper extremity rehabilitation	Annett M., Anderson F., Bischof W.F.	2017	10.4018/978-1-5225-3926-1.ch041	Sco	E8

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1022	User evaluation of hand gestures for designing an intelligent in-vehicle interface	Jahani H., Alyamani H.J., Kavakli M., Dey A., Billinghurst M.	2017	10.1007/978-3-319-59144-5_7	Sco	E8
1023	Analysis and Improvement on a Unimodal Haptic PIN-Entry Method	Lee M.-K., Yoo J., Nam H.	2017	10.1155/2017/6047312	Sco	E8
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1027	A study on immersion of hand interaction for mobile platform virtual reality contents	Han S., Kim J.	2017	10.3390/sym9020022	Sco	E8
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1035	Multi-view gesture annotations in image-based 3D reconstructed scenes	Nuernberger B., Lien K.-C., Grinta L., Sweeney C., Turk M., Höllerer T.	2016	10.1145/2993369.2993371	Sco	E8
1036	Usability evaluation of an augmented reality system for teaching Euclidean vectors	Martin-Gonzalez A., Chi-Poot A., Uc-Cetina V.	2016	10.1080/14703297.2015.1108856	Sco	I1
1037	Exploring educational immersive videogames: an empirical study with a 3D multimodal interaction prototype	Alves Fernandes L.M., Cruz Matos G., Azevedo D., Rodrigues Nunes R., Paredes H., Morgado L., Barbosa L.F., Martins P., Fonseca B., Cristóvão P., de Carvalho F., Cardoso B.	2016	10.1080/0144929X.2016.1232754	Sco	E8
1038	Exploration of virtual environments on tablet: Comparison between tactile and tangible interaction techniques	Arnaud A., Corrégé J.-B., Clavel C., Gouiffès M., Ammi M.	2016	10.1145/2993148.2993186	Sco	E8

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1040	2084 - Safe New World: Designing ubiquitous interactions	Frommel J., Rogers K., Dreja T., Winterfeldt J., Hunger C., Bär M., Weber M.	2016	10.1145/2967934.2968087	Sco	E8
1041	The emergence of eyeplay: A survey of eye interaction in games	Velloso E., Carter M.	2016	10.1145/2967934.2968084	Sco	E8
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1043	Improving interaction in HMD-based vehicle simulators through real time object reconstruction	Bottone M., Johnsen K.	2016	10.1145/2983310.2985761	Sco	E8
1044	Touching the sphere: Leveraging joint-centered kinespheres for spatial user interaction	Lubos P., Bruder G., Ariza O., Steinicke F.	2016	10.1145/2983310.2985753	Sco	E8
1045	Locomotion in Virtual reality for individuals with autism spectrum disorder	Bozgeyikli E., Raij A., Katkoori S., Dubey R.	2016	10.1145/2983310.2985763	Sco	E8
1046	Towards the design of effective freehand gestural interaction for interactive TV	Ren G., Li W., O'Neill E.	2016	10.3233/JIFS-169106	Sco	E8
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1048	Could tangibility improve the safety of touch-based interaction? Exploring a new physical design space for pilot-system interfaces	Vinot J.-L., Letondal C., Pauchet S., Chatty S.	2016	10.1145/2950112.2964581	Sco	E8
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1055	Information practices and user interfaces: Student use of an iOS application in special education	Demmans Epp C., McEwen R., Campigotto R., Moffatt K.	2016	10.1007/s10639-015-9392-6	Sco	E8
1056	Ground Control Systems	Gawron V.J., Gambold K., Scheff S., Shively J.	2016	10.1002/9781118965900.ch4	Sco	E8
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1060	Smartkuber: A Serious Game for Cognitive Health Screening of Elderly Players	Boletsis C., McCallum S.	2016	10.1089/g4h.2015.0107	Sco	E8
1061	A Virtual Environment for Drone Pilot Training Using VR Devices [Um Ambiente Virtual para Treinamento de Pilotagem de Drones utilizando Dispositivos de RV]	Postal G.R., Pavan W., Rieder R.	2016	10.1109/SVR.2016.39	Sco	E8
1062	Application and scope analysis of Augmented Reality in marketing using image processing technique	Rajappa S., Raj G.	2016	10.1109/CONFLUENCE.2016.7508159	Sco	E8
1063	Programming moves: Design and evaluation of applying embodied interaction in virtual environments to enhance computational thinking in middle school students	Parmar D., Isaac J., Babu S.V., D'Souza N., Leonard A.E., Jorg S., Gundersen K., Daily S.B.	2016	10.1109/VR.2016.7504696	Sco	E8
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1067	Hide and seek: A LEGO village game for developing spatial ability of children	Lee T., Noh W., Kim Y., Cho J.D.	2016	10.1145/2930674.2930715	Sco	E8
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1072	Magic mirror interface for augmented reality maintenance: An automotive case study	Fiorentino M., Radkowski R., Boccaccio A., Uva A.E.	2016	10.1145/2909132.2909268	Sco	E8
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1074	The living room: Exploring the haunted and paranormal to transform design and interaction	Annett M., Lakier M., Li F., Widgor D., Grossman T., Fitzmaurice G.	2016	10.1145/2901790.2901819	Sco	E8
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1076	Hyve-3D and the 3D Cursor: Architectural co-design with freedom in virtual reality	Dorta T., Kinayoglu G., Hoffmann M.	2016	10.1177/1478077116638921	Sco	E8
1077	Predicting the use of smartphone-based Augmented Reality (AR): Does telepresence really help?	Kim H.-C., Hyun M.Y.	2016	10.1016/j.chb.2016.01.001	Sco	E8
1078	Applying thematic analysis to define an awareness interpretation for collaborative computer games	Teruel M.A., Navarro E., González P., López-Jaquero V., Montero F.	2016	10.1016/j.infsof.2016.01.009	Sco	E8

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1080	Achieving the performance benefits of hands-on experience when using digital devices: A representational approach	Goodman S.G., Seymour T.L., Anderson B.R.	2016	10.1016/j.chb.2016.01.006	Sco	E8
1081	Interactive spatial sonification of multidimensional data for composition and auditory display	Barrett N.	2016	10.1162/COMJ_a_00358	Sco	E8
1082	Technologies and methodologies applied in the teaching of literacy to people with down syndrome [Tecnologías y metodologías aplicadas en la enseñanza de la lectoescritura a personas con síndrome de down]	Tangarife Chalarca D., Blanco Palencia M., Díaz Cabrera G.M.	2016		Sco	E8
1083	Integrating New Technologies into the Treatment of CP and DCD	Wilson P., Green D., Caeyenberghs K., Steenbergen B., Duckworth J.	2016	10.1007/s40474-016-0083-9	Sco	E8
1084	Accessible play in everyday spaces: Mixed reality gaming for adult powered chair users	Seaborn K., Edey J., Dolinar G., Whitfield M., Gardner P., Branje C., Fels D.I.	2016	10.1145/2893182	Sco	I1
1085	Defining rules among devices in smart environment using an augmented reality headset	Park H., Koh K., Choi Y., Chae H.J., Hwang J., Seo J.	2016	10.1145/2962735.2962746	Sco	I1
1086	Microinteractions in mobile and wearable computing	Aleksy M., Bronmark J., Mahate S.	2016	10.1109/AINA.2016.134	Sco	E8
1087	Effect of a mixed reality-based intervention on arm, hand, and finger function on chronic stroke	Colomer C., Llorens R., Noé E., Alcañiz M.	2016	10.1186/s12984-016-0153-6	Sco	E8
1088	PathSync: Multi-user gestural interaction with touchless rhythmic path mimicry	Carter M., Velloso E., Downs J., Sellen A., O'Hara K., Vetere F.	2016	10.1145/2858036.2858284	Sco	E8
1089	An exploration of designing for playfulness in a business context	Mekky S., Lucero A.	2016	10.1145/2851581.2892332	Sco	E8
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1091	Voices from the war: Design as a means of understanding the experience of visiting heritage	Petrelli D., Dulake N., Marshall M.T., Pisetti A., Not E.	2016	10.1145/2858036.2858287	Sco	E8
1092	Towards an understanding of mobile touch navigation in a stereoscopic viewing environment for 3D data exploration	López D., Oehlberg L., Doger C., Isenberg T.	2016	10.1109/TVCG.2015.2440233	Sco	E8
1093	The to-and-fro of sense making: Supporting users' active indexing in museums	Hornecker E.	2016	10.1145/2882785	Sco	E8
1094	Toward open-source portable haptic displays with visual-force-tactile feedback colocation	Gallacher C., Mohtat A., Ding S., Kövecses J.	2016	10.1109/HAPTICS.2016.7463157	Sco	E8
1095	Lift-Off: Using Reference Imagery and Freehand Sketching to Create 3D Models in VR	Jackson B., Keefe D.F.	2016	10.1109/TVCG.2016.2518099	Sco	E8
1096	A Study on Generalized Interface in China: The Relational System of Design	Su L.-X., Yang Z., Mager B.	2016	10.3233/jid-2015-0014	Sco	E8
1097	Mobile Augmented Reality Authoring Tool	Yang Y., Shim J., Chae S., Han T.-D.	2016	10.1109/ICSC.2016.42	Sco	E8
1098	Haptic, virtual interaction and motor imagery: Entertainment tools and psychophysiological testing	Invitto S., Faggiano C., Sammarco S., de Luca V., de Paolis L.T.	2016	10.3390/s16030394	Sco	E8

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1100	Supporting precise manual-handling task using visuo-haptic interaction	Nomoto A., Ban Y., Narumi T., Tanikawa T., Hirose M.	2016	10.1145/2875194.2875216	Sco	I1
1101	Tangible viewports: Getting out of flatland in desktop environments	Gervais R., Roo J.S., Hachet M.	2016	10.1145/2839462.2839468	Sco	E8
1102	Usability Evaluation of a Wearable Augmented Reality System for the Enjoyment of the Cultural Heritage	Brancati N., Caggianese G., Pietro G.D., Frucci M., Gallo L., Neroni P.	2016	10.1109/SITIS.2015.98	Sco	I1
1103	What's the Matter with Cultural Heritage Tweets? An Ontology - Based Approach for CH Sensitivity Estimation in Social Network Activities	Marulli F., Benedusi P., Racioppi A., Ungaro L.F.	2016	10.1109/SITIS.2015.79	Sco	E8
1104	Hybrid reality-based user experience and evaluation of a context-aware smart home	Seo D.W., Kim H., Kim J.S., Lee J.Y.	2016	10.1016/j.compind.2015.11.003	Sco	I1
1105	Informal interactions in 3D education: Citizenship participation and assessment of virtual urban proposals	Fonseca D., Valls F., Redondo E., Villagrasa S.	2016	10.1016/j.chb.2015.05.032	Sco	E8
1106	Secure bimodal PIN-entry method using audio signals	Lee M.-K., Nam H., Kim D.K.	2016	10.1016/j.cose.2015.06.006	Sco	E8
1107	Designing interactions with multilevel auditory displays in mobile audio-augmented reality	Vazquez-Alvarez Y., Aylett M.P., Brewster S.A., Von Jungenfeld R., Virolainen A.	2016	10.1145/2829944	Sco	E8
1108	Physiopucks: Increasing user motivation by combining tangible and implicit physiological interaction	Cincuegrani S.M., Jordà S., Väljamäe A.	2016	10.1145/2838732	Sco	E8
1109	The aesthetic awareness display - A new design pattern for ambient information systems	Shelton B., Nesbitt K.	2016	10.1145/2843043.2843371	Sco	E8
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1111	Interaction design for 3D user interfaces: The world of modern input devices for research, applications, and game development	Ortega F.R., Abyarjoo F., Barreto A., Rishe N., Adjouadi M.	2016		Sco	E2
1112	Product usability: Is it a criterion to measure "Good UX" or a prerequisite?	Ceccacci S., Giraldi L., Mengoni M.	2016	10.1115/DETC2016-59500	Sco	E8
1113	Touchless disambiguation techniques forwearable augmented reality systems	Caggianese G., Gallo L., Neroni P.	2016	10.1007/978-3-319-39345-2_48	Sco	I1
1114	Design principles of augmented reality focusing on the ageing population	Liang S.	2016	10.14236/ewic/HCI2016.2	Sco	E8
1115	Augmented reality at the workplace of the future: A usability framework for smart glasses [Augmented Reality am Arbeitsplatz der Zukunft: Ein Usability-Framework für Smart Glasses]	Zobel B., Berkemeier L., Werning S., Thomas O.	2016		Sco	E8
1116	10th International Conference on Universal Access in Human-Computer Interaction, UAHCI 2016	[No author name available]	2016		Sco	E8
1117	Bridging heritage and tourist UX: A socially-driven perspective	La Scala P., Simões B., De Amicis R.	2016	10.1007/978-3-319-39345-2_45	Sco	E8
1118	The usability attributes and evaluation measurements of mobile media AR (augmented reality)	Lee W.-H., Lee H.-K.	2016	10.1080/23311983.2016.1241171	Sco	I2

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1119	10th International Conference on Universal Access in Human-Computer Interaction, UAHCI 2016	[No author name available]	2016		Sco	E4
1120	The loupe: Tangible augmented reality for learning to look at ancient Greek art	Damala A., Hornecker E., van der Vaart M., van Dijk D., Ruthven I.	2016	10.5281/zenodo.204970	Sco	E8
1121	A Mixed Reality System for Kansei-Based Co-Design of Highly-Customized Products	Arrighi P.-A., Maurya S., Arai K., Moriya K., Mougenot C.	2016	10.3233/jid-2016-0013	Sco	E8
1122	Methods for user involvement in the design of augmented reality systems for engineering education	Anastassova M., Panëels S., Souvestre F.	2016	10.1007/978-3-319-27540-6_5	Sco	E8
1123	An investigation of leap motion based 3D manipulation techniques for use in egocentric viewpoint	Caggianese G., Gallo L., Neroni P.	2016	10.1007/978-3-319-40651-0_26	Sco	E8
1124	Evaluation of a usability testing guide for mobile applications focused on people with down syndrome (USATESTDOWN)	Cáliz D., Gomez J., Alamán X., Martínez L., Cáliz R., Terán C.	2016	10.1007/978-3-319-48746-5_51	Sco	E8
1125	Vocal one switch (VOS) selection interfaces for virtual and augmented reality hands-free tasks	Manuri F., Sanna A., Lamberti F., Paravati G.	2016	10.2312/stag.20161367	Sco	E8
1126	Understanding users' continuance intention toward smartphone augmented reality applications	Kim K., Hwang J., zo H.	2016	10.1177/0266666914535119	Sco	E8
1127	Backend infrastructure supporting audio augmented reality and storytelling	Salo K., Giova D., Mikkonen T.	2016	10.1007/978-3-319-40397-7_31	Sco	E8
1128	Making tangible the intangible: Hybridization of the real and the virtual to enhance learning of abstract phenomena	Fleck S., Hachet M.	2016	10.3389/fict.2016.00030	Sco	I1
1129	Designing with cards	Lucero A., Dalsgaard P., Halskov K., Buur J.	2016	10.1007/978-3-319-29155-0_5	Sco	E8
1130	ARDock: A web-ar based real-time tangible edugame for molecular docking	He G., Sun F., Hu D., Lu X., Guo Y., Lai S., Pan Z.	2016	10.1007/978-3-319-40259-8_4	Sco	E5
1131	KioskAR: An Augmented Reality Game as a New Business Model to Present Artworks	Sekhavat Y.A.	2016	10.1155/2016/7690754	Sco	E8
1132	Evaluation of a sketching interface to control a concatenative synthesiser	Tsiros A., Leplâtre G.	2016		Sco	E8
1133	Blurry (Sticky) finger: Proprioceptive pointing and selection of distant objects for optical see-through based augmented reality	Yu J.E., Kim G.J.	2016	10.2312/egve.20161434	Sco	I1
1134	Lowering the threshold and raising the ceiling of tangible expressiveness in hybrid board-games	Marco J., Cerezo E., Baldassarri S.	2016	10.1007/s11042-014-2298-2	Sco	E8
1135	Experience-driven framework for technologically-enhanced environments: Key challenges and potential solutions	Simões B., De Amicis R.	2016	10.1007/978-3-319-39345-2_47	Sco	E8
1136	From interactive surfaces to interactive game pieces in hybrid board games	Mora S., Di Loreto I., Divitini M.	2016	10.3233/AIS-160396	Sco	E8
1137	User-centered gesture development in TV viewing environment	Wu H., Wang J., Zhang X.L.	2016	10.1007/s11042-014-2323-5	Sco	E8
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1140	Historical insights for ebook design	Koh H., Herring S.C.	2016	10.1108/LHT-06-2016-0075	Sco	E8
1141	Multi-device territoriality to support collaborative activities: Implementation and findings from the e-learning domain	Marty J.-C., Serna A., Carron T., Pernelle P., Wayntal D.	2016	10.1007/978-3-319-45153-4_12	Sco	E8
1142	Interaction interfaces in interactive geometry software: Are we exploring new devices and possibilities?	Reis H.M., Brandão A.A.F., Brandão L.O., Isotani S.	2016	10.1504/IJLT.2016.081712	Sco	E8
1143	Framing the past: How virtual experience affects bodily description of artefacts	Di Giuseppantonio Di Franco P., Matthews J.L., Matlock T.	2016	10.1016/j.culher.2015.04.006	Sco	E8
1144	Haptogram: Ultrasonic Point-Cloud Tactile Stimulation	Korres G., Eid M.	2016	10.1109/ACCESS.2016.2608835	Sco	E8
1145	Design guidelines for wearable pointing devices	Zucco J.E., Thomas B.H.	2016	10.3389/fict.2016.00013	Sco	E8
1146	Affective Haptics: Current Research and Future Directions	Eid M.A., Al Osman H.	2016	10.1109/ACCESS.2015.2497316	Sco	E8
1147	A prototype SSVEP based real time BCI gaming system	Martišius I., Damaševičius R.	2016	10.1155/2016/3861425	Sco	E8
1148	What Exactly Is Performance?	Spence J.	2016	10.1007/978-3-319-28395-1_3	Sco	E2
1149	Being really virtual: Immersive natives and the future of virtual reality	Steinicke F.	2016	10.1007/978-3-319-43078-2	Sco	E4
1150	Using the Kinect sensor with open source tools for the development of educational games for kids in pre-school age	Fernández R., Von Lücken C.	2015	10.1109/CLEI.2015.7360041	Sco	E8
1151	INSPECT: extending plane-casting for 6-DOF control	Katzakis N., Teather R.J., Kiyokawa K., Takemura H.	2015	10.1186/s13673-015-0037-y	Sco	E8
1152	Providing Information on the Spot: Using Augmented Reality for Situational Awareness in the Security Domain	Lukosch S., Lukosch H., Datcu D., Cidota M.	2015	10.1007/s10606-015-9235-4	Sco	E8
1153	Using the blended spaces framework to design heritage stories with schoolchildren	O'Keefe B., Benyon D.	2015	10.1016/j.ijcci.2016.02.001	Sco	E8
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1156	Hi robot: Evaluating robotale	Krzywinski A., Chen W.	2015	10.1145/2817721.2823507	Sco	E8
1157	A preliminary study of a hybrid user interface for augmented reality applications	Manuri F., Piumatti G.	2015	10.4108/icst.intetain.2015.259629	Sco	I1
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1160	Digital digits: A comprehensive survey of finger augmentation devices	Shilkrot R., Huber J., Steimle J., Nanayakkara S., Maes P.	2015	10.1145/2828993	Sco	E8
1161	Immersive Analytics	Chandler T., Cordeil M., Czauderna T., Dwyer T., Glowacki J., Goncu C., Klapperstueck M., Klein K., Marriott K., Schreiber F., Wilson E.	2015	10.1109/BDVA.2015.7314296	Sco	E8
1162	Gesture Interaction and Evaluation Using the Leap Motion for Medical Visualization [Interacao Gestual e Avaliacao usando o Leap Motion para Visualizacao Medica]	Silva E.S., Rodrigues M.A.F.	2015	10.1109/SVR.2015.31	Sco	E8
1163	Spatial sound and multimodal interaction in immersive environments	Grani F., Overholt D., Erkut C., Gelineck S., Triantafyllidis G., Nordahl R., Serafin S.	2015	10.1145/2814895.2814919	Sco	E8
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1165	Using advanced approaches in urban design researches: A mutation from 3D digital models to virtual reality	Shakibamanesh A., Ghorbanian M.	2015	10.4018/978-1-4666-8751-6.ch100	Sco	E8
1166	Theoretical foundations of a CSCL script in persistent virtual worlds according to the contemporary learning theories and models	Pellas N.	2015	10.4018/978-1-4666-8751-6.ch089	Sco	E2
1167	Evaluating metaphor reification in tangible interfaces	Celentano A., Dubois E.	2015	10.1007/s12193-015-0198-z	Sco	E8
1168	Diri-the actuated helium balloon: A study of autonomous behaviour in interfaces	Nowacka D., Hammerla N.Y., Elsden C., Plötz T., Kirk D.	2015	10.1145/2750858.2805825	Sco	E8
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1172	Health Smart Home Services incorporating a MAR-based Energy Consumption Awareness System	Kim M.J., Lee J.H., Wang X., Kim J.T.	2015	10.1007/s10846-014-0114-x	Sco	E8
1173	Elasticcon: Elastic controllers for casual interaction	Klamka K., Dachselt R.	2015	10.1145/2785830.2785849	Sco	E8
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1175	Design and evaluation of an "around the smartphone" technique for 3D manipulations on distant display	Bergé L.-P., Dubois E., Raynal M.	2015	10.1145/2788940.2788941	Sco	E8
1176	Evaluating mid-air list interaction for spatial audio interfaces	Dicke C., Müller J.	2015	10.1145/2788940.2788945	Sco	E8
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1178	Assessing the emotional experience of soap bubbles as input material for interactive games	Döring T., Lorz F., Malaka R.	2015		Sco	E8
1179	Navigating the future of tsunami risk communication: Using dimensionality, interactivity and situatedness to interface with society	Lonergan C., Hedley N.	2015	10.1007/s11069-015-1709-7	Sco	E8

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1181	Using advanced approaches in urban design researches: A mutation from 3D digital models to virtual reality	Shakibamanesh A., Ghorbanian M.	2015	10.4018/978-1-4666-8379-2.ch024	Sco	E6
1182	An examination of interactions in a three-dimensional virtual world	Yilmaz R.M., Baydas O., Karakus T., Goktas Y.	2015	10.1016/j.compedu.2015.06.002	Sco	E8
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1184	Pervasive gaming: Status, trends and design principles	Kasapakis V., Gavalas D.	2015	10.1016/j.jnca.2015.05.009	Sco	E8
1185	Creating TUIS using RFID sensors—a case study based on the literacy process of children with down syndrome	Jadán-Guerrero J., Guerrero L., López G., Cáliz D., Bravo J.	2015	10.3390/s150714845	Sco	E8
1186	Towards a gamification of industrial production. A comparative study in sheltered work environments	Korn O., Funk M., Schmidt A.	2015	10.1145/2774225.2774834	Sco	E8
1187	HiReD: A high-resolution multi-window visualisation environment for cluster-driven displays	Rooney C., Ruddle R.A.	2015	10.1145/2774225.2774850	Sco	E8
1188	Marker-based Augmented Reality: Instructional-design to improve children interactions with astronomical concepts	Fleck S., Hachet M., Christian Bastien J.M.	2015	10.1145/2771839.2771842	Sco	E8
1189	Designing motion-based activities to engage students with autism in classroom settings	Bhattacharya A., Gelsomini M., Pérez-Fuster P., Abowd G.D., Rozga A.	2015	10.1145/2771839.2771847	Sco	E8
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1191	Review of NASA's evidence reports on human health risks: 2014 letter report	Scott-Conner C.E.H., Masys D.R., Liverman C.T., McCoy M.A., Committee to Review NASA's Evidence Reports on Human Health Risks, Board on Health Sciences Policy, Institute of Medicine	2015	10.17226/18983	Sco	E8
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1194	Coordinated hybrid virtual environments: Seamless interaction contexts for effective virtual reality	Wang J., Lindeman R.	2015	10.1016/j.cag.2015.02.007	Sco	E8
1195	Consumers' Involvement on (Re)Engineering Store Design: A Cloud Approach	Gianpiero D.B., Eleonora P.	2015	10.4018/978-1-4666-8297-9.ch002	Sco	E2
1196	Augmented miniature prototyping toolkit for UX in interactive space	Kim H.-J., Nam T.-J.	2015	10.1145/2702613.2732744	Sco	E8
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1199	Design and preliminary evaluation of a touchless interface for manipulating virtual heritage artefacts	Caggianese G., Gallo L., De Pietro G.	2015	10.1109/SITIS.2014.44	Sco	E8

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1201	The utility of Magic Lens interfaces on handheld devices for touristic map navigation	Grubert J., Pahud M., Grasset R., Schmalstieg D., Seichter H.	2015	10.1016/j.pmcj.2014.08.005	Sco	E8
1202	A comprehensive operating room information system using the Kinect sensors and RFID	Nouei M.T., Kamyad A.V., Soroush A.R., Ghazalbash S.	2015	10.1007/s10877-014-9591-5	Sco	E8
1203	A wearable device for the elderly: A case study in Malaysia	Sin A.K., Ahmad A., Zaman H.B., Sulaiman R.	2015	10.1109/ICIMU.2014.7066652	Sco	E8
1204	Designing interactive narratives for mobile augmented reality	Nam Y.	2015	10.1007/s10586-014-0354-3	Sco	E8
1205	Gemini redux: Understanding player perception of accumulated context	Stanley K.G., Eishita F.Z., Anderson E., Mandryk R.	2015	10.1109/GEM.2014.7048100	Sco	E8
1206	Academic performance assessment using Augmented Reality in engineering degree course	Sánchez A., Redondo E., Fonseca D., Navarro I.	2015	10.1109/FIE.2014.7044238	Sco	E8
1207	Desktop vs. mobile: A comparative study of augmented reality systems for engineering visualizations in education	Camba J., Contero M., Salvador-Herranz G.	2015	10.1109/FIE.2014.7044138	Sco	E8
1208	Demystifying the design of mobile augmented reality applications	Kourouthanassis P.E., Boletsis C., Lekakos G.	2015	10.1007/s11042-013-1710-7	Sco	E8
1209	Interaction Paradigms Versus Age-Related User Profiles: An Evaluation on Content Selection	Carvalho D.C.M., Bessa M.E.C., Magalhães L.G.M., Carrapatoso E.M.E.M.	2015	10.1109/TLA.2015.7055575	Sco	E8
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1211	User experience of mobile augmented reality: A review of studies	Irshad S., Rambli D.R.B.A.	2015	10.1109/IUSER.2014.7002689	Sco	E8
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1213	7th International Conference on Virtual, Augmented and Mixed Reality, VAMR 2015 Held as Part of 17th International Conference on Human-Computer Interaction, HCI International 2015	[No author name available]	2015		Sco	E8
1214	Applying tangible augmented reality in usability evaluation	Zhang X., Choi Y.M.	2015	10.1007/978-3-319-21067-4_11	Sco	I1
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1216	Touchless target selection techniques forwearable augmented reality systems	Brancati N., Caggianese G., Frucci M., Gallo L., Neroni P.	2015	10.1007/978-3-319-19830-9_1	Sco	E8
1217	8th KES International Conference on Intelligent Interactive Multimedia Systems and Services, IIMSS 2015	[No author name available]	2015		Sco	E8
1218	Using augmented reality to facilitate piping assembly: An experiment-based evaluation	Hou L., Wang X., Truijens M.	2015	10.1061/(ASCE)CP.1943-5487.0000344	Sco	E8
1219	Exploring benefits of using augmented reality for usability testing	Mi C.Y., Sanchit M.	2015		Sco	I1
1220	User experience design of VR-AR hybrid mobile browsing system based on mental model	Lin Y., Chen J., Liu Y., Wang Y.-T.	2015	10.3724/SP.J.1016.2015.00408	Sco	E5

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1222	Development and evaluation of a system for AR enabling realistic display of gripping motions using Leap Motion Controller	Katahira R., Soga M.	2015	10.1016/j.procs.2015.08.269	Sco	I1
1223	A Weighted QFD-Based Usability Evaluation Method for Elderly in Smart Cars	Choi I.-K., Kim W.-S., Lee D., Kwon D.-S.	2015	10.1080/10447318.2015.1070553	Sco	E8
1224	Poke, Swipe, and Pinch: Reinventing adaptability across cultures using mixed technology	Lim L.	2015	10.1007/978-3-319-21380-4_45	Sco	E8
1225	Transparent touch – interacting with a multi-layered touch-sensitive display system	Kratky A.	2015	10.1007/978-3-319-20681-3_11	Sco	I1
1226	Utilizing end User Input in Early Product Development	Choi Y.M.	2015	10.1016/j.promfg.2015.07.368	Sco	E8
1227	Observed interaction in games for down syndrome children	Macedo I., Trevisan D.G., Vasconcelos C.N., Clua E.	2015	10.1109/HICSS.2015.86	Sco	E8
1228	Augmented Reality System for the Visualization and Interaction with 3D Digital Models in a Wide Environment	Caruso G., Carulli M., Bordegoni M.	2015	10.1080/16864360.2014.949579	Sco	I1
1229	Using affinity diagrams to evaluate interactive prototypes	Lucero A.	2015	10.1007/978-3-319-22668-2_19	Sco	E8
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1231	PERSEO: A system to Personalize smart Environments through Smartphones, sEnsors and media Objects	Bergesio L., Bernardos A.M., Marquínez Í., Besada J.A., Casar J.R.	2015	10.3233/AIS-150345	Sco	E8
1232	A Design of Augmented Tabletop Game Based on RFID Technology	Tan J., Rau P.-L.P.	2015	10.1016/j.promfg.2015.07.353	Sco	E8
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1236	Analysis on universality evaluation standard system of product design on basis of Kansei engineering and virtual reality	Xiao W., Cheng J., Wang X., Ye J., Xi L.	2015	10.1007/978-3-319-21380-4_74	Sco	E8
1237	HCI/HMI pleasure: Push your buttons	Wendrich R.E.	2015		Sco	E8
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1239	Gesture-based universal optical remote control: Concept, reconstruction principle and recognition results	Ruser H., Kosterski S., Kargel C.	2015	10.1109/I2MTC.2015.7151532	Sco	E8
1240	A haptic knob as an innovative user interface for visually-impaired	Mengoni M., Cavalieri L., Raponi D.	2015	10.1007/978-3-319-20681-3_12	Sco	E8
1241	Virtual reality applications in manufacturing industries: Past research, present findings, and future directions	Choi S., Jung K., Noh S.D.	2015	10.1177/1063293X14568814	Sco	E8

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1243	Knowledge Bricks - Educational immersive reality environment	Hachaj T., Baraniewicz D.	2015	10.1016/j.ijinfomgt.2015.01.006	Sco	E8
1244	Natural user interfaces for exploring and modeling medical images and defining gesture description technology	[No author name available]	2015	10.1007/978-3-319-07800-7_5	Sco	E8
1245	RemoAct: Portable projected interface with hand gesture interaction	Adeen H.S., Atia A., Amin A., Victor A., Essam A., Gharib E., Hussien M.	2015	10.3844/jcssp.2015.738.749	Sco	I1
1246	Design and evaluation of freehand gesture interaction for light field display	Adhikarla V.K., Jakus G., Sodnik J.	2015	10.1007/978-3-319-20916-6_6	Sco	I1
1247	Serious games in psychotherapy: A comparative analysis of game design models	Yusof N., Rias R.M.	2015		Sco	E8
1248	Classroom technology design guidelines: A focused survey	Prieto L.P.	2015		Sco	E8
1249	User study of hand gestures for gesture based 3D CAD modeling	Thakur A., Rai R.	2015	10.1115/DETC2015-46086	Sco	E8
1250	Applications of multi-touch tabletop displays and their challenging issues: An overview	Ahsanullah, Sulaiman S., Mahmood A.K.B., Khan M., Madni M.	2015	10.21307/ijssis-2017-791	Sco	E8
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1252	Characterization and classification of existing ambient assisted living systems: A systematic literature review	Queirós A., Silva A.G., Alvarelhão J., Teixeira A., Rocha N.P.	2015	10.1201/b18520	Sco	E8
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1254	From smart health to smart hospitals	Holzinger A., Röcker C., Ziefle M.	2015	10.1007/978-3-319-16226-3_1	Sco	E8
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1258	Performance analysis of vision based adaptive hand gesture recognition system for human computer interaction	Rautaray S.S., Pandey M.	2014	10.1145/2660859.2660924	Sco	E8
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1264	Adaptation strategies to increase advertisement effectiveness in digital media	Bauer C., Lasinger P.	2014	10.1007/s11301-014-0101-0	Sco	E8
1265	Relationship between student profile, tool use, participation, and academic performance with the use of Augmented Reality technology for visualized architecture models	Fonseca D., Martí N., Redondo E., Navarro I., Sánchez A.	2014	10.1016/j.chb.2013.03.006	Sco	E8
1266	Rural community libraries in Africa: Challenges and impacts	Dent V.F., Goodman G., Kevane M.	2014	10.4018/978-1-4666-5043-5	Sco	E2
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1302	Educational computer card games: Results from empirical studies during the last decade	Kordaki M., Gousiou A.	2014		Sco	E8

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1307	What is a device bend gesture really good for?	Ahmaniemi T., Kildal J., Haveri M.	2014	10.1145/2556288.2557306	Sco	E8
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1309	Pinch-drag-flick vs. spatial input: Rethinking zoom & pan on mobile displays	Spindler M., Schuessler M., Martsch M., Dachselt R.	2014	10.1145/2556288.2557028	Sco	E8
1310	Disability, rehabilitation research and post-cartesian embodied ontologies - Has the research paradigm changed?	Edwards G., Noreau L., Boucher N., Fougeyrollas P., Grenier Y., McFadyen B.J., Morales E., Vincent C.	2014	10.1108/S1479-3547201400000008005	Sco	E8
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1347	CollARt: A tool for creating 3D photo collages using mobile augmented reality	Marzo A., Ardaiz O.	2013	10.1145/2502081.2502154	Sco	E8
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1386	Design Recommendations for Digital Game Design within an Ageing Society	Marston H.R.	2013	10.1080/03601277.2012.689936	Sco	E8
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1388	Reframing dichotomies: Human experiential design of healthcare technologies	Hoshi K.	2013	10.4018/978-1-4666-2770-3.ch065	Sco	E2
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1390	Designing perspectively correct multiplanar displays	Harish P., Narayanan P.J.	2013	10.1109/TVCG.2012.135	Sco	E8
1391	TouchableAR: A new experience of augmented reality	Li D., Weng D., Li Y., Xie J.	2013	10.1109/ICVRV.2013.14	Sco	I1
1392	Low cost mixed reality system using projectors for evaluation of product design (shape and function structure)	Chinone Y., Aoyama H., Oya T.	2013	10.1115/DETC2013-12518	Sco	E5
1393	Hand-held augmented reality: Usability and academic performance assessment in educational environments. Case study of an engineering degree course	Sánchez A., Redondo E., Fonseca D., Navarro I.	2013		Sco	E8
1394	New strategies using handheld augmented reality and mobile learning-teaching methodologies, in architecture and building engineering degrees	Redondoa E., Fonsecab D., Sáncheza A., Navarroa I.	2013	10.1016/j.procs.2013.11.007	Sco	E8
1395	A study of touchless versus touch-based interactions with bacterial biofilm images	Hosseini M., Vallotton P., Bednarz T., Sowmya A.	2013	10.1145/2534329.2534366	Sco	E8
1396	Augmented reality in built environment: Classification and implications for future research	Wang X., Kim M.J., Love P.E.D., Kang S.-C.	2013	10.1016/j.autcon.2012.11.021	Sco	E8
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1398	How to make learning management systems more exciting and entertaining: Games, interaction and experience design	De Almeida Souza-Concilio I., De Almeida Pacheco B.	2013	10.1109/IC3e.2013.6735959	Sco	E8
1399	Designing augmented reality for the classroom	Cuendet S., Bonnard Q., Do-Lenh S., Dillenbourg P.	2013	10.1016/j.compedu.2013.02.015	Sco	E8
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1402	Implementation of augmented reality in "3.0 learning" methodology: Case studies with students of architecture degree	Redondo E., Navarro I., Sánchez A., Fonseca D.	2013	10.4018/978-1-4666-2851-9.ch019	Sco	E2
1403	Fun learning with AR alphabet book for preschool children	Rambli D.R.A., Matcha W., Sulaiman S.	2013	10.1016/j.procs.2013.11.026	Sco	E8
1404	Controlling a planetarium software with a Kinect or in a multi-touch table: A comparison	Tuveri E., Iacolina S.A., Sorrentino F., Spano L.D., Scateni R.	2013	10.1145/2499149.2499161	Sco	E8
1405	Hand gestures in CAD systems	Tumkor S., Esche S.K., Chassapis C.	2013	10.1115/IMECE2013-64551	Sco	E8
1406	Configuring and controlling ubiquitous computing infrastructure with semantic connections: A tangible and an AR approach	Van Der Vlist B., Niezen G., Rapp S., Hu J., Feijs L.	2013	10.1007/s00779-012-0627-x	Sco	E8
1407	Wearable smartphone: Wearable hybrid framework for hand and foot gesture interaction on smartphone	Lv Z.	2013	10.1109/ICCVW.2013.64	Sco	I1
1408	A steerable multitouch display for surface computing and its evaluation	Koutlemanis P., Ntelidakis A., Zabulis X., Grammenos D., Adami I.	2013	10.1142/S0218213013600166	Sco	E8
1409	The fun.tast.tisch. project - A novel approach to neuro-rehabilitation using an interactive multiuser multitouch tabletop	Augstein M., Neumayr T., Ruckser-Scherb R., Karlhuber I., Altmann J.	2013	10.1145/2512349.2512808	Sco	E8
1410	MoClo planner: Interactive visualization for Modular Cloning bio-design	Shaer O., Valdes C., Liu S., Lu K., Haddock T.L., Bhatia S., Densmore D., Kincaid R.	2013	10.1109/BioVis.2013.6664347	Sco	E8
1411	Kidkit guides children into alarming atmospheres: Designing for embodied habituation in hospital wards	Kinch S., Højlund M.K.	2013	10.1145/2513506.2513507	Sco	E8
1412	3D selection with freehand gesture	Ren G., O'Neill E.	2013	10.1016/j.cag.2012.12.006	Sco	E8
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1418	Static and dynamic user portraits	Huang K.-H., Deng Y.-S., Chuang M.-C.	2012	10.1155/2012/123725	Sco	E2
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1420	A collaborative environment for engaging novices in scientific inquiry	Valdes C., Ferreirae M., Feng T., Wang H., Tempel K., Liu S., Shaer O.	2012	10.1145/2396636.2396654	Sco	E8
1421	Human Performance Modification: Review of Worldwide Research with a View to the Future	Committee on Assessing Foreign Technology Development in Human Performance Modification, Division on Engineering and Physical Sciences, Board	2012	10.17226/13480	Sco	E2

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1424	Developing an augmented reality application in the framework of architecture degree	Riera A.S., Dominguez E.R., Escudero D.F.	2012	10.1145/2390895.2390905	Sco	E8
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1428	Influence of specific ar capabilities on the learning effectiveness and efficiency	Iordache Dr D.D., Pribeanu C., Balog A.	2012		Sco	E8
1429	User centred approach for home environment designing	Ceccacci S., Germani M., Mengoni M.	2012	10.1145/2413097.2413136	Sco	E8
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1436	A survey of visual, mixed, and augmented reality gaming	Thomas B.H.	2012	10.1145/2381876.2381879	Sco	E8
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1443	Usability evaluation of augmented reality systems	Kostaras N., Xenos M.	2012	10.3233/IDT-2012-0130	Sco	E5
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1445	Using virtual reality for clinical assessment and intervention	Rizzo A.S., Parsons T.D., Kenny P., Galen Buckwalter J.	2012		Sco	E8
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1447	Two user studies on creation and evaluation of use scenarios for mixed reality communication	Suhonen K., Väänänen-Vainio-Mattila K., Schrader M., Pölönen M., Salmimaa M., Saarikko P.	2012	10.1145/2254556.2254665	Sco	I1
1448	Potentials of the Tangible User Interface (TUI) in enhancing inclusion of people with special needs in the ICT-assisted learning and e-accessibility	Zajc M., Istenic Starcic A.	2012	10.1007/978-3-642-30947-2_30	Sco	E8
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1455	A tangible experiment support system with presentation ambiguity for safe and independent chemistry experiments	Sokan A., Hou M.W., Shinagawa N., Egi H., Fujinami K.	2012	10.1007/s12652-011-0079-6	Sco	E8
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1457	MOSOCO: A mobile assistive tool to support children with autism practicing social skills in real-life situations	Escobedo L., Nguyen D.H., Boyd L.A., Hirano S.H., Rangel A., García-Rosas D., Tentori M., Hayes G.R.	2012	10.1145/2207676.2208649	Sco	E8
1458	Phylo-Genie: Engaging students in collaborative 'tree-thinking' through tabletop techniques	Schneider B., Strait M., Muller L., Elfenbein S., Shaer O., Shen C.	2012	10.1145/2207676.2208720	Sco	E8
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1463	Personalization in cultural heritage: The road travelled and the one ahead	Ardissono L., Kuflik T., Petrelli D.	2012	10.1007/s11257-011-9104-x	Sco	E8
1464	Evaluating and understanding the usability of a pen-based command system for interactive paper	Liao C., Guimbretière F.	2012	10.1145/2147783.2147786	Sco	E8
1465	Designing with and for Older adults: Experience from game design	Mahmud A.A., Shahid S., Mubin O.	2012	10.1007/978-3-642-25691-2_5	Sco	E8
1466	Freedom of contract in an augmented reality: The case of consumer contracts	Peppet S.R.	2012		Sco	E8
1467	User evaluation of mobile augmented reality scenarios	Olsson T., Kärkkäinen T., Lagerstam E., Ventä-Olkkonen L.	2012	10.3233/AIS-2011-0127	Sco	I2
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1473	How to use virtual and augmented reality techniques to design highly usable human-machine interfaces	Ceccacci S., Germani M., Mengoni M.	2012	10.1007/978-1-4471-2867-0_7	Sco	E8
1474	A survey of visual, mixed, and augmented reality gaming	Thomas B.H.	2012	10.1145/2381876.2381879	Sco	E6
1475	Tangible interaction and tabletops: New horizons for children's games	Marco J., Cerezo E., Baldassarri S.	2012	10.1504/ijart.2012.046272	Sco	E8
1476	Grounded Innovation	Holmquist L.E.	2012	10.1016/C2010-0-67726-1	Sco	E2
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1479	Collaborative mixed-reality environment to support the industrial product development	Caruso G., Polistina S., Bordegoni M.	2011	10.1115/WINVR2011-5540	Sco	E5
1480	Models transformations for ubiquitous system design	Dubois E., Bortolaso C., Gauffre G.	2011		Sco	E8
1481	Comparing different visuo-haptic environments for virtual prototyping applications	Bruno F., Angilica A., Cosco F., Barbieri L., Muzzupappa M.	2011	10.1115/WINVR2011-5533	Sco	E8

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1483	The mid-air fogscreen and user experiences	Rakkolainen I., Jumisko-Pyykkö S.	2011	10.4018/978-1-60960-762-3.ch036	Sco	E2
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1485	Wearable mobile Augmented Reality: Evaluating outdoor user experience	Kerr S.J., Rice M.D., Teo Y., Wan M., Cheong Y.L., Ng J., Ng-Thamrin L., Thura-Myo T., Wren D.	2011	10.1145/2087756.2087786	Sco	I1
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1488	An augmented reality based application for furnishing configuration and evaluation	Filippi S., Barattin D., Amato M., Tozzi R.	2011	10.1115/WINVR2011-5530	Sco	E8
1489	Developing interfaces for interactive product visualization in truly 3D virtual workspaces	Opiyo E.Z.	2011	10.1115/DETC2011-47088	Sco	I1
1490	Virtualization of industrial consumer products for haptic interaction design	Ferrise F., Ambrogio M., Gatti E., Lizaranzu J., Bordegoni M.	2011	10.1115/WINVR2011-5526	Sco	E8
1491	PicoLife: A computer vision-based gesture recognition and 3D gaming system for android mobile devices	Mariappan M.B., Guo X., Prabhakaran B.	2011	10.1109/ISM.2011.13	Sco	E8
1492	Combining location tracking and RFID tagging toward an improved research infrastructure	Wilson G., McCrickard S.	2011	10.4018/978-1-60960-042-6.ch030	Sco	E2
1493	A tactile simulation approach to enhance virtual prototypes interaction	Mengoni M., Morichetti P., Peruzzini M., Germani M.	2011	10.1115/WINVR2011-5561	Sco	E8
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1495	Virtual museums: Platforms, practices, prospects	Ho C.M.L.	2011	10.4018/978-1-60960-762-3.ch007	Sco	E2
1496	Wayfinding study in virtual environments: The elderly vs. The younger-aged groups	Lee S., Kline R.	2011		Sco	E8
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1499	Augmented reality remedial worksheet for negative numbers: Subtraction operation	Periasamy E., Badioze Zaman H.	2011	10.1007/978-3-642-25200-6_23	Sco	E8
1500	Adaptation techniques in games and serious games. State of the art [Techniques d'adaptation dans les jeux ludiques et sérieux: État de l'art]	Hocine N., Gouaïch A., Di Loreto I., Abrouk L.	2011	10.3166/ria.25.253-280	Sco	E8
1501	Hand gesture interaction using color-based method for tabletop interfaces	Bellarbi A., Benbelkacem S., Zenati-Henda N., Belhocine M.	2011	10.1109/WISP.2011.6051717	Sco	E8
1502	Development trend analysis of augmented reality system in educational applications	Lai Y.-S., Hsu J.-M.	2011	10.1109/ICECENG.2011.6056941	Sco	E8

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1504	Establishment and usability evaluation of an interactive AR learning system on conservation of fish	Koong Lin H.-C., Hsieh M.-C., Wang C.-H., Sie Z.-Y., Chang S.-H.	2011		Sco	E8
1505	Novel human-to-human interactions from the evolution of HCI	Gentile A., Santangelo A., Sorce S., Vitabile S.	2011	10.1109/CISIS.2011.99	Sco	E8
1506	Development of an interactive artifact for cognitive rehabilitation based on augmented reality	Kirner C., Kirner T.G.	2011	10.1109/ICVR.2011.5971837	Sco	E8
1507	Model-based design of interactions that can bridge realities: The augmented "drag-and-drop"	Feuerstack S., Oliveira A.C.M.D., Araujo R.B.	2011	10.1109/SVR.2011.15	Sco	I1
1508	Enhancing and evaluating users' social experience with a mobile phone guide applied to cultural heritage	Suh Y., Shin C., Woo W., Dow S., MacIntyre B.	2011	10.1007/s00779-010-0344-2	Sco	E8
1509	Design and implementation of a student-generated virtual museum in a language curriculum to enhance collaborative multimodal meaning-making	Ho C.M.L., Nelson M.E., Müeller-Wittig W.	2011	10.1016/j.compedu.2010.12.003	Sco	E8
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1511	Introducing animatronics to HCI: Extending reality-based interaction	Poor G.M., Jacob R.J.K.	2011	10.1007/978-3-642-21605-3_65	Sco	E8
1512	Design and development of four prototype interactive edutainment exhibits for museums	Grammenos D., Zabulis X., Michel D., Sarmis T., Georgalis G., Tzevanidis K., Argyros A., Stephanidis C.	2011	10.1007/978-3-642-21666-4_20	Sco	E8
1513	Visual interfaces and user experience: Augmented reality for architectural education: One study case and work in progress	Redondo E., Navarro I., Sánchez A., Fonseca D.	2011	10.1007/978-3-642-21984-9_31	Sco	E8
1514	Interactive and intelligent storytelling system for children	Wang D., Zhan Z., Dai G.	2011		Sco	E8
1515	Enhancing genomic learning through tabletop interaction	Shaer O., Strait M., Valdes C., Feng T., Lintz M., Wang H.	2011	10.1145/1978942.1979361	Sco	E8
1516	i*Chameleon: A scalable and extensible framework for multimodal interaction	Tang W.W.W., Chan S.C.F., Lo K.W.K., Leong H.V., Chan A.T.S., Ngai G.	2011	10.1145/1979742.1979703	Sco	E8
1517	TouchPlanVS-A tangible multitouch planning system for virtual TV studio productions	Herder J., Brosda C., Djuderija S., Drochtert D., Genc O., Joeres S., Kellerberg P., Looschen S., Geiger C., Wöldecke B.	2011	10.1109/3DUI.2011.5759226	Sco	E8
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1804	6th Ibero-American Conference on Human-Computer Interaction, HCI-Collab 2020	[No author name available]	1998		Sco	E4
1805	Augmented Reality Towards Facilitating Abstract Concepts Learning	Olim S.C., Nisi V.	1998	10.1007/978-3-030-65736-9_17	Sco	E8
1806	3D Mirrored Object Selection for Occluded Objects in Virtual Environments	Lee J.-J., Park J.-M.	1998	10.1109/ACCESS.2020.3035376	Sco	E8
1807	Tangible interactions in Virtual Reality environments	Sirizzotti M., Guercio S., Lampus F., Marti P., Lusuardi L., Innocenti A.	1998		Sco	E8
1808	Design framework and intelligent in-vehicle information system for sensor-cloud platform and applications	Zeng Q., Duan Q., Shi M., He X., Hassan M.M.	1998	10.1109/ACCESS.2020.3035654	Sco	E8
1809	Designing technology-enhanced learning environments in vocational education and training	Aprea C., Cattaneo A.A.P.	1998	10.1002/9781119098713.ch19	Sco	E2
1810	Treating children with speech sound disorders: Development of a tangible artefact prototype	Santos J., Vairinhos M., Jesus L.M.T.	1998	10.2196/13861	Sco	E8
1811	Follow the vibes: A comparison between two tactile displays in a navigation task in the field	Orso V., Gamberini L., Mazza R., Hsieh Y.-T., Jensen W., Jacucci G., Morrison A.	1998		Sco	E8
1812	Quantifying quality aspects of multimodal interactive systems	Kühnel C.	1998		Sco	E2
1813	Designing for a socioenactive experience: A case study in an educational workshop on deep time	Baranauskas M.C.C., Mendoza Y.L.M., Duarte E.F.	1998	10.1016/j.ijcci.2021.100287	Sco	E8
1814	Preliminary user experience framework for designing mobile augmented reality technologies	S. Irshad; D. R. A. Rambli	2020	10.1109/IDM.2015.7547833	IEEE	I2
1815	Developing an eXtended Reality platform for Immersive and Interactive Experiences for Cultural Heritage: Serralves Museum and Coa Archeologic Park	M. Silva; L. Teixeira	2020	10.1109/ISMAR-Adjunct51615.2020.00084	IEEE	E8
1816	Usability Evaluation of a Mixed Reality Collaborative Tool for Design Review	Xiangyu Wang; P. S. Dunston	2020	10.1109/CGIV.2006.87	IEEE	242
1817	Usability Evaluation of a Wearable Augmented Reality System for the Enjoyment of the Cultural Heritage	N. Brancati; G. Caggianese; G. De Pietro; M. Frucci; L. Gallo; P. Neroni	2020	10.1109/SITIS.2015.98	IEEE	E6
1818	Alternative tools for tangible interaction: a usability evaluation	M. Fjeld; S. G. Schar; D. Signorello; H. Krueger	2020	10.1109/ISMAR.2002.1115085	IEEE	E6

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1820	Tangible interaction techniques to support asynchronous collaboration	A. Irlitti; S. Von Itzstein; L. Alem; B. Thomas	2020	10.1109/ISMAR.2013.6671840	IEEE	E8
1821	Augmented Tangibility Surgical Navigation Using Spatial Interactive 3-D Hologram zSpace with OsiriX and Bio-Texture 3-D Organ Modeling	M. Sugimoto	2020	10.1109/CCATS.2015.53	IEEE	E8
1822	An empirical evaluation of virtual hand techniques for 3D object manipulation in a tangible augmented reality environment	T. Ha; W. Woo	2020	10.1109/3DUI.2010.5444713	IEEE	E6
1823	A Dynamic Blocks Platform Based on Projective Augmented Reality and Tangible Interfaces for Educational Activities	R. A. Roberto; D. Q. d. Freitas; F. P. M. Simões; V. Teichrieb	2020	10.1109/SVR.2013.11	IEEE	E6
1824	Investigating Tangible User Interaction in Mixed-Reality Robotic Games	F. G. Pratticò; P. Baldo; A. Cannavò; F. Lamberti	2020	10.1109/ICCE-Berlin47944.2019.8966135	IEEE	E6
1825	The Effect of Tangible User Interfaces on Cognitive Load in the Creative Design Process	T. Chandrasekera; S. Yoon	2020	10.1109/ISMAR-MASHD.2015.18	IEEE	E8
1826	Live Solar System (LSS): Evaluation of an Augmented Reality book-based educational tool	A. K. Sin; H. B. Zaman	2020	10.1109/ITSIM.2010.5561320	IEEE	E6
1827	Mid-Air Fingertip-Based User Interaction in Mixed Reality	M. Dani; G. Garg; R. Perla; R. Hebbalaguppe	2020	10.1109/ISMAR-Adjunct.2018.00061	IEEE	E6
1828	Touch experience in augmented reality	D. Li; J. Xie; D. Weng; Y. Li	2020	10.1109/VR.2013.6549376	IEEE	E6
1829	ARQuest: A Tangible Augmented Reality Approach to Developing Computational Thinking Skills	A. Gardeli; S. Vosinakis	2020	10.1109/VS-Games.2019.8864603	IEEE	E8
1830	lifeClipper3 — An augmented walking experience field evaluation of an experience design approach for immersive outdoor augmented reality	J. Torpus; B. Tobler	2020	10.1109/ISMAR-AMH.2011.6093660	IEEE	E8
1831	Using Augmented Reality to Explore Museum Artifacts	R. A. Alakhtar	2020	10.1109/ISMAR-Adjunct51615.2020.00083	IEEE	I1
1832	Grey Island: Immersive tangible interaction through augmented reality	Z. Gong; G. Wang; Q. Wu	2020	10.1109/DSC.2019.00107	IEEE	I1
1833	Usability Engineering for Augmented Reality: Employing User-Based Studies to Inform Design	J. L. Gabbard; J. E. Swan II	2020	10.1109/TVCG.2008.24	IEEE	E8
1834	TouchableAR: A New Experience of Augmented Reality	D. Li; D. Weng; Y. Li; J. Xie	2020	10.1109/ICVRV.2013.14	IEEE	E1
1835	Towards an efficient methodology for evaluation of quality of experience in Augmented Reality	J. Puig; A. Perkis; F. Lindseth; T. Ebrahimi	2020	10.1109/QoMEX.2012.6263864	IEEE	E8
1836	Using children's developmental psychology to guide augmented-reality design and usability	I. Radu; B. MacIntyre	2020	10.1109/ISMAR.2012.6402561	IEEE	E8
1837	Implementation of the Framework to Heritage Education supported in Augmented Reality	R. Mendoza; A. Cabarcas; R. Fabregat; S. Baldiris	2020	10.1109/ICVRV47840.2019.00036	IEEE	E8

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1838	Making Pretense Visible and Graspable: An augmented reality approach to promote pretend play	Z. Bai; A. F. Blackwell; G. Coulouris	2020	10.1109/ISMAR.2012.6402567	IEEE	E8
1839	User Experience Evaluation of the REEFOCUS ADHD Management Gaming System	T. Kanellos; A. Doulgerakis; E. Georgiou; M. Bessa; S. C. A. Thomopoulos; A. Vatakis; A. del Val-Guardiola; J. Navarra	2020	10.23919/SpliTech.2019.8783141	IEEE	E8
1840	Augmented reality in e-learning review of prototype designs for usability evaluation	T. Satpute; S. Pingale; V. Chavan	2020	10.1109/ICCICT.2015.7045712	IEEE	E8
1841	Providing a Wide Field of View for Effective Interaction in Desktop Tangible Augmented Reality	S. Jeon; G. J. Kim	2020	10.1109/VR.2008.4480743	IEEE	E6
1842	AR-Jig: A Handheld Tangible User Interface for Modification of 3D Digital Form via 2D Physical Curve	M. Anabuki; H. Ishii	2020	10.1109/ISMAR.2007.4538826	IEEE	E8
1843	Interaction and presentation techniques for shake menus in tangible augmented reality	S. White; D. Feng; S. Feiner	2020	10.1109/ISMAR.2009.5336500	IEEE	E8
1844	Evaluation of Tangible User Interfaces for Desktop AR	A. Dünser; J. Looser; R. Grasset; H. Seichter; M. Billinghurst	2020	10.1109/ISUVR.2010.19	IEEE	E6
1845	Towards Immersive Comprehension of Software Systems Using Augmented Reality - An Empirical Evaluation	R. Mehra; V. S. Sharma; V. Kaulgud; S. Podder; A. P. Burden	2020		IEEE	E8
1846	Academic performance assessment using Augmented Reality in engineering degree course	A. Sánchez; E. Redondo; D. Fonseca; I. Navarro	2020	10.1109/FIE.2014.7044238	IEEE	E6
1847	Visuo-Haptic Mixed Reality with Unobstructed Tool-Hand Integration	F. Cosco; C. Garre; F. Bruno; M. Muzzupappa; M. A. Otaduy	2020	10.1109/TVCG.2012.107	IEEE	I1
1848	A review of recent usability measures in English Language Teaching (ELT) technologies	L. K. Cheng; F. Puteh; A. Selamat; F. B. Mohamed	2020	10.1109/MySEC.2015.7475233	IEEE	E8
1849	A Tangible Volume for Portable 3D Interaction	P. Issartel; L. Besançon; T. Isenberg; M. Ammi	2020	10.1109/ISMAR-Adjunct.2016.0079	IEEE	E8
1850	MIXR: A Standard Architecture for Medical Image Analysis in Augmented and Mixed Reality	B. Allison; X. Ye; F. Janan	2020	10.1109/AIVR50618.2020.00053	IEEE	E8
1851	Light Detecting 3D User Interface-Equipped System for Mixed and Augmented Reality Games	J. Park; S. An; W. Woo	2020	10.1109/ISMAR-MASHD.2015.23	IEEE	E8
1852	On the Usability of Augmented Reality for Information Exchange in Teams from the Security Domain	D. Datcu; M. Cidota; H. Lukosch; S. Lukosch	2020	10.1109/JISIC.2014.32	IEEE	E6
1853	SPAROGRAM: The spatial augmented reality holographic display for 3D visualization and exhibition	M. Kim; J. Lee; K. Whon	2020	10.1109/3DVis.2014.7160106	IEEE	I1
1854	Design and Assessment of a Collaborative 3D Interaction Technique for Handheld Augmented Reality	J. G. Grandi; H. G. Debarba; I. Bemdt; L. Nedel; A. Maciel	2020	10.1109/VR.2018.8446295	IEEE	E6
1855	Effects of Real-World Visual Fidelity on AR Interface Assessment: A Case Study Using AR Head-up Display Graphics in Driving	C. Merenda; C. Suga; J. L. Gabbard; T. Misu	2020	10.1109/ISMAR.2019.00-10	IEEE	E8
1856	[POSTER] Remote Mixed Reality System Supporting Interactions with Virtualized Objects	P. Yang; I. Kitahara; Y. Ohta	2020	10.1109/ISMAR.2015.22	IEEE	I1
1857	AR Circuit Constructor: Combining Electricity Building Blocks and Augmented Reality for Analogy-Driven Learning and Experimentation	T. Kreienbühl; R. Wetzel; N. Burgess; A. Maria Schmid; D. Brovelli	2020	10.1109/ISMAR-Adjunct51615.2020.00019	IEEE	E8

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1859	Pointing and Selection Methods for Text Entry in Augmented Reality Head Mounted Displays	W. Xu; H. Liang; A. He; Z. Wang	2020	10.1109/ISMAR.2019.00026	IEEE	E6
1860	3D Object Manipulation Techniques in Handheld Mobile Augmented Reality Interface: A Review	E. S. Goh; M. S. Sunar; A. W. Ismail	2020	10.1109/ACCESS.2019.2906394	IEEE	E6
1861	From boards to augmented reality learning	W. F. Maqableh; M. S. Sidhu	2020	10.1109/INFRKM.2010.5466920	IEEE	E8
1862	Interactive Augmented Reality Authoring System using mobile device as input method	Y. Yang; J. Shim; Seungho Chae; T. Han	2020	10.1109/SMC.2016.7844437	IEEE	I1
1863	Comparing the Accuracy of Hierarchical Agglomerative and K-means Clustering on Mobile Augmented Reality Usability Metrics	L. K. Cheng; A. Selamat; M. H. M. Zabil; M. H. Selamat; R. A. Alias; F. Puteh; F. Mohamed; O. Krejcar	2020	10.1109/ICBDA47563.2019.8987044	IEEE	E8
1864	Performance Envelopes of Virtual Keyboard Text Input Strategies in Virtual Reality	J. Dudley; H. Benko; D. Wigdor; P. O. Kristensson	2020	10.1109/ISMAR.2019.00027	IEEE	E8
1865	AR-REHAB: An Augmented Reality Framework for Poststroke-Patient Rehabilitation	A. Alamri; J. Cha; A. El Saddik	2020	10.1109/TIM.2010.2057750	IEEE	E6
1866	Tangible Cubes Used as the User Interface in an Augmented Reality Game for Edutainment	C. M. Juan; G. Toffetti; F. Abad; J. Cano	2020	10.1109/ICALT.2010.170	IEEE	E8
1867	Collaborative Educational Environments Incorporating Mixed Reality Technologies: A Systematic Mapping Study	A. A. Ali; G. A. Dafoulas; J. C. Augusto	2020	10.1109/TLT.2019.2926727	IEEE	E8
1868	Immersive authoring of tangible augmented reality applications	G. A. Lee; C. Nelles; M. Billinghurst; G. J. Kim	2020	10.1109/ISMAR.2004.34	IEEE	E8
1869	Evaluation of Direct Manipulation Methods in Augmented Reality Environments Using Google Glass	A. Ohlei; T. Winkler; D. Wessel; M. Herczeg	2020	10.1109/ISMAR-Adjunct.2018.00083	IEEE	E6
1870	Web AR: A Promising Future for Mobile Augmented Reality—State of the Art, Challenges, and Insights	X. Qiao; P. Ren; S. Dustdar; L. Liu; H. Ma; J. Chen	2020	10.1109/JPROC.2019.2895105	IEEE	E8
1871	Measuring performance of aerial projection of 3D Hologram Object (3DHO)	I. S. Asyifa; J. Mahfud; T. Matsumaru	2020	10.1109/ROBIO.2017.8324726	IEEE	E6
1872	A Markeless Augmented Reality Tracking for Enhancing the User Interaction during Virtual Rehabilitation	A. Klein; G. A. d. Assis	2020	10.1109/SVR.2013.43	IEEE	E8
1873	A 3D Flexible and Tangible Magic Lens in Augmented Reality	J. Looser; R. Grasset; M. Billinghurst	2020	10.1109/ISMAR.2007.4538825	IEEE	E8
1874	HoloR: Interactive mixed-reality rooms	C. Schwede; T. Hermann	2020	10.1109/CogInfoCom.2015.7390647	IEEE	I1
1875	[POSTER] Rubix: Dynamic Spatial Augmented Reality by Extraction of Plane Regions with a RGB-D Camera	M. Sano; K. Matsumoto; B. H. Thomas; H. Saito	2020	10.1109/ISMAR.2015.43	IEEE	E8
1876	Augmented Reality Learning Experiences: Survey of Prototype Design and Evaluation	M. E. C. Santos; A. Chen; T. Taketomi; G. Yamamoto; J. Miyazaki; H. Kato	2020	10.1109/TLT.2013.37	IEEE	E6
1877	Design and evaluation of a low-cost 3D interaction technique for wearable and handled AR devices	A. Bellarbi; S. Benbelkacem; H. Belghit; S. Otmane; N. Zenati	2020	10.1109/IPTA.2014.7001995	IEEE	E6
1878	PRISME: Toward a model linking tangible interaction and domain-specific tasks in mixed reality environments	J. -M. FAZZARI; S. KUBICKI; R. QUERREC	2020	10.1109/SVR51698.2020.00042	IEEE	E8

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1880	Augmented Reality for Vocational Education Training in K12 Classrooms	M. Belani; A. Parnami	2020	10.1109/ISMAR-Adjunct51615.2020.00090	IEEE	E6
1881	Thermal touch: Thermography-enabled everywhere touch interfaces for mobile augmented reality applications	D. Kurz	2020	10.1109/ISMAR.2014.6948403	IEEE	E8
1882	Exploring the Use of Mixed-Reality for the Design and Innovation of Future Ubiquitous Devices and Intelligent Environments	M. Shauakt; V. Callaghan	2020	10.1109/IE.2010.74	IEEE	E6
1883	Augmented Reality-based application to foster sustainable agriculture in the context of aquaponics	J. Garzón; S. Baldiris; J. Acevedo; J. Pavón	2020	10.1109/ICALT49669.2020.00101	IEEE	E8
1884	Collaborative Augmented Reality for Chess Game in Handheld Devices	C. S. Yusof; T. S. Low; A. W. Ismail; M. S. Sunar	2020	10.1109/GAME47560.2019.8980979	IEEE	I1
1885	Light-weight immaterial particle displays with mid-air tactile feedback	A. Sand; I. Rakkolainen; P. Isokoski; R. Raisamo; K. Palovuori	2020	10.1109/HAVE.2015.7359448	IEEE	I1
1886	Aerial Imaging by Retro-Reflection for Mid-Air Image Display and Camera Viewpoint Transfer	K. Tsuchiya; N. Koizumi	2020	10.1109/ACCESS.2021.3057056	IEEE	E8
1887	XRaSE: Towards Virtually Tangible Software using Augmented Reality	R. Mehra; V. S. Sharma; V. Kaulgud; S. Podder	2020	10.1109/ASE.2019.00135	IEEE	I1
1888	Towards the development of guidelines for educational evaluation of augmented reality tools	M. M. O. da Silva; R. A. Roberto; V. Teichrieb; P. S. Cavalcante	2020	10.1109/KELVAR.2016.7563677	IEEE	E6
1889	Design Framework and Intelligent In-Vehicle Information System for Sensor-Cloud Platform and Applications	Q. Zeng; Q. Duan; M. Shi; X. He; M. M. Hassan	2020	10.1109/ACCESS.2020.3035654	IEEE	E6
1890	The Potential of Augmented Reality for Computer Science Education	D. Resnyansky; E. ?bili; M. Billinghurst	2020	10.1109/TALE.2018.8615331	IEEE	E6
1891	Slicing techniques for handheld augmented reality	P. Issartel; F. Guéniat; M. Ammi	2020	10.1109/3DUI.2014.6798839	IEEE	E6
1892	Development of the MR laboratory for electrical experiment using ARToolKit	Y. Iwasaki; S. Nishimura; Y. Hamada; K. Kozono	2020	10.1109/ITHET.2010.5480055	IEEE	E8
1893	Gesture Interaction and Evaluation Using the Leap Motion for Medical Visualization	É. S. Silva; M. A. F. Rodrigues	2020	10.1109/SVR.2015.31	IEEE	E6
1894	Poster: Evaluation of a cup-shaped interface in tabletop AR environments	Seiko Myojin; H. Kato; S. Nishida	2020	10.1109/3DUI.2009.4811224	IEEE	E8
1895	A Practical Evaluation of Commercial Industrial Augmented Reality Systems in an Industry 4.0 Shipyard	Ó. Blanco-Novoa; T. M. FernáNdez-CaraméS; P. Fraga-Lamas; M. A. Vilar-Montesinos	2020	10.1109/ACCESS.2018.2802699	IEEE	E8
1896	Interactive Spatial Augmented Reality in Collaborative Robot Programming: User Experience Evaluation	Z. Materna; M. Kapinus; V. Beran; P. Smrž; P. Zem?ík	2020	10.1109/ROMAN.2018.8525662	IEEE	E6
1897	3D Character Customization for Non-Professional Users in Handheld Augmented Reality	I. Seidinger; J. Grubert	2020	10.1109/ISMAR-Adjunct.2016.0059	IEEE	E6
1898	Symmetric Model of Remote Collaborative MR Using Tangible Replicas	S. Yamamoto; H. Tamaki; Y. Okajima; K. Okada; Y. Bannai	2020	10.1109/VR.2008.4480753	IEEE	E8

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1900	Measurements of live actor motion in mixed reality interaction	G. Hough; I. Williams; C. Athwal	2020	10.1109/ISMAR.2014.6948414	IEEE	I1
1901	Systematic Mapping Study on High-Level Content Design Frameworks for Augmented Reality	Y. Apaza; R. Tumailla; W. Hancco; A. Paz-Valderrama; C. Corrales-Delgado; M. Loaiza	2020	10.1109/SVR.2018.00037	IEEE	E8
1902	Physical Objects in AR Games – Offering a Tangible Experience	C. Eichhorn; D. A. Plecher; M. Inami; G. Klinker	2020	10.1109/VR.2019.8798056	IEEE	E8
1903	Enlightening Patients with Augmented Reality	A. Jakl; A. Lienhart; C. Baumann; A. Jalaeefar; A. Schlager; L. Schöffer; F. Bruckner	2020	10.1109/VR46266.2020.00038	IEEE	E6
1904	Herding sheep: live system for distributed augmented reality	A. MacWilliams; C. Sandor; M. Wagner; M. Bauer; G. Klinker; B. Bruegge	2020	10.1109/ISMAR.2003.1240695	IEEE	E8
1905	A Comparison of Desktop and Augmented Reality Scenario Based Training Authoring Tools	A. Vargas González; S. Koh; K. Kapalo; R. Sottilare; P. Garrity; M. Billinghurst; J. LaViola	2020	10.1109/ISMAR.2019.00032	IEEE	E6
1906	Augmented Reality System Design and Scenario Study for Location-Based Adaptive Mobile Learning	W. Chang; Q. Tan	2020	10.1109/CSE.2010.66	IEEE	E8
1907	Developing and authoring mixed reality with MX toolkit	J. M. S. Dias; L. Monteiro; P. Santos; R. Silvestre; R. Bastos	2020	10.1109/ART.2003.1320420	IEEE	E6
1908	3D Object Visualization using Interactive Holographic Projection	S. Sumpeno; F. D. Hasna; A. Zaini	2020	10.1109/CENIM51130.2020.9297919	IEEE	I1
1909	Augmented Reality for Learning of Children and Adolescents With Autism Spectrum Disorder (ASD): A Systematic Review	K. Khowaja; B. Banire; D. Al-Thani; M. T. Sqalli; A. Aqle; A. Shah; S. S. Salim	2020	10.1109/ACCESS.2020.2986608	IEEE	E8
1910	Desktop vs. mobile: A comparative study of augmented reality systems for engineering visualizations in education	J. Camba; M. Contero; G. Salvador-Herranz	2020	10.1109/FIE.2014.7044138	IEEE	E6
1911	The Human Muscular Arm Avatar as an Interactive Visualization Tool in Learning Anatomy: Medical Students' Perspectives	Y. O. Cakmak; B. K. Daniel; N. Hammer; O. Yilmaz; E. C. Irmak; P. Khwaounjoo	2020	10.1109/TLT.2020.2995163	IEEE	E8
1912	MARVisT: Authoring Glyph-Based Visualization in Mobile Augmented Reality	Z. Chen; Y. Su; Y. Wang; Q. Wang; H. Qu; Y. Wu	2020	10.1109/TVCG.2019.2892415	IEEE	E8
1913	Teaching Multidisciplinary Teams Requirements for Undergraduate Students: an Approach to Augmented Reality Software in Design Thinking Context	E. M. d. Almeida; E. F. Damasceno; A. L'Erário	2020	10.1109/FIE.2018.8658529	IEEE	E8
1914	Exploring the Use of Augmented Reality in a Kinesthetic Learning Application Integrated with an Intelligent Virtual Embodied Agent	M. Z. Iqbal; E. Mangina; A. G. Campbell	2020	10.1109/ISMAR-Adjunct.2019.00018	IEEE	E8
1915	Gesture-Based Manipulation of Virtual Terrains on an Augmented Reality Environment	A. A. Ribeiro; D. C. B. d. Oliveira; R. L. d. S. d. Silva	2020	10.1109/SVR.2017.9	IEEE	I1
1916	TTUI-SM: A New Specification Model for Tabletop Tangible User Interfaces	A. M. B. Dourado; L. C. Botega; R. B. Araújo	2020	10.1109/SVR.2014.30	IEEE	E8
1917	Where Does My Augmented Reality Learning Experience (ARLE) Belong? A Student and Teacher Perspective to Positioning ARLEs	N. Drljevi?; L. H. Wong; I. Boti?ki	2020	10.1109/TLT.2017.2690426	IEEE	E8
1918	User Perception of Robot's Role in Floor Projection-based Mixed-Reality Robotic Games	F. G. Pratticò; A. Cannavò; J. Chen; F. Lamberti	2020	10.1109/ISCE.2019.8901037	IEEE	E6

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1920	VPModel: High-Fidelity Product Simulation in a Virtual-Physical Environment	X. Min; W. Zhang; S. Sun; N. Zhao; S. Tang; Y. Zhuang	2020	10.1109/TVCG.2019.2932276	IEEE	E6
1921	SARIM: A gesture-based sound augmented reality interface for visiting museums	F. Z. Kaghat; A. Azough; M. Fakhour	2020	10.1109/ISACV.2018.8354050	IEEE	E6
1922	Telecommunications Field Operations Supported by Augmented Reality – a Systematic Review	G. Ferreira Dela Coleta; A. Cardoso; E. Afonso Lamounier Júnior; G. F. Mendes de Lima	2020	10.1109/SVR.2019.00028	IEEE	E8
1923	Spatial User Interfaces for Large-Scale Projector-Based Augmented Reality	M. R. Marner; R. T. Smith; J. A. Walsh; B. H. Thomas	2020	10.1109/MCG.2014.117	IEEE	E8
1924	User evaluations on form factors of tangible magic lenses	J. Oh; H. Hua	2020	10.1109/ISMAR.2006.297790	IEEE	E6
1925	Design and Preliminary Evaluation of a Touchless Interface for Manipulating Virtual Heritage Artefacts	G. Caggianese; L. Gallo; G. De Pietro	2020	10.1109/SITIS.2014.44	IEEE	E6
1926	The Virtual Mirror: A New Interaction Paradigm for Augmented Reality Environments	C. Bichlmeier; S. M. Heining; M. Feuerstein; N. Navab	2020	10.1109/TMI.2009.2018622	IEEE	I1
1927	Self-Guided Virtual Tour Using Augmented Reality	A. Kondlo; A. Henney; A. Bagula; O. Ajayi; L. Van Breda	2020	10.23919/ITUK50268.2020.9303209	IEEE	E8
1928	HIBEY: Hide the Keyboard in Augmented Reality	L. H. Lee; K. Yung Lam; Y. P. Yau; T. Braud; P. Hui	2020	10.1109/PERCOM.2019.8767420	IEEE	I1
1929	HiKeyb: High-Efficiency Mixed Reality System for Text Entry	H. Jiang; D. Weng; Z. Zhang; Y. Bao; Y. Jia; M. Nie	2020	10.1109/ISMAR-Adjunct.2018.00051	IEEE	E8
1930	Enhancing user experience through physical interaction in handheld Augmented Reality	Nivedha S.; Hemalatha S.	2020	10.1109/ICCCI.2015.7218127	IEEE	I1
1931	Revisiting Trends in Augmented Reality Research: A Review of the 2nd Decade of ISMAR (2008–2017)	K. Kim; M. Billinghurst; G. Bruder; H. B. Duh; G. F. Welch	2020	10.1109/TVCG.2018.2868591	IEEE	E6
1932	Senseboard: A Touchless Input Device for Hand Motion Detection	F. B. d. Medeiros; F. Davin; A. Barros; R. Dantas	2020	10.1109/SVR.2018.00008	IEEE	E8
1933	M2A: A Framework for Visualizing Information from Mobile Web to Mobile Augmented Reality	K. Y. Lam; L. Hang Lee; T. Braud; P. Hui	2020	10.1109/PERCOM.2019.8767388	IEEE	E8
1934	Performance Envelopes of in-Air Direct and Smartwatch Indirect Control for Head-Mounted Augmented Reality	D. Wolf; J. J. Dudley; P. O. Kristensson	2020	10.1109/VR.2018.8448289	IEEE	E8
1935	The House of Olbrich — An Augmented Reality tour through architectural history	J. Keil; M. Zollner; M. Becker; F. Wientapper; T. Engelke; H. Wuest	2020	10.1109/ISMAR-AMH.2011.6093651	IEEE	E8
1936	Evaluation of the educational potentials - interactive technologies applied to Cultural Heritage	A. Pagano; I. Cerato	2020	10.1109/DigitalHeritage.2015.7419516	IEEE	E8
1937	A Toolkit for Exploring Augmented Reality through Construction with Children	D. Brun; P. Ruer; C. Gouin-Vallerand; S. George	2020	10.1109/SVR.2018.00026	IEEE	E8
1938	Agents that talk and hit back: animated agents in augmented reality	I. Barakonyi; T. Psik; D. Schmalstieg	2020	10.1109/ISMAR.2004.11	IEEE	E8
1939	Comparing Different Performance Factors of Conventional VS Immersive Service Prototypes	A. R. Abdel Razek; C. van Husen; M. Pallot; S. Richir	2020	10.1109/ICE.2019.8792566	IEEE	E8

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1940	E-DUB-A: A Tangible Educational Resource Editor in Inclusive Classes	E. Preuss; L. Passerino; S. Baldassarri; V. R. Camargo; L. Kober de Almeida	2020	10.1109/ICALT.2019.00095	IEEE	E8
1941	Gain A New Perspective: Towards Exploring Multi-View Alignment in Mixed Reality	A. Martin-Gomez; J. Fotouhi; U. Eck; N. Navab	2020	10.1109/ISMAR50242.2020.00044	IEEE	E8
1942	Interaction techniques in mobile Augmented Reality: State-of-the-art	L. Ahmed; S. Hamdy; D. Hegazy; T. El-Arif	2020	10.1109/IntelCIS.2015.7397255	IEEE	E1
1943	Experiences with an AR evaluation test bed: Presence, performance, and physiological measurement	M. Gandy; R. Catrambone; B. MacIntyre; C. Alvarez; E. Eiriksdottir; M. Hilimire; B. Davidson; A. C. McLaughlin	2020	10.1109/ISMAR.2010.5643560	IEEE	E8
1944	Preliminary Evaluation of an Augmented Reality Collaborative Process Modelling System	E. Poppe; R. Brown; D. Johnson; J. Recker	2020	10.1109/CW.2012.18	IEEE	I1
1945	Body-Prop Interaction: Evaluation of Augmented Open Discs and Egocentric Body-Based Interaction	R. Khadka; A. Banic	2020	10.1109/VR.2019.8797684	IEEE	E6
1946	Leap Motion Performance in an Augmented Reality Workspace: Integrating Devices with an Interactive Platform	T. Wright; S. de Ribaupierre; R. Eagleson	2020	10.1109/MCE.2018.2816302	IEEE	I1
1947	CAViAR: Context Aware Visual Indoor Augmented Reality for a University Campus	B. A. Delail; L. Weruaga; M. J. Zemerly	2020	10.1109/WI-IAT.2012.99	IEEE	E8
1948	Quick viewpoint switching for manipulating virtual objects in hand-held augmented reality using stored snapshots	M. Sukan; S. Feiner; B. Tversky; S. Energin	2020	10.1109/ISMAR.2012.6402560	IEEE	I1
1949	Handheld AR games — A triarchic conceptual design framework	Y. Chang; R. K. C. Koh; H. Been-Lirn Duh	2020	10.1109/ISMAR-AMH.2011.6093653	IEEE	E8
1950	DVV: A Taxonomy for Mixed Reality Visualization in Image Guided Surgery	M. Kersten-Oertel; P. Jannin; D. L. Collins	2020	10.1109/TVCG.2011.50	IEEE	E8
1951	Urban Sketcher: Mixed Reality on Site for Urban Planning and Architecture	M. Sareika; D. Schmalstieg	2020	10.1109/ISMAR.2007.4538821	IEEE	E8
1952	A Tangible Spherical Proxy for Object Manipulation in Augmented Reality	D. Englmeier; J. Dörner; A. Butz; T. Höllerer	2020	10.1109/VR46266.2020.00041	IEEE	E6
1953	An infrastructure for realizing custom-tailored augmented reality user interfaces	W. Broll; I. Lindt; J. Ohlenburg; I. Herbst; M. Wittkamper; T. Novotny	2020	10.1109/TVCG.2005.90	IEEE	E6
1954	PUMAH: Pan-Tilt Ultrasound Mid-Air Haptics for Larger Interaction Workspace in Virtual Reality	T. Howard; M. Marchal; A. Lécuyer; C. Pacchierotti	2020	10.1109/TOH.2019.2963028	IEEE	E8
1955	Augmented Reality applications in Cultural Heritage: Technology or Content?	S. Tzima; G. Styliaras; A. Bassounas	2020	10.1109/IISA50023.2020.9284355	IEEE	E8
1956	Collocated AAR: Augmenting After Action Review with Mixed Reality	J. Quarles; S. Lampotang; I. Fischler; P. Fishwick; B. Lok	2020	10.1109/ISMAR.2008.4637335	IEEE	E8
1957	ARZombie: A mobile augmented reality game with multimodal interaction	D. Cordeiro; N. Correia; R. Jesus	2020		IEEE	E8
1958	Development of an interactive book with Augmented Reality for teaching and learning geometric shapes	T. G. Kirner; F. M. V. Reis; C. Kirner	2020		IEEE	E8
1959	Continuous natural user interface: Reducing the gap between real and digital world	N. Petersen; D. Stricker	2020	10.1109/ISMAR.2009.5336502	IEEE	I1
1960	Taxondroid: Design Interactive Application for Animal Taxonomy Learning Using Teen-Computer Interaction Approach	Y. Arifin; Hendra; R. P. Wibowo; O. Praditiya	2020	10.1109/TALE48000.2019.9225967	IEEE	E8

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1962	An interactive augmented reality coloring book	A. Clark; A. Dünser	2020	10.1109/3DUI.2012.6184168	IEEE	I1
1963	Face Commands - User-Defined Facial Gestures for Smart Glasses	K. Masai; K. Kunze; D. Sakamoto; Y. Sugiura; M. Sugimoto	2020	10.1109/ISMAR50242.2020.00064	IEEE	E8
1964	Model-Driven Development of an Augmented Reality-Based Application for English Language Teaching to Children between 9 and 12 Years Old	L. Rodríguez-Vizzuett; J. Guerrero-García; I. Olmos-Pineda; M. D. Lozano	2020	10.1109/CONTIE49246.2019.00011	IEEE	E6
1965	Square AR: Using Augmented Reality for Urban Planning	K. Anagnostou; P. Vlamos	2020	10.1109/VS-GAMES.2011.24	IEEE	E8
1966	Interaction Methods for Smart Glasses: A Survey	L. -H. Lee; P. Hui	2020	10.1109/ACCESS.2018.2831081	IEEE	E6
1967	Tangi: Tangible Proxies For Embodied Object Exploration And Manipulation In Virtual Reality	M. Feick; S. Bateman; A. Tang; A. Miede; N. Marquardt	2020	10.1109/ISMAR50242.2020.00042	IEEE	E8
1968	Using augmented reality virtual assistants to teach the traditional leather tanning process	G. Mações; W. Pimenta; E. Carvalho	2020		IEEE	E8
1969	Evaluating gesture-based augmented reality annotation	Y. S. Chang; B. Nuernberger; B. Luan; T. Höllerer	2020	10.1109/3DUI.2017.7893337	IEEE	I1
1970	Mixed Reality Humans: Evaluating Behavior, Usability, and Acceptability	A. Kotranza; B. Lok; A. Deladisma; C. M. Pugh; D. S. Lind	2020	10.1109/TVCG.2008.195	IEEE	E6
1971	Trends in augmented reality tracking, interaction and display: A review of ten years of ISMAR	Feng Zhou; H. B. Duh; M. Billinghurst	2020	10.1109/ISMAR.2008.4637362	IEEE	E8
1972	The book of Ellie: An interactive book for teaching the alphabet to children	E. Papadaki; X. Zabulis; S. Ntoa; G. Margetis; P. Koutlemanis; P. Karamaounas; C. Stephanidis	2020	10.1109/ICMEW.2013.6618341	IEEE	E6
1973	CollaboVR: A Reconfigurable Framework for Creative Collaboration in Virtual Reality	Z. He; R. Du; K. Perlin	2020	10.1109/ISMAR50242.2020.00082	IEEE	E6
1974	AREEF Multi-player Underwater Augmented Reality experience	L. Oppermann; L. Blum; Jun-Yeong Lee; Jung-Hyub Seo	2020	10.1109/IGIC.2013.6659137	IEEE	E8
1975	HydrogenAR: Interactive Data-Driven Presentation of Dispenser Reliability	M. Whitlock; D. A. Szafir; K. Gruchalla	2020	10.1109/ISMAR50242.2020.00101	IEEE	E8
1976	A virtual holographic display case for museum installations	M. Chessa; M. Garibotti; V. Rossi; A. Novellino; F. Solari	2020		IEEE	E8
1977	Supporting SMEs towards adopting mixed reality : A training concept to bring the reality-virtuality continuum into application	L. Büth; M. Juraschek; G. Posselt; C. Herrmann	2020	10.1109/INDIN.2018.8471990	IEEE	E8
1978	Augmented reality experiments with industrial robot in industry 4.0 environment	I. Malý; D. Sedlá?ek; P. Leitão	2020	10.1109/INDIN.2016.7819154	IEEE	I1
1979	Volumetric Display for Augmented Reality	R. Sidharta; A. Hiyama; T. Tanikawa; M. Hirose	2020	10.1109/ICAT.2007.17	IEEE	E8
1980	Comparative Effectiveness of Mixed Reality-Based Virtual Environments in Collaborative Design	X. Wang; P. S. Dunston	2020	10.1109/TSMCC.2010.2093573	IEEE	E8
1981	Toward Mixed Reality Hybrid Objects with IoT Avatar Agents	A. Morris; J. Guan; N. Lessio; Y. Shao	2020	10.1109/SMC42975.2020.9282914	IEEE	E8

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1982	Personal Augmented Reality for Information Visualization on Large Interactive Displays	P. Reipschlager; T. Flemisch; R. Dachselt	2020	10.1109/TVCG.2020.3030460	IEEE	E8
1983	FingerTouch: Touch Interaction Using a Fingernail-Mounted Sensor on a Head-Mounted Display for Augmented Reality	J. Y. Oh; J. Park; J. Park	2020	10.1109/ACCESS.2020.2997972	IEEE	E6
1984	Augmented Reality Exposure Therapy with Tactile Feedback for Small Animal Phobia : Hardware Concept and User Study Design	M. Kurscheidt; V. Ostapchuck; F. Sottek; S. F. Rauh; G. Meixner	2020	10.1109/ICHI.2019.8904800	IEEE	E8
1985	Using Semantics to Automatically Generate Speech Interfaces for Wearable Virtual and Augmented Reality Applications	F. Lamberti; F. Manuri; G. Paravati; G. Piumatti; A. Sanna	2020	10.1109/THMS.2016.2573830	IEEE	E8
1986	Application of low-cost 3D scanning technologies to the development of educational augmented reality content	J. D. Camba; A. B. De Leon; J. de la Torre; J. L. Saorín; M. Contero	2020	10.1109/FIE.2016.7757673	IEEE	E8
1987	Combining Wearable Finger Haptics and Augmented Reality: User Evaluation Using an External Camera and the Microsoft HoloLens	L. Meli; C. Pacchierotti; G. Salvietti; F. Chinello; M. Maisto; A. De Luca; D. Prattichizzo	2020	10.1109/LRA.2018.2864354	IEEE	E6
1988	Eyes-free Target Acquisition During Walking in Immersive Mixed Reality	Q. Zhou; D. Yu; M. N. Reinoso; J. Newn; J. Goncalves; E. Velloso	2020	10.1109/TVCG.2020.3023570	IEEE	E8
1989	Wearable Smartphone: Wearable Hybrid Framework for Hand and Foot Gesture Interaction on Smartphone	Z. Lv	2020	10.1109/ICCVW.2013.64	IEEE	E6
1990	Development trend analysis of augmented reality system in educational applications	Y. Lai; J. Hsu	2020	10.1109/ICECENG.2011.6056941	IEEE	E6
1991	Cascading Hand and Eye Movement for Augmented Reality Videoconferencing	I. Barakonyi; H. Prendinger; D. Schmalstieg; M. Ishizuka	2020	10.1109/3DUI.2007.340777	IEEE	E8
1992	VoxAR: 3D Modelling Editor Using Real Hands Gesture for Augmented Reality	F. E. Fadzli; A. W. Ismail	2020	10.1109/ICSPC47137.2019.9067992	IEEE	I1
1993	Development of an interactive book with Augmented Reality for mobile learning	A. G. D. Corrêa; A. Tahira; J. B. Ribeir; R. K. Kitamura; T. Y. Inoue; I. K. Ficheman	2020		IEEE	E8
1994	Ubii: Physical World Interaction Through Augmented Reality	S. Lin; H. F. Cheng; W. Li; Z. Huang; P. Hui; C. Peylo	2020	10.1109/TMC.2016.2567378	IEEE	E6
1995	Virtual Character Animation Based on Affordable Motion Capture and Reconfigurable Tangible Interfaces	F. Lamberti; G. Paravati; V. Gatteschi; A. Cannavò; P. Montuschi	2020	10.1109/TVCG.2017.2690433	IEEE	E8
1996	InterViewR: A Mixed-Reality Based Interview Training Simulation Platform for Individuals with Autism	S. Ahmed; W. Deneke; V. Mai; A. Veneruso; M. Stepita; A. Dawson; B. Hoefel; G. Claeys; N. Lam; M. Sharmin	2020	10.1109/COMPSAC48688.2020.0-211	IEEE	E6
1997	Android mobile augmented reality application based on different learning theories for primary school children	B. Parhizkar; W. K. Obeidy; S. A. Chowdhury; Z. Mohana Gebril; M. N. A. Ngan; A. Habibi Lashkari	2020	10.1109/ICMCS.2012.6320114	IEEE	E8
1998	Augmented Reality-Based Simulators as Discovery Learning Tools: An Empirical Study	M. Ibáñez; Á. Di-Serio; D. Villarán-Molina; C. Delgado-Kloos	2020	10.1109/TE.2014.2379712	IEEE	E8
1999	Teaching electronegativity and dipole moment in a TUI	M. Fjeld; D. Hobi; L. Winterthaler; B. Voegtli; P. Juchli	2020	10.1109/ICALT.2004.1357659	IEEE	E6
2000	Tomb of a Sultan: A VR Digital Heritage Approach	Z. S. See; D. Santano; M. Sansom; C. H. Fong; H. Thwaites	2020	10.1109/DigitalHeritage.2018.8810083	IEEE	E8
2001	Implementation and Evaluation of Touch-based Interaction Using Electrovibration Haptic Feedback in Virtual Environments	L. Zhao; Y. Liu; D. Ye; Z. Ma; W. Song	2020	10.1109/VR46266.2020.00043	IEEE	E6
2002	A taxonomy of handheld augmented reality applications	T. Gjøsæter	2020	10.1109/IHCI.2012.6481781	IEEE	E8

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2004	Augmented Reality for Big Data Visualization: A Review	A. N. Ramaseri Chandra; F. El Jamiy; H. Reza	2020	10.1109/CSCI49370.2019.00238	IEEE	E8
2005	Experimental Study on Augmented Reality Potentials in Urban Design	X. Wang; R. Chen; Y. Gong; Y. Hsieh	2020	10.1109/IV.2007.146	IEEE	E8
2006	A pilot study for Augmented Reality supported procedure guidance to operate payload racks on-board the International Space Station	D. Markov-Vetter; O. Staadt	2020	10.1109/ISMAR.2013.6671832	IEEE	E6
2007	A First-Person Mentee Second-Person Mentor AR Interface for Surgical Telementoring	C. Lin; D. Andersen; V. Popescu; E. Rojas-Muñoz; M. E. Cabrera; B. Mullis; B. Zarzaur; K. Anderson; S. Marley; J. Wachs	2020	10.1109/ISMAR-Adjunct.2018.00021	IEEE	E8
2008	Bare-hand Depth Inpainting for 3D Tracking of Hand Interacting with Object	W. Cho; G. Park; W. Woo	2020	10.1109/ISMAR50242.2020.00048	IEEE	E8
2009	Mobile Augmented Reality Survey: From Where We Are to Where We Go	D. Chatzopoulos; C. Bermejo; Z. Huang; P. Hui	2020	10.1109/ACCESS.2017.2698164	IEEE	E6
2010	Computer-Assisted Culture Learning in an Online Augmented Reality Environment Based on Free-Hand Gesture Interaction	M. Yang; W. Liao	2020	10.1109/TLT.2014.2307297	IEEE	I1
2011	Voice Interaction for Augmented Reality Navigation Interfaces with Natural Language Understanding	J. Zhao; C. J. Parry; R. dos Anjos; C. Anslow; T. Rhee	2020	10.1109/IVCNZ51579.2020.9290643	IEEE	E8
2012	User-centered co-design and AGILE methodology for developing ambient assisting technologies: Study plan and methodological framework of the CAPTAIN project	F. Tessarolo; G. Nollo; V. Conotter; G. Onorati; E. I. Konstantinidis; D. Petsani; P. D. Bamidis	2020	10.1109/ISCE.2019.8901003	IEEE	E8
2013	Indoor Augmented Reality Using Deep Learning for Industry 4.0 Smart Factories	H. Subakti; J. Jiang	2020	10.1109/COMPSAC.2018.10204	IEEE	I1
2014	Development of an interactive artifact for cognitive rehabilitation based on augmented reality	C. Kirner; T. G. Kirner	2020	10.1109/ICVR.2011.5971837	IEEE	E6
2015	Feel the Globe: Enhancing the Perception of Immersive Spherical Visualizations with Tangible Proxies	D. Englmeier; I. Schönewald; A. Butz; T. Höllerer	2020	10.1109/VR.2019.8797869	IEEE	E8
2016	Universal Usability: Past, Present, and Future	G. Meiselwitz; B. Wentz; J. Lazar	2020		IEEE	E8
2017	A Survey of Augmented Reality	M. Billinghurst; A. Clark; G. Lee	2020		IEEE	E8
2018	A review of recent methodologies in English language content delivery	L. K. Cheng; F. Puteh; A. Selamat; F. bin Mohamed	2020	10.1109/IC3e.2015.7403507	IEEE	E8
2019	Mid-Air Haptic Algorithms for Rendering 3D Shapes	J. Martinez; A. Harwood; H. Limerick; R. Clark; O. Georgiou	2020	10.1109/HAVE.2019.8921211	IEEE	E8
2020	The use of multimedia, Augmented Reality (AR) and Virtual Environment (VE) in enhancing children's understanding of road safety	N. A. A. Bakar; A. N. Zulkifli; N. F. F. Mohamed	2020	10.1109/ICOS.2011.6079288	IEEE	E8
2021	A Mobile Mixed-Reality Environment for Children's Storytelling Using a Handheld Projector and a Robot	M. Sugimoto	2020	10.1109/TLT.2011.13	IEEE	E8
2022	Development of Mobile Learning Application Based on Augmented Reality with Index Card Match Method	W. Nur Hidayat; M. Akhsan Hakiki; M. Fajar Nashrullah; H. Elmunsyah; T. Atmadji Sutikno	2020	10.1109/ICOVET50258.2020.9229914	IEEE	E8
2023	Virtual and Augmented Reality supporting group consciousness within collaborative working environments	P. Antoniac; M. Pallot; P. Pulli	2020	10.1109/ICE.2006.7477065	IEEE	E8

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2025	Evaluating stereo vision and user tracking in mixed reality tasks!	A. Albarelli; A. Celentano; L. Cosmo	2020	10.1109/3DUI.2015.7131730	IEEE	I1
2026	Multithreaded Hybrid Feature Tracking for Markerless Augmented Reality	T. Lee; T. Hollerer	2020	10.1109/TVCG.2008.190	IEEE	I1
2027	Evaluating Future Automation Work in Process Plants with an Experience-Driven Science Fiction Prototype	T. Kymäläinen; E. Kaasinen; M. Aikala; J. Hakulinen; T. Heimonen; H. Paunonen; J. Ruotsalainen; L. Lehtikunnas; P. Mannonen	2020	10.1109/IE.2016.17	IEEE	E8
2028	Real-time adaptation of augmented-reality games for optimizing player satisfaction	G. N. Yannakakis; J. Hallam	2020	10.1109/CIG.2008.5035627	IEEE	E8
2029	Virtual Circuits: An Augmented Reality Circuit Simulator for Engineering Students	P. Lucas; D. Vaca; F. Domínguez; X. Ochoa	2020	10.1109/ICALT.2018.00097	IEEE	E8
2030	Exploring the Impact of Multimodal Adaptive Learning with Tangible Interaction on Learning Motivation	N. Chettaoui; A. Atia; M. S. Bouhlel	2020	10.1109/ICCES51560.2020.9334588	IEEE	E6
2031	Augmented Reality Go: Extending Traditional Game Play with Interactive Self-Learning Support	T. Iwata; T. Yamabe; T. Nakajima	2020	10.1109/RTCSA.2011.43	IEEE	E6
2032	Summo Sonic: Paper sumo wrestling system using voice vibration and AR technology	H. Suzuki; H. Sato; H. Hayami	2020	10.1109/VSMM.2017.8346275	IEEE	E8
2033	Interaction between players of mobile phone game with augmented reality (AR) interface	S. Koceski; N. Koceska	2020	10.1109/iUSEr.2011.6150574	IEEE	E8
2034	A Pervasive Augmented Reality Serious Game	F. Liarokapis; L. Macan; G. Malone; G. Rebolledo-Mendez; S. d. Freitas	2020	10.1109/VS-GAMES.2009.40	IEEE	E8
2035	Core-Task Design: A Practice-Theory Approach to Human Factors	L. Norros; P. Savioja; H. Koskinen	2020		IEEE	E2
2036	Psycho-stimulation for elderly people using puzzle game	B. G. Zapirain; A. M. Zorrilla; S. Larrañaga	2020	10.1109/ICEGIC.2010.5716903	IEEE	E8
2037	Withindows: A Framework for Transitional Desktop and Immersive User Interfaces	A. Hill; A. Johnson	2020	10.1109/3DUI.2008.4476584	IEEE	E8
2038	Recent Developments and Future Challenges in Medical Mixed Reality	L. Chen; T. W. Day; W. Tang; N. W. John	2020	10.1109/ISMAR.2017.29	IEEE	E8
2039	A qualitative usability evaluation of a mobile 3D-based environment controller	A. A. Nazari Shirehjini	2020	10.1049/cp:20070408	IEEE	E8
2040	An intelligent multimodal mixed reality real-time strategy game	S. Link; B. Barkschat; C. Zimmerer; M. Fischbach; D. Wiebusch; J. Lugrin; M. E. Latoschik	2020	10.1109/VR.2016.7504734	IEEE	I1
2041	Tangible User Interface for Homework for Children with Communication Disorders	J. Santos; L. M. T. Jesus; M. Vairinhos; J. Rodriguez	2020	10.23919/CISTI.2019.8760591	IEEE	E6
2042	A survey of AR systems and a case study of virtual keyboard based camera projector system	M. Karray; M. Krid; D. Sellami	2020	10.1109/IPAS.2016.7880150	IEEE	E8
2043	AR markerless game	S. Mubarak; K. Ahmed; J. Khan; M. N. A. Khan	2020	10.1109/ICISCT49550.2020.9080041	IEEE	E8
2044	Poster: MVCE - a design pattern to guide the development of next generation user interfaces	J. Stocklein; C. Geiger; V. Paelke; P. Pogscheba	2020	10.1109/3DUI.2009.4811232	IEEE	E8

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2045	When Augmented Reality meets Big Data	C. Bermejo; Z. Huang; T. Braud; P. Hui	2020	10.1109/ICDCSW.2017.62	IEEE	E8
2046	Tangible User Interfaces: Past, Present and Future Directions	O. Shaer; E. Hornecker	2020		IEEE	E8
2047	Hand Gesture Based Region Marking for Tele-Support Using Wearables	A. Gupta; S. Mohatta; J. Maurya; R. Perla; R. Hebbalaguppe; E. Hassan	2020	10.1109/CVPRW.2017.53	IEEE	I1
2048	Hybrid Tactile/Tangible Interaction for 3D Data Exploration	L. Besançon; P. Issartel; M. Ammi; T. Isenberg	2020	10.1109/TVCG.2016.2599217	IEEE	E6
2049	Advanced Medical Displays: A Literature Review of Augmented Reality	T. Sielhorst; M. Feuerstein; N. Navab	2020	10.1109/JDT.2008.2001575	IEEE	E8
2050	Augmented foam sculpting for capturing 3D models	M. R. Marner; B. H. Thomas	2020	10.1109/3DUI.2010.5444720	IEEE	E8
2051	Building AR-based Optical Experiment Applications in a VR Course	H. Wei; Y. Liu; Y. Wang	2020	10.1109/VR.2019.8797799	IEEE	E8
2052	The art of nurturing citizen scientists through mixed reality	C. Stapleton; E. Smith; C. E. Hughes	2020	10.1109/ISMAR.2005.58	IEEE	E8
2053	Competencies in maintenance management: The iLearn2Main tools for training and competence assessment	C. Emmanouilidis; P. Pistofidis; N. Papathanassiou; A. Labid	2020	10.1109/EDUCON.2011.5773261	IEEE	E8
2054	Bringing online shopping experience to offline retail through augmented reality and RFID	Z. Rashid; E. Peig; R. Pous	2020	10.1109/IOT.2015.7356547	IEEE	E8
2055	Through-Walls Collaboration	W. Piekarski; B. H. Thomas	2020	10.1109/MPRV.2009.59	IEEE	E8
2056	Jointly Optimizing Sensing Pipelines for Multimodal Mixed Reality Interaction	D. Rathnayake; A. de Silva; D. Puwakdandawa; L. Meegahapola; A. Misra; I. Perera	2020	10.1109/MASS50613.2020.00046	IEEE	E8
2057	Evaluating usability of amplified head rotations on base-to-final turn for flight simulation training devices	L. L. Ngoc; R. S. Kalawsky	2020	10.1109/VR.2013.6549359	IEEE	E8
2058	VAL: Visually Augmented Laser cutting to enhance and support creativity	K. Winge; R. Haugaard; T. Merritt	2020	10.1109/ISMAR-AMH.2014.6935435	IEEE	E8
2059	Extended Workspace Using a Smartphone with a Depth Camera	M. Miyazaki; T. Komuro	2020	10.1109/ISMAR-Adjunct.2018.00046	IEEE	I1
2060	Implementation of god-like interaction techniques for supporting collaboration between outdoor AR and indoor tabletop users	A. Stafford; W. Piekarski; B. H. Thomas	2020	10.1109/ISMAR.2006.297809	IEEE	E8
2061	Exploring players' user experience in a high-embodied virtual reality game	W. Huang	2020	10.1109/GEM.2019.8902148	IEEE	E6
2062	Virtual-Physical Interaction System	X. Min; S. Sun; W. Zhang; C. Chao	2020	10.1109/ICVRV.2018.00056	IEEE	E8
2063	HGR: Hand-Gesture-Recognition Based Text Input Method for AR/VR Wearable Devices	N. Nooruddin; R. Dembani; N. Maitlo	2020	10.1109/SMC42975.2020.9283348	IEEE	E8
2064	Extending touch-less interaction on vision based wearable device	Z. Lv; S. Feng; L. Feng; H. Li	2020	10.1109/VR.2015.7223380	IEEE	I1
2065	Augmented Reality versus Virtual Reality for 3D Object Manipulation	M. Krichenbauer; G. Yamamoto; T. Taketom; C. Sandor; H. Kato	2020	10.1109/TVCG.2017.2658570	IEEE	E8

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2067	Graphical Menus Using a Mobile Phone for Wearable AR Systems	H. Lee; D. Kim; W. Woo	2020	10.1109/ISUVR.2011.23	IEEE	I1
2068	Effects of Viewing Conditions and Rotation Methods in a Collaborative Tabletop AR Environment	S. Lee; H. Hua	2020	10.1109/TVCG.2011.49	IEEE	E8
2069	New imaging frontiers: 3D and mixed reality	E. Badique	2020	10.1109/TDPVT.2002.1024074	IEEE	E8
2070	Tangible User Interfaces to Digitalize Real Environments	E. de la Guia; M. D. Lozano; V. M. R. Penichet	2020	10.1109/TLA.2015.7404938	IEEE	E6
2071	TangiNet: A Tangible User Interface System for Teaching the Properties of Network Cables	D. Gajadur; G. Bekaroo	2020	10.1109/NEXTCOMP.2019.8883538	IEEE	E8
2072	Augmented Interface for Children Chinese Learning	C. Chen; C. C. Su; P. Lee; F. Wu	2020	10.1109/ICALT.2007.76	IEEE	E8
2073	Values derived from virtual reality shopping experience among generation Z	K. Kapusy; E. Lógó	2020	10.1109/CogInfoCom.2017.8268249	IEEE	E8
2074	A Comparative Analysis of 3D User Interaction: How to Move Virtual Objects in Mixed Reality	H. J. Kang; J. Shin; K. Ponto	2020	10.1109/VR46266.2020.00047	IEEE	E6
2075	Sound and tangible interface for shape evaluation and modification	M. Bordegoni; F. Ferrise; S. Shelley; M. A. Alonso; D. Hermes	2020	10.1109/HAVE.2008.4685315	IEEE	E8
2076	Haptic based augmented reality simulator for training clinical breast examination	M. Solanki; V. Raja	2020	10.1109/IECBES.2010.5742241	IEEE	E8
2077	Drawing outside the lines: Tracking-based gesture interaction in mobile augmented entertainment	W. Hürst; R. Poppe; J. van Angeren	2020		IEEE	E8
2078	How Does Usability Impact Motivation in Augmented Reality Serious Games for Education?	V. Ferrer; A. Perdomo; H. Rashed-Ali; C. Fies; J. Quarles	2020	10.1109/VS-GAMES.2013.6624233	IEEE	E6
2079	TACTUS: An Intuitive and Tangible Framework for Composing IOT Services	M. Alessi; A. Camilló; E. Giangreco; M. Pinnella; S. Pino; D. Storelli	2020		IEEE	E8
2080	MyoKey: Surface Electromyography and Inertial Motion Sensing-based Text Entry in AR	Y. D. Kwon; K. A. Shatilov; L. -H. Lee; S. Kumyol; K. -Y. Lam; Y. -P. Yau; P. Hui	2020	10.1109/PerComWorkshops48775.2020.9156084	IEEE	E8
2081	Clickable augmented documents	S. Martedi; H. Uchiyama; H. Saito	2020	10.1109/MMSP.2010.5662012	IEEE	I1
2082	Annotation vs. Virtual Tutor: Comparative Analysis on the Effectiveness of Visual Instructions in Immersive Virtual Reality	H. Lee; H. Kim; D. V. Monteiro; Y. Goh; D. Han; H. -N. Liang; H. S. Yang; J. Jung	2020	10.1109/ISMAR.2019.00030	IEEE	E8
2083	Mining Virtual Reality Nuggets: A Pattern-Based Approach for Creating Virtual Reality Content Based on Microlearning Methodology	R. Horst; R. Dörner	2020	10.1109/TALE48000.2019.9225867	IEEE	E8
2084	Hybrid PS-V Technique: A Novel Sensor Fusion Approach for Fast Mobile Eye-Tracking With Sensor-Shift Aware Correction	I. Rigas; H. Raffle; O. V. Komogortsev	2020	10.1109/JSEN.2017.2762704	IEEE	E8
2085	Mixed Reality for Museum Experiences: A Co-Creative Tactile-immersive Virtual Coloring Serious Game	K. Antlej; B. Horan; M. Mortimer; R. Leen; M. Allaman; P. Vickers-Rich; T. Rich	2020	10.1109/DigitalHeritage.2018.8810060	IEEE	E8

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2087	Multisensory musical entertainment systems	Zhiying Zhou; A. D. Cheok; Wei Liu; Xiangdong Chen; Farzam Farbiz; Xubo Yang; M. Haller	2020	10.1109/MMUL.2004.13	IEEE	E8
2088	Magic Lenses for augmented virtual environments	L. D. Brown; H. Hua	2020	10.1109/MCG.2006.84	IEEE	E8
2089	Spaces of Interaction, Places for Experience: Places for Experience	D. Benyon	2020		IEEE	E2
2090	Accessible Augmented Reality to support chemistry teaching	G. H. Paciulli; Y. C. de Lima; M. T. Faccin; M. Amelia Eliseo	2020	10.1109/LACLO50806.2020.9381132	IEEE	E8
2091	A Situative Space Model for Mobile Mixed-Reality Computing	T. Pederson; L. Janlert; D. Surie	2020	10.1109/MPRV.2010.51	IEEE	E8
2092	Mixed-Reality Robotic Games: Design Guidelines for Effective Entertainment With Consumer Robots	F. G. Pratticò; F. Lamberti	2020	10.1109/MCE.2020.2988578	IEEE	E8
2093	Design of a home-based adaptive mixed reality rehabilitation system for stroke survivors	M. Baran; N. Lehrer; D. Siwiak; Y. Chen; M. Duff; T. Ingalls; T. Rikakis	2020	10.1109/IEMBS.2011.6091874	IEEE	E8
2094	Repetitive Drag & Drop of AR Objects: A Pilot Study	G. Barresi; D. Mazzanti; D. Caldwell; A. Brogni	2020	10.1109/CISIS.2014.99	IEEE	E8
2095	A Survey of Mid-Air Ultrasound Haptics and Its Applications	I. Rakkolainen; E. Freeman; A. Sand; R. Raisamo; S. Brewster	2020	10.1109/TOH.2020.3018754	IEEE	E7
2096	User Experience Analysis in Industry 4.0 - The Use of Biometric Devices in Engineering Design and Manufacturing	Y. Borgianni; E. Rauch; L. Maccioni; B. G. Mark	2020	10.1109/IEEM.2018.8607367	IEEE	E8
2097	Towards the Next Generation of Learning Environments: An InterReality Learning Portal and Model	A. Peña-Ríos; V. Callaghan; M. Gardner; M. J. Alhaddad	2020	10.1109/IE.2012.31	IEEE	E8
2098	Evaluation of a distributed collaborative workspace as a creativity tool in the context of design education	G. Salvador; M. Bañó; M. Contero; J. Camba	2020	10.1109/FIE.2014.7044144	IEEE	E8
2099	Intermediation Family: Workspace for Sharing Spatial Design among Multiple Users	K. Tanaka; M. Mikawa; M. Fujisawa	2020	10.1109/CW49994.2020.00016	IEEE	E6
2100	Analysis of XR Research in Brazil from 21 Years of SVR Publications	J. M. Teixeira; F. F. F. Peres	2020	10.1109/SVR51698.2020.00043	IEEE	E8
2101	IntelliPupil: Pupillometric Light Modulation for Optical See-Through Head-Mounted Displays	C. Liu; A. Plopski; K. Kiyokawa; P. Ratsamee; J. Orlosky	2020	10.1109/ISMAR.2018.00037	IEEE	E8
2102	Lossless Multitasking: Using 3D Gestures Embedded in Mouse Devices	J. Franz; A. Menin; L. Nedel	2020	10.1109/SVR.2016.27	IEEE	E8
2103	Voxar puzzle motion: an innovative ar application proposed using design techniques	R. A. Roberto; M. M. O. da Silva; D. Q. Freitas; Y. C. C. A. Lima; V. E. M. Silva; C. C. Araujo; J. M. X. N. Teixeira; V. Teichrieb	2020	10.1109/KELVAR.2016.7563676	IEEE	E8
2104	Accessibility of Immersive Serious Games for Persons with Cognitive Disabilities	P. Guitton; H. Sauzéon; P. Cinquin	2020	10.1109/ISMAR-Adjunct.2019.00051	IEEE	E8
2105	Mixed Reality Tabletop Gameplay: Social Interaction with a Virtual Human Capable of Physical Influence	M. Lee; N. Norouzi; G. Bruder; P. Wisniewski; G. Welch	2020	10.1109/TVCG.2019.2959575	IEEE	E8
2106	Exploring Visual Techniques for Boundary Awareness During Interaction in Augmented Reality Head-Mounted Displays	W. Xu; H. Liang; Y. Chen; X. Li; K. Yu	2020	10.1109/VR46266.2020.00039	IEEE	E6

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2107	DXR: A Toolkit for Building Immersive Data Visualizations	R. Sicat; J. Li; J. Choi; M. Cordeil; W. -K. Jeong; B. Bach; H. Pfister	2020	10.1109/TVCG.2018.2865152	IEEE	E8
2108	Gaze Modulated Disambiguation Technique for Gesture Control in 3D Virtual Objects Selection	S. Deng; J. Chang; S. Hu; J. J. Zhang	2020	10.1109/CYBConf.2017.7985779	IEEE	E8
2109	Digital Music Performance for Mobile Devices Based on Magnetic Interaction	H. Ketabdar; A. Haji-Abolhassani; K. A. Yuksel; I. Kehribar; A. Ercil	2020	10.1109/TIM.2011.2164283	IEEE	E8
2110	User-Evaluated Gestures for Touchless Interactions from a Distance	W. Fikkert; P. v. d. Vet; A. Nijholt	2020	10.1109/ISM.2010.30	IEEE	E8
2111	Is there a reality in Industrial Augmented Reality?	P. Fite-Georgel	2020	10.1109/ISMAR.2011.6092387	IEEE	E6
2112	Spatial Presence, Performance, and Behavior between Real, Remote, and Virtual Immersive Environments	N. Khenak; J. Vézien; P. Bourdot	2020	10.1109/TVCG.2020.3023574	IEEE	E8
2113	Cross-dimensional gestural interaction techniques for hybrid immersive environments	H. Benko; E. W. Ishak; S. Feiner	2020	10.1109/VR.2005.1492776	IEEE	E8
2114	SurfaceVox - Exploring Sound Control for Gesture-Tracking Interactive Surfaces	A. Braun; M. Majewski; J. Loge; F. Kirchbuchner; A. Kuijper	2020	10.1109/SITIS.2018.00113	IEEE	E8
2115	Interaction Paradigms Versus Age-Related User Profiles: an Evaluation on Content Selection	D. Carvalho; M. Bessa; L. Magalhaes; E. Carrapatoso	2020	10.1109/TLA.2015.7055575	IEEE	E6
2116	V-Touch: Markerless laser-based interactive surface	C. R. Dikovita; D. P. Abeysooriya	2020	10.1109/ICTer.2013.6761186	IEEE	E8
2117	Collaborative Mixed Reality Exposure Therapy	H. Regenbrecht; D. Wickeroth; B. Dixon; S. Mueller	2020	10.1109/CW.2006.19	IEEE	E8
2118	Synchronous location-aware media and augmented visualization for real world tourist (SMART): An application for Khalifatabad heritage site, Bagerhat, Bangladesh	H. Rahaman; A. B. Biswas; S. M. Nazimuddin; M. E. Rahman; M. R. Khan	2020	10.1109/VSMM.2016.7863159	IEEE	E8
2119	Comparison of Multimodal Heading and Pointing Gestures for Co-Located Mixed Reality Human-Robot Interaction	D. Krupke; F. Steinicke; P. Lubos; Y. Jonetzko; M. Görner; J. Zhang	2020	10.1109/IROS.2018.8594043	IEEE	E8
2120	Multimodal user interaction framework for e-commerce	S. Hewawalpita; I. Perera	2020	10.23919/SCSE.2019.8842815	IEEE	E8
2121	PhoneCursor: Improving 3D Selection Performance With Mobile Device in AR	M. Sun; M. Cao; L. Wang; Q. Qian	2020	10.1109/ACCESS.2020.2986037	IEEE	E6
2122	Virtual stomach visualization and a stomach tumor detection system	J. Harischandra; U. Perera	2020	10.1109/IECBES.2012.6498053	IEEE	I1
2123	Immersive Analytics	T. Chandler; M. Cordeil; T. Czauderna; T. Dwyer; J. Glowacki; C. Goncu; M. Klapperstueck; K. Klein; K. Marriott; F. Schreiber; E. Wilson	2020	10.1109/BDVA.2015.7314296	IEEE	E6
2124	Future Virtual Heritage - Techniques	J. Rogers; M. A. Schnabel; T. Jacob Moleta	2020	10.1109/DigitalHeritage.2018.8810119	IEEE	E8
2125	5G Service Value Chain and Network Slicing Framework Using Ecosystem Modeling, Agile Delivery, and User-Story Automation	M. U. Alhuseini; M. M. Olama	2020	10.1109/ACCESS.2019.2933193	IEEE	E8
2126	A fulldome interactive visitor experience a novel approach to delivering interactive virtual heritage experiences to group audiences in fulldome	J. Tredinnick; P. Richens	2020	10.1109/DigitalHeritage.2015.7413919	IEEE	E8

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	projection spaces, evaluated through spatial awareness and emotional response					
2127	Pattern independent fiducial marker detection for an interactive public display	M. H. M. Hamzeen; M. U. S. Perera	2020	10.1109/ICTer.2011.6075026	IEEE	E8
2128	Toward a Digital Ecosystem: International Symposium on Ubiquitous Virtual Reality 2010	H. Yoon; A. v. d. Hengel; G. Reitmayr; J. Lifton; S. Lee; W. Woo	2020	10.1109/MPRV.2011.35	IEEE	E8
2129	Visualization of Software Architectures in Virtual Reality and Augmented Reality	A. Schreiber; L. Nafeie; A. Baranowski; P. Seipel; M. Misiak	2020	10.1109/AERO.2019.8742198	IEEE	E8
2130	Furniture layout AR application using floor plans based on planar object tracking	T. Fuji; Y. Mitsukura; T. Moriya	2020	10.1109/ROMAN.2012.6343828	IEEE	E8
2131	Songverse: A Music-Loop Authoring Tool Based on Virtual Reality	W. Costa; L. Ananias; I. Barbosa; B. Barbosa; A. De' Carli; R. R. Barioni; L. Figueiredo; V. Teichrieb; D. Filgueira	2020	10.1109/SVR.2019.00046	IEEE	E6
2132	Geometrically-Correct Projection-Based Texture Mapping onto a Deformable Object	Y. Fujimoto; R. T. Smith; T. Taketomi; G. Yamamoto; J. Miyazaki; H. Kato; B. H. Thomas	2020	10.1109/TVCG.2014.25	IEEE	E8
2133	Virtual multi-tools for hand and tool-based interaction with life-size virtual human agents	A. Kotranza; K. Johnsen; J. Cendan; B. Miller; D. S. Lind; B. Lok	2020	10.1109/3DUI.2009.4811201	IEEE	E6
2134	A Proposed Research Framework and Model for Service Prototyping	A. R. A. Razek; C. Van Husen; M. Pallot; S. Richir	2020	10.1109/ICE.2018.8436359	IEEE	E8
2135	Augmented Reality for Rehabilitation of Cognitive Disabled Children: A Preliminary Study	E. Richard; V. Billaudeau; P. Richard; G. Gaudin	2020	10.1109/ICVR.2007.4362148	IEEE	E8
2136	Pen-based Interaction with Spreadsheets in Mobile Virtual Reality	T. Gesslein; V. Biener; P. Gagel; D. Schneider; P. O. Kristensson; E. Ofek; M. Pahud; J. Grubert	2020	10.1109/ISMAR50242.2020.00063	IEEE	E6
2137	Systems Engineering Approach to Medical Automation	M. Alwan	2020		IEEE	E2
2138	AR in the Computer Programming Classroom: A Review of the Literature	K. Larson; R. Chambers	2020	10.1109/TALE48869.2020.9368329	IEEE	E8
2139	Design and implementation of a wearable, context-aware MR framework for the Chloe@University application	X. Righetti; A. Peternier; M. Hopmann; D. Thalmann	2020	10.1109/ETFA.2008.4638576	IEEE	E8
2140	A Smart Environment for Children with Autism	M. Tentori; L. Escobedo; G. Balderas	2020	10.1109/MPRV.2015.22	IEEE	E8
2141	The Perceptive Workbench: toward spontaneous and natural interaction in semi-immersive virtual environments	B. Leibe; T. Starner; W. Ribarsky; Z. Wartell; D. Krum; B. Singletary; L. Hodges	2020	10.1109/VR.2000.840358	IEEE	E8
2142	Mixed-Granularity Human-Swarm Interaction	J. Patel; Y. Xu; C. Pinciroli	2020	10.1109/ICRA.2019.8793261	IEEE	E8
2143	An inclusive approach for home environment design	M. Mengoni; S. Ceccacci; D. Raponi	2020	10.1109/MESA.2014.6935594	IEEE	E8
2144	A User-Centered Framework for Designing Midair Gesture Interfaces	A. E. Uva; M. Fiorentino; V. M. Manghisi; A. Boccaccio; S. Debernardis; M. Gattullo; G. Monno	2020	10.1109/THMS.2019.2919719	IEEE	I1
2145	Evaluating geometrical properties of virtual shapes using interactive sonification	M. Alonso; S. Shelley; D. Hermes; A. Kohlrausch	2020	10.1109/HAVE.2008.4685316	IEEE	E8
2146	Effects of viewing conditions and rotation methods in a collaborative tabletop AR environment	S. Lee; H. Hua	2020	10.1109/VR.2010.5444794	IEEE	E8

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2148	A foresight strategy proposal for ICT scenarios definitions: An application for PLM tools and systems	A. Corallo; M. Lazoi; G. De Marco; N. C. Greco; M. Manna; C. Pascarelli	2020	10.1109/ICE.2014.6871548	IEEE	E8
2149	A Kinesthetic Approach to Digital Heritage Using Leap Motion: The Cycladic Sculpture Application	S. Vosinakis; P. Koutsabasis; D. Makris; E. Sagia	2020	10.1109/VS-GAMES.2016.7590334	IEEE	I1
2150	Slicing-Volume: Hybrid 3D/2D Multi-target Selection Technique for Dense Virtual Environments	R. A. Montano-Murillo; C. Nguyen; R. H. Kazi; S. Subramanian; S. DiVerdi; D. Martinez-Plasencia	2020	10.1109/VR46266.2020.00023	IEEE	E8
2151	Design space for spatio-data coordination: Tangible interaction devices for immersive information visualisation	M. Cordeil; B. Bach; Yongchao Li; E. Wilson; T. Dwyer	2020	10.1109/PACIFICVIS.2017.8031578	IEEE	E8
2152	RadarTHEREMIN - Creating musical expressions in a virtual studio environment	B. Wöldecke; D. Marinos; P. Pogscheba; C. Geiger; J. Herder; T. Schwirten	2020	10.1109/ISVRI.2011.5759671	IEEE	E8
2153	A Virtual Environment for Drone Pilot Training Using VR Devices	G. R. Postal; W. Pavan; R. Rieder	2020	10.1109/SVR.2016.39	IEEE	E6
2154	Above Surface Interaction for Multiscale Navigation in Mobile Virtual Reality	T. Menzner; T. Gesslein; A. Otte; J. Grubert	2020	10.1109/VR46266.2020.00057	IEEE	E6
2155	Agile Systems with Reusable Patterns of Business Knowledge: A Component-Based Approach	A. Gupta; A. Mitra	2020		IEEE	E2
2156	Experience design, interactive art environments and the sense of becoming	S. Mytilinaiou; K. Cham; C. Hutchison	2020	10.1109/ISMAR-AMH.2011.6093662	IEEE	E8
2157	Interactive Technologies for Autism: A Review	J. A. Kientz; M. Goodwin; G. R. Hayes; G. D. Abowd	2020		IEEE	E8
2158	MovExp: A Versatile Visualization Tool for Human-Computer Interaction Studies with 3D Performance and Biomechanical Data	G. Palmas; M. Bachynskyi; A. Oulasvirta; H. Seidel; T. Weinkauf	2020	10.1109/TVCG.2014.2346311	IEEE	E8
2159	Comfortable Immersive Analytics With the VirtualDesk Metaphor	J. A. W. Filho; C. M. D. S. Freitas; L. Nedel	2020	10.1109/MCG.2019.2898856	IEEE	E6
2160	6 Improving User Experience in Virtual Reality	no authors	2020		IEEE	E8
2161	Antsworld - a Tangible Interface for an Interactive Ant Foraging Simulator	M. Yildirim; D. Tinapple	2020	10.1109/VS-GAMES.2013.6624221	IEEE	E8
2162	Editing the Visual Properties of Collaborative KJ Diagram Decoration by User-Defined Handwritten Gestures	T. Nyu; M. Miura	2020	10.1109/WMUTE.2012.49	IEEE	E8
2163	A hand and wrist detection method for unobtrusive hand gesture interactions using HMD	J. Y. Oh; J. Lee; J. H. Lee; J. H. Park	2020	10.1109/ICCE-Asia.2016.7804805	IEEE	I1
2164	VisAr3D: An Innovative 3D Visualization of UML Models	C. S. C. Rodrigues; C. M. L. Werner; L. Landau	2020		IEEE	E8
2165	XR-Cockpit: a comparison of VR and AR solutions on an interactive training station	A. Caputo; S. Jacota; S. Krayevskyy; M. Pesavento; F. Pellacini; A. Giachetti	2020	10.1109/ETFA46521.2020.9212043	IEEE	E8
2166	Economic and organizational effects of business ICT systems' evolution in oil and energy sector	S. Aksentijevi?; E. Tijan; B. Hla?a	2020		IEEE	E8
2167	TaggingCreaditor: A tool to create and share content for location-based games for learning	C. Sintoris; N. Yiannoutsou; A. Ortega-Arranz; R. López-Romero; M. Masoura; N. Avouris; Y. Dimitriadis	2020	10.1109/IMCTL.2014.7011148	IEEE	E8

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2168	Rock or Roll – Locomotion Techniques with a Handheld Spherical Device in Virtual Reality	D. Englmeier; F. Fan; A. Butz	2020	10.1109/ISMAR50242.2020.00089	IEEE	E6
2169	On the Role of Presence in Mixed Reality	I. Wagner; W. Broll; G. Jacucci; K. Kuutii; R. McCall; A. Morrison; D. Schmalstieg; J. Terrin	2020	10.1162/pres.18.4.249	IEEE	E8
2170	Virtual museums and audience studies: the case of “Keys To Rome” exhibition	A. Pagano; G. Armone; E. De Sanctis	2020	10.1109/DigitalHeritage.2015.7413905	IEEE	E8
2171	Usability of Multi-Scale Interfaces for 3D Workbench Displays	J. Oh; H. Hua	2020	10.1162/pres.17.5.415	IEEE	E6
2172	Metaphoric Hand Gestures for Orientation-Aware VR Object Manipulation With an Egocentric Viewpoint	Y. Jang; I. Jeon; T. Kim; W. Woo	2020	10.1109/THMS.2016.2611824	IEEE	E8
2173	Menus on the Desk? System Control in DeskVR	D. Zielasko; M. Krüger; B. Weyers; T. W. Kuhlen	2020	10.1109/VR.2019.8797900	IEEE	E8
2174	A Digital Board Game Based Learning System for Authentic Learning	K. Chen; C. Wu; G. Chen	2020	10.1109/ICALT.2011.16	IEEE	E8
2175	Spiral, a new interaction technique for 3DOF with only one finger: Concepts and preliminary tests	D. Bertolo; B. Martin; R. Vivian; S. Guilhaumon; G. Hoenen	2020	10.1109/SAI.2017.8252153	IEEE	E8
2176	Touch the Wall: Comparison of Virtual and Augmented Reality with Conventional 2D Screen Eye-Hand Coordination Training Systems	A. U. Batmaz; A. K. Mutasim; M. Malekmakan; E. Sadr; W. Stuerzlinger	2020	10.1109/VR46266.2020.00037	IEEE	E8
2177	Analysis of direct selection in head-mounted display environments	P. Lubos; G. Bruder; F. Steinicke	2020	10.1109/3DUI.2014.6798834	IEEE	E8
2178	A haptic feedback driver-vehicle interface for controlling lateral and longitudinal motions of autonomous vehicles	U. E. Manawadu; M. Kamezaki; M. Ishikawa; T. Kawano; S. Sugano	2020	10.1109/AIM.2016.7576753	IEEE	E8
2179	UnityMol: interactive and ludic visual manipulation of coarse-grained RNA and other biomolecules	S. Doutreligne; C. Gageat; T. Cragnolini; A. Taly; S. Pasquali; P. Derreumaux; M. Baaden	2020	10.1109/VARMS.2015.7151718	IEEE	E8
2180	Characterizing Visual Programming Approaches for End-User Developers: A Systematic Review	M. A. Kuhail; S. Farooq; R. Hammad; M. Bahja	2020	10.1109/ACCESS.2021.3051043	IEEE	E8
2181	Design and Evaluation of a Real-World Virtual Environment for Architecture and Urban Planning	G. Drettakis; M. Roussou; A. Reche; N. Tsingos	2020	10.1162/pres.16.3.318	IEEE	E6
2182	Engaging and shared gesture-based interaction for museums the case study of K2R international expo in Rome	B. Fanini; E. d'Annibale; E. Demetrescu; D. Ferdani; A. Pagano	2020	10.1109/DigitalHeritage.2015.7413880	IEEE	E8
2183	A gaming approach in physical therapy for facial nerve paralysis patient	T. Tasneem; A. Shome; S. K. A. Hossain	2020	10.1109/ICCITechn.2014.6997334	IEEE	E8
2184	GeoMaps: An interactive application to enhance map comprehension skills of students	A. Rane; V. N. John; S. Murthy	2020	10.1109/ICALT49669.2020.00083	IEEE	E6
2185	There Is No Spoon: Evaluating Performance, Space Use, and Presence with Expert Domain Users in Immersive Analytics	A. Batch; A. Cunningham; M. Cordeil; N. Elmqvist; T. Dwyer; B. H. Thomas; K. Marriott	2020	10.1109/TVCG.2019.2934803	IEEE	E8
2186	Learning Rubik's Cube through User Operation History	S. Ajisaka; S. Hara; M. Matsuchi; S. Luo; S. Yoshida; H. Xie; K. Miyata	2020	10.1109/NicoInt50878.2020.00015	IEEE	E8
2187	3D User Interfaces: New Directions and Perspectives	D. A. Bowman; S. Coquillart; B. Froehlich; M. Hirose; Y. Kitamura; K. Kiyokawa; W. Stuerzlinger	2020	10.1109/MCG.2008.109	IEEE	E8
2188	Haptic Augmented Reality: Taxonomy and an Example of Stiffness Modulation	S. Jeon; S. Choi	2020	10.1162/pres.18.5.387	IEEE	E8

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2191	Learning based on 3D photogrammetry models to evaluate the competences in visual testing of welds	M. Rodríguez-Martín; P. Rodríguez-Gonzalvez	2020	10.1109/EDUCON.2018.8363422	IEEE	E8
2192	Proposal of a Conceptual Model for Serious Games Design: A Case Study in Children With Learning Disabilities	D. Avila-Pesantez; R. Delgadillo; L. A. Rivera	2020	10.1109/ACCESS.2019.2951380	IEEE	E8
2193	Designing and Evaluating Mobile Interaction: Challenges and Trends	M. de Sá; L. Carriço	2020		IEEE	E8
2194	Consolidating Learning in Power Systems: Virtual Reality Applied to the Study of the Operation of Electric Power Transformers	P. N. A. Barata; M. R. Filho; M. V. A. Nunes	2020	10.1109/TE.2015.2393842	IEEE	E8
2195	Extracting Velocity-Based User-Tracking Features to Predict Learning Gains in a Virtual Reality Training Application	A. G. Moore; R. P. McMahan; H. Dong; N. Ruozzi	2020	10.1109/ISMAR50242.2020.00099	IEEE	E6
2196	Novel Wake-up Scheme for Energy-Efficient Low-Latency Mobile Devices in 5G Networks	S. Rostami; K. Heiska; O. Puchko; K. Leppanen; M. Valkama	2020	10.1109/TMC.2020.2964218	IEEE	E8
2197	Exploring Eye Gaze Visualization Techniques for Identifying Distracted Students in Educational VR	Y. Rahman; S. M. Asish; N. P. Fisher; E. C. Bruce; A. K. Kulshreshth; C. W. Borst	2020	10.1109/VR46266.2020.00009	IEEE	E8
2198	Augmented Reality-Based Real-Time Accurate Artifact Management System for Museums	Z. Abbas; W. Chao; C. Park; V. Soni; S. H. Hong	2020	10.1162/pres_a_00314	IEEE	E8
2199	IEEE Draft Standard for Systems and Software Engineering -- Requirements for Acquirers and Suppliers of User Documentation	no authors	2020		IEEE	E2
2200	PhoneLens: A Low-Cost, Spatially Aware, Mobile-Interaction Device	A. Roudaki; J. Kong; G. S. Walia; A. Roudaki	2020	10.1109/THMS.2014.2305436	IEEE	E8
2201	Admux: An Adaptive Multiplexer for Haptic–Audio–Visual Data Communication	M. Eid; J. Cha; A. El Saddik	2020	10.1109/TIM.2010.2065530	IEEE	E8
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2203	Furthering Service 4.0: Harnessing Intelligent Immersive Environments and Systems	A. Pena-Rios; H. Hagras; G. Owusu; M. Gardner	2020	10.1109/MSMC.2017.2769199	IEEE	E8
2204	Pop-Out Tetris: An Implementation of a Tablet FTVR Game	S. Kongsilp; H. Chawmungkrung; T. Komuro	2020	10.1109/JCSSE.2018.8457377	IEEE	E8
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2206	Designing Haptics: Comparing Two Virtual Reality Gloves with Respect to Realism, Performance and Comfort	D. Shor; B. Zaaijer; L. Ahsmann; S. Immerzeel; M. Weetzel; D. Eikelenboom; J. Hartcher-O'Brien; D. Aschenbrenner	2020	10.1109/ISMAR-Adjunct.2018.00095	IEEE	E8
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2211	Hybrid Cemetery Culture: Making Death Matter in Cultural Heritage Using Smart Mobile Technologies	J. B. Sabra; H. J. Andersen; K. Rodil	2020	10.1109/Culture.and.Computing.2015.16	IEEE	E8
2212	Text entry on smart glasses	R. McCall; B. Martin; A. Popleteev; N. Louveton; T. Engel	2020	10.1109/HSI.2015.7170665	IEEE	I1
2213	An information appliance capable of seamless screen-display atop printed matter: towards paper-anchored hypertext and multimedia	L. -. Nougaret; M. Ohinori	2020	10.1109/ICIP.2001.959244	IEEE	E8
2214	Virtual Reality Smart City Based on WebVRGIS	Z. Lv; T. Yin; X. Zhang; H. Song; G. Chen	2020	10.1109/JIOT.2016.2546307	IEEE	E8
2215	A Cost-effective Approach for Developing Application-control GUIs for Virtual Environments	C. Andujar; M. Fairen; F. Argelaguet	2020	10.1109/VR.2006.6	IEEE	E8
2216	Using Pico Projectors to Explore Other Worlds	R. Santos; N. Correia	2020	10.1109/ISM.2015.59	IEEE	E8
2217	Haptic strip based on modular independent actuators for virtual shapes rendering	A. Mansutti; M. Covarrubias; M. Bordegoni; U. Cugini	2020	10.1109/HAPTICS.2014.6775426	IEEE	E8
2218	Immersive Virtual Reality-Based Interfaces for Character Animation	A. Cannavò; C. Demartini; L. Morra; F. Lamberti	2020	10.1109/ACCESS.2019.2939427	IEEE	E6
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2220	MoClo planner: Interactive visualization for Modular Cloning bio-design	O. Shaer; C. Valdes; S. Liu; K. Lu; T. L. Haddock; S. Bhatia; D. Densmore; R. Kincaid	2020	10.1109/BioVis.2013.6664347	IEEE	E6
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2223	Tracking of Flexible Brush Tip on Real Canvas: Silhouette-Based and Deep Ensemble Network-Based Approaches	J. B. Joolee; A. Raza; M. Abdullah; S. Jeon	2020	10.1109/ACCESS.2020.3004173	IEEE	E8
2224	Tactile Experiences: User Interpretations and Meaning with Tablets	E. D. Zamani; G. M. Giaglis; A. Pouloudi	2020	10.1109/HICSS.2014.413	IEEE	E6
2225	Publishing and Using Cultural Heritage Linked Data on the Semantic Web	E. Hyvonen	2020		IEEE	E2
2226	A Framework for Everyday Instructional Situations	B. Mehlenbacher	2020		IEEE	E2
2227	Using Augmented Virtuality for Remote Collaboration	H. Regenbrecht; T. Lum; P. Kohler; C. Ott; M. Wagner; W. Wilke; E. Mueller	2020	10.1162/1054746041422334	IEEE	E6
2228	A Unified Framework for Individualized Avatar-Based Interactions	A. Nagendran; R. Pillat; A. Kavanaugh; G. Welch; C. Hughes	2020	10.1162/PRES_a_00177	IEEE	E8
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2230	Open Symphony: Creative Participation for Audiences of Live Music Performances	Y. Wu; L. Zhang; N. Bryan-Kinns; M. Barthet	2020	10.1109/MMUL.2017.19	IEEE	E8

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2233	Human-System Interaction Interface Utilizing 3D Gesture Recognition Techniques based on Wearable Technology	H. I. Patel; S. A. Senanayake; J. Triloka	2020	10.1109/CITISIA50690.2020.9371806	IEEE	E8
2234	Deep Learning in Mobile and Wireless Networking: A Survey	C. Zhang; P. Patras; H. Haddadi	2020	10.1109/COMST.2019.2904897	IEEE	E8
2235	Augmenting Mood Boards: Flexible and Intuitive Interaction in the Context of the Design Studio	A. Lucero; D. Aliakseyeu; J. Martens	2020	10.1109/TABLETOP.2007.17	IEEE	E8
2236	Authoring edutainment content through video annotations and 3D model augmentation	A. S. M. M. Rahman; Jongeun Cha; A. El Saddik	2020	10.1109/VECIMS.2009.5068927	IEEE	I1
2237	Tele-Wobble: A Telerehabilitation Wobble Board for Lower Extremity Therapy	A. Karime; H. Al-Osman; J. M. Alja'am; W. Gueaieb; A. El Saddik	2020	10.1109/TIM.2012.2192338	IEEE	E8
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2239	Collaborative Haptic Exploration of Dynamic Remote Environments	S. Kim; J. Park	2020	10.1109/MCG.2018.053491733	IEEE	E8
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2243	Virtual Dulcimer Auxiliary Teaching System Based on Musical Instrument Digital Interface	Q. Liu; S. Ba; L. Wu; J. Huang; H. Li	2020	10.1109/ISET.2018.00027	IEEE	E8
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2251	Understanding Virtual Reality: Presence, Embodiment, and Professional Practice	J. Tham; A. H. Duin; L. Gee; N. Ernst; B. Abdelqader; M. McGrath	2020	10.1109/TPC.2018.2804238	IEEE	E8
2252	Mobile Game Play and Everyday Life	M. C. Angelides; H. Agius	2020	10.1002/9781118796443.ch16	IEEE	E6

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2255	ViMM - Virtual Multimodal Museum: a Manifesto and Roadmap for Europe's Digital Cultural Heritage	M. Ioannides; R. Davies	2020	10.1109/IS.2018.8710556	IEEE	E8
2256	Lessons from Designing Geometry Learning Activities that Combine Mobile and 3D Tools	D. Spikol; J. Eliasson	2020	10.1109/WMUTE.2010.44	IEEE	E6
2257	3D Interaction with Virtual Objects in Real Water	R. Costa; J. Quarles	2020	10.1109/VS-Games.2019.8864574	IEEE	E6
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2259	A Review on Blockchain Technologies for an Advanced and Cyber-Resilient Automotive Industry	P. Fraga-Lamas; T. M. Fernández-Caramés	2020	10.1109/ACCESS.2019.2895302	IEEE	E8
2260	Interdisciplinary Collaboration Approaches on Undergraduate Virtual Reality Technology Projects	E. Nersesian; M. Vinnikov; J. Ross-Nersesian; M. J. Lee	2020	10.1109/ISEC49744.2020.9280580	IEEE	E8
2261	How to use virtual prototyping to design product-service systems	M. Peruzzini; M. Mengoni; D. Raponi	2020	10.1109/MESA.2016.7587135	IEEE	E8
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2263	The Effect of Room Complexity on Physical Object Selection Performance in 3-D Mobile User Interfaces	M. Rezaie; M. Malekmakan; A. A. N. Shirehjini; S. Shirmohammadi	2020	10.1109/THMS.2020.2984750	IEEE	E6
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2265	Indirect touch manipulation for interaction with stereoscopic displays	A. L. Simeone	2020	10.1109/3DUI.2016.7460025	IEEE	E8
2266	Sol y Agua: A Game-based Learning Platform to Engage Middle-school Students in STEM	M. Akbar; L. Dura; A. Q. Gates; A. Ortega; M. K. Roy; C. Santiago; J. G. Tellez; E. Villa	2020	10.1109/FIE.2018.8659071	IEEE	E8
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2268	Passive Haptic Menus for Desk-Based and HMD-Projected Virtual Reality	D. Zielasko; M. Krüger; B. Weyers; T. W. Kuhlen	2020	10.1109/WEVR.2019.8809589	IEEE	E6
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2270	Evaluating an Immersive Space-Time Cube Geovisualization for Intuitive Trajectory Data Exploration	J. A. W. Filho; W. Stuerzlinger; L. Nedel	2020	10.1109/TVCG.2019.2934415	IEEE	E6
2271	PizzaText: Text Entry for Virtual Reality Systems Using Dual Thumbsticks	D. Yu; K. Fan; H. Zhang; D. Monteiro; W. Xu; H. Liang	2020	10.1109/TVCG.2018.2868581	IEEE	E8
2272	Understanding Edge Computing: Engineering Evolution With Artificial Intelligence	J. Huh; Y. Seo	2020	10.1109/ACCESS.2019.2945338	IEEE	E8

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2275	The Cloudlet Accelerator: Bringing Mobile-Cloud Face Recognition into Real-Time	N. Powers; A. Alling; K. Osolinsky; T. Soyata; M. Zhu; H. Wang; H. Ba; W. Heinzelman; J. Shi; M. Kwon	2020	10.1109/GLOCOMW.2015.7414055	IEEE	E8
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2277	Cloud-Based Augmentation for Mobile Devices: Motivation, Taxonomies, and Open Challenges	S. Abolfazli; Z. Sanaei; E. Ahmed; A. Gani; R. Buyya	2020	10.1109/SURV.2013.070813.00285	IEEE	E8
2278	Understanding the everyday use of head-worn computers	A. Vogl; N. Louveton; R. McCall; M. Billinghurst; M. Haller	2020	10.1109/HSI.2015.7170668	IEEE	E6
2279	4 Robotics in Virtual Reality	no authors	2020		IEEE	E8
2280	Virtual Reality: Recent Advancements, Applications and Challenges	no authors	2020		IEEE	E8
2281	1 Recent Application Areas, Interaction Techniques and User Interfaces in Virtual Reality	no authors	2020		IEEE	E2
2282	Mobile Interactions in Context: A Designerly Way Toward Digital Ecology	J. Kjeldskov	2020		IEEE	E2
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2284	Exploring the Feasibility of Diegetic User Interfaces in Immersive Virtual Exhibitions within the Cultural Heritage	G. Caggianese; L. Gallo; P. Neroni	2020	10.1109/SITIS.2018.00101	IEEE	E8
2285	HCI Theory: Classical, Modern, and Contemporary	Y. Rogers	2020		IEEE	E2
2286	ISO/IEC/IEEE International Standard - Systems and software engineering - Requirements for acquirers and suppliers of information for users	no authors	2020	10.1109/IEEESTD.2017.8288807	IEEE	E2
2287	The human experience [of ubiquitous computing]	G. D. Abowd; E. D. Mynatt; T. Rodden	2020	10.1109/MPRV.2002.993144	IEEE	E8
2288	K-eXplorer: Cellular phone ubiquitous real-world interface with distributed K-stations	Y. Ikei; H. Eguchi; K. Ishigaki	2020	10.1109/ICAT.2007.4414630	IEEE	E8
2289	Embedded Commissioning of Building Systems	O. Akin	2020		IEEE	E2
2290	Richly Connected Systems and Multi-Device Worlds	B. Tomlinson; M. L. Yau; E. Baumer; J. Ross; A. Correa; G. Ji	2020	10.1162/pres.18.1.54	IEEE	E6
2291	Feeling wind: An interactive haptization system for motion rendering in video contents using SPIDAR	A. Jayasiri; K. Honda; K. Akahane; M. Sato	2020	10.1109/ICAT.2013.6728906	IEEE	E8
2292	A Scoping Review of Immersive Virtual Reality in STEM Education	N. Pellas; A. Dengel; A. Christopoulos	2020	10.1109/TLT.2020.3019405	IEEE	E8
2293	Improved Topological Fiducial Tracking in the reacTIVision System	R. Bencina; M. Kaltenbrunner; S. Jorda	2020	10.1109/CVPR.2005.475	IEEE	E8

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2295	Designing Wearable Systems for Sports: A Review of Trends and Opportunities in Human–Computer Interaction	E. Mencarini; A. Rapp; L. Tirabeni; M. Zancanaro	2020	10.1109/THMS.2019.2919702	IEEE	E6
2296	A Survey on Unmanned Aerial Vehicle Remote Control Using Brain–Computer Interface	A. Nourmohammadi; M. Jafari; T. O. Zander	2020	10.1109/THMS.2018.2830647	IEEE	E8
2297	Designing Hand Pose Aware Virtual Keyboard With Hand Drift Tolerance	D. Choi; H. Cho; K. Seo; S. Lee; J. Lee; J. Ko	2020	10.1109/ACCESS.2019.2929310	IEEE	E6
2298	Resistive swipe: Visuo-haptic interaction during swipe gestures to scroll background images on touch interfaces	T. Narumi; Y. Ujitoko; Y. Ban; T. Tanikawa; K. Hirota; M. Hirose	2020	10.1109/WHC.2017.7989924	IEEE	E8
2299	Sketch-Based Interaction for Planning-Based Interactive Storytelling	E. S. de Lima; F. J. Gheno; A. Viseu	2020	10.1109/SBGames51465.2020.00029	IEEE	E8
2300	Design and Characterization of an Actuated Drill Mockup for Orthopedic Surgical Training	Q. Ha-Van; H. Schwendinger; Y. Kim; M. Harders	2020	10.1109/TOH.2020.2966608	IEEE	E8
2301	Approaching Sustainability Learning Via Digital Serious Games	A. Diniz dos Santos; F. Strada; A. Bottino	2020	10.1109/TLT.2018.2858770	IEEE	E6
2302	Haptic and Sound Interface for Shape Rendering	M. Bordegoni	2020	10.1162/PRES_a_00010	IEEE	E8
2303	A SWOT Analysis of the Field of Virtual Reality Rehabilitation and Therapy	A. “. Rizzo; G. J. Kim	2020	10.1162/1054746053967094	IEEE	E8
2304	DuplicateSpace: Enhancing operability of virtual 3D objects by asymmetric bimanual interaction	H. Kim; J. Park	2020	10.1109/URAI.2014.7057534	IEEE	E8
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2306	Web History Tools and Revisitation Support: A Survey of Existing Approaches and Directions	M. Mayer	2020		IEEE	E8
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2308	Haptogram: Ultrasonic Point-Cloud Tactile Stimulation	G. Korres; M. Eid	2020	10.1109/ACCESS.2016.2608835	IEEE	E6
2309	Collaboration Research for Crisis Management Teams	J. L. Drury; E. Beaton; L. Boiney; M. O. Duncan; R. GreenPope; M. D. Howland; G. L. Klein	2020		IEEE	E2
2310	Web Science: Understanding the Emergence of Macro-Level Features on the World Wide Web	K. Hara; N. S. Contractor; W. Hall; J. A. Hendler; N. Shadbolt	2020		IEEE	E2
2311	Interactive Information Visualization to Explore and Query Electronic Health Records	A. Rind; T. D. Wang; W. Aigner; S. Miksch; K. Wongsuphasawat; C. Plaisant; B. Shneiderman	2020		IEEE	E4
2312	Interaction Design and Children	J. P. Hourcade	2020		IEEE	E4
2313	Human-Robot Interaction: A Survey	M. A. Goodrich; A. C. Schultz	2020		IEEE	E2
2314	Recognition of Dynamic Hand Gestures from 3D Motion Data Using LSTM and CNN Architectures	C. R. Naguri; R. C. Bunescu	2020	10.1109/ICMLA.2017.00013	IEEE	E8
2315	Pervasive Displays: Understanding the Future of Digital Signage	N. Davies; S. Clinch; F. Alt	2020		IEEE	E2

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2317	Pervasive Computing for Hospital, Chronic, and Preventive Care	M. Tentori	2020		IEEE	E2
2318	Ambient Intelligence, Wireless Networking, and Ubiquitous Computing	W. Pedrycz; A. Vasilakos	2020		IEEE	E2
2319	Principles of Place: Developing a Place-Based Ethic for Discussing, Debating, and Anticipating Technical Communication Concerns	D. G. Ross; B. Oppegaard; R. Willerton	2020	10.1109/TPC.2018.2867179	IEEE	E8
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2321	NICH: A preliminary theoretical study on natural interaction applied to cultural heritage contexts	S. Pescarin; E. Pietroni; L. Rescic; M. Wallergård; K. Omar; C. Rufa	2020	10.1109/DigitalHeritage.2013.6743760	IEEE	E8
2322	Citizens' Campaigns for Environmental Water Monitoring: Lessons From Field Experiments	T. H. Assumpção; A. Jonoski; I. Theona; C. Tsiakos; M. Krommyda; S. Tamascelli; A. Kallioras; M. Mierla; H. V. Georgiou; M. Miska; C. Pouliaris; C. Trifanov; K. T. Cîmpan; A. Tsertou; E. Marin; M. Diakakis; I. Nichersu; A. J. Amditis; I. Popescu	2020	10.1109/ACCESS.2019.2939471	IEEE	E8
2323	IoT Technical Challenges and Solutions	A. Pal; B. Purushothaman	2020		IEEE	E8
2324	ReViVD: Exploration and Filtering of Trajectories in an Immersive Environment using 3D Shapes	F. Homps; Y. Beugin; R. Vuillemot	2020	10.1109/VR46266.2020.00096	IEEE	E8
2325	Eiffel: Evolutionary Flow Map for Influence Graph Visualization	Y. Huang; L. Shi; Y. Su; Y. Hu; H. Tong; C. Wang; T. Yang; D. Wang; S. Liang	2020	10.1109/TVCG.2019.2906900	IEEE	E8
2326	Overcoming World in Miniature Limitations by a Scaled and Scrolling WIM	C. A. Wingrave; Y. Haciahmetoglu; D. A. Bowman	2020	10.1109/VR.2006.106	IEEE	E8
2327	Experiencing Interactive Exhibition Spaces	E. A. Sharji; F. L. Y. Peng; P. Woods	2020	10.1109/ICICM.2013.71	IEEE	E8
2328	FrailSafe: An ICT Platform for Unobtrusive Sensing of Multi-Domain Frailty for Personalized Interventions	E. I. Zacharaki; K. Deltouzos; S. Kalogiannis; I. Kalamaras; L. Bianconi; C. Degano; R. Orselli; J. Montesa; K. Moustakas; K. Votis; D. Tzovaras; V. Megalooikonomou	2020	10.1109/JBHI.2020.2986918	IEEE	E8
2329	Towards a reference curriculum for education on Concurrent Engineering / Enterprising	D. Romero; L. Cannetta; M. Pallot; C. Boër; A. Molina	2020	10.1109/ICE.2010.7477038	IEEE	E8
2330	Knowing, Communication and Experiencing through Body and Emotion	K. Hook	2020	10.1109/TLT.2009.3	IEEE	E8
2331	SmartSantander: Experimentation and service provision in the smart city	L. Sánchez; V. Gutiérrez; J. A. Galache; P. Sotres; J. R. Santana; J. Casanueva; L. Muñoz	2020		IEEE	E8
2332	Designing engaging intelligent tutoring systems in an age of cognitive computing	S. C. Sundararajan; S. V. Nitta	2020	10.1147/JRD.2015.2464085	IEEE	E8
2333	Visual gesture interfaces for virtual environments	R. O'Hagan; A. Zelinsky	2020	10.1109/AUIC.2000.822069	IEEE	E8
2334	Collaborative Accessible Gameplay with One-Switch Interfaces	D. Bulgarelli; F. Corno; L. De Russis	2020	10.1109/GEM.2018.8516494	IEEE	E8
2335	Sharing Distributed and Heterogeneous Resources toward End-to-End 5G Networks: A Comprehensive Survey and a Taxonomy	N. Slamnik-Kriještorac; H. Kremo; M. Ruffini; J. M. Marquez-Barja	2020	10.1109/COMST.2020.3003818	IEEE	E8
2336	A Workflow for Designing Virtual Worlds for Collaborative Learning	A. Schmeil; M. Steinbusch; A. Jost; M. Henn; M. Jacobi; M. Schwitalla; B. Hasler	2020	10.1109/VS-GAMES.2010.33	IEEE	E8
2337	Reality recalled: Elders, memory and VR	M. J. Ladly; T. Bakker; K. Chadha; G. Farrelly; K. Micak; G. Penn; F. Rudzicz	2020	10.1109/VSMM.2017.8346256	IEEE	E8

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2339	Archiving new media arts in interactive digital space	Y. P. Lim; K. C. Tan; P. S. Lim	2020	10.1109/VSMM.2016.7863201	IEEE	E8
2340	Agreement Supplements	R. D. Lankes	2020		IEEE	E2
2341	Immersive VR for scientific visualization: a progress report	A. van Dam; A. S. Forsberg; D. H. Laidlaw; J. J. LaViola; R. M. Simpson	2020	10.1109/38.888006	IEEE	E8
2342	InTml: A Dataflow Oriented Development System for Virtual Reality Applications	P. Figueroa; W. F. Bischof; P. Boulanger; H. J. Hoover; R. Taylor	2020	10.1162/pres.17.5.492	IEEE	E8
2343	Combinatorial Optimization of Graphical User Interface Designs	A. Oulasvirta; N. R. Dayama; M. Shiripour; M. John; A. Karrenbauer	2020	10.1109/JPROC.2020.2969687	IEEE	E6
2344	Hand Gesture-Based Virtual Reality Training Simulator for Collaboration Rescue of a Railway Accident	J. Xu; Z. Tang; H. Zhao; J. Zhang; R. Beale	2020	10.1093/iwc/iwz037	IEEE	E8
2345	ISO/IEC/IEEE Draft International Standard - Systems and Software Engineering -- Requirements for Acquirers and Suppliers of Information for Users	no authors	2020		IEEE	E2
2346	Safe Human-Computer Interface Based On Efficient Image Processing Algorithm	S. Wilding; P. Walker; S. Clinton; D. Williams; J. I. Olszewska	2020	10.1109/CINTI51262.2020.9305821	IEEE	E8
2347	Gamified educational programme for childhood obesity	N. G. del Río; C. S. G. González; R. M. González; V. N. Adelantado; P. T. Delgado; Y. B. Fleitas	2020	10.1109/EDUCON.2018.8363476	IEEE	E8
2348	Modelling eye fatigue in gaze spelling task	M. Vasiljevas; T. Gedminas; A. Šev?enko; M. Jan?iukas; T. Blažauskas; R. Damaševi?ius	2020	10.1109/ICCP.2016.7737129	IEEE	E8
2349	Operator Awareness in Human–Robot Collaboration Through Wearable Vibrotactile Feedback	A. Casalino; C. Messeri; M. Pozzi; A. M. Zanchettin; P. Rocco; D. Prattichizzo	2020	10.1109/LRA.2018.2865034	IEEE	E8
2350	Towards An Understanding of Mobile Touch Navigation in a Stereoscopic Viewing Environment for 3D Data Exploration	D. López; L. Oehlberg; C. Doger; T. Isenberg	2020	10.1109/TVCG.2015.2440233	IEEE	E6
2351	Integrated real and virtual prototyping	F. W. Bruns	2020	10.1109/IECON.1998.724051	IEEE	E8
2352	MulseBox: Portable Multisensory Interactive Device	C. Jost; B. L. Pévédic; O. E. Barraj; G. Uzan	2020	10.1109/SMC.2019.8913987	IEEE	E8
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2354	Supporting Activity in Desktop and Ubiquitous Computing	V. Kaptelinin; M. Czerwinski	2020		IEEE	E2
2355	Comparison of the Effect of Interactive versus Passive Virtual Reality Learning Activities in Evoking and Sustaining Conceptual Change	M. Roussou; M. Slater	2020	10.1109/TETC.2017.2737983	IEEE	E8
2356	Enabling Computation Offloading for Autonomous and Assisted Driving in 5G Networks	E. Coronado; G. Cebrian-Marquez; R. Riggio	2020	10.1109/GLOBECOM38437.2019.9013490	IEEE	E8
2357	4 Applications	B. Friedman; D. G. Hendry	2020		IEEE	E8
2358	Mediators: virtual haptic interfaces for tele-operated robots	M. Gutierrez; R. Ott; D. Thalmann; F. Vexo	2020	10.1109/ROMAN.2004.1374814	IEEE	E8

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2360	Development and Validation of a Hybrid Nuss Procedure Surgical Simulator and Trainer	M. F. Obeid; R. E. Kelly; F. D. Mckenzie	2020	10.1109/TBME.2020.3048516	IEEE	E8
2361	Evaluating the affective dimensions of Traces-Olion: a subtle mob at St Fagans National Museum of History, Wales	S. Huws; A. John; J. Kidd	2020	10.1109/DigitalHeritage.2018.8810117	IEEE	E8
2362	Approaching M-learning with the Application of Instructional Pervasive Game	J. Shih; C. Chen	2020	10.1109/WMUTE.2012.62	IEEE	E8
2363	Object augmentation through ecological human-wearable computer interactions	N. Plouznikoff; A. Plouznikoff; J. -. Robert	2020	10.1109/WIMOB.2005.1512964	IEEE	E8
2364	Platform Independent Audio	O. Schreer; J. -F. Macq; O. A. Niamut; J. Ruiz-Hidalgo; B. Shirley; G. Thallinger; G. Thomas	2020	10.1002/9781118706350.ch4	IEEE	E2
2365	Interface for Human Machine Interaction for assistant devices: A Review	S. Mahmud; X. Lin; J. Kim	2020	10.1109/CCWC47524.2020.9031244	IEEE	E8
2366	Research on Multimodal Perceptual Navigational Virtual and Real Fusion Intelligent Experiment Equipment and Algorithm	J. Yuan; Z. Feng; D. Dong; X. Meng; J. Meng; D. Kong	2020	10.1109/ACCESS.2020.2978089	IEEE	E8
2367	The Foundations of a Trustworthy Web	P. Cofta	2020		IEEE	E2
2368	Methods and Techniques for Involving Children in the Design of New Technology for Children	J. A. Fails; M. L. Guha; A. Druin	2020		IEEE	E8
2369	Interactive 3D Model Acquisition and Tracking of Building Block Structures	A. Miller; B. White; E. Charbonneau; Z. Kanzler; J. J. LaViola Jr.	2020	10.1109/TVCG.2012.48	IEEE	E8
2370	What User Interface to Use for Virtual Reality? 2D, 3D or Speech–A User Study	Y. Weiß; D. Hepperle; A. Sieß; M. Wölfel	2020	10.1109/CW.2018.00021	IEEE	E8
2371	3D-TV R&D Activities in Europe	O. Grau; T. Borel; P. Kauff; A. Smolic; R. Tanger	2020	10.1109/TBC.2011.2126350	IEEE	E8
2372	Advancements in medical imaging through Kinect: A review	I. Jawaid; J. K. Qureshi	2020	10.1109/ISWSN.2017.8250032	IEEE	E8
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2376	Review of Designs for Haptic Data Visualization	S. Paneels; J. C. Roberts	2020	10.1109/TOH.2009.44	IEEE	E8
2377	The Use of Serious Games in Museum Visits and Exhibitions: A Systematic Mapping Study	I. Paliokas; S. Sylaiou	2020	10.1109/VS-GAMES.2016.7590371	IEEE	E8
2378	Human-Machine Interaction for Vehicles: Review and Outlook	A. L. Kun	2020		IEEE	E8
2379	A Survey of Enabling Technologies for Network Localization, Tracking, and Navigation	C. Laoudias; A. Moreira; S. Kim; S. Lee; L. Wirola; C. Fischione	2020	10.1109/COMST.2018.2855063	IEEE	E8
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2382	Book of Abstracts	no authors	2020	10.1109/ICCSE49874.2020.9201866	IEEE	E4
2383	Computational Support for Sketching in Design	G. Johnson; M. D. Gross; J. Hong; E. Yi-Luen Do	2020		IEEE	E2
2384	References	P. Dourish; G. Bell	2020		IEEE	E2
2385	The State of Industrial Robotics: Emerging Technologies, Challenges, and Key Research Directions	L. Sanneman; C. Fourie; J. A. Shah	2020		IEEE	E8
2386	Use of HCI for the development of emotional skills in the treatment of Autism Spectrum Disorder: A systematic review	G. Constain; C. Collazos; F. Moreira	2020	10.23919/CISTI.2018.8399209	IEEE	E8
2387	Ubiquitous System: Challenges and Outlook	S. Poslad	2020	10.1002/9780470779446.ch13	IEEE	E8
2388	6 Nicholas Negroponte and the MIT Architecture Machine Group: Interfaces to Artificial Intelligence	M. W. Steenson	2020		IEEE	E2
2389	Handheld haptic interface with visual display for touching remote objects	H. Yano; T. Aoki; H. Iwata	2020	10.1109/HAPTIC.2012.6183813	IEEE	E8
2390	The Evolution of TV Systems, Content, and Users Towards Interactivity	P. Cesar; K. Chorianopoulos	2020		IEEE	E2
2391	A Survey on Information and Communication Technologies for Industry 4.0: State-of-the-Art, Taxonomies, Perspectives, and Challenges	G. Aceto; V. Persico; A. Pescapé	2020	10.1109/COMST.2019.2938259	IEEE	E8
2392	Reflecting on the Design and Implementation Issues of Virtual Environments	C. A. Wingrave; J. J. LaViola	2020	10.1162/pres.19.2.179	IEEE	E8
2393	Deep Learning Applications of Short-Range Radars	A. Santra; S. Hazra	2020		IEEE	E2
2394	Ubiquitous Computing for Capture and Access	K. N. Truong; G. R. Hayes	2020		IEEE	E8
2395	3 The Next Generation Internet of Things – Hyperconnectivity and Embedded Intelligence at the Edge	no authors	2020		IEEE	E2
2396	Affordances of computer-supported collaborative learning platforms: A systematic review	D. Shawky; A. Badawi; T. Said; R. Hozayin	2020	10.1109/ICL.2014.7017846	IEEE	E6
2397	Emerging Input Technologies for Always-Available Mobile Interaction	D. Morris; D. Tan; S. Saponas	2020		IEEE	E8
2398	Pervasive Displays Research: What's Next?	V. Gentile; P. Elagroudy; E. Ergin	2020	10.1109/MPRV.2019.2898538	IEEE	E8
2399	End-User Privacy in Human-Computer Interaction	G. Iachello; J. Hong	2020		IEEE	E8
2400	A Survey of Pervasive Displays for Information Presentation	S. Clinch; J. Alexander; S. Gehring	2020	10.1109/MPRV.2016.55	IEEE	E8
2401	Understanding Web Credibility: A Synthesis of the Research Literature	J. Lazar; Meiselwitz. Gabriele; J. Feng	2020		IEEE	E2

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2402	Towards Ubiquitous RE: A Perspective on Requirements Engineering in the Era of Digital Transformation	K. Villela; A. Hess; M. Koch; R. Falcao; E. C. Groen; J. Dörr; C. N. Valero; A. Ebert	2020	10.1109/RE.2018.00029	IEEE	E8
2403	A Survey Study on QoE Perspective of Mobile Cloud Computing	W. Tang; T. Nguyen; E. N. Huh	2020	10.1109/ICISA.2014.6847345	IEEE	E8
2404	Frontmatter	K. Franinovic; S. Serafin; S. Krebs; K. Bijsterveld; C. Salter; Y. Visell; R. Murray-Smith; J. Williamson; S. Brewster; D. Rocchesso; M. Rinott; B. Giordano; P. Susini; R. Bresin; S. O'Modhrain; G. Essl; D. Merrill; H. Raffle; S. D. Monache; P. Polotti; S. Barrass; A. Tanaka; O. Bau; W. Mackay; F. Avanzini; S. Spagnol; A. Rodà; A. D. Gotzen; T. Hermann; G. Baier; J. Kildal; J. Sreng; A. Lecuyer; C. Erkut; A. Jylhä; D. Hug	2020		IEEE	E2
2405	Crowd V-IoE: Visual Internet of Everything Architecture in AI-Driven Fog Computing	W. Ji; B. Liang; Y. Wang; R. Qiu; Z. Yang	2020	10.1109/MWC.001.1900349	IEEE	E8
2406	Index	S. Poslad	2020	10.1002/9780470779446.index	IEEE	E8
2407	Collaborative Filtering Recommender Systems	M. D. Ekstrand; J. T. Riedl; J. A. Konstan	2020		IEEE	E2
2408	Virtual Reality Musical Instruments: State of the Art, Design Principles, and Future Directions	S. Serafin; C. Erkut; J. Kojs; N. C. Nilsson; R. Nordahl	2020	10.1162/COMJ_a_00372	IEEE	E8
2409	Foundational Issues in Touch-Surface Stroke Gesture Design: An Integrative Review	S. Zhai; P. O. Kristensson; C. Appert; T. H. Andersen; X. Cao	2020		IEEE	E8
2410	Special Issue on Arts, Aesthetics, and Performance in Telepresence: Guest Editors' Introduction: Homo Ludens in Virtual Environments	M. ". Jeon; P. Fishwick	2020	10.1162/PRES_e_00295	IEEE	E8
2411	Fun based education for ages from 3 to 100: Lighting the candle of learning passion	K. Murthy	2020	10.1109/IEDEC.2013.6526751	IEEE	E8
2412	Design Thinking in Digital Innovation Projects—Exploring the Effects of Intangibility	L. Przybilla; K. Klinker; M. Lang; M. Schreieck; M. Wiesche; H. Krcmar	2020	10.1109/TEM.2020.3036818	IEEE	E8
2413	Human-machine-interaction in the industry 4.0 era	D. Gorecky; M. Schmitt; M. Loskyll; D. Zühlke	2020	10.1109/INDIN.2014.6945523	IEEE	E8
2414	Substitutional reality: Towards a research agenda	A. L. Simeone	2020	10.1109/WEVR.2015.7151690	IEEE	E8
2415	Shared Surfaces and Spaces: Collaborative Data Visualisation in a Co-located Immersive Environment	B. Lee; X. Hu; M. Cordeil; A. Prouzeau; B. Jenny; T. Dwyer	2020	10.1109/TVCG.2020.3030450	IEEE	E8
2416	Abstract of Presentations on March 10th	no authors	2020	10.1109/LifeTech52111.2021.9391958	IEEE	E4
2417	Magnetic Levitation Haptic Augmentation for Virtual Tissue Stiffness Perception	Q. Tong; Z. Yuan; X. Liao; M. Zheng; T. Yuan; J. Zhao	2020	10.1109/TVCG.2017.2772236	IEEE	E8
2418	Computer-supported Collaborative Learning in Programming Education: A Systematic Literature Review	L. Silva; A. J. Mendes; A. Gomes	2020	10.1109/EDUCON45650.2020.9125237	IEEE	E8
2419	Location Systems: An Introduction to the Technology Behind Location Awareness	A. LaMarca; E. d. Lara	2020		IEEE	E8
2420	The Paradigm Shift to Multimodality in Contemporary Computer Interfaces	S. Oviatt; P. R. Cohen	2020		IEEE	E2

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2422	A Smart Home Experience Using Egocentric Interaction Design Principles	D. Surie; T. Pederson; L. Janlert	2020	10.1109/ICCSE.2012.94	IEEE	E6
2423	A 360-Degree View of IoT Technologies	J. Soldatos	2020		IEEE	E2
2424	RESonance: Lightweight, Room-Scale Audio-Visual Biofeedback for Immersive Relaxation Training	B. Yu; J. Hu; M. Funk; R. -H. Liang; M. Xue; L. Feijs	2020	10.1109/ACCESS.2018.2853406	IEEE	E6
2425	Privacy in Mobile and Pervasive Computing	M. Langheinrich; F. Schaub	2020		IEEE	E2
2426	[ACP 2012 Abstracts]	no authors	2020		IEEE	E4
2427	Chamber of Mirrors: A Socially Activated Game Exploits Pervasive Technology	M. Laibowitz; v. samanta; S. Ali; R. Azuma	2020	10.1109/MPRV.2012.18	IEEE	E8
2428	Book of abstracts	no authors	2020	10.1109/ITSC.2010.5625295	IEEE	E4
2429	Toward computers that recognize and respond to user emotion	R. W. Picard	2020	10.1147/sj.393.0705	IEEE	E6
2430	Threads	R. D. Lankes	2020		IEEE	E2
2431	TSU.MI.KI: stimulating children's creativity and imagination with interactive blocks	Y. Itoh; S. Akinobu; H. Ichida; R. Watanabe; Y. Kitamura; F. Kishino	2020	10.1109/C5.2004.1314370	IEEE	E8
2432	Exertion Games	F. Mueller; R. A. Khot; K. Gerling; R. Mandryk	2020		IEEE	E8
2433	Comparison of the Levels of Presence and Anxiety in an Acrophobic Environment Viewed via HMD or CAVE	M. C. Juan; D. Pérez	2020	10.1162/pres.18.3.232	IEEE	E8
2434	Motivating students with Mobiles, Ubiquitous applications and the Internet of Things for STEM (MUMI4STEM)	A. Mavroudi; A. A. Economides; O. Fragkou; S. A. Nikou; M. Divitini; M. Giannakos; A. Kameas	2020	10.1109/EDUCON.2017.7942820	IEEE	E8
2435	Implementing e-Navigation	J. Hagen	2020		IEEE	E2
2436	C?IoT Applications and Services	F. Behmann; K. Wu	2020	10.1002/9781118913734.ch3	IEEE	E2
2437	Applications and Requirements	S. Poslad	2020	10.1002/9780470779446.ch2	IEEE	E2
2438	Fiber-Optic Sensors for Biomedical Applications	D. Tosi; G. Perrone	2020		IEEE	E2
2439	Human-Centered Information Fusion	D. Hall; J. Jordan	2020		IEEE	E2
2440	Conference Digest	no authors	2020	10.1109/AERO47225.2020.9172613	IEEE	E2
2441	UI transformer: An UIDL for smart mobile devices	Y. Li; Q. Hua; N. Wang; C. Guo; X. Qi; H. Pan	2020	10.1109/ICCSN.2011.6014239	IEEE	E8
2442	Perceptual Conflicts in a Multi-Stereoscopic Immersive Virtual Environment: Case Study on Face-to-Face Interaction through an Avatar	W. Chen; C. Clavel; N. Férey; P. Bourdot	2020	10.1162/PRES_a_00209	IEEE	E8
2443	Information Concepts: From Books to Cyberspace Identities	G. Marchionini	2020		IEEE	E2
2444	Index	K. E. Green	2020		IEEE	E2

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2445	Breaking the Screen: Interaction Across Touchscreen Boundaries in Virtual Reality for Mobile Knowledge Workers	V. Biener; D. Schneider; T. Gesslein; A. Otte; B. Kuth; P. O. Kristensson; E. Ofek; M. Pahud; J. Grubert	2020	10.1109/TVCG.2020.3023567	IEEE	E6
2446	Conference digest	no authors	2020	10.1109/AERO.2017.7943556	IEEE	E2
2447	Pedagogical Uses of Thymio II: How Do Teachers Perceive Educational Robots in Formal Education?	M. Chevalier; F. Riedo; F. Mondada	2020	10.1109/MRA.2016.2535080	IEEE	E8
2448	Gestures, Shapes and Multitouch Interaction	A. Celentano; A. Minuto	2020	10.1109/DEXA.2008.103	IEEE	E8
2449	Interactive Spatial Sonification of Multidimensional Data for Composition and Auditory Display	N. Barrett	2020	10.1162/COMJ_a_00358	IEEE	E6
2450	RoonRoon: A Wearable Teddy as Social Interface for Contextual Notification	F. Kawsar; K. Fujinami; S. Pirttikangas; K. Hayashi; T. Nakajima	2020	10.1109/NGMAST.2007.4343404	IEEE	E8
2451	Empirical Study Evaluating Business Process Modeling on Multi-touch Devices	H. Wittern	2020	10.1109/SWSTE.2012.16	IEEE	E8
2452	A Simulation of a Billiards Game Based on Marker Detection	L. T. De Paolis; G. Aloisio; M. Pulimeno	2020	10.1109/ACHI.2009.19	IEEE	E8
2453	ICCAIS 2019-Papers titles and authors lists	no authors	2020	10.1109/CAIS.2019.8769533	IEEE	E4
2454	[ARGENCON 2018 Abstracts]	no authors	2020	10.1109/ARGENCON.2018.8646298	IEEE	E4
2455	The Networked Sensory Landscape: Capturing and Experiencing Ecological Change Across Scales	B. Mayton; G. Dublon; S. Russell; E. F. Lynch; D. D. Haddad; V. Ramasubramanian; C. Duhart; G. Davenport; J. A. Paradiso	2020	10.1162/PRES_a_00292	IEEE	E8
2456	Combination of Ultra-Dense Networks and Other 5G Enabling Technologies: A Survey	M. A. Adedoyin; O. E. Falowo	2020	10.1109/ACCESS.2020.2969980	IEEE	E8
2457	Implementation of new services to support ubiquitous computing for campus life	Tack-Don Han; Cheolho Cheong; Jae-Won Ann; Jong-Young Kim; Hyung-Min Yoon; Chang-Su Lee; Hyon-Gu Shin; Young-Jin Lee; Hyoung-Min Yook; Myoung-Hoon Jeon; Jung Soo Choi; Joo-Hyeon Lee; Young-Woo Sohn; Yoon Su Baek; Sang-Yong Lee; Eun-Dong Shin; WooShik Kang; SeongWoon Kim	2020	10.1109/WSTFES.2004.1300406	IEEE	E8
2458	7 IoT European Security and Privacy Projects: Integration, Architectures and Interoperability	no authors	2020		IEEE	E2
2459	How We Cope with Digital Technology	P. Turner	2020		IEEE	E2
2460	Collaboration through Gaming	M. C. Angelides; H. Agius	2020	10.1002/9781118796443.ch9	IEEE	E6
2461	UMTS and Mobile Computing	A. Huber	2020		IEEE	E2
2462	Visualization of Cultural Heritage Collection Data: State of the Art and Future Challenges	F. Windhager; P. Federico; G. Schreder; K. Glinka; M. Dörk; S. Miksch; E. Mayr	2020	10.1109/TVCG.2018.2830759	IEEE	E8
2463	Survey of Immersive Analytics	A. Fonnet; Y. Prié	2020	10.1109/TVCG.2019.2929033	IEEE	E8
2464	Multimodal virtual navigation of a cultural heritage site: The medieval ceiling of Steri in Palermo	S. Andolina; A. Santangelo; M. Cannella; A. Gentile; F. Agnello; B. Villa	2020	10.1109/HSI.2009.5091039	IEEE	E8
2465	RESPECT 2020 Prepint proceedings	no authors	2020	10.1109/RESPECT49803.2020.9272473	IEEE	E4

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2466	Human-Food Interaction	R. A. Khot; F. Mueller	2020		IEEE	E2
2467	Paper Titles and Abstracts	no authors	2020	10.1109/ICSMC.2007.4413566	IEEE	E4
2468	1 Relevance of Cyber Security Innovations	S. Petrenko	2020		IEEE	E2
2469	Using new learning technologies with multimedia	S. G. Schar; H. Krueger	2020	10.1109/93.879767	IEEE	E8
2470	Human-Computer Interaction and Global Development	K. Toyama	2020		IEEE	E2
2471	Motivate Them to Communicate	D. M. Popovici; C. Septseault; R. Querrec	2020	10.1109/CW.2006.28	IEEE	E8
2472	User Centric Media of the Future Internet	J. Calic; P. Daras; N. Achilleopoulos; M. Panebarco; O. Mayora; P. Stollenmayer; D. Williams; T. Pennick; N. Magnenat-Thalmann; C. Guerrero; M. Pelt; T. McGrath; E. Fuenmayor; N. Papaoulakis; F. Alvarez; E. Kalapanidas; A. Shani; J. -Y. L. Moine	2020	10.1109/NGMAST.2008.28	IEEE	E8
2473	The METIS 5G Architecture: A Summary of METIS Work on 5G Architectures	H. Droste; G. Zimmermann; M. Stamatelatos; N. Lindqvist; O. Bulakci; J. Eichinger; V. Venkatasubramanian; U. Dotsch; H. Tullberg	2020	10.1109/VTCSpring.2015.7146131	IEEE	E8
2474	Surface Computing and Collaborative Analysis Work	J. Brown; J. Wilson; S. Gossage; C. Hack	2020		IEEE	E2
2475	A Natural User Interface implementation for an Interactive Learning Environment	M. L. Barron-Estrada; R. Zatarain-Cabada; B. A. Cardenas-Sainz	2020	10.1109/ICALT49669.2020.00109	IEEE	E8
2476	One-thumb Text Acquisition on Force-assisted Miniature Interfaces for Mobile Headsets	L. LEE; Y. ZHU; Y. YAU; T. BRAUD; X. SU; P. Hui	2020	10.1109/PerCom45495.2020.9127378	IEEE	E8
2477	References	P. Dourish	2020		IEEE	E2
2478	Advanced Interaction and Virtual\/Augmented Reality: Making Interaction with Machines More Natural and Effective	F. Lamberti; F. Pescador	2020	10.1109/MCE.2017.2776499	IEEE	E8
2479	Guest Editorial: Joint Special Issue on Innovation in Technologies for Educational Computing	F. Lamberti; G. Hwang; B. F. Manjón; W. Wang	2020	10.1109/TLT.2018.2813860	IEEE	E8
2480	CHI 2018	N. van Berkel; J. Vega; A. Kariryaa; C. E. Smith; Y. Yuan	2020	10.1109/MPRV.2018.03367735	IEEE	E8
2481	Researchers connect at society conferences	no authors	2020	10.1109/MC.2004.1297244	IEEE	E4
2482	Candidates announced for Board of Governors election [Society News]	B. G. Lee	2020	10.1109/MCOM.2014.6815887	IEEE	E8
2483	Forum	no authors	2020	10.1109/MSPEC.1976.6369076	IEEE	E2
2484	TALE 2020 Table of Contents	no authors	2020	10.1109/TALE48869.2020.9368325	IEEE	E4
2485	Table of Contents	no authors	2020	10.1109/ISMAR50242.2020.00004	IEEE	E4
2486	Table of contents	no authors	2020	10.1109/ISMAR.2019.00004	IEEE	E4
2487	Table of contents	no authors	2020	10.1109/SVR.2018.00004	IEEE	E4

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2488	Table of Contents	no authors	2020	10.1109/SVR51698.2020.00004	IEEE	E4
2489	TALE 2020 Authors Index	no authors	2020	10.1109/TALE48869.2020.9368466	IEEE	E4
2490	Table of Contents	no authors	2020	10.1109/ISMAR-Adjunct51615.2020.00004	IEEE	E4
2491	Table of contents	no authors	2020	10.1109/VS-Games.2019.886460 0	IEEE	E4
2492	Scanning the issue - Special issue on human-computer multimodal interface	J. L. Franagan; T. S. Huang	2020	10.1109/JPROC.2003.817113	IEEE	E8
2493	Table of contents	no authors	2020	10.1109/CONTIE49246.2019.00004	IEEE	E4
2494	List of papers	no authors	2020	10.1109/NEXTCOMP.2019.8883617	IEEE	E4
2495	Table of contents	no authors	2020	10.1109/ICALT.2018.00004	IEEE	E4
2496	Table of Contents	no authors	2020	10.1109/T4E.2019.00004	IEEE	E4
2497	VR 2020 TOC	no authors	2020	10.1109/VR46266.2020.00004	IEEE	E4
2498	ECTI-CON 2020 Table of Contents	no authors	2020	10.1109/ECTI-CON49241.2020.9158292	IEEE	E4
2499	Technical Program	no authors	2020	10.1109/ICCSE49874.2020.9201784	IEEE	E2
2500	[Front cover]	no authors	2020	10.1109/DDECS.2017.7934553	IEEE	E2
2501	VRW 2020 TOC	no authors	2020	10.1109/VRW50115.2020.00004	IEEE	E4
2502	exp.at 19 2019 Authors Index	no authors	2020	10.1109/EXPAT.2019.8876573	IEEE	E4
2503	Table of contents	no authors	2020	10.1109/EXPAT.2019.8876501	IEEE	E4
2504	EMBC 2018 TOC	no authors	2020	10.1109/EMBC.2018.8512261	IEEE	E4
2505	Table of Contents	no authors	2020	10.1109/ICALT49669.2020.00004	IEEE	E4
2506	What's Happening at That Hip?: Evaluating an On-Body Projection Based Augmented Reality System for Physiotherapy Classroom	Ferdous, Hasan Shahid; Hoang, Thuong; Joukhadar, Zaher; Reinoso, Martin N.; Vetere, Frank; Kelly, David; Remedios, Louisa	2005	10.1145/3290605.3300464	ACM	E8

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2507	1st International ACM Workshop on User Experience in E-Learning and Augmented Technologies in Education	Fonseca, David; Zabulis, Xenophon; Ramzan, Naeem; Kurti, Arianit; Pileggi, Salvatore Flavio; Ko, Heedong	2005	10.1145/2393347.2396546	ACM	E8
2508	A 3D Flexible and Tangible Magic Lens in Augmented Reality	Looser, Julian; Grasset, Raphael; Billinghurst, Mark	2005	10.1109/ISMAR.2007.4538825	ACM	E6
2509	A Bermuda Triangle? A Review of Method Application and Triangulation in User Experience Evaluation	Pettersson, Ingrid; Lachner, Florian; Frison, Anna-Katharina; Riener, Andreas; Butz, Andreas	2005	10.1145/3173574.3174035	ACM	E6
2510	A Blended Space for Heritage Storytelling	O'Keefe, Brian; Benyon, David; Chandwani, Gaurav; Menon, Madhav; Duke, Randy	2005	10.14236/ewic/hci2014.10	ACM	E6
2511	A Comparative Study on Conventional versus Immersive Service Prototyping (VR, AR, MR)	Razek, Abdul Rahman Abdel; van Husen, Christian; Pallot, Marc; Richir, Simon	2005	10.1145/3234253.3234296	ACM	E8
2512	A Comparison of Spatial Organization Strategies in Graphical and Tangible User Interfaces	Patten, James; Ishii, Hiroshi	2005	10.1145/354666.354671	ACM	E8
2513	A Framework Supporting Selecting Space to Make Place in Spatial Mixed Reality Play	Sharma, Hitesh Nidhi; Alharthi, Sultan A.; Dolgov, Igor; Toups, Zachary O.	2005	10.1145/3116595.3116612	ACM	E8
2514	A Location-Based Social Network System Integrating Mobile Augmented Reality and User Generated Content	Yue, Yuanwen; Ding, Jiaqi; Kang, Yuhao; Wang, Yueyao; Wu, Kunlin; Fei, Teng	2005	10.1145/3356994.3365507	ACM	E8
2515	A Ludological View on the Pervasive Mixed-Reality Game Research Paradigm	Montola, Markus	2005	10.1007/s00779-010-0307-7	ACM	E8
2516	A Meta-Analysis of Recent Studies on Haptic Feedback Enhancement in Immersive-Augmented Reality	Kang, Namkyoo; Lee, Sangwon	2005	10.1145/3198910.3198911	ACM	E6
2517	A Mixed Reality Approach for Interactively Blending Dynamic Models with Corresponding Physical Phenomena	Quarles, John; Fishwick, Paul; Lampotang, Samsun; Fischler, Ira; Lok, Benjamin	2005	10.1145/1842722.1842727	ACM	E8
2518	A Mobile Augmented Reality Game Design Approach for on Product Advertising	Nazri, Nur Intan Adhani M.; Rambli, Dayang Rohaya Awang; Tomi, Azfar	2005	10.1145/2832932.2856222	ACM	E8
2519	A Next-Generation Augmented Reality Platform for Mass Casualty Incidents (MCI)	Demir, Fatih; Ahmad, Salman; Calyam, Prasad; Jiang, Duo; Huang, Rui; Jahnke, Isa	2005	10.5555/3190867.3190871	ACM	E8
2520	A Rapid Prototyping Software Infrastructure for User Interfaces in Ubiquitous Augmented Reality	Sandor, Christian; Klinker, Gudrun	2005	10.1007/s00779-004-0328-1	ACM	E8
2521	A Study on Improving Close and Distant Device Movement Pose Manipulation for Hand-Held Augmented Reality	Samini, Ali; Palmerius, Karljohan Lundin	2005	10.1145/2993369.2993380	ACM	E8
2522	A Survey of Augmented, Virtual, and Mixed Reality for Cultural Heritage	Bekele, Mafkereseb Kassahun; Pierdicca, Roberto; Frontoni, Emanuele; Malinverni, Eva Savina; Gain, James	2005	10.1145/3145534	ACM	E6
2523	A User Study on Mixed Reality Remote Collaboration with Eye Gaze and Hand Gesture Sharing	Bai, Huidong; Sasikumar, Prasanth; Yang, Jing; Billinghurst, Mark	2005	10.1145/3313831.3376550	ACM	E8
2524	A UX Oriented Evaluation Approach for Mobile Augmented Reality Applications	Irshad, Shafaq; Awang, Dayang Rohaya Bt	2005	10.1145/3282353.3282357	ACM	E8
2525	Accessible Play in Everyday Spaces: Mixed Reality Gaming for Adult Powered Chair Users	Seaborn, Katie; Edey, Jamal; Dolinar, Gregory; Whitfield, Margot; Gardner, Paula; Branje, Carmen; Fels, Deborah I.	2005	10.1145/2893182	ACM	E6
2526	Adaptive Mixed Reality Stroke Rehabilitation: System Architecture and Evaluation Metrics	Chen, Yinpeng; Lehrer, Nicole; Sundaram, Hari; Rikakis, Thanassis	2005	10.1145/1730836.1730872	ACM	I1
2527	Advisory Service Support That Works: Enhancing Service Quality with a Mixed-Reality System	Dolata, Mateusz; Agotai, Doris; Schubiger, Simon; Schwabe, Gerhard	2005	10.1145/3415191	ACM	E8

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2528	Aerial Tunes: Exploring Interaction Qualities of Mid-Air Displays	Alrøe, Tobias; Grann, Jonas; Grönvall, Erik; Petersen, Marianne Graves; Rasmussen, Jesper L.	2005	10.1145/2399016.2399095	ACM	E8
2529	Affinity Lens: Data-Assisted Affinity Diagramming with Augmented Reality	Subramonyam, Hariharan; Drucker, Steven M.; Adar, Eytan	2005	10.1145/3290605.3300628	ACM	E6
2530	Agents That Talk And Hit Back: Animated Agents in Augmented Reality	Barakonyi, Istvan; Psik, Thomas; Schmalstieg, Dieter	2005	10.1109/ISMAR.2004.11	ACM	E6
2531	Alternative Tools for Tangible Interaction: A Usability Evaluation	Fjeld, Morten; Schär, Sissel Guttormsen; Signorello, Domenico; Krueger, Helmut	2005	10.5555/850976.854963	ACM	E8
2532	An AR-Method for Documenting LEGO Serious Play Models	Herbert, Jonas; Herrmann, Thomas	2005	10.1145/3205873.3210703	ACM	I1
2533	An Augmented Reality Environment for Astronomy Learning in Elementary Grades: An Exploratory Study	Fleck, Stéphanie; Simon, Gilles	2005	10.1145/2534903.2534907	ACM	I1
2534	An Augmented Reality Learning Space for PC DIY	Chiang, Heien-Kun; Chou, Yin-Yu; Chang, Long-Chyr; Huang, Chun-Yen; Kuo, Feng-Lan; Chen, Hown-Wen	2005	10.1145/1959826.1959838	ACM	E8
2535	An English Language Learning Study with Rural Chinese Children Using an Augmented Reality App	Fan, Min; Antle, Alissa N.	2005	10.1145/3392063.3394409	ACM	E8
2536	An Intravenous Injection Simulator Using Augmented Reality for Veterinary Education and Its Evaluation	Lee, Jun; Kim, WonJong; Seo, Anna; Jun, JiSun; Lee, SeungYeon; Kim, Jee-In; Eom, KiDong; Pyeon, Muwook; Lee, Hanku	2005	10.1145/2407516.2407524	ACM	E8
2537	Ani-Bot: A Modular Robotics System Supporting Creation, Tweaking, and Usage with Mixed-Reality Interactions	Cao, Yuanzhi; Xu, Zhuangying; Glenn, Terrell; Huo, Ke; Ramani, Karthik	2005	10.1145/3173225.3173226	ACM	E6
2538	Approaches and Challenges to Virtual and Augmented Reality in Health Care and Rehabilitation	Jorge, Joaquim; Campos, Pedro; Lopes, Daniel Simões	2005	10.1145/3415263.3419174	ACM	E8
2539	ARgo: Animate Everyday Object in Augmented Reality	Park, Byung-Hwa; Oh, Se-Young	2005	10.1145/2663806.2663865	ACM	E8
2540	AR-Jig: A Handheld Tangible User Interface for Modification of 3D Digital Form via 2D Physical Curve	Anabuki, Mahoro; Ishii, Hiroshi	2005	10.1109/ISMAR.2007.4538826	ACM	E6
2541	Augmented Reality Action Assistance and Learning for Cognitively Impaired People: A Systematic Literature Review	Blattgerste, Jonas; Renner, Patrick; Pfeiffer, Thies	2005	10.1145/3316782.3316789	ACM	E8
2542	Augmented Reality for Children in a Confirmation Task: Time, Fatigue, and Usability	Munsinger, Brita; Quarles, John	2005	10.1145/3359996.3364274	ACM	E6
2543	Augmented Reality in Science Classroom: Perceived Effects in Education, Visualization and Information Processing	Virata, Rholeo O.; Castro, Johan Daryll L.	2005	10.1145/3306500.3306556	ACM	E8
2544	Augmented Reality Information for Food (ARIF): Design and Development	Azlina Mokmin, Nur Azlina Mohamed	2005	10.1145/3439147.3439162	ACM	E8
2545	Augmented Reality Instruction for Object Assembly Based on Markerless Tracking	Wu, Li-Chen; Lin, I.-Chen; Tsai, Ming-Han	2005	10.1145/2856400.2856416	ACM	E8
2546	Augmented Reality to Enable Users in Learning Case Grammar from Their Real-World Interactions	Draxler, Fiona; Labrie, Audrey; Schmidt, Albrecht; Chuang, Lewis L.	2005	10.1145/3313831.3376537	ACM	E6
2547	Augmented Reality User Interaction to Computer Assisted Orthopedic Surgery System	Bautista R., Luis E.; Maradei G., Fernanda; Pedraza F., Gabriel	2005	10.1145/3293578.3293590	ACM	I1
2548	Authorable Augmented Reality Instructions for Assistance and Training in Work Environments	Blattgerste, Jonas; Renner, Patrick; Pfeiffer, Thies	2005	10.1145/3365610.3365646	ACM	E6

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2549	Automatic Object Recognition in a Light-Weight Augmented Reality-Based Vocabulary Learning Application for Children with Autism	Tang, Tiffany Y.; Xu, Jiasheng; Winoto, Pinata	2005	10.1145/3319921.3319945	ACM	E8
2550	BalanSAR: Using Spatial Augmented Reality to Train Children's Balancing Skills in Physical Education	Mast, Danica; Bosman, Michel; Schipper, Sylvia; de Vries, Sanne	2005	10.1145/3024969.3025085	ACM	E6
2551	Bimanual Handheld Mixed Reality Interfaces for Urban Planning	Sareika, Markus; Schmalstieg, Dieter	2005	10.1145/1842993.1843027	ACM	E6
2552	BISHARE: Exploring Bidirectional Interactions Between Smartphones and Head-Mounted Augmented Reality	Zhu, Fengyuan; Grossman, Tovi	2005	10.1145/3313831.3376233	ACM	I1
2553	BragFish: Exploring Physical and Social Interaction in Co-Located Handheld Augmented Reality Games	Xu, Yan; Gandy, Maribeth; Deen, Sami; Schrank, Brian; Spreen, Kim; Gorbsky, Michael; White, Timothy; Barba, Evan; Radu, Iulian; Bolter, Jay; MacIntyre, Blair	2005	10.1145/1501750.1501816	ACM	E8
2554	CAPturAR: An Augmented Reality Tool for Authoring Human-Involved Context-Aware Applications	Wang, Tianyi; Qian, Xun; He, Fengming; Hu, Xiyun; Huo, Ke; Cao, Yuanzhi; Ramani, Karthik	2005	10.1145/3379337.3415815	ACM	E6
2555	CARDS: A Mixed-Reality System for Collaborative Learning at School	Giraudeau, Philippe; Olry, Alexis; Roo, Joan Sol; Fleck, Stephanie; Bertolo, David; Vivian, Robin; Hachet, Martin	2005	10.1145/3343055.3359721	ACM	E6
2556	CARe: An Augmented Reality Support System for Geriatric Inpatients with Mild Cognitive Impairment	Wolf, Dennis; Besserer, Daniel; Sejunaite, Karolina; Schuler, Anja; Riepe, Matthias; Rukzio, Enrico	2005	10.1145/3365610.3365612	ACM	I1
2557	CAViAR: Context Aware Visual Indoor Augmented Reality for a University Campus	Delail, Buti Al; Weruaga, Luis; Zemerly, M. Jamal	2005	10.1109/WI-IAT.2012.99	ACM	E6
2558	CETA: Designing Mixed-Reality Tangible Interaction to Enhance Mathematical Learning	Marichal, Sebastián; Rosales, Anadrea; Perilli, Fernando Gonzalez; Pires, Ana Cristina; Bakala, Ewelina; Sansone, Gustavo; Blat, Josep	2005	10.1145/3098279.3098536	ACM	E8
2559	Children's and Parents' Perception of Full-Body Interaction and Violence in a Martial Arts Game	Höysniemi, Johanna; Hämäläinen, Perttu	2005	10.5555/1138235.1138268	ACM	E8
2560	Closing the Distance: Mixed and Augmented Reality, Tangibles and Indigenous Culture Preservation	Sieck, Jürgen; Zaman, Tariq	2005	10.1145/3136560.3136586	ACM	E8
2561	Co-Creating Personal Augmented Reality Accessories to Enhance Social Well-Being of Urban San Youth	Kauhondamwa, Maria; Winschiers-Theophilus, Heike; Kapembe, Simson; Costa, Hiskia; Guxab, Jan; Kamati, Isay; Afrikaner, Helena	2005	10.1145/3283458.3283480	ACM	E8
2562	Coherence Evaluation of Input Vocabularies to Enhance Usability and User Experience	Peshkova, Ekaterina; Hitz, Martin	2005	10.1145/3102113.3102118	ACM	E8
2563	Collaborative Augmented Reality in Schools	Pemberton, Lyn; Winter, Marcus	2005	10.5555/1599503.1599540	ACM	E8
2564	CollARt: A Tool for Creating 3D Photo Collages Using Mobile Augmented Reality	Marzo, Asier; Ardaiz, Oscar	2005	10.1145/2502081.2502154	ACM	E6
2565	Collocated AAR: Augmenting After Action Review with Mixed Reality	Quarles, John; Lampotang, Samsun; Fischler, Ira; Fishwick, Paul; Lok, Benjamin	2005	10.1109/ISMAR.2008.4637335	ACM	E6
2566	Combining Embedded Computation and Image Tracking for Composing Tangible Augmented Reality	Düwel, Tim; Herbig, Nico; Kahl, Denise; Krüger, Antonio	2005	10.1145/3334480.3383043	ACM	E6
2567	Creating Accessible Interactive Audio-Tactile Drawings Using Spatial Augmented Reality	Thevin, Lauren; Jouffrais, Christophe; Rodier, Nicolas; Palard, Nicolas; Hachet, Martin; Brock, Anke M.	2005	10.1145/3343055.3359711	ACM	E6
2568	Cyberchase Shape Quest: Pushing Geometry Education Boundaries with Augmented Reality	Radu, Iulian; Doherty, Ellen; DiQuollo, Kristin; McCarthy, Betsy; Tiu, Michelle	2005	10.1145/2771839.2771871	ACM	E8
2569	Design, Large-Scale Usage Testing, and Important Metrics for Augmented Reality Gaming Applications	Roberto, Pierdicca; Emanuele, Frontoni; Primo, Zingaretti; Adriano, Mancini; Jelena, Loncarski; Marina, Paolanti	2005	10.1145/3311748	ACM	E8

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2570	Designer's Augmented Reality Toolkit, Ten Years Later: Implications for New Media Authoring Tools	Gandy, Maribeth; MacIntyre, Blair	2005	10.1145/2642918.2647369	ACM	E8
2571	Designing Interactions with Multilevel Auditory Displays in Mobile Audio-Augmented Reality	Vazquez-Alvarez, Yolanda; Aylett, Matthew P.; Brewster, Stephen A.; Jungenfeld, Rocio Von; Virolainen, Antti	2005	10.1145/2829944	ACM	E6
2572	Designing Mid-Air Haptic Gesture Controlled User Interfaces for Cars	Young, Gareth; Milne, Hamish; Griffiths, Daniel; Padfield, Elliot; Blenkinsopp, Robert; Georgiou, Orestis	2005	10.1145/3397869	ACM	E8
2573	Developing an Augmented Reality Application in the Framework of Architecture Degree	Sánchez, Albert; Redondo, Ernest; Fonseca, David	2005	10.1145/2390895.2390905	ACM	E6
2574	Development of an Augmented Reality Tour Guide for a Cultural Heritage Site	Koo, Seungbum; Kim, Jinyoung; Kim, Changhyuk; Kim, Jeeyeop; Cha, Hee Sung	2005	10.1145/3317552	ACM	E8
2575	DMarkers: Ubiquitous Dynamic Makers for Augmented Reality	Peiris, Roshan Lalintha; Fernando, Owen Noel Newton; Bee, Chua Su; Cheok, Adrian David; Ganesan, Arij Glycin; Kumarasinghe, Prabhash	2005	10.1145/2087756.2087787	ACM	E8
2576	DMove: Directional Motion-Based Interaction for Augmented Reality Head-Mounted Displays	Xu, Wenge; Liang, Hai-Ning; Zhao, Yuxuan; Yu, Difeng; Monteiro, Diego	2005	10.1145/3290605.3300674	ACM	E6
2577	Electric Agents: Combining Collaborative Mobile Augmented Reality and Web-Based Video to Reinvent Interactive Television	Revelle, Glenda; Reardon, Emily; Cook, Kristin; Takeuchi, Lori; Ballagas, Rafael; Mori, Koichi; Horii, Hiroshi; Raffle, Hayes; Sandberg, Maria; Spasojevic, Mirjana	2005	10.1145/2702109.2633413	ACM	E8
2578	Embodied Axes: Tangible, Actuated Interaction for 3D Augmented Reality Data Spaces	Cordeil, Maxime; Bach, Benjamin; Cunningham, Andrew; Montoya, Bastian; Smith, Ross T.; Thomas, Bruce H.; Dwyer, Tim	2005	10.1145/3313831.3376613	ACM	I1
2579	Evaluating Menu Techniques for Handheld AR with a Smartphone & Mid-Air Pen	Wacker, Philipp; Nowak, Oliver; Voelker, Simon; Borchers, Jan	2005	10.1145/3379503.3403548	ACM	E8
2580	Evaluating the Effects of Feedback Type on Older Adults' Performance in Mid-Air Pointing and Target Selection	Cabreira, Arthur Theil; Hwang, Faustina	2005	10.1145/3267782.3267933	ACM	E8
2581	Evaluating the Use of Pedagogical Virtual Machine with Augmented Reality to Support Learning Embedded Computing Activity	Alrashidi, Malek; Gardner, Michael; Callaghan, Vic	2005	10.1145/3057039.3057088	ACM	E8
2582	Evaluation of 3D Selection Tasks in Parabolic Flight Conditions: Pointing Task in Augmented Reality User Interfaces	Markov-Vetter, Daniela; Moll, Eckard; Staadt, Oliver	2005	10.1145/2407516.2407583	ACM	I1
2583	Evaluation of Docking Task Performance Using Mid-Air Interaction Techniques	Vuibert, Vanessa; Stuerzlinger, Wolfgang; Cooperstock, Jeremy R.	2005	10.1145/2788940.2788950	ACM	I1
2584	Evaluation of User Satisfaction and Learnability for Outdoor Augmented Reality Gaming	Avery, Benjamin; Piekarski, Wayne; Warren, James; Thomas, Bruce H.	2005	10.5555/1151758.1151759	ACM	E8
2585	EvoGuide: Implementation of a Tour Guide Support Solution with Multimedia and Augmented-Reality Content	Hable, Richard; Rößler, Thomas; Schuller, Christina	2005	10.1145/2406367.2406403	ACM	E8
2586	Expanding the Bounds of Seated Virtual Workspaces	Mcgill, Mark; Kehoe, Aidan; Freeman, Euan; Brewster, Stephen	2005	10.1145/3380959	ACM	E8
2587	Expected User Experience of Mobile Augmented Reality Services: A User Study in the Context of Shopping Centres	Olsson, Thomas; Lagerstam, Else; Kärkkäinen, Tuula; Väänänen-Vainio-Mattila, Kaisa	2005	10.1007/s00779-011-0494-x	ACM	E6
2588	Experiencing Touchless Interaction with Augmented Content on Wearable Head-Mounted Displays in Cultural Heritage Applications	Brancati, Nadia; Caggianese, Giuseppe; Frucci, Maria; Gallo, Luigi; Neroni, Pietro	2005	10.1007/s00779-016-0987-8	ACM	E6
2589	Exploring Expressive Augmented Reality: The FingAR Puppet System for Social Pretend Play	Bai, Zhen; Blackwell, Alan F.; Coulouris, George	2005	10.1145/2702123.2702250	ACM	E8
2590	Exploring Potentially Abusive Ethical, Social and Political Implications of Mixed Reality Research in HCI	Gugenheimer, Jan; McGill, Mark; Huron, Samuel; Mai, Christian; Williamson, Julie; Nebeling, Michael	2005	10.1145/3334480.3375180	ACM	E8

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2591	Exploring the Design and Engineering of Mixed Reality Systems	Dubois, Emmanuel; Gray, Philip; Trevisan, Daniela; Vanderdonckt, Jean	2005	10.1145/964442.964541	ACM	E8
2592	Exploring User Experience in Blended Reality: Moving Interactions out of the Screen	Huynh, David F.; Xu, Yan; Wang, Shuo	2005	10.1145/1125451.1125625	ACM	E8
2593	ExTouch: Spatially-Aware Embodied Manipulation of Actuated Objects Mediated by Augmented Reality	Kasahara, Shunichi; Niiyama, Ryuma; Heun, Valentin; Ishii, Hiroshi	2005	10.1145/2460625.2460661	ACM	E8
2594	Fast and Precise Touch-Based Text Entry for Head-Mounted Augmented Reality with Variable Occlusion	Dudley, John J.; Vertanen, Keith; Kristensson, Per Ola	2005	10.1145/3232163	ACM	E6
2595	FingARtips: Gesture Based Direct Manipulation in Augmented Reality	Buchmann, Volkert; Violich, Stephen; Billinghurst, Mark; Cockburn, Andy	2005	10.1145/988834.988871	ACM	I1
2596	Finger Contact in Gesture Interaction Improves Time-Domain Input Accuracy in HMD-Based Augmented Reality	Oh, Seo Young; Yoon, Boram; Kim, Hyung-il; Woo, Woontack	2005	10.1145/3334480.3383098	ACM	E8
2597	Freeze View Touch and Finger Gesture Based Interaction Methods for Handheld Augmented Reality Interfaces	Bai, Huidong; Lee, Gun A.; Billinghurst, Mark	2005	10.1145/2425836.2425864	ACM	E8
2598	From Immersion's Bleeding Edge to the Augmented Telegrapher: A Method for Creating Mixed Reality Games for Museum and Heritage Contexts	Krzywinska, Tanya; Phillips, Tim; Parker, Alcwyn; Scott, Michael James	2005	10.1145/3414832	ACM	E8
2599	Fusion of Mixed-Reality Tabletop and Location-Based Applications for Pervasive Games	Zimmerer, Chris; Fischbach, Martin; Latoschik, Marc	2005	10.1145/2669485.2669527	ACM	E8
2600	Gripmarks: Using Hand Grips to Transform In-Hand Objects into Mixed Reality Input	Zhou, Qian; Sykes, Sarah; Fels, Sidney; Kin, Kenrick	2005	10.1145/3313831.3376313	ACM	E8
2601	Gunslinger: Subtle Arms-down Mid-Air Interaction	Liu, Mingyu; Nancel, Mathieu; Vogel, Daniel	2005	10.1145/2807442.2807489	ACM	E8
2602	Hand Range Interface: Information Always at Hand with a Body-Centric Mid-Air Input Surface	Xu, Xuhai; Dancu, Alexandru; Maes, Pattie; Nanayakkara, Suranga	2005	10.1145/3229434.3229449	ACM	E8
2603	Head-Mounted Display with Mid-Air Tactile Feedback	Sand, Antti; Rakkolainen, Ismo; Isokoski, Poika; Kangas, Jari; Raisamo, Roope; Palovuori, Karri	2005	10.1145/2821592.2821593	ACM	E8
2604	Heatmaps, Shadows, Bubbles, Rays: Comparing Mid-Air Pen Position Visualizations in Handheld AR	Wacker, Philipp; Wagner, Adrian; Voelker, Simon; Borchers, Jan	2005	10.1145/3313831.3376848	ACM	E6
2605	Herding Sheep: Live System Development for Distributed Augmented Reality	MacWilliams, Asa; Sandor, Christian; Wagner, Martin; Bauer, Martin; Klinker, Gudrun; Bruegge, Bernd	2005	10.5555/946248.946803	ACM	E8
2606	Human Factors and Qualitative Pedagogical Evaluation of a Mobile Augmented Reality System for Science Education Used by Learners with Physical Disabilities	Arvanitis, Theodoros N.; Petrou, Argeroula; Knight, James F.; Savas, Stavros; Sotiriou, Sofoklis; Gargalakos, Michael; Gialouri, Elpida	2005	10.1007/s00779-007-0187-7	ACM	E8
2607	HyperCubes: A Playful Introduction to Computational Thinking in Augmented Reality	Fuste, Anna; Schmandt, Chris	2005	10.1145/3341215.3356264	ACM	E8
2608	IIMR: A Framework for Intangible Mid-Air Interactions in a Mixed Reality Environment	Reddy, G. S. Rajshekar; Raj, Prithvi; G. M., Lingaraju	2005	10.1145/3380867.3426203	ACM	E6
2609	Immersive Authoring of Tangible Augmented Reality Applications	Lee, Gun A.; Nelles, Claudia; Billinghurst, Mark; Kim, Gerard Jounghyun	2005	10.1109/ISMAR.2004.34	ACM	E6
2610	Incorporating the Perception of Visual Roughness into the Design of Mid-Air Haptic Textures	Beattie, David; Frier, William; Georgiou, Orestis; Long, Benjamin; Ablart, Damien	2005	10.1145/3385955.3407927	ACM	E8

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2612	Inner Garden: Connecting Inner States to a Mixed Reality Sandbox for Mindfulness	Roo, Joan Sol; Gervais, Renaud; Frey, Jeremy; Hachet, Martin	2005	10.1145/3025453.3025743	ACM	E6
2613	Integrating Augmented Reality into Blended Learning for Elementary Science Course	Chen, Chien-Hsu; Huang, Chun-Yen; Chou, Yin-Yu	2005	10.1145/3029387.3029417	ACM	E8
2614	Integrating Usability Engineering and Software Engineering in Mixed Reality System Development	Paelke, Volker; Nebe, Karsten	2005	10.1145/1557626.1557648	ACM	E8
2615	Interacting with Augmented Paper Maps: A User Experience Study	Margetis, George; Ntoa, Stavroula; Antona, Margherita; Stephanidis, Constantine	2005	10.1145/3125571.3125584	ACM	E8
2616	Interaction with Virtual Content Using Augmented Reality: A User Study in Assembly Procedures	Marques, Bernardo; Alves, João; Neves, Miguel; Justo, Inês; Santos, André; Rainho, Raquel; Maio, Rafael; Costa, Dany; Ferreira, Carlos; Dias, Paulo; Santos, Beatriz Sousa	2005	10.1145/3427324	ACM	I1
2617	Interactive Antarctica: A Museum Installation Based on an Augmented Reality System	de Bérigny Wall, Caitilin; Wang, Xiangyu	2005	10.1145/1413634.1413692	ACM	E8
2618	Interweaving Visual and Audio-Haptic Augmented Reality for Urban Exploration	Hsieh, Yi-Ta; Orso, Valeria; Andolina, Salvatore; Canaveras, Manuela; Cabral, Diogo; Spagnolli, Anna; Gamberini, Luciano; Jacucci, Giulio	2005	10.1145/3196709.3196733	ACM	I1
2619	Investigating Smartphone-Based Pan and Zoom in 3D Data Spaces in Augmented Reality	Büschel, Wolfgang; Mitschick, Annett; Meyer, Thomas; Dachselt, Raimund	2005	10.1145/3338286.3340113	ACM	E6
2620	Investigating Universal Appliance Control through Wearable Augmented Reality	Becker, Vincent; Rauchenstein, Felix; Sörös, Gábor	2005	10.1145/3311823.3311853	ACM	E6
2621	Is It Real? Understanding Interaction Mechanics within the Reality-Virtuality Continuum	Lakhnati, Younes; Springer, Raphael; White, Edward; Gerken, Jens	2005	10.1145/3365610.3365634	ACM	E8
2622	JOLED: A Mid-Air Display Based on Electrostatic Rotation of Levitated Janus Objects	Sahoo, Deepak Ranjan; Nakamura, Takuto; Marzo, Asier; Omirou, Themis; Asakawa, Michihiro; Subramanian, Sriram	2005	10.1145/2984511.2984549	ACM	E8
2623	Korat Historical Explorer: The Augmented Reality Mobile Application to Promote Historical Tourism in Korat	Phithak, Thawatphong; Kamollimsakul, Sorachai	2005	10.1145/3383845.3383888	ACM	E8
2624	Like Bees around the Hive: A Comparative Study of a Mobile Augmented Reality Map	Morrison, Ann; Oulasvirta, Antti; Peltonen, Peter; Lemmela, Saija; Jacucci, Giulio; Reitmayr, Gerhard; Näsänen, Jaana; Juustila, Antti	2005	10.1145/1518701.1518991	ACM	E8
2625	Living Paper: Authoring AR Narratives Across Digital and Tangible Media	Claudino Daffara, Stephanie; Brewer, Anna; Thoravi Kumaravel, Balasaravanan; Hartmann, Bjoern	2005	10.1145/3334480.3383091	ACM	E6
2626	Makeup Creativity Enhancement with an Augmented Reality Face Makeup System	Treepong, Bantita; Mitake, Hironori; Hasegawa, Shoichi	2005	10.1145/3277452	ACM	E6
2627	Making Mobile Augmented Reality Applications Accessible	Herskovitz, Jaylin; Wu, Jason; White, Samuel; Pavel, Amy; Reyes, Gabriel; Guo, Anhong; Bigham, Jeffrey P.	2005	10.1145/3373625.3417006	ACM	E8
2628	MARE: Multiuser Augmented Reality Environment on Table Setup	Grasset, Raphaël; Gascuel, Jean-Dominique	2005	10.1145/1242073.1242226	ACM	I1
2629	Marker-Based Augmented Reality: Instructional-Design to Improve Children Interactions with Astronomical Concepts	Fleck, Stéphanie; Hachet, Martin; Bastien, J. M. Christian	2005	10.1145/2771839.2771842	ACM	E6
2630	Mechanism Perfboard: An Augmented Reality Environment for Linkage Mechanism Design and Fabrication	Jeong, Yunwoo; Kim, Han-Jong; Nam, Tek-Jin	2005	10.1145/3173574.3173985	ACM	E8

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2631	Merging Tangible Buttons and Spatial Augmented Reality to Support Ubiquitous Prototype Designs	Simon, Tim M.; Smith, Ross T.; Thomas, Bruce; Von Itzstein, Stewart; Smith, Mark; Park, Joonsuk; Park, Jun	2005	10.5555/2512125.2512130	ACM	E8
2632	Mid-Air Haptic Interfaces for Interactive Digital Signage and Kiosks	Georgiou, Orestis; Limerick, Hannah; Corenthy, Loïc; Perry, Mark; Maksymenko, Mykola; Frish, Sam; Müller, Jörg; Bachynskyi, Myroslav; Kim, Jin Ryong	2005	10.1145/3290607.3299030	ACM	E8
2633	Mini-Me: An Adaptive Avatar for Mixed Reality Remote Collaboration	Piumsomboon, Thammathip; Lee, Gun A.; Hart, Jonathon D.; Ens, Barrett; Lindeman, Robert W.; Thomas, Bruce H.; Billinghurst, Mark	2005	10.1145/3173574.3173620	ACM	E8
2634	Mixed Reality Based Interaction System for Digital Heritage	Bugalia, Nishant; Kumar, Subodh; Kalra, Prem; Choudhary, Shantanu	2005	10.1145/3013971.3014000	ACM	E6
2635	Mixed Reality Classroom: Learning from Entertainment	Liu, Wei; Cheok, Adrian David; Mei-Ling, Charissa Lim; Theng, Yin-Leng	2005	10.1145/1306813.1306833	ACM	E8
2636	Mixed Reality Guidance System for Motherboard Assembly Using Tangible Augmented Reality	Reyes, Arvin Christopher C.; Del Gallego, Neil Patrick A.; Deja, Jordan Aiko P.	2005	10.1145/3385378.3385379	ACM	E8
2637	MixFab: A Mixed-Reality Environment for Personal Fabrication	Weichel, Christian; Lau, Manfred; Kim, David; Villar, Nicolas; Gellersen, Hans W.	2005	10.1145/2556288.2557090	ACM	I1
2638	Mobile Augmented Reality Client as a UX Method for Living Lab's User Involvement Tool	Alavesa, Paula; Pakanen, Minna; Niemelä, Arttu; Huang, Weiping; Väinämö, Satu; Haukipuro, Lotta; Arhippainen, Leena; Ojala, Timo	2005	10.1145/3275116.3275147	ACM	E8
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2640	Model Augmented Reality Curriculum	Fominykh, Mikhail; Wild, Fridolin; Klamma, Ralf; Billinghurst, Mark; Costiner, Lisandra S.; Karsakov, Andrey; Mangina, Eleni; Molka-Danielsen, Judith; Pollock, Ian; Preda, Marius; Smolic, Aljosa	2005	10.1145/3437800.3439205	ACM	E8
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2642	Multimodal Feedback for Finger-Based Interaction in Mobile Augmented Reality	Hürst, Wolfgang; Vriens, Kevin	2005	10.1145/2993148.2993163	ACM	I1
2643	Napkin Sketch: Handheld Mixed Reality 3D Sketching	Xin, Min; Sharlin, Ehud; Sousa, Mario Costa	2005	10.1145/1450579.1450627	ACM	E8
2644	Narratives of Satisfying and Unsatisfying Experiences of Current Mobile Augmented Reality Applications	Olsson, Thomas; Salo, Markus	2005	10.1145/2207676.2208677	ACM	E8
2645	Occupational Therapy Meets Design: An Augmented Reality Tool for Assistive Home Modifications	Aoyama, Hiroo; Aflatoony, Leila	2005	10.1145/3441000.3441016	ACM	E8
2646	Overview of Augmented Reality	Azuma, Ronald	2005	10.1145/1103900.1103926	ACM	E8
2647	Peppy: A Paper-Based Augmented Reality Application to Help Children Against Dysgraphia	Abid, Maira; Bhimra, Muhammad Ahmed; Mubeen, Muhammad; Zahid, Azan Bin; Shahid, Suleman	2005	10.1145/3311927.3325311	ACM	E8
2648	Performance Improvement Using Data Tags for Handheld Spatial Augmented Reality	Irlitti, Andrew; Von Itzstein, Stewart; Smith, Ross T.; Thomas, Bruce H.	2005	10.1145/2671015.2671116	ACM	E8
2649	Personalised Human Device Interaction through Context Aware Augmented Reality	Perera, Madhawa	2005	10.1145/3382507.3421157	ACM	E8
2650	Portal-Ble: Intuitive Free-Hand Manipulation in Unbounded Smartphone-Based Augmented Reality	Qian, Jing; Ma, Jiaju; Li, Xiangyu; Attal, Benjamin; Lai, Haoming; Tompkin, James; Hughes, John F.; Huang, Jeff	2005	10.1145/3332165.3347904	ACM	E6

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2652	Pronto: Rapid Augmented Reality Video Prototyping Using Sketches and Enaction	Leiva, Germán; Nguyen, Cuong; Kazi, Rubaiat Habib; Asente, Paul	2005	10.1145/3313831.3376160	ACM	E8
2653	PrototypAR: Prototyping and Simulating Complex Systems with Paper Craft and Augmented Reality	Kang, Seokbin; Norooz, Leyla; Bonsignore, Elizabeth; Byrne, Virginia; Clegg, Tamara; Froehlich, Jon E.	2005	10.1145/3311927.3323135	ACM	E6
2654	Prototyping and Simulating Complex Systems with Paper Craft and Augmented Reality: An Initial Investigation	Kang, Seokbin; Norooz, Leyla; Byrne, Virginia; Clegg, Tamara; Froehlich, Jon E.	2005	10.1145/3173225.3173264	ACM	E6
2655	Rapid Prototyping for AR/VR Experiences	Billinghurst, Mark	2005	10.1145/3334480.3375065	ACM	E8
2656	RealitySketch: Embedding Responsive Graphics and Visualizations in AR through Dynamic Sketching	Suzuki, Ryo; Kazi, Rubaiat Habib; Wei, Li-yi; DiVerdi, Stephen; Li, Wilmot; Leithinger, Daniel	2005	10.1145/3379337.3415892	ACM	E8
2657	RoboTable: A Tabletop Framework for Tangible Interaction with Robots in a Mixed Reality	Krzywinski, Aleksander; Mi, Haipeng; Chen, Weiqin; Sugimoto, Masanori	2005	10.1145/1690388.1690407	ACM	E8
2658	Room2Room: Enabling Life-Size Telepresence in a Projected Augmented Reality Environment	Pejsa, Tomislav; Kantor, Julian; Benko, Hrvoje; Ofek, Eyal; Wilson, Andrew	2005	10.1145/2818048.2819965	ACM	E8
2659	SA '18: SIGGRAPH Asia 2018 Virtual & Augmented Reality		2005	10.1145/3275495	ACM	E8
2660	SceneCtrl: Mixed Reality Enhancement via Efficient Scene Editing	Yue, Ya-Ting; Yang, Yong-Liang; Ren, Gang; Wang, Wenping	2005	10.1145/3126594.3126601	ACM	E8
2661	SCORPIODROME: An Exploration in Mixed Reality Social Gaming for Children	Metaxas, G.; Metin, B.; Schneider, J.; Shapiro, G.; Zhou, W.; Markopoulos, P.	2005	10.1145/1178477.1178514	ACM	E8
2662	Security and Privacy Approaches in Mixed Reality: A Literature Survey	De Guzman, Jaybie A.; Thilakarathna, Kanchana; Seneviratne, Aruna	2005	10.1145/3359626	ACM	E6
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2664	Simplifying Orientation Measurement for Mobile Audio Augmented Reality Applications	Heller, Florian; Krämer, Aaron; Borchers, Jan	2005	10.1145/2556288.2557021	ACM	E6
2665	Simulating Educational Physical Experiments in Augmented Reality	Kaufmann, Hannes; Meyer, Bernd	2005	10.1145/1507713.1507717	ACM	E8
2666	Situated Game Level Editing in Augmented Reality	Ng, Gary; Shin, Joon Gi; Plopski, Alexander; Sandor, Christian; Saakes, Daniel	2005	10.1145/3173225.3173230	ACM	E8
2667	Spatial Sound Localization in an Augmented Reality Environment	Sodnik, Jaka; Tomazic, Saso; Grasset, Raphael; Duenser, Andreas; Billinghurst, Mark	2005	10.1145/1228175.1228197	ACM	E8
2668	StoryMakAR: Bringing Stories to Life With An Augmented Reality & Physical Prototyping Toolkit for Youth	Glenn, Terrell; Ipsita, Ananya; Carithers, Caleb; Peppler, Kylie; Ramani, Karthik	2005	10.1145/3313831.3376790	ACM	E8
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2670	SWISH: Shifting Weight-Based Interfaces for Simulated Hydrodynamics in Mixed-Reality Fluid Vessels	Sagheb, Shahabedin; Bahremand, Alireza; LiKamWa, Robert; Lahey, Byron	2005	10.1145/3294109.3300988	ACM	E8
2671	Tangibility is Overrated: Comparing Learning Experiences of Physical Setups and Their Virtual Equivalent in Augmented Reality	Knierim, Pascal; Kiss, Francisco; Rauh, Maximilian; Schmidt, Albrecht	2005	10.1145/3428361.3428379	ACM	E6
2672	Tell Me What i See: Recognize RFID Tagged Objects in Augmented Reality Systems	Xie, Lei; Sun, Jianqiang; Cai, Qingliang; Wang, Chuyu; Wu, Jie; Lu, Sanglu	2005	10.1145/2971648.2971661	ACM	E8

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2674	The BoomRoom: Mid-Air Direct Interaction with Virtual Sound Sources	Müller, Jörg; Geier, Matthias; Dicke, Christina; Spors, Sascha	2005	10.1145/2556288.2557000	ACM	I1
2675	The Real Augmented Reality: Real-Time Game Editor in a Spatial Augmented Environment	Oswald, Patrick; Tost, Jordi; Wettach, Reto	2005	10.1145/2663806.2663853	ACM	E8
2676	The Revealing Flashlight: Interactive Spatial Augmented Reality for Detail Exploration of Cultural Heritage Artifacts	Ridel, Brett; Reuter, Patrick; Laviole, Jeremy; Mellado, Nicolas; Couture, Nadine; Granier, Xavier	2005	10.1145/2611376	ACM	E8
2677	TimeWarp: Interactive Time Travel with a Mobile Mixed Reality Game	Herbst, Iris; Braun, Anne-Kathrin; McCall, Rod; Broll, Wolfgang	2005	10.1145/1409240.1409266	ACM	E8
2678	TiPoint: Detecting Fingertip for Mid-Air Interaction on Computational Resource Constrained Smartglasses	Lee, Lik Hang; Braud, Tristan; Bijarbooneh, Farshid Hassani; Hui, Pan	2005	10.1145/3341163.3347723	ACM	I1
2679	Touch-Less Interactive Augmented Reality Game on Vision-Based Wearable Device	Lv, Zhihan; Halawani, Alaa; Feng, Shengzhong; Ur Réhman, Shafiq; Li, Haibo	2005	10.1007/s00779-015-0844-1	ACM	E6
2680	Towards a Mixed-Reality Interface for Mind-Mapping	Giraudeau, Philippe; Hachet, Martin	2005	10.1145/3132272.3132275	ACM	E6
2681	Towards a Multisensory Augmented Reality Map for Blind and Low Vision People: A Participatory Design Approach	Albouys-Perrois, Jérémy; Laviole, Jérémy; Briant, Carine; Brock, Anke M.	2005	10.1145/3173574.3174203	ACM	E6
2682	Towards an Understanding of Augmented Reality Extensions for Existing 3D Data Analysis Tools	Wang, Xiyao; Besançon, Lonni; Rousseau, David; Sereno, Mickael; Ammi, Mehdi; Isenberg, Tobias	2005	10.1145/3313831.3376657	ACM	I1
2683	Towards Efficient Interdisciplinary Authoring of Industrial Augmented Reality Applications	Börsting, Ingo; Gruhn, Volker	2005	10.1145/3397537.3398474	ACM	E6
2684	Towards In-Situ Process Tomography Data Processing Using Augmented Reality Technology	Nowak, Adam; Woundefinedniak, Miko?aj; Rowi?ska, Zdzis?awa; Grudzie?, Krzysztof; Romanowski, Andrzej	2005	10.1145/3341162.3343782	ACM	I1
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2686	Trends in Augmented Reality Tracking, Interaction and Display: A Review of Ten Years of ISMAR	Zhou, Feng; Duh, Henry Been-Lirn; Billinghurst, Mark	2005	10.1109/ISMAR.2008.4637362	ACM	E6
2687	UbiPoint: Towards Non-Intrusive Mid-Air Interaction for Hardware Constrained Smart Glasses	Lee, Lik Hang; Braud, Tristan; Bijarbooneh, Farshid Hassani; Hui, Pan	2005	10.1145/3339825.3391870	ACM	E6
2688	Uncomfortable User Experience	Benford, Steve; Greenhalgh, Chris; Giannachi, Gabriella; Walker, Brendan; Marshall, Joe; Rodden, Tom	2005	10.1145/2500468.2500889	ACM	E8
2689	Understanding Gesture and Speech Multimodal Interactions for Manipulation Tasks in Augmented Reality Using Unconstrained Elicitation	Williams, Adam S.; Ortega, Francisco R.	2005	10.1145/3427330	ACM	E6
2690	Understanding User Experience Aspects in Cultural Heritage Interaction	Konstantakis, Markos; Aliprantis, John; Teneketzis, Alexandros; Caridakis, George	2005	10.1145/3291533.3291580	ACM	E6
2691	Understanding Users' Capability to Transfer Information between Mixed and Virtual Reality: Position Estimation across Modalities and Perspectives	Roo, Joan Sol; Basset, Jean; Cinquin, Pierre-Antoine; Hachet, Martin	2005	10.1145/3173574.3173937	ACM	E6
2692	Urban Sketcher: Mixed Reality on Site for Urban Planning and Architecture	Sareika, Markus; Schmalstieg, Dieter	2005	10.1109/ISMAR.2007.4538821	ACM	E6

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2693	Usability and Collaborative Aspects of Augmented Reality	Fjeld, Morten	2005	10.1145/1029036.1029044	ACM	E2
2694	Usability Factors of 3D Criminal Archive in an Augmented Reality Environment	Breien, Fredrik Sundt; Rødseth, Ingerid	2005	10.1145/1182475.1182518	ACM	E6
2695	User Experience of Panoramic Video in CAVE-like and Head Mounted Display Viewing Conditions	Philpot, Adam; Glancy, Maxine; Passmore, Peter J.; Wood, Andrew; Fields, Bob	2005	10.1145/3077548.3077550	ACM	E8
2696	User Experience Problems in Immersive Virtual Environments	Forte, Juan Luis Berenguel; Vela, Francisco Luis Gutiérrez; Rodríguez, Patricia Paderewski	2005	10.1145/3335595.3336288	ACM	E8
2697	Using Human-Values as a Guide for Understanding Worthy Design Directions in Augmented Reality	Rousi, Rebekah	2005	10.1145/2994310.2994322	ACM	E8
2698	Using the S-PI Algorithm for Interaction in Augmented Reality	Ismail, Ajune Wanis; Billinghurst, Mark; Sunar, Mohd Shahrizal	2005	10.1145/2542242.2542254	ACM	E8
2699	Uvmode: Usability Verification Mixed Reality System for Mobile Devices	Yang, Ungyeon; Jo, Dongsik; Son, Wooho	2005	10.1145/1358628.1358893	ACM	E6
2700	V.Ra: An In-Situ Visual Authoring System for Robot-IoT Task Planning with Augmented Reality	Cao, Yuanzhi; Xu, Zhuangying; Li, Fan; Zhong, Wentao; Huo, Ke; Ramani, Karthik	2005	10.1145/3322276.3322278	ACM	E8
2701	Video Card Game: An Augmented Environment for User Centred Design Discussions	Buur, Jacob; Soendergaard, Astrid	2005	10.1145/354666.354673	ACM	E8
2702	Wearable Mobile Augmented Reality: Evaluating Outdoor User Experience	Kerr, Steven J.; Rice, Mark D.; Teo, Yinquan; Wan, Marcus; Cheong, Yian Ling; Ng, Jamie; Ng-Thamrin, Lillian; Thura-Myo, Thant; Wren, Dominic	2005	10.1145/2087756.2087786	ACM	E6
2703	Window-Shaping: 3D Design Ideation by Creating on, Borrowing from, and Looking at the Physical World	Huo, Ke; Vinayak; Ramani, Karthik	2005	10.1145/3024969.3024995	ACM	E8
2704	WireDraw: 3D Wire Sculpturing Guided with Mixed Reality	Yue, Ya-Ting; Zhang, Xiaolong; Yang, Yongliang; Ren, Gang; Choi, Yi-King; Wang, Wenping	2005	10.1145/3025453.3025792	ACM	E8
2705	XRaSE: Towards Virtually Tangible Software Using Augmented Reality	Mehra, Rohit; Sharma, Vibhu Saujanya; Kaulgud, Vikrant; Podder, Sanjay	2005	10.1109/ASE.2019.00135	ACM	E6
2706	The Printer is Telling Me about Itself: Supporting the Appropriation of Hardware by Using Projection Mapping	Ludwig, Thomas; Döll, Michael; Kotthaus, Christoph	2005	10.1145/3322276.3322342	ACM	E8
2707	ARAnimator: In-Situ Character Animation in Mobile AR with User-Defined Motion Gestures	Ye, Hui; Kwan, Kin Chung; Su, Wanchao; Fu, Hongbo	2005	10.1145/3386569.3392404	ACM	E8
2708	3D Helping Hands: A Gesture Based MR System for Remote Collaboration	Tecchia, Franco; Alem, Leila; Huang, Weidong	2005	10.1145/2407516.2407590	ACM	E6
2709	3PI Experiment: Immersion in Third-Person View	Nakamura, Ricardo; Lago, Lucas L. M.; Carneiro, Alexandre B.; Cunha, Anderson J. C.; Ortega, Fábio J. M.; Bernardes, João L.; Tori, Romero	2005	10.1145/1836135.1836142	ACM	E6
2710	A Dimension Space for the Design of Interactive Systems within Their Physical Environments	Graham, T. C. Nicholas; Watts, Leon A.; Calvary, Gaëlle; Coutaz, Joëlle; Dubois, Emmanuel; Nigay, Laurence	2005	10.1145/347642.347799	ACM	E8
2711	A Holistic User-Centered Approach to Immersive Digital Cultural Heritage Installations: Case Vrouw Maria	Reunanen, Markku; Díaz, Lily; Horttana, Tommi	2005	10.1145/2637485	ACM	E8
2712	A Multi Modal Table-Top 3D Modeling Tool in Augmented Environments	Novotny, Tom; Lindt, Irma; Broll, Wolfgang	2005	10.5555/2386021.2386028	ACM	E8
2713	A New Projection-Based Exhibition System for a Museum	Lee, Yong Yi; Lee, Jong Hun; Ahmed, Bilal; Son, Moon Gu; Lee, Kwan H.	2005	10.1145/3275522	ACM	E8

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2714	A Study of Touchless versus Touch-Based Interactions with Bacterial Biofilm Images	Hosseini, Mohammadreza; Vallotton, Pascal; Bednarz, Tomasz; Sowmya, Arcot	2005	10.1145/2534329.2534366	ACM	E6
2715	A Survey and Taxonomy of 3D Menu Techniques	Dachselt, R.; Hübner, A.	2005	10.5555/2386021.2386035	ACM	E8
2716	Accurate and Low-Latency Sensing of Touch Contact on Any Surface with Finger-Worn IMU Sensor	Gu, Yizheng; Yu, Chun; Li, Zhipeng; Li, Weiqi; Xu, Shuchang; Wei, Xiaoying; Shi, Yuanchun	2005	10.1145/3332165.3347947	ACM	E8
2717	Adding Physical Objects to an Interactive Game Improves Learning and Enjoyment: Evidence from EarthShake	Yannier, Nesra; Hudson, Scott E.; Wiese, Eliane Stampfer; Koedinger, Kenneth R.	2005	10.1145/2934668	ACM	E8
2718	An Active Tangible User Interface Framework for Teaching and Learning Artificial Intelligence	De Raffaele, Clifford; Smith, Serengul; Gemikonakli, Orhan	2005	10.1145/3172944.3172976	ACM	E8
2719	An Interactive Multimedia Framework for Digital Heritage Narratives	Adabala, Neeharika; Datha, Naren; Joy, Joseph; Kulkarni, Chinmay; Manchepalli, Ajay; Sankar, Aditya; Walton, Rebecca	2005	10.1145/1873951.1874240	ACM	E8
2720	An Interactive Visualisation Interface for Virtual Museums	Liarokapis, F.; Sylaiou, S.; Basu, A.; Mourkoussis, N.; White, M.; Lister, P. F.	2005	10.5555/2384368.2384375	ACM	E8
2721	An Introduction to 3D Spatial Interaction with Video Game Motion Controllers	LaViola, Joseph J.; Marks, Richard L.	2005	10.1145/1837101.1837103	ACM	E8
2722	Application of Virtual Reality Technologies in Rapid Development and Assessment of Ambient Assisted Living Environments	Jiménez-Mixco, Viveca; Villalar González, Juan Luis; Arca, Antonella; Cabrera-Umpierrez, María Fernanda; Arredondo, María Teresa; Manchado, Pablo; García-Robledo, María	2005	10.1145/1631097.1631101	ACM	E8
2723	AR in the Gallery: The Psychogeographer's Table	Franz, Juliano; Alnusayri, Mohammed; Malloch, Joseph; Gahlon, Akshay; Reilly, Derek	2005	10.1145/3290607.3312898	ACM	I1
2724	AR Pen and Hand Gestures: A New Tool for Pen Drawings	Kim, Hark-Joon; Kim, Hayoung; Chae, Seungho; Seo, Jonghoon; Han, Tack-Don	2005	10.1145/2468356.2468525	ACM	E8
2725	AR Typing Interface for Mobile Devices	Higuchi, Masakazu; Komuro, Takashi	2005	10.1145/2541831.2541847	ACM	I1
2726	AR-Based Chemistry Learning with Mobile Molecules	Ducao, Arlene; Milne, Catherine; Koen, Ilias	2005	10.1145/2485760.2485862	ACM	E8
2727	ARcadia: A Rapid Prototyping Platform for Real-Time Tangible Interfaces	Kelly, Annie; Shapiro, R. Benjamin; de Halleux, Jonathan; Ball, Thomas	2005	10.1145/3170427.3186535	ACM	E8
2728	ARcadia: A Rapid Prototyping Platform for Real-Time Tangible Interfaces	Kelly, Annie; Shapiro, R. Benjamin; de Halleux, Jonathan; Ball, Thomas	2005	10.1145/3173574.3173983	ACM	E8
2729	ARMath: Augmenting Everyday Life with Math Learning	Kang, Seokbin; Shokeen, Ekta; Byrne, Virginia L.; Norooz, Leyla; Bonsignore, Elizabeth; Williams-Pierce, Caro; Froehlich, Jon E.	2005	10.1145/3313831.3376252	ACM	E6
2730	ATSI: Augmented and Tangible Sonic Interaction	Pugliese, Roberto; Politis, Archontis; Takala, Tapio	2005	10.1145/2677199.2680550	ACM	E8
2731	Augmented Experiences in Cultural Spaces through Social Participation	Díaz, Paloma; Bellucci, Andrea; Yuan, Chien-Wen; Aedo, Ignacio	2005	10.1145/3230675	ACM	E6
2732	Augmented Miniature Prototyping Toolkit for UX in Interactive Space	Kim, Han-Jong; Nam, Tek-Jin	2005	10.1145/2702613.2732744	ACM	E6
2733	Augmenting Embodied Sensemaking Using VR-Enabled New and Unusual Perspectives	Smit, Dorothé	2005	10.1145/3374920.3374962	ACM	E8
2734	Augmenting Static Visualizations with PapARVis Designer	Chen, Zhutian; Tong, Wai; Wang, Qianwen; Bach, Benjamin; Qu, Huamin	2005	10.1145/3313831.3376436	ACM	E8

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2735	Beyond LED Status Lights - Design Requirements of Privacy Notices for Body-Worn Cameras	Koelle, Marion; Wolf, Katrin; Boll, Susanne	2005	10.1145/3173225.3173234	ACM	E6
2736	Blending into the White Box of the Art Museum	Lange, Vera; van Beuzekom, Marleen; Hansma, Michel; Jeurens, Jasper; van den Oever, Willemiek; Regterschot, Marjolein; Treffers, Jille; van Turnhout, Koen; Ibrahim Sezen, Tonguc; Iurgel, Ido; Bakker, Rene	2005	10.1145/3363384.3363469	ACM	E8
2737	Body-Centric Design Space for Multi-Surface Interaction	Wagner, Julie; Nancel, Mathieu; Gustafson, Sean G.; Huot, Stephane; Mackay, Wendy E.	2005	10.1145/2470654.2466170	ACM	E8
2738	Books with Voices: Paper Transcripts as a Physical Interface to Oral Histories	Klemmer, Scott R.; Graham, Jamey; Wolff, Gregory J.; Landay, James A.	2005	10.1145/642611.642628	ACM	E8
2739	Bridging Designers' Intentions to Outcomes with Constructivism	Muise, Kevin; Wakkary, Ron	2005	10.1145/1858171.1858229	ACM	E8
2740	Bringing Tabletop Technologies to Kindergarten Children	Marco, Javier; Cerezo, Eva; Baldassarri, Sandra; Mazzone, Emanuela; Read, Janet C.	2005	10.5555/1671011.1671023	ACM	E8
2741	CAPTIVE: A Cube with Augmented Physical Tools	Chakraborty, Arpan; Gross, Ryan; McIntee, Shea; Hong, Kyung Wha; Lee, Jae Yeol; St. Amant, Robert	2005	10.1145/2559206.2581340	ACM	E8
2742	Challenges Related to Nonhuman Animal-Computer Interaction: Usability and 'Liking'	Ritvo, Sarah E.; Allison, Robert S.	2005	10.1145/2693787.2693795	ACM	E8
2743	Challenges Using Head-Mounted Displays in Shared and Social Spaces	Gugenheimer, Jan; Mai, Christian; McGill, Mark; Williamson, Julie; Steinicke, Frank; Perlin, Ken	2005	10.1145/3290607.3299028	ACM	E8
2744	Changing the Camera-to-Screen Angle to Improve AR Browser Usage	Colley, Ashley; Van Vlaenderen, Wouter; Schöning, Johannes; Häkkilä, Jonna	2005	10.1145/2935334.2935384	ACM	E8
2745	Charade: Remote Control of Objects Using Free-Hand Gestures	Baudel, Thomas; Beaudouin-Lafon, Michel	2005	10.1145/159544.159562	ACM	E8
2746	Charting Past, Present, and Future Research in Ubiquitous Computing	Abowd, Gregory D.; Mynatt, Elizabeth D.	2005	10.1145/344949.344988	ACM	E8
2747	Clusters, Trends, and Outliers: How Immersive Technologies Can Facilitate the Collaborative Analysis of Multidimensional Data	Butscher, Simon; Hubenschmid, Sebastian; Müller, Jens; Fuchs, Johannes; Reiterer, Harald	2005	10.1145/3173574.3173664	ACM	E8
2748	Communicating Art through Interactive Technology: New Approaches for Interaction Design in Art Museums	Kortbek, Karen Johanne; Grønbæk, Kaj	2005	10.1145/1463160.1463185	ACM	E6
2749	Configuring and Controlling Ubiquitous Computing Infrastructure with Semantic Connections: A Tangible and an AR Approach	Vlist, Bram; Niezen, Gerrit; Rapp, Stefan; Hu, Jun; Feijs, Loe	2005	10.1007/s00779-012-0627-x	ACM	E6
2750	Context-Aware Assistive Systems at the Workplace: Analyzing the Effects of Projection and Gamification	Korn, Oliver; Funk, Markus; Abele, Stephan; Hörz, Thomas; Schmidt, Albrecht	2005	10.1145/2674396.2674406	ACM	E6
2751	Continuous Micro Finger Writing Recognition with a Commodity Smartwatch: Demo Abstract	Chen, Wenqiang; Chen, Lin; Ma, Meiyi; Parizi, Farshid Salemi; Shwetak, Patel; Stankovic, John	2005	10.1145/3384419.3430417	ACM	E8
2752	Control and Being Controlled: Exploring the Use of Technology in an Immersive Theatre Performance	Wiseman, Sarah; van der Linden, Janet; Spiers, Ad; Oshodi, Maria	2005	10.1145/3064663.3064694	ACM	E6
2753	Cooperative Augmentation of Mobile Smart Objects with Projected Displays	Molyneaux, David; Gellersen, Hans; Finney, Joe	2005	10.1145/2499474.2499476	ACM	E8
2754	Could a Tangible Interface Help a Child to Weigh His/Her Opinion on Usability?	Veytizou, Julien; Bertolo, David; Baraudon, Charlotte; Olry, Alexis; Fleck, Stéphanie	2005	10.1145/3286689.3286702	ACM	E6

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2756	Crafting Memorable VR Experiences Using Experiential Fidelity	Lindeman, Robert W.; Beckhaus, Steffi	2005	10.1145/1643928.1643970	ACM	E8
2757	Creating Augmented and Virtual Reality Applications: Current Practices, Challenges, and Opportunities	Ashtari, Narges; Bunt, Andrea; McGrenere, Joanna; Nebeling, Michael; Chilana, Parmit K.	2005	10.1145/3313831.3376722	ACM	E6
2758	C-Space: An Interactive Prototyping Platform for Collaborative Spatial Design Exploration	Son, Kihoon; Chun, Hwiwon; Park, Sojin; Hyun, Kyung Hoon	2005	10.1145/3313831.3376452	ACM	E8
2759	Customizing Hybrid Products	Benford, Steve; Koleva, Boriana; Preston, William Westwood; Angus, Alice; Thorn, Emily-Clare; Glover, Kevin	2005	10.1145/3173574.3173604	ACM	E8
2760	Design and Evaluation of a Wearable AR System for Sharing Personalized Content on Ski Resort Maps	Fedosov, Anton; Niforatos, Evangelos; Elhart, Ivan; Schneider, Teseo; Anisimov, Dmitry; Langheinrich, Marc	2005	10.1145/3012709.3012721	ACM	E8
2761	Design and Evaluation of DIO Construction Toolkit for Co-Making Shared Constructions	Arora, Jatin; Mathur, Kartik; Goel, Manvi; Kumar, Piyush; Mishra, Abhijeet; Parnami, Aman	2005	10.1145/3369833	ACM	E8
2762	Design Probes Study on User Perceptions of a Smart Glasses Concept	Häkkilä, Jonna; Vahabpour, Farnaz; Colley, Ashley; Väyrynen, Jani; Koskela, Timo	2005	10.1145/2836041.2836064	ACM	E8
2763	Design Research & Tangible Interaction	van den Hoven, Elise; Frens, Joep; Aliakseyeu, Dima; Martens, Jean-Bernard; Overbeeke, Kees; Peters, Peter	2005	10.1145/1226969.1226993	ACM	E6
2764	Designing a CD Augmentation for Mobile Phones	Henze, Niels; Boll, Susanne	2005	10.1145/1753846.1754089	ACM	E8
2765	Designing a Willing-to-Use-in-Public Hand Gestural Interaction Technique for Smart Glasses	Hsieh, Yi-Ta; Jylhä, Antti; Orso, Valeria; Gamberini, Luciano; Jacucci, Giulio	2005	10.1145/2858036.2858436	ACM	E8
2766	Designing an Informal Learning Curriculum to Develop 3D Modeling Knowledge and Improve Spatial Thinking Skills	Bhaduri, Srinjita; Van Horne, Katie; Sumner, Tamara	2005	10.1145/3290607.3299039	ACM	E8
2767	Designing for Mobile Interaction with Augmented Objects	Tomitsch, Martin; Mitchell, Mark C.; Weng, Hanley	2005	10.1145/2307798.2307803	ACM	E6
2768	Designing for Performative Interactions in Public Spaces	Rico, Julie; Jacucci, Giulio; Reeves, Stuart; Hansen, Lone Koefoed; Brewster, Stephen	2005	10.1145/1864431.1864503	ACM	E8
2769	Designing Hybrid Gifts	Koleva, Boriana; Spence, Jocelyn; Benford, Steve; Kwon, Hyosun; Schnädelbach, Holger; Thorn, Emily; Preston, William; Hazzard, Adrian; Greenhalgh, Chris; Adams, Matt; Farr, Ju Row; Tandavanitj, Nick; Angus, Alice; Lane, Giles	2005	10.1145/3398193	ACM	E8
2770	Designing Interfaces for Creative Learning Environments Using the Transreality Storyboarding Framework	Rasool, Jazz; Molka-Danielsen, Judith; Smith, Carl H.	2005	10.1145/3404512.3404530	ACM	E8
2771	Designing Mobile Technologies to Support Co-Present Collaboration	Cole, Helen; Stanton, Danaë	2005	10.1007/s00779-003-0249-4	ACM	E8
2772	Designing Smart Home Interfaces: Traditional vs Virtual Prototyping	Ceccacci, S.; Mengoni, M.	2005	10.1145/3056540.3056556	ACM	E6
2773	Designing Socially Acceptable Hand-to-Face Input	Lee, DoYoung; Lee, Youryang; Shin, Yonghwan; Oakley, Ian	2005	10.1145/3242587.3242642	ACM	E6
2774	Designing the Interaction with the Internet of Tangible Things: A Card Set	Angelini, Leonardo; Mugellini, Elena; Couture, Nadine; Abou Khaled, Omar	2005	10.1145/3173225.3173288	ACM	E8

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2776	Digital Augmentation of Historical Objects Through Tangible Interaction	Not, Elena; Cavada, Dario; Maule, Stefano; Pisetti, Anna; Venturini, Adriano	2005	10.1145/3297764	ACM	E8
2777	Digital Foam Interaction Techniques for 3D Modeling	Smith, Ross T.; Thomas, Bruce H.; Piekarski, Wayne	2005	10.1145/1450579.1450592	ACM	E8
2778	Digital Interaction: Where Are We Going?	Catarci, Tiziana; Amendola, Massimo; Bertacchini, Francesca; Bilotta, Eleonora; Bracalenti, Marco; Buono, Paolo; Cocco, Antonello; Costabile, Maria Francesca; Desolda, Giuseppe; Di Nocera, Francesco; Federici, Stefano; Gaudino, Giancarlo; Lanzilotti, Rosa; Marrella, Andrea; Mele, Maria Laura; Pantano, Pietro S.; Poggi, Isabella; Tarantino, Laura	2005	10.1145/3206505.3206606	ACM	E8
2779	Duopography: Using Back-of-Device Multi-Touch Input to Manipulate Spatial Data on Mobile Tangible Interactive Topography	Li, Nico; Sharlin, Ehud; Sousa, Mario Costa	2005	10.1145/3132787.3139197	ACM	E8
2780	Ec(h)o: Situated Play in a Tangible and Audio Museum Guide	Wakkary, Ron; Hatala, Marek	2005	10.1145/1142405.1142448	ACM	E8
2781	Editorial: The Evolving Field of Tangible Interaction for Children: The Challenge of Empirical Validation	Zaman, Bieke; Vanden Abeele, Vero; Markopoulos, Panos; Marshall, Paul	2005	10.1007/s00779-011-0409-x	ACM	E6
2782	EGuide: Investigating Different Visual Appearances and Guidance Techniques for Egocentric Guidance Visualizations	Dürr, Maximilian; Weber, Rebecca; Pfeil, Ulrike; Reiterer, Harald	2005	10.1145/3374920.3374945	ACM	E8
2783	Engagement in HCI: Conception, Theory and Measurement	Doherty, Kevin; Doherty, Gavin	2005	10.1145/3234149	ACM	E6
2784	Enriching Archaeological Parks with Contextual Sounds and Mobile Technology	Ardito, Carmelo; Costabile, Maria F.; De Angeli, Antonella; Lanzilotti, Rosa	2005	10.1145/2395131.2395136	ACM	E8
2785	Evaluation of Basic Object Manipulation Modes for Low-Cost Immersive Virtual Reality	Caputo, Fabio Marco; Giachetti, Andrea	2005	10.1145/2808435.2808439	ACM	E8
2786	Evaluation of Ultrasound Haptics as a Supplementary Feedback Cue for Grasping in Virtual Environments	Frutos-Pascual, Maite; Harrison, Jake Michael; Creed, Chris; Williams, Ian	2005	10.1145/3340555.3353720	ACM	E6
2787	Experimental Evaluation of Sketching on Surfaces in VR	Arora, Rahul; Kazi, Rubaiat Habib; Anderson, Fraser; Grossman, Tovi; Singh, Karan; Fitzmaurice, George	2005	10.1145/3025453.3025474	ACM	E8
2788	Experiments in 3D Interaction for Mobile Phone AR	Henrysson, Anders; Marshall, Joe; Billinghurst, Mark	2005	10.1145/1321261.1321295	ACM	E6
2789	Exploration and Reflection in Interactive Art: Glass Pond	Seevinck, Jennifer; Candy, Linda; Edmonds, Ernest A.	2005	10.1145/1228175.1228202	ACM	E8
2790	Exploring Smartphone-Based Interaction with Overview+detail Interfaces on 3D Public Displays	Bergé, Louis-Pierre; Serrano, Marcos; Perelman, Gary; Dubois, Emmanuel	2005	10.1145/2628363.2628374	ACM	E8
2791	Exploring the Performance of Graphically Designed AR Markers	Colley, Ashley; Wolf, Dennis; Kammerer, Klaus; Rukzio, Enrico; Häkkilä, Jonna	2005	10.1145/3428361.3432076	ACM	E8
2792	Expressive Interactions - Supporting Collaboration in Urban Design	Maquil, Valérie; Psik, Thomas; Wagner, Ina; Wagner, Mira	2005	10.1145/1316624.1316635	ACM	E6
2793	Feeling Virtual Worlds: An Exploration into Coupling Virtual and Kinaesthetic Experiences	Campbell, Joey; Hogan, Trevor; Fraser, Mike	2005	10.1145/3173225.3173281	ACM	E8
2794	Flying Frustum: A Spatial Interface for Enhancing Human-UAV Awareness	Li, Nico; Cartwright, Stephen; Shekhar Nittala, Aditya; Sharlin, Ehud; Costa Sousa, Mario	2005	10.1145/2814940.2814956	ACM	E8

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2796	From Tangible to Augmented: Designing a PhonoBlocks Reading System Using Everyday Technologies	Fan, Min; Antle, Alissa N.; Sarker, Shubhra	2005	10.1145/3170427.3188459	ACM	E8
2797	Getting a Grip on Tangible Interaction: A Framework on Physical Space and Social Interaction	Hornecker, Eva; Buur, Jacob	2005	10.1145/1124772.1124838	ACM	E8
2798	HCI, Natural Science and Design: A Framework for Triangulation across Disciplines	Mackay, Wendy E.; Fayard, Anne-Laure	2005	10.1145/263552.263612	ACM	E8
2799	HeadGesture: Hands-Free Input Approach Leveraging Head Movements for HMD Devices	Yan, Yukang; Yu, Chun; Yi, Xin; Shi, Yuanchun	2005	10.1145/3287076	ACM	E8
2800	Here and Now: Reality-Based Information Retrieval: Perspective Paper	Büschel, Wolfgang; Mitschick, Annett; Dachselt, Raimund	2005	10.1145/3176349.3176384	ACM	E8
2801	HideOut: Mobile Projector Interaction with Tangible Objects and Surfaces	Willis, Karl D. D.; Shiratori, Takaaki; Mahler, Moshe	2005	10.1145/2460625.2460682	ACM	E8
2802	HOBIT: Hybrid Optical Bench for Innovative Teaching	Furió, David; Fleck, Stéphanie; Bousquet, Bruno; Guillet, Jean-Paul; Canioni, Lionel; Hachet, Martin	2005	10.1145/3025453.3025789	ACM	E6
2803	Horst - The Teaching Frog: Learning the Anatomy of a Frog Using Tangible AR	Oberdörfer, Sebastian; Elsässer, Anne; Schraudt, David; Grafe, Silke; Latoschik, Marc Erich	2005	10.1145/3404983.3410007	ACM	E8
2804	Household Surface Interactions: Understanding User Input Preferences and Perceived Home Experiences	Tigwell, Garreth W.; Crabb, Michael	2005	10.1145/3313831.3376856	ACM	E8
2805	Human-Sound Interaction: Towards a Human-Centred Sonic Interaction Design Approach	Donato, Balandino Di; Dewey, Christopher; Michailidis, Tychonas	2005	10.1145/3401956.3404233	ACM	E8
2806	I-LAND: An Interactive Landscape for Creativity and Innovation	Streitz, Norbert A.; Geißler, Jörg; Holmer, Torsten; Konomi, Shin'ichi; Müller-Tomfelde, Christian; Reischl, Wolfgang; Rexroth, Petra; Seitz, Peter; Steinmetz, Ralf	2005	10.1145/302979.303010	ACM	E8
2807	Immersive Simulation of Visual Impairments Using a Wearable See-through Display	Ates, Halim Cagri; Fiannaca, Alexander; Folmer, Eelke	2005	10.1145/2677199.2680551	ACM	E8
2808	Implementation of God-like Interaction Techniques for Supporting Collaboration between Outdoor AR and Indoor Tabletop Users	Stafford, Aaron; Piekarski, Wayne; Thomas, Bruce	2005	10.1109/ISMAR.2006.297809	ACM	E6
2809	Incorporating Kinesthetic Creativity and Gestural Play into Immersive Modeling	Jang, Sung-A.; Wakefield, Graham; Lee, Sung-Hee	2005	10.1145/3077981.3078045	ACM	E6
2810	Informative Art: Using Amplified Artworks as Information Displays	Redström, Johan; Skog, Tobias; Hallnäs, Lars	2005	10.1145/354666.354677	ACM	E8
2811	Interact with Your Car: A User-Elicited Gesture Set to Inform Future in-Car User Interfaces	Weidner, Florian; Broll, Wolfgang	2005	10.1145/3365610.3365625	ACM	E6
2812	Interaction Design & Prototyping for Immersive Analytics	Bach, Benjamin; Cordeil, Maxime; Engelke, Ulrich; Ens, Barrett; Serrano, Marcos; Willett, Wesley	2005	10.1145/3290607.3299019	ACM	E8
2813	Interaction Techniques for Navigation through and Manipulation of 2D and 3D Data	Aliakseyeu, Dzmitry; Subramanian, Sriram; Martens, Jean-Bernard; Rauterberg, Matthias	2005	10.5555/509709.509737	ACM	E8
2814	Interactive Auditory Mediated Reality: Towards User-Defined Personal Soundscapes	Haas, Gabriel; Stemasov, Evgeny; Rietzler, Michael; Rukzio, Enrico	2005	10.1145/3357236.3395493	ACM	E6

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2815	Interactive Mediated Reality	Grasset, Raphael; Boissieux, Laurence; Gascuel, Jean D.; Schmalstieg, Dieter	2005	10.5555/1082243.1082247	ACM	E8
2816	Interactive Spatial Multimedia for Communication of Art in the Physical Museum Space	Kortbek, Karen Johanne; Grønbæk, Kaj	2005	10.1145/1459359.1459441	ACM	E8
2817	Interface Evaluation for Cultural Heritage Applications: The Case of FERRUM Exhibition	Alzua-Sorzabal, A.; Linaza, M. T.; Abad, M.; Arretxea, L.; Susperregui, A.	2005	10.5555/2384344.2384363	ACM	E8
2818	Intuitive Virtual Production Tools for Set and Light Editing	Trottnow, Jonas; Götz, Kai; Seibert, Stefan; Spielmann, Simon; Helzle, Volker; Einabadi, Farshad; Sielaff, Clemens K. H.; Grau, Oliver	2005	10.1145/2824840.2824851	ACM	E8
2819	KAVA: The Virtual Experience of Urban Sharing	Fouad Amirouche, Nacim; Lafond, Marie-Christine; Lavigne, Josianne; Monette, Marc-André	2005	10.1145/2468356.2468835	ACM	E6
2820	Kid Space: Interactive Learning in a Smart Environment	Anderson, Glen J.; Panneer, Selvakumar; Shi, Meng; Marshall, Carl S.; Agrawal, Ankur; Chierichetti, Rebecca; Raffa, Giuseppe; Sherry, John; Loi, Daria; Durham, Lenitra Megail	2005	10.1145/3279981.3279986	ACM	E8
2821	Learner versus System Control in Augmented Lab Experiments	Karsten, Susanne; Jörg, Daniel; Hornecker, Eva	2005	10.1145/3132272.3132276	ACM	E8
2822	LightGuide: Projected Visualizations for Hand Movement Guidance	Sodhi, Rajinder; Benko, Hrvoje; Wilson, Andrew	2005	10.1145/2207676.2207702	ACM	E8
2823	Looking Inside the Wires: Understanding Museum Visitor Learning with an Augmented Circuit Exhibit	Beheshti, Elham; Kim, David; Ecanow, Gabrielle; Horn, Michael S.	2005	10.1145/3025453.3025479	ACM	E8
2824	MacroScope: First-Person Perspective in Physical Scale Models	Smit, Dorothé; Grah, Thomas; Murer, Martin; van Rheden, Vincent; Tscheligi, Manfred	2005	10.1145/3173225.3173276	ACM	E8
2825	Metaphor Modelling for Tangible Interfaces Evaluation	Celentano, Augusto; Dubois, Emmanuel	2005	10.1145/2254556.2254573	ACM	E8
2826	Methodologies and Evaluation Tools Used in Tangible User Interfaces: A Systematic Literature Review	da Costa, Vinicius Kruger; de Vasconcellos, Ana Priscila Valerão; Darley, Natalia Toralles; Tavares, Tatiana Aires	2005	10.1145/3274192.3274223	ACM	E6
2827	MIDAS Projection: Markerless and Modelless Dynamic Projection Mapping for Material Representation	Miyashita, Leo; Watanabe, Yoshihiro; Ishikawa, Masatoshi	2005	10.1145/3272127.3275045	ACM	E8
2828	MiniStudio: Designers' Tool for Prototyping Ubicomp Space with Interactive Miniature	Kim, Han-Jong; Kim, Ju-Whan; Nam, Tek-Jin	2005	10.1145/2858036.2858180	ACM	E8
2829	Mixing Realities for Sketch Retrieval in Virtual Reality	Giunchi, Daniele; James, Stuart; Degraen, Donald; Steed, Anthony	2005	10.1145/3359997.3365751	ACM	E8
2830	Models for Rested Touchless Gestural Interaction	Guinness, Darren; Jude, Alvin; Poor, G. Michael; Dover, Ashley	2005	10.1145/2788940.2788948	ACM	E8
2831	Mouse, Touch, or Fich: Comparing Traditional Input Modalities to a Novel Pre-Touch Technique	Müller, Jonas; Rieger, Lea; Aslan, Ilhan; Anneser, Christoph; Sandstede, Malte; Schwarzmeier, Felix; Petrak, Björn; André, Elisabeth	2005	10.1145/3365610.3365622	ACM	E8
2832	Multimodal Collaborative Activity among Architectural Designers Using an Augmented Desktop at Distance or in Collocation	Burkhardt, Jean-Marie; Détienne, Françoise; Moutsingua-Mpaga, Linda; Perron, Laurence; Safin, Stéphane; Leclercq, Pierre	2005	10.1145/1473018.1473049	ACM	E8
2833	Multi-View Gesture Annotations in Image-Based 3D Reconstructed Scenes	Nuernberger, Benjamin; Lien, Kuo-Chin; Grinta, Lennon; Sweeney, Chris; Turk, Matthew; Höllerer, Tobias	2005	10.1145/2993369.2993371	ACM	E6
2834	Object-Based Touch Manipulation for Remote Guidance of Physical Tasks	Adcock, Matt; Ranatunga, Dulitha; Smith, Ross; Thomas, Bruce H.	2005	10.1145/2659766.2659768	ACM	E8

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2836	PalmSpace: Continuous around-Device Gestures vs. Multitouch for 3D Rotation Tasks on Mobile Devices	Kratz, Sven; Rohs, Michael; Guse, Dennis; Müller, Jörg; Bailly, Gilles; Nischt, Michael	2005	10.1145/2254556.2254590	ACM	E8
2837	Papier-Mache: Toolkit Support for Tangible Input	Klemmer, Scott R.; Li, Jack; Lin, James; Landay, James A.	2005	10.1145/985692.985743	ACM	E8
2838	Passive Haptics Based MR System for Geography Teaching	Yang, Zhizhuo; Weng, Dongdong	2005	10.1145/3013971.3013995	ACM	E8
2839	Pen-and-Paper Rituals in Service Interaction: Combining High-Touch and High-Tech in Financial Advisory Encounters	Dolata, Mateusz; Agotai, Doris; Schubiger, Simon; Schwabe, Gerhard	2005	10.1145/3359326	ACM	E6
2840	Pervasive Games: Bringing Computer Entertainment Back to the Real World	Magerkurth, Carsten; Cheok, Adrian David; Mandryk, Regan L.; Nilsen, Trond	2005	10.1145/1077246.1077257	ACM	E8
2841	PLANWELL: Spatial User Interface for Collaborative Petroleum Well-Planning	Nittala, Aditya Shekhar; Li, Nico; Cartwright, Stephen; Takashima, Kazuki; Sharlin, Ehud; Sousa, Mario Costa	2005	10.1145/2818427.2818443	ACM	E8
2842	Pocket6: A 6DoF Controller Based On A Simple Smartphone Application	Babic, Teo; Reiterer, Harald; Haller, Michael	2005	10.1145/3267782.3267785	ACM	E8
2843	PPCards: Toward Enhancing Electronic Prototyping with Editions of a Card-Based Platform	Gomes de Siqueira, Alexandre; Bhargava, Ayush; Venkatakrishnan, Rohith; Venkatakrishnan, Roshan	2005	10.1145/3430524.3440643	ACM	E6
2844	Presence and Engagement in an Interactive Drama	Dow, Steven; Mehta, Manish; Harmon, Ellie; MacIntyre, Blair; Mateas, Michael	2005	10.1145/1240624.1240847	ACM	E8
2845	Real Binoculars with Virtual Functions for Mixed Environments	Sherstyuk, Andrei; Wang, Kin Lik; Treskunov, Anton; Pair, Jarrell	2005	10.1145/1501750.1501778	ACM	E8
2846	Real-Time Capture of Holistic Tangible Interactions	Varga, Virag; Vakulya, Gergely; Buergisser, Benjamin; Riopelle, Nathan; Zund, Fabio; Sumner, Robert W.; Gross, Thomas R.; Sample, Alanson	2005	10.1145/3430524.3440658	ACM	E6
2847	Replicate and Reuse: Tangible Interaction Design for Digitally-Augmented Physical Media Objects	Gupta, Aakar; Lin, Bo Rui; Ji, Siyi; Patel, Arjav; Vogel, Daniel	2005	10.1145/3313831.3376139	ACM	E6
2848	Research in the Wild via Performance: Challenges, Ethics and Opportunities	Taylor, Robyn; Williamson, Julie; Spence, Jocelyn; Wood, Matthew; Hook, Jonathan; Chen, Ko-Le	2005	10.1145/3317697.3323348	ACM	E8
2849	Rig Animation with a Tangible and Modular Input Device	Glauser, Oliver; Ma, Wan-Chun; Panozzo, Daniele; Jacobson, Alec; Hilliges, Otmar; Sorkine-Hornung, Olga	2005	10.1145/2897824.2925909	ACM	E8
2850	SA '17: SIGGRAPH Asia 2017 Emerging Technologies		2005	10.1145/3132818	ACM	E8
2851	SA '17: SIGGRAPH Asia 2017 Mobile Graphics & Interactive Applications		2005	10.1145/3132787	ACM	E8
2852	SA '17: SIGGRAPH Asia 2017 Technical Briefs		2005	10.1145/3145749	ACM	E8
2853	SA '18: SIGGRAPH Asia 2018 Emerging Technologies		2005	10.1145/3275476	ACM	E8
2854	Shaking the Dead: Multimodal Location Based Experiences for Un-Stewarded Archaeological Sites	McGookin, David; Vazquez-Alvarez, Yolanda; Brewster, Stephen; Bergstrom-Lehtovirta, Joanna	2005	10.1145/2399016.2399048	ACM	E8
2855	SIGGRAPH '13: ACM SIGGRAPH 2013 Mobile		2005	10.1145/2503512	ACM	E8
2856	Slice of Light: Transparent and Integrative Transition Among Realities in a Multi-HMD-User Environment	Wang, Chiu-Hsuan; Tsai, Chia-En; Yong, Seraphina; Chan, Liwei	2005	10.1145/3379337.3415868	ACM	E8

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2857	SpaceTop: Integrating 2D and Spatial 3D Interactions in a See-through Desktop Environment	Lee, Jinha; Olwal, Alex; Ishii, Hiroshi; Boulanger, Cati	2005	10.1145/2470654.2470680	ACM	I1
2858	Spatially Aware Handhelds for High-Precision Tangible Interaction with Large Displays	Olwal, Alex; Feiner, Steven	2005	10.1145/1517664.1517705	ACM	E6
2859	Supporting Casual Interactions between Board Games on Public Tabletop Displays and Mobile Devices	Echtler, Florian; Nestler, Simon; Dippon, Andreas; Klinker, Gudrun	2005	10.1007/s00779-009-0246-3	ACM	E8
2860	SymbiosisSketch: Combining 2D & 3D Sketching for Designing Detailed 3D Objects in Situ	Arora, Rahul; Habib Kazi, Rubaiat; Grossman, Tovi; Fitzmaurice, George; Singh, Karan	2005	10.1145/3173574.3173759	ACM	E8
2861	TabletInVR: Exploring the Design Space for Using a Multi-Touch Tablet in Virtual Reality	Surale, Hemant Bhaskar; Gupta, Aakar; Hancock, Mark; Vogel, Daniel	2005	10.1145/3290605.3300243	ACM	E6
2862	Tabletop AR with HMD and Tablet: A Comparative Study for 3D Selection	Plasson, Carole; Cunin, Dominique; Laurillau, Yann; Nigay, Laurence	2005	10.1145/3343055.3360760	ACM	E6
2863	Tangible Agile Mapping: Ad-Hoc Tangible User Interaction Definition	Walsh, James A.; von Itzstein, Stewart; Thomas, Bruce H.	2005	10.5555/2525493.2525494	ACM	E8
2864	Tangible Autonomous Interfaces (TAIs): Exploring Autonomous Behaviours in TUIs	Nowacka, Diana; Kirk, David	2005	10.1145/2540930.2540942	ACM	E8
2865	Tangible Landscape: A Hands-on Method for Teaching Terrain Analysis	Millar, Garrett C.; Tabrizian, Payam; Petrasova, Anna; Petras, Vaclav; Harmon, Brendan; Mitasova, Helena; Meetenmeyer, Ross K.	2005	10.1145/3173574.3173954	ACM	E6
2866	Tangible Tiles: Design and Evaluation of a Tangible User Interface in a Collaborative Tabletop Setup	Waldner, Manuela; Hauber, Jörg; Zauner, Jürgen; Haller, Michael; Billinghurst, Mark	2005	10.1145/1228175.1228203	ACM	E8
2867	Tangible User Interface for Chemistry Education: Comparative Evaluation and Re-Design	Fjeld, Morten; Fredriksson, Jonas; Ejdestig, Martin; Duca, Florin; Bötschi, Kristina; Voegtli, Benedikt; Juchli, Patrick	2005	10.1145/1240624.1240745	ACM	E8
2868	Tangible Viewports: Getting Out of Flatland in Desktop Environments	Gervais, Renaud; Roo, Joan Sol; Hachet, Martin	2005	10.1145/2839462.2839468	ACM	E6
2869	Tangible VR: Diegetic Tangible Objects for Virtual Reality Narratives	Harley, Daniel; Tarun, Aneesh P.; Germinario, Daniel; Mazalek, Ali	2005	10.1145/3064663.3064680	ACM	E8
2870	TaraScope: Controlling Remote Telescopes Through Tangible Interaction	Hogan, Trevor; Goveas, Dylan; Noonan, Rebecca; Twomey, Luke	2005	10.1145/2677199.2680562	ACM	E8
2871	Techniques for Augmented-Tangibles on Mobile Devices for Early Childhood Learning	Cheung, Victor; Antle, Alissa N.; Sarker, Shubhra; Fan, Min; Fan, Jianyu; Pasquier, Philippe	2005	10.1145/3392063.3394412	ACM	E8
2872	Teegi: Tangible EEG Interface	Frey, Jérémy; Gervais, Renaud; Fleck, Stéphanie; Lotte, Fabien; Hachet, Martin	2005	10.1145/2642918.2647368	ACM	E8
2873	The Designer's Body as Resource in Design: Exploring Combinations of Point-of-View and Tense	Svanæs, Dag; Barkhuus, Louise	2005	10.1145/3313831.3376430	ACM	E8
2874	The Embodied Hybrid Space: Designing Ubiquitous Computing towards an Amplification of Situated Real World Experiences	Bilandzic, Mark	2005	10.1145/1952222.1952327	ACM	E8
2875	The Finnish You: An Interactive Storytelling Application for an Airport Environment	Burova, Alisa; Kelling, Chelsea; Hakulinen, Jaakko; Kallioniemi, Pekka; Keskinen, Tuuli; Turunen, Markku; Väätäjä, Heli	2005	10.1145/3275116.3275142	ACM	E8
2876	The INTELed Pedagogical Framework: Applying Embodied Digital Apps to Support Special Education Children in Inclusive Educational Contexts	Martínez-Monés, Alejandra; Villagrá-Sobrino, Sara; Georgiou, Yiannis; Ioannou, Andri; Ruiz, María Jiménez	2005	10.1145/3335595.3335652	ACM	E8
2877	The MUSETECH Model: A Comprehensive Evaluation Framework for Museum Technology	Damala, Areti; Ruthven, Ian; Hornecker, Eva	2005	10.1145/3297717	ACM	E6

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2879	The SpaceStation App: Design and Evaluation of an AR Application for Educational Television	von der Au, Simon; Giering, Leon; Schneegass, Christina; Ludwig, Markus	2005	10.1145/3391614.3393655	ACM	E6
2880	The Tangible Augmented Street Map	Moore, Antoni; Regenbrecht, Holger	2005	10.1145/1152399.1152449	ACM	E8
2881	The World-as-Support: Embodied Exploration, Understanding and Meaning-Making of the Augmented World	Malinverni, Laura; Maya, Julian; Schaper, Marie-Monique; Pares, Narcis	2005	10.1145/3025453.3025955	ACM	E8
2882	Thresholds: Embedding Virtual Reality in the Museum	Tennent, Paul; Martindale, Sarah; Benford, Steve; Darzentas, Dimitrios; Brundell, Pat; Collishaw, Mat	2005	10.1145/3369394	ACM	E8
2883	Touch or Touchless? Evaluating Usability of Interactive Displays for Persons with Autistic Spectrum Disorders	Gentile, Vito; Adjorlu, Ali; Serafin, Stefania; Rocchesso, Davide; Sorce, Salvatore	2005	10.1145/3321335.3324946	ACM	E6
2884	TouchPlanVS Lite: A Tablet-Based Tangible Multitouch Planning System for Virtual TV Studio Productions	Brosda, Constantin; Daemen, Jeff; Djuderija, Sascha; Joeres, Stephan; Langer, Oleg; Schweitzer, Andre; Wilhelm, Andreas; Herder, Jens	2005	10.1145/2160749.2160764	ACM	E8
2885	Towards Using Mobile, Head-Worn Displays in Cultural Heritage: User Requirements and a Research Agenda	Vainstein, Natalia; Kuflik, Tsvi; Lanir, Joel	2005	10.1145/2856767.2856802	ACM	E8
2886	TrackCap: Enabling Smartphones for 3D Interaction on Mobile Head-Mounted Displays	Mohr, Peter; Tatzgern, Markus; Langlotz, Tobias; Lang, Andreas; Schmalstieg, Dieter; Kalkofen, Denis	2005	10.1145/3290605.3300815	ACM	E8
2887	Turning Your Book into a Game: Improving Motivation through Tangible Interaction and Diegetic Feedback in an AR Mathematics Game for Children	Li, Jingya; van der Spek, Erik D.; Hu, Jun; Feijs, Loe	2005	10.1145/3311350.3347174	ACM	E6
2888	UbiBeam++: Augmenting Interactive Projection with Head-Mounted Displays	Knierim, Pascal; Funk, Markus; Kosch, Thomas; Fedosov, Anton; Müller, Tamara; Schopf, Benjamin; Weise, Marc; Schmidt, Albrecht	2005	10.1145/2971485.2996747	ACM	E8
2889	Ubii: Towards Seamless Interaction between Digital and Physical Worlds	Huang, Zhanpeng; Li, Weikai; Hui, Pan	2005	10.1145/2733373.2806266	ACM	I1
2890	Understanding and Evaluating Cooperative Games	Seif El-Nasr, Magy; Aghabeigi, Bardia; Milam, David; Erfani, Mona; Lameman, Beth; Maygoli, Hamid; Mah, Sang	2005	10.1145/1753326.1753363	ACM	E8
2891	Usability Assessment of a Safe Walking Assistive Device for Individuals with Vision Impairments Based on Tactile Communication Using 3D Braille Image for Proactive Detection of Obstacles	Lim, Shinyoung; Jang, Kyungbae	2005	10.17210/hcik.2016.01.507	ACM	E8
2892	Usability Evaluation of the EPOCH Multimodal User Interface: Designing 3D Tangible Interactions	Petridis, Panagiotis; Mania, Katerina; Pletinckx, Daniel; White, Martin	2005	10.1145/1180495.1180521	ACM	E8
2893	User Evaluations on Form Factors of Tangible Magic Lenses	Oh, Ji-young; Hua, Hong	2005	10.1109/ISMAR.2006.297790	ACM	E6
2894	User Generated Soundscapes Activating Museum Visitors	Salo, Kari; Bauters, Merja; Mikkonen, Tommi	2005	10.1145/3019612.3019691	ACM	E8
2895	User Perception on 3D Stereoscopic Cultural Heritage Ancient Collection	Sooai, Adri Gabriel; Sumpeno, Surya; Purnomo, Mauridhi Hery	2005	10.1145/2898459.2898476	ACM	E8
2896	User-Oriented Design and Tangible Interaction for Kindergarten Children	Marco, Javier; Cerezo, Eva; Baldasarri, Sandra; Mazzone, Emanuela; Read, Janet C.	2005	10.1145/1551788.1551825	ACM	E8
2897	Using Nature Elements in Mobile AR for Education with Children	Alakärppä, Ismo; Jaakkola, Elisa; Väyrynen, Jani; Häkkilä, Jonna	2005	10.1145/3098279.3098547	ACM	E8

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2899	Visually Interactive Location-Aware Computing	Rehman, Kasim; Stajano, Frank; Coulouris, George	2005	10.1007/11551201_11	ACM	E5
2900	VRSketchIn: Exploring the Design Space of Pen and Tablet Interaction for 3D Sketching in Virtual Reality	Drey, Tobias; Gugenheimer, Jan; Karlbauer, Julian; Milo, Maximilian; Rukzio, Enrico	2005	10.1145/3313831.3376628	ACM	E6
2901	VUM: Understanding Requirements for a Virtual Ubiquitous Microscope	Kiss, Francisco; Woundefinedniak, Pawe? W.; Biener, Verena; Knierim, Pascal; Schmidt, Albrecht	2005	10.1145/3428361.3428386	ACM	E6
2902	WatchSense: On- and Above-Skin Input Sensing through a Wearable Depth Sensor	Sridhar, Srinath; Markussen, Anders; Oulasvirta, Antti; Theobalt, Christian; Boring, Sebastian	2005	10.1145/3025453.3026005	ACM	E8
2903	When High Fidelity Matters: AR and VR Improve the Learning of a 3D Object	Louis, Thibault; Troccaz, Jocelyne; Rochet-Capellan, Amélie; Hoyek, Nady; Bérard, François	2005	10.1145/3399715.3399815	ACM	E6
2904	World-Stabilized Annotations and Virtual Scene Navigation for Remote Collaboration	Gauglitz, Steffen; Nuernberger, Benjamin; Turk, Matthew; Höllerer, Tobias	2005	10.1145/2642918.2647372	ACM	E8
2905	Teegi's so Cute!: Assessing the Pedagogical Potential of an Interactive Tangible Interface for Schoolchildren	Fleck, Stéphanie; Baraudon, Charlotte; Frey, Jérémy; Lainé, Thibault; Hachet, Martin	2005	10.1145/3202185.3202731	ACM	E6
2906	A Conceptual Framework for Designing Virtual Heritage Environment for Cultural Learning	Ibrahim, Nazrita; Ali, Nazlena Mohamad	2005	10.1145/3117801	ACM	E8
2907	A Design Framework for Playful Wearables	Buruk, O?uz 'Oz'; Isbister, Katherine; Tanenbaum, Theresa Jean	2005	10.1145/3337722.3337733	ACM	E8
2908	A Generic Virtual Reality Software System's Architecture and Application	Steinicke, Frank; Ropinski, Timo; Hinrichs, Klaus	2005	10.1145/1152399.1152440	ACM	E8
2909	A Glimpse into the Past, Present, and Future of Engineering Interactive Computing Systems	Bowen, Judy; Winckler, Marco; Vanderdonckt, Jean	2005	10.1145/3394973	ACM	E8
2910	A Method to Assess Pervasive Qualities in Mobile Games	Valente, Luis; Feijó, Bruno; Leite, Julio Cesar Sampaio Do Prado; Clua, Esteban	2005	10.1007/s00779-017-1107-0	ACM	E8
2911	A Specification Paradigm for the Design and Implementation of Tangible User Interfaces	Shaer, Orit; Jacob, Robert J. K.	2005	10.1145/1614390.1614395	ACM	E8
2912	A Systematic Review of Gesture Elicitation Studies: What Can We Learn from 216 Studies?	Villarreal-Narvaez, Santiago; Vanderdonckt, Jean; Vatavu, Radu-Daniel; Wobbrock, Jacob O.	2005	10.1145/3357236.3395511	ACM	E6
2913	A Table Tennis Game for Three Players	Mueller, Florian 'Floyd'; Gibbs, Martin	2005	10.1145/1228175.1228234	ACM	E8
2914	A Tangible Multi-Display Toolkit to Support the Collaborative Design Exploration of AV-Pedestrian Interfaces	Hoggenmüller, Marius; Tomitsch, Martin; Parker, Callum; Nguyen, Trung Thanh; Zhou, Dawei; Worrall, Stewart; Nebot, Eduardo	2005	10.1145/3441000.3441031	ACM	E6
2915	A Team-Based Approach to Developing Training, Documentation, and Communication for a Virtual Reality Space	Rossmann, Doralyn	2005	10.1145/3419944.3441167	ACM	E8
2916	Acquario: A Tangible Spatially-Aware Tool for Information Interaction and Visualization	Pratte, Sydney; Seyed, Teddy; Maurer, Frank	2005	10.1145/2983310.2989208	ACM	I1
2917	ACTO: A Modular Actuated Tangible User Interface Object	Vonach, Emanuel; Gerstweiler, Georg; Kaufmann, Hannes	2005	10.1145/2669485.2669522	ACM	E6
2918	Adding Input Controls and Sensors to RFID Tags to Support Dynamic Tangible User Interfaces	Simon, Timothy M.; Thomas, Bruce H.; Smith, Ross T.; Smith, Mark	2005	10.1145/2540930.2540979	ACM	E8

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2919	Advances in Geometry and Reflectance Acquisition (Course Notes)	Weinmann, Michael; Klein, Reinhard	2005	10.1145/2818143.2818165	ACM	E8
2920	Amazing Land: Developing a Marble-Run Toy with Just-Right-Challenge	Wang, Yi-Ya; Chang, Teng-wen; Harty, Lillian	2005	10.1145/2898459.2898463	ACM	E8
2921	An Interactive Support Tool to Convey the Intended Message in Asynchronous Presentations	Lucero, Andrés; Aliakseyeu, Dzmitry; Overbeeke, Kees; Martens, Jean-Bernard	2005	10.1145/1690388.1690391	ACM	E8
2922	An Interactive, Cyber-Physical Read-Aloud Environment: Results and Lessons from an Evaluation Activity with Children and Their Teachers	Schafer, George; Green, Keith; Walker, Ian; King Fullerton, Susan; Lewis, Elise	2005	10.1145/2598510.2598562	ACM	E8
2923	An Internet of Old Things as an Augmented Memory System	Barthel, Ralph; Leder Mackley, Kerstin; Hudson-Smith, Andrew; Karpovich, Angelina; Jode, Martin; Speed, Chris	2005	10.1007/s00779-011-0496-8	ACM	E8
2924	Animations 25 Years Later: New Roles and Opportunities	Chevalier, Fanny; Riche, Nathalie Henry; Plaisant, Catherine; Chalbi, Amira; Hurter, Christophe	2005	10.1145/2909132.2909255	ACM	E8
2925	Applying Design-Based Research for Developing Virtual Reality Training in the South African Mining Industry	van Wyk, Etienne; de Villiers, M. R. (Ruth)	2005	10.1145/2664591.2664627	ACM	E8
2926	AromaCue - A Scent Toolkit To Cope with Stress Using the 4-7-8 Breathing Method	Lin, Zilan; Kunze, Kai; Ueki, Atsuro; Inakage, Masa	2005	10.1145/3374920.3374940	ACM	E6
2927	Attention Regulation Framework: Designing Self-Regulated Mindfulness Technologies	Niksirat, Kavous Salehzadeh; Silpasuwanchai, Chaklam; Cheng, Peng; Ren, Xiangshi	2005	10.1145/3359593	ACM	E6
2928	AudioCubes: A Distributed Cube Tangible Interface Based on Interaction Range for Sound Design	Schiettecatte, Bert; Vanderdonckt, Jean	2005	10.1145/1347390.1347394	ACM	E8
2929	Augmenting the CAVE: An Initial Study into Close Focused, Inward Looking, Exploration in IPT Systems	Aspin, Rob; Le, Kien Hoang	2005	10.1109/DS-RT.2007.15	ACM	E8
2930	Augmenting the Driver's View with Realtime Safety-Related Information	Fröhlich, Peter; Schatz, Raimund; Leitner, Peter; Baldauf, Matthias; Mantler, Stephan	2005	10.1145/1785455.1785466	ACM	E8
2931	Augmenting Virtual Prototyping with Physical Objects	Halttunen, Virtu; Tuikka, Tuomo	2005	10.1145/345513.345363	ACM	E8
2932	Ball Game Controller: A Tangible User Interface	Kaisar, Md. Zarif; Ahsan, Hameem; Saleheen, Mohd. Mushfiqus; Jacky, Md. Amzad Hossain; Hasan, Khandaker Tabin; Ahmed, Fahad; Ahmed, Md. Zahiduddin	2005	10.1145/3377049.3377101	ACM	E8
2933	Beyond The Force: Using Quadcopters to Appropriate Objects and the Environment for Haptics in Virtual Reality	Abtahi, Parastoo; Landry, Benoit; Yang, Jackie (Junrui); Pavone, Marco; Follmer, Sean; Landay, James A.	2005	10.1145/3290605.3300589	ACM	E6
2934	Body and Mind: A Study of Avatar Personalization in Three Virtual Worlds	Ducheneaut, Nicolas; Wen, Ming-Hui; Yee, Nicholas; Wadley, Greg	2005	10.1145/1518701.1518877	ACM	E8
2935	Body Music: Physical Exploration of Music Theory	Khoo, Eng Tat; Merritt, Timothy; Fei, Victor Lim; Liu, Wei; Rahaman, Hafizur; Prasad, Janaka; Marsh, Timothy	2005	10.1145/1401843.1401850	ACM	E8
2936	Bridging the Gap: Fluidly Connecting Paper Notecards with Digital Representations for Story/Task-Based Planning	Hurlbutt, Tom; Klemmer, Scott R.	2005	10.1145/1125451.1125624	ACM	E8
2937	Building a Table Tennis Game for Three Players	Mueller, Florian 'Floyd'; Gibbs, Martin R.	2005	10.1145/1255047.1255083	ACM	E8
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2940	Character Alive: A Tangible Reading and Writing System for Chinese Children At-Risk for Dyslexia	Fan, Min; Fan, Jianyu; Antle, Alissa N.; Jin, Sheng; Yin, Dongxu; Pasquier, Philippe	2005	10.1145/3290607.3312756	ACM	E8
2941	CheMO: Mixed Object Instruments and Interactions for Tangible Chemistry Experiments	Song, Kyohyun; Kim, Gunhee; Han, Inkyu; Lee, Jeongyoung; Park, Ji-Hyung; Ha, Sungdo	2005	10.1145/1979742.1979907	ACM	E8
2942	Comparing Input Modalities for Shape Drawing Tasks	Streichert, Annalena; Angerbauer, Katrin; Schwarzl, Magdalena; Sedlmair, Michael	2005	10.1145/3379156.3391830	ACM	E8
2943	Comparing Tangible and Multi-Touch Interaction for Interactive Data Visualization Tasks	Al-Megren, Shiroq; Ruddle, Roy A.	2005	10.1145/2839462.2839464	ACM	E8
2944	Comparing the Tangible Tutorial System and the Human Teacher in Intangible Cultural Heritage Education	Guo, Jiahao; Lin, Yuyu; Yang, Hongyu; Wang, Junwu; Li, Shuo; Liu, Enmao; Yao, Cheng; Ying, Fangtian	2005	10.1145/3357236.3395449	ACM	E6
2945	Conductive Inkjet Printed Passive 2D TrackPad for VR Interaction	Gao, Chuhan; Zhang, Xinyu; Banerjee, Suman	2005	10.1145/3241539.3241546	ACM	E8
2946	Connected Candles as Peripheral Emotional User Interface	Häkkilä, Jonna; Li, Hong; Koskinen, Saara; Colley, Ashley	2005	10.1145/3282894.3282909	ACM	E8
2947	Constructing Virtual 3D Models with Physical Building Blocks	Jota, Ricardo; Benko, Hrvoje	2005	10.1145/1979742.1979915	ACM	E8
2948	Contact through Canvas: An Entertaining Encounter	Boerdonk, Koen; Tieben, Rob; Klooster, Sietske; Hoven, Elise	2005	10.1007/s00779-009-0240-9	ACM	E6
2949	Crime Story as a Tool for Scientific and Technological Outreach	Crovari, Pietro; Catania, Fabio; Garzotto, Franca	2005	10.1145/3334480.3381822	ACM	E8
2950	Crowdlicit: A System for Conducting Distributed End-User Elicitation and Identification Studies	Ali, Abdullah X.; Morris, Meredith Ringel; Wobbrock, Jacob O.	2005	10.1145/3290605.3300485	ACM	E6
2951	Design and Evaluation of a Handheld-Based 3D User Interface for Collaborative Object Manipulation	Grandi, Jerônimo Gustavo; Debarba, Henrique Galvan; Nedel, Luciana; Maciel, Anderson	2005	10.1145/3025453.3025935	ACM	E8
2952	Design Guidelines for an Interactive 3D Model as a Supporting Tool for Exploring a Cultural Site by Visually Impaired and Sighted People	Leporini, Barbara; Rossetti, Valentina; Furfari, Francesco; Pelagatti, Susanna; Quarta, Andrea	2005	10.1145/3399679	ACM	E8
2953	Design Patterns for Mixed-Method Research in HCI	van Turnhout, Koen; Bennis, Arthur; Craenmehr, Sabine; Holwerda, Robert; Jacobs, Marjolein; Niels, Ralph; Zaad, Lambert; Hoppenbrouwers, Stijn; Lenior, Dick; Bakker, René	2005	10.1145/2639189.2639220	ACM	E4
2954	Designing a Hybrid User Interface: A Case Study on an Oil and Gas Application	de Carvalho, Felipe Gomes; Raposo, Alberto; Gattass, Marcelo	2005	10.1145/1670252.1670293	ACM	E8
2955	Designing an Interactive Gravestone Display	Häkkilä, Jonna; Colley, Ashley; Kalving, Matilda	2005	10.1145/3321335.3324952	ACM	E8
2956	Designing and Evaluating Advanced Interactive Experiences to Increase Visitor's Stimulation in a Museum	Schmitt, Bénédicte; Bach, Cedric; Dubois, Emmanuel; Duranthon, Francis	2005	10.1145/1785455.1785470	ACM	E6
2957	Designing for Movement Experience	Levisohn, Aaron M.	2005	10.1145/1979742.1979690	ACM	E8
2958	Designing Interactivity in Media Interfaces: A Communications Perspective	Sundar, S. Shyam; Xu, Qian; Bellur, Saraswathi	2005	10.1145/1753326.1753666	ACM	E8

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2960	Designing Wearable Technologies through a User Centered Approach	Ferraro, Venere; Ugur, Secil	2005	10.1145/2347504.2347510	ACM	E8
2961	Detecting, Tracking and Interacting with People in a Public Space	Cheamanunkul, Sunsern; Ettinger, Evan; Jacobsen, Matt; Lai, Patrick; Freund, Yoav	2005	10.1145/1647314.1647330	ACM	E8
2962	DigiGlo: Exploring the Palm as an Input and Display Mechanism through Digital Gloves	Chatain, Julia; Sisserman, Danielle M.; Reichardt, Lea; Fayolle, Violaine; Kapur, Manu; Sumner, Robert W.; Zünd, Fabio; Bermano, Amit H.	2005	10.1145/3410404.3414260	ACM	E6
2963	Digital Arts and Interaction (Invited)	England, David; Edmonds, Ernest; Sheridan, Jennifer G.; Pobiner, Scott; Bryan-Kinns, Nick; Wright, Peter; Twidale, Michael; Diana, Carla	2005	10.1145/1979742.1979538	ACM	E8
2964	Digital Vibrons: Understanding Users' Perceptions of Interacting with Invisible, Zero-Weight Matter	Vatavu, Radu-Daniel; Mossel, Annette; Schönauer, Christian	2005	10.1145/2935334.2935364	ACM	E6
2965	Digitally Enchanted Wear: A Novel Approach in the Field of Dresses as Dynamic Digital Displays	Kleinberger, Rebecca; Panjwani, Alisha	2005	10.1145/3173225.3173250	ACM	E8
2966	DigiTouch: Reconfigurable Thumb-to-Finger Input and Text Entry on Head-Mounted Displays	Whitmire, Eric; Jain, Mohit; Jain, Divye; Nelson, Greg; Karkar, Ravi; Patel, Shwetak; Goel, Mayank	2005	10.1145/3130978	ACM	E8
2967	Do Game Designers' Decisions Related to Visual Activities Affect Knowledge Acquisition in Cultural Heritage Games? An Evaluation From a Human Cognitive Processing Perspective	Raptis, George E.; Fidas, Christos; Avouris, Nikolaos	2005	10.1145/3292057	ACM	E6
2968	Dynamic Offloading of Web Application Execution Using Snapshot	Jeong, Hyuk-Jin; Jeong, Inchang; Moon, Soo-Mook	2005	10.1145/3402124	ACM	E8
2969	Elaborating Eight Elements of Fun: Supporting Design of Pervasive Player Enjoyment	Jegers, Kalle	2005	10.1145/1541895.1541905	ACM	E6
2970	Empirical Evaluation of Gaze-Enhanced Menus in Virtual Reality	Pfeuffer, Ken; Mecke, Lukas; Delgado Rodriguez, Sarah; Hassib, Mariam; Maier, Hannah; Alt, Florian	2005	10.1145/3385956.3418962	ACM	E8
2971	Evaluating Body-Centered Interactions in an Image Search Task	González-Ibáñez, Roberto; Varela-Otárola, José Luis; Barrera-Pulgar, Carlos	2005	10.1145/2854946.2854998	ACM	E8
2972	Evaluating Touch-Based Interactions in an Image Search Task	González-Ibáñez, Roberto; Barrera-Pulgar, Carlos; Varela-Otárola, José Luis	2005	10.1145/2854946.2854999	ACM	E8
2973	Evaluation Strategies for HCI Toolkit Research	Ledo, David; Houben, Steven; Vermeulen, Jo; Marquardt, Nicolai; Oehlberg, Lora; Greenberg, Saul	2005	10.1145/3173574.3173610	ACM	E6
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2975	ExerTiles: A Tangible Interactive Physiotherapy Toolkit for Balance Training with Older Adults	Subramanian, Sruti; Dahl, Yngve; Vereijken, Beatrix; Svanæs, Dag	2005	10.1145/3441000.3441043	ACM	E8
2976	Exhibition of Lunar Surface Navigation System Facilitating Collaboration between Children and Parents in Science Museum	Asai, Kikuo; Sugimoto, Yuji; Billinghurst, Mark	2005	10.1145/1900179.1900203	ACM	E8
2977	Expergefactor: Sonic Interaction Design for an Alarm Clock App	Greindl, Andreas; Heidegger, Patrick; Groß-Vogt, Katharina; Weger, Marian	2005	10.1145/3411109.3411149	ACM	E8
2978	Experiencing the Reading Glove	Tanenbaum, Karen; Tanenbaum, Theresa Jean; Antle, Alissa N.; Bizzocchi, Jim; Seif el-Nasr, Magy; Hatala, Marek	2005	10.1145/1935701.1935728	ACM	E8
2979	Exploring Low-Cost, Internet-Free Information Access for Resource-Constrained Communities	Pearson, Jennifer; Robinson, Simon; Jones, Matt	2005	10.1145/2990498	ACM	E8

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2981	Extending Museum Exhibits by Embedded Media Content for an Embodied Interaction Experience	Torpus, Jan	2005	10.1145/3240167.3240169	ACM	E6
2982	FEETICHE: FEET Input for Contactless Hand GEsture Interaction	Lopes, Daniel; Relvas, Filipe; Paulo, Soraia; Rekik, Yosra; Grisoni, Laurent; Jorge, Joaquim	2005	10.1145/3359997.3365704	ACM	E8
2983	First-Person Experience and Usability of Co-Located Interaction in a Projection-Based Virtual Environment	Simon, Andreas	2005	10.1145/1101616.1101622	ACM	E8
2984	FLIPPIN': Exploring a Paper-Based Book UI Design in a Public Space	Yoshino, Koichi; Obata, Koichi; Tokuhisa, Satoru	2005	10.1145/3025453.3025981	ACM	E6
2985	FlowMatic: An Immersive Authoring Tool for Creating Interactive Scenes in Virtual Reality	Zhang, Lei; Oney, Steve	2005	10.1145/3379337.3415824	ACM	E6
2986	FlowPut: Environment-Aware Interactivity for Tangible 3D Objects	Riemann, Jan; Schmitz, Martin; Hendrich, Alexander; Mühlhäuser, Max	2005	10.1145/3191763	ACM	E8
2987	From Paper Flight Strips to Digital Strip Systems: Changes and Similarities in Air Traffic Control Work Practices	Huber, Stephan; Gramlich, Johanna; Grundgeiger, Tobias	2005	10.1145/3392833	ACM	E6
2988	From Snark to Park: Lessons Learnt Moving Pervasive Experiences from Indoors to Outdoors	Harris, Eric; Fitzpatrick, Geraldine; Rogers, Yvonne; Price, Sara; Phelps, Ted; Randell, Cliff	2005	10.5555/976310.976316	ACM	E8
2989	Funneling and Saltation Effects for Tactile Interaction with Virtual Objects	Lee, Jaedong; Kim, Youngsun; Kim, Gerard	2005	10.1145/2207676.2208729	ACM	I1
2990	Future Home Design: An Emotional Communication Channel Approach to Smart Space	Huang, Yu-Chun; Wu, Kuan-Ying; Liu, Yu-Tung	2005	10.1007/s00779-012-0635-x	ACM	E6
2991	Gamification for Learning 3D Computer Graphics Arts	Villagrasa, Sergi; Duran, Jaume	2005	10.1145/2536536.2536602	ACM	E8
2992	GeoPGD: Proposed Methodology for the Implementation of Geolocated Pervasive Games	Arango-López, Jeferson; Gallardo, Jesús; Gutiérrez-Vela, Francisco Luis; Amengual, Esperança; Collazos, Cesar A.	2005	10.1145/3233824.3233862	ACM	E8
2993	Gesture Tracking and Recognition in Touchscreens Usability Testing	Cicho?, Kamil; Sobecki, Janusz; Szyma?ski, Jerzy M.	2005	10.1145/2500342.2500351	ACM	E8
2994	Getting in on the (Inter)Action: Exploring Affordances for Collaborative Learning in a Context of Informed Participation	Eden, Hal	2005	10.5555/1658616.1658672	ACM	E8
2995	Hand-Over-Face Input Sensing for Interaction with Smartphones through the Built-in Camera	Loorak, Mona Hosseinkhani; Zhou, Wei; Trinh, Ha; Zhao, Jian; Li, Wei	2005	10.1145/3338286.3340143	ACM	E8
2996	Haptic Annotation for an Interactive Image	Kim, Seung-Chan; Kyung, Ki-Uk; Kwon, Dong-Soo	2005	10.1145/1968613.1968675	ACM	E8
2997	Haptic Selfies: Bold and Beautiful Living for the Blind and Visually Impaired	Yasmin, Shamima	2005	10.1145/3385956.3422129	ACM	E8
2998	Hard and Soft Tangibles: Mixing Multi-Touch and Tangible Interaction in Scientific Poster Scenarios	de Siqueira, Alexandre G.; Ullmer, Brygg; Delarosa, Mark; Branton, Chris; Konkel, Miriam K.	2005	10.1145/3173225.3173252	ACM	E8
2999	HeadCross: Exploring Head-Based Crossing Selection on Head-Mounted Displays	Yan, Yukang; Shi, Yingtian; Yu, Chun; Shi, Yuanchun	2005	10.1145/3380983	ACM	E6
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3003	Immersive Interactive Technologies in Digital Humanities: A Review and Basic Concepts	Lugmayr, Artur; Teras, Marko	2005	10.1145/2814347.2814354	ACM	E8
3004	Improving Modularity and Usability of Interactive Systems with Malai	Blouin, Arnaud; Beaudoux, Olivier	2005	10.1145/1822018.1822037	ACM	E8
3005	Information Visualization and the Arts-Science-Social Science Interface	Bown, J.; Fee, K.; Sampson, A.; Shovman, M.; Falconer, R.; Goltsov, A.; Issacs, J.; Robertson, P.; Scott-Brown, K.; Szymkowiak, A.	2005	10.1145/1963564.1963566	ACM	E8
3006	Integrating Video Games and Robotic Play in Physical Environments	Lahey, Byron; Burleson, Winslow; Jensen, Camilla Nørgaard; Freed, Natalie; Lu, Patrick	2005	10.1145/1401843.1401864	ACM	E8
3007	Integration of RFID and Computer Vision for Remote Object Perception for Individuals Who Are Blind	McDaniel, Troy L.; Kahol, Kanav; Villanueva, Daniel; Panchanathan, Sethuraman	2005	10.5555/1413907.1413914	ACM	E8
3008	Intelligent Computing for Interactive System Design: Statistics, Digital Signal Processing, and Machine Learning in Practice		2005	10.1145/3447404	ACM	E2
3009	Interacting with Tangible Objects in Distributed Settings	de la Guía, Elena; Lozano, María D.; Penichet, Victor M. R.	2005	10.1145/2677356.2677659	ACM	E8
3010	Interaction Mapping Affects Spatial Memory and the Sense of Presence When Navigating in a Virtual Environment	Järvinen, Hannu; Bernardet, Ulysses; Verschure, Paul F. M. J.	2005	10.1145/1935701.1935776	ACM	E6
3011	Interactive and Open-Ended Sensory Toys: Designing with Therapists and Children for Tangible and Visual Interaction	Güldenpfennig, Florian; Fikar, Peter; Ganhör, Roman	2005	10.1145/3173225.3173247	ACM	E8
3012	Interfaces to Support Children's Co-Present Collaboration: Multiple Mice and Tangible Technologies	Stanton, Danaä; Neale, Helen; Bayon, Victor	2005	10.5555/1658616.1658665	ACM	E8
3013	Introducing PALLA, a Novel Input Device for Leisure Activities: A Case Study on a Tangible Video Game for Seniors	Varesano, Fabio; Vernero, Fabiana	2005	10.1145/2367616.2367621	ACM	E8
3014	IRelics: Designing a Tangible Interaction Platform for the Popularization of Field Archaeology	Lu, Qi; Ma, Shao-en; Li, Jiayin; Mi, Haipeng; Xu, Yingqing	2005	10.1145/3294109.3295647	ACM	E8
3015	ISAR: An Authoring System for Interactive Tabletops	Hodaie, Zardosht; Haladjian, Juan; Brügge, Bernd	2005	10.1145/3343055.3360751	ACM	E8
3016	JumpVR: Jump-Based Locomotion Augmentation for Virtual Reality	Wolf, Dennis; Rogers, Katja; Kunder, Christoph; Rukzio, Enrico	2005	10.1145/3313831.3376243	ACM	E8
3017	Kawalu\u: Macro Environment for Collaborative Surface with Dynamic Parameters Using Tangible Objects	Hakoda, Arika; Hatada, Koki; Yura, Junichi	2005	10.1145/3170427.3188463	ACM	E8
3018	Knowledge Work, Knowledge Play: A Heuristic Approach to Communication Design for Hybrid Spaces	McNely, Brian J.	2005	10.1145/2721874.2721876	ACM	E8
3019	Learning from Interactive Museum Installations about Interaction Design for Public Settings	Hornecker, Eva; Stifter, Matthias	2005	10.1145/1228175.1228201	ACM	E6
3020	Listen to It Yourself! Evaluating Usability of What's around Me? For the Blind	Panëels, Sabrina A.; Olmos, Adriana; Blum, Jeffrey R.; Cooperstock, Jeremy R.	2005	10.1145/2470654.2481290	ACM	E8
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3023	Mirror Ritual: An Affective Interface for Emotional Self-Reflection	Rajcic, Nina; McCormack, Jon	2005	10.1145/3313831.3376625	ACM	E8
3024	MlioLight: Projector-Camera Based Multi-Layered Image Overlay System for Multiple Flashlights Interaction	Sato, Toshiki; Hwang, Dong-Hyun; Koike, Hideki	2005	10.1145/3279778.3279797	ACM	E8
3025	Molder: An Accessible Design Tool for Tactile Maps	Shi, Lei; Zhao, Yuhang; Gonzalez Penuela, Ricardo; Kupferstein, Elizabeth; Azenkot, Shiri	2005	10.1145/3313831.3376431	ACM	E6
3026	Movement-Based Interaction in Camera Spaces: A Conceptual Framework	Eriksson, Eva; Hansen, Thomas Riisgaard; Lykke-Olesen, Andreas	2005	10.1007/s00779-006-0134-z	ACM	E8
3027	Multilevel Design and Role Play: Experiences in Assessing Support for Neighborhood Participation in Design	Eden, Hal; Scharff, Eric; Hornecker, Eva	2005	10.1145/778712.778768	ACM	E8
3028	Multimodal Hand and Foot Gesture Interaction for Handheld Devices	Lv, Zhihan; Halawani, Alaa; Feng, Shengzhong; Li, Haibo; Réhman, Shafiq Ur	2005	10.1145/2645860	ACM	E8
3029	My Being to Your Place, Your Being to My Place: Co-Present Robotic Avatars Create Illusion of Living Together	Kang, Bumsoo; Hwang, Inseok; Lee, Jinho; Lee, Seungchul; Lee, Taegyeong; Chang, Youngjae; Lee, Min Kyung	2005	10.1145/3210240.3210348	ACM	E8
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3031	Online Generative Model Personalization for Hand Tracking	Tkach, Anastasia; Tagliasacchi, Andrea; Remelli, Edoardo; Pauly, Mark; Fitzgibbon, Andrew	2005	10.1145/3130800.3130830	ACM	E8
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3033	Optical Marionette: Graphical Manipulation of Human's Walking Direction	Ishii, Akira; Suzuki, Ippei; Sakamoto, Shinji; Kanai, Keita; Takazawa, Kazuki; Doi, Hiraku; Ochiai, Yoichi	2005	10.1145/2984511.2984545	ACM	E8
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3035	Overview of Auditory Representations in Human-Machine Interfaces	Csapó, \'{A}dám; Wersényi, György	2005	10.1145/2543581.2543586	ACM	E6
3036	PaperView: Augmenting Physical Surfaces with Location-Aware Digital Information	Grammenos, Dimitris; Michel, Damien; Zabulis, Xenophon; Argyros, Antonis A.	2005	10.1145/1935701.1935713	ACM	E8
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3038	PATI: A Projection-Based Augmented Table-Top Interface for Robot Programming	Gao, Yuxiang; Huang, Chien-Ming	2005	10.1145/3301275.3302326	ACM	E8
3039	Phone vs. Tangible in Museums: A Comparative Study	Petrelli, Daniela; O'Brien, Sinead	2005	10.1145/3173574.3173686	ACM	E8
3040	Physical Hand Interaction for Controlling Multiple Virtual Objects in Virtual Reality	Sait, Mohamed Suhail Mohamed Yousuf; Sargunam, Shyam Prathish; Han, Dustin T.; Ragan, Eric D.	2005	10.1145/3191801.3191814	ACM	E8
3041	Physio-Stacks: Supporting Communication with Ourselves and Others via Tangible, Modular Physiological Devices	Roo, Joan Sol; Gervais, Renaud; Lainé, Thibault; Cinquin, Pierre-Antoine; Hachet, Martin; Frey, Jérémy	2005	10.1145/3379503.3403562	ACM	E8
3042	PneumAct: Pneumatic Kinesthetic Actuation of Body Joints in Virtual Reality Environments	Günther, Sebastian; Makhija, Mohit; Müller, Florian; Schön, Dominik; Mühlhäuser, Max; Funk, Markus	2005	10.1145/3322276.3322302	ACM	E8

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3044	Programming Embodied Interactions with a Remotely Controlled Educational Robot	Merkouris, Alexandros; Chorianopoulos, Konstantinos	2005	10.1145/3336126	ACM	E8
3045	Proposed Open Source Framework for Interactive IoT Smart Museums	Dossis, Michael; Kazanidis, Ioannis; Valsamidis, Stavros; Kokkonis, George; Kontogiannis, Sotirios	2005	10.1145/3291533.3291586	ACM	E8
3046	Quadmetric Optimized Thumb-to-Finger Interaction for Force Assisted One-Handed Text Entry on Mobile Headsets	Lee, Lik Hang; Lam, Kit Yung; Li, Tong; Braud, Tristan; Su, Xiang; Hui, Pan	2005	10.1145/3351252	ACM	E8
3047	Reflections on Experience-Driven Design: A Case Study on Designing for Playful Experiences	Olsson, Thomas; Väänänen-Vainio-Mattila, Kaisa; Saari, Timo; Lucero, Andrés; Arrasvuori, Juha	2005	10.1145/2513506.2513524	ACM	E8
3048	Replay Enactments: Exploring Possible Futures through Historical Data	Holstein, Kenneth; Harpstead, Erik; Gulotta, Rebecca; Forlizzi, Jodi	2005	10.1145/3357236.3395427	ACM	E8
3049	RotoSwype: Word-Gesture Typing Using a Ring	Gupta, Aakar; Ji, Cheng; Yeo, Hui-Shyong; Quigley, Aaron; Vogel, Daniel	2005	10.1145/3290605.3300244	ACM	E6
3050	SA '15: SIGGRAPH Asia 2015 Emerging Technologies		2005	10.1145/2818466	ACM	E8
3051	SA '15: SIGGRAPH Asia 2015 Haptic Media And Contents Design		2005	10.1145/2818384	ACM	E8
3052	SA '15: SIGGRAPH Asia 2015 Mobile Graphics and Interactive Applications		2005	10.1145/2818427	ACM	E8
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3054	SA '16: SIGGRAPH ASIA 2016 Virtual Reality Meets Physical Reality: Modelling and Simulating Virtual Humans and Environments		2005	10.1145/2992138	ACM	E4
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3056	SA '18: SIGGRAPH Asia 2018 Posters		2005	10.1145/3283289	ACM	E8
3057	Sensory VR: Smelling, Touching, and Eating Virtual Reality	Harley, Daniel; Verni, Alexander; Willis, Mackenzie; Ng, Ashley; Bozzo, Lucas; Mazalek, Ali	2005	10.1145/3173225.3173241	ACM	E6
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3061	SIGGRAPH '17: ACM SIGGRAPH 2017 Emerging Technologies		2005	10.1145/3084822	ACM	E8
3062	SIGGRAPH '18: ACM SIGGRAPH 2018 Emerging Technologies		2005	10.1145/3214907	ACM	E8
3063	Situated Play in a Tangible Interface and Adaptive Audio Museum Guide	Wakkary, Ron; Hatala, Marek	2005	10.1007/s00779-006-0101-8	ACM	E6
3064	Situated Tangible Gamification of Heritage for Supporting Collaborative Learning of Young Museum Visitors	Nofal, Eslam; Panagiotidou, Georgia; Reffat, Rabee M.; Hameeuw, Hendrik; Boschloos, Vanessa; Moere, Andrew Vande	2005	10.1145/3350427	ACM	E8
3065	SketchStudio: Experience Prototyping with 2.5-Dimensional Animated Design Scenarios	Kim, Han-Jong; Kim, Chang Min; Nam, Tek-Jin	2005	10.1145/3196709.3196736	ACM	E8
3066	SmellControl: The Study of Sense of Agency in Smell	Cornelio, Patricia; Maggioni, Emanuela; Brianza, Giada; Subramanian, Sriram; Obrist, Marianna	2005	10.1145/3382507.3418810	ACM	E6

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3068	Spaces for Participatory Creativity	Bratteteig, Tone; Wagner, Ina	2005	10.1145/1900441.1900449	ACM	E8
3069	Tactile Camera vs. Tangible Camera: Taking Advantage of Small Physical Artefacts to Navigate into Large Data Collection	Raynal, Mathieu; Gauffre, Guillaume; Bach, Cédric; Schmitt, Bénédicte; Dubois, Emmanuel	2005	10.1145/1868914.1868958	ACM	E6
3070	Tailored Controls: Creating Personalized Tangible User Interfaces from Paper	Becker, Vincent; Kalbermatter, Sandro; Mayer, Simon; Sörös, Gábor	2005	10.1145/3343055.3359700	ACM	E6
3071	Tangible and Modular Input Device for Character Articulation	Jacobson, Alec; Panozzo, Daniele; Glauser, Oliver; Pradalier, Cédric; Hilliges, Otmar; Sorkine-Hornung, Olga	2005	10.1145/2601097.2601112	ACM	E8
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3074	Tangible Interfaces for Download: Initial Observations from Users' Everyday Environments	Costanza, Enrico; Giaccone, Matteo; Kueng, Olivier; Shelley, Simon; Huang, Jeffrey	2005	10.1145/1753846.1753862	ACM	E8
3075	Tangible Privacy: Towards User-Centric Sensor Designs for Bystander Privacy	Ahmad, Imtiaz; Farzan, Rosta; Kapadia, Apu; Lee, Adam J.	2005	10.1145/3415187	ACM	E8
3076	Tangible Social Interfaces: Critical Theory, Boundary Objects and Interdisciplinary Design Methods	Jennings, Pamela	2005	10.1145/1056224.1056249	ACM	E8
3077	TangibleSphere – Interaction Techniques for Physical and Virtual Spherical Displays	Englmeier, David; O'Hagan, Joseph; Zhang, Mengyi; Alt, Florian; Butz, Andreas; Höllerer, Tobias; Williamson, Julie	2005	10.1145/3419249.3420101	ACM	E8
3078	Teegi, He's so Cute: Example of Pedagogical Potential Testing of an Interactive Tangible Interface for Children at School	Fleck, Stéphanie; Baraudon, Charlotte; Frey, Jérémy; Lainé, Thibault; Hachet, Martin	2005	10.1145/3132129.3132143	ACM	E6
3079	The ColorTable: A Design Story	Maquil, Valérie; Psik, Thomas; Wagner, Ina	2005	10.1145/1347390.1347412	ACM	E8
3080	The Case for Haptic Props: Shape, Weight and Vibro-Tactile Feedback	White, Michael; Gain, James; Vimont, Ulysse; Lochner, Daniel	2005	10.1145/3359566.3360058	ACM	E8
3081	The Dissimilarity-Consensus Approach to Agreement Analysis in Gesture Elicitation Studies	Vatavu, Radu-Daniel	2005	10.1145/3290605.3300454	ACM	E8
3082	The Medium Matters: The Impact of Full-Body Interaction on the Socio-Affective Aspects of Collaboration	Malinverni, Laura; Burguès, Narcís Parés	2005	10.1145/2771839.2771849	ACM	E8
3083	The Networked Home as a User-Centric Multimedia System	Mani, Ankur; Sundaram, Hari; Birchfield, David; Qian, Gang	2005	10.1145/1026763.1026768	ACM	E8
3084	The Use of Surrounding Visual Context in Handheld AR: Device vs. User Perspective Rendering	\v{C}opi? Pucihar, Klen; Coulton, Paul; Alexander, Jason	2005	10.1145/2556288.2557125	ACM	E8
3085	TinkerSheets: Using Paper Forms to Control and Visualize Tangible Simulations	Zufferey, Guillaume; Jermann, Patrick; Lucchi, Aurélien; Dillenbourg, Pierre	2005	10.1145/1517664.1517740	ACM	E8
3086	TOAST: Ten-Finger Eyes-Free Typing on Touchable Surfaces	Shi, Weinan; Yu, Chun; Yi, Xin; Li, Zhen; Shi, Yuanchun	2005	10.1145/3191765	ACM	E8
3087	TOF Tactile Stamps: Drawing Object Silhouettes through Depth Segmentation by Blind People	Bornschein, Jens; Förster, Lukas; Bornschein, Denise	2005	10.1145/3056540.3064946	ACM	E8

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3089	Towards an Interface for Untethered Ubiquitous Gaming	Martins, Tiago; Romão, Teresa; Sommerer, Christa; Mignonneau, Laurent; Correia, Nuno	2005	10.1145/1501750.1501757	ACM	E6
3090	Towards Simplifying Learning Systems: A Critical Review	Kolyda, Frantzeska	2005	10.1145/2507065.2507077	ACM	E8
3091	TPad: Designing Transparent-Display Mobile Interactions	Hincapié-Ramos, Juan David; Roscher, Sophie; Büschel, Wolfgang; Kister, Ulrike; Dachselt, Raimund; Irani, Pourang	2005	10.1145/2598510.2598578	ACM	E8
3092	Truesight Battle Grid - Enhancing the Game Experience of Tabletop Role-Playing through Tangible Data Visualization	Plijnaer, Bas A.; O'Neill, Daisy; Kompier, Eloisa; Wallner, Günter; Bernhaupt, Regina	2005	10.1145/3383668.3419931	ACM	E8
3093	TVX '19: Proceedings of the 2019 ACM International Conference on Interactive Experiences for TV and Online Video		2005	10.1145/3317697	ACM	E4
3094	Ubicomp to the Masses: A Large-Scale Study of Two Tangible Interfaces for Download	Costanza, Enrico; Giaccone, Matteo; Kueng, Olivier; Shelley, Simon; Huang, Jeffrey	2005	10.1145/1864349.1864388	ACM	E8
3095	Understanding AR inside and out --- Part Two: Expanding out and into the World	Ventura, Jonathan; Zollmann, Stefanie; Stannus, Simon; Billinghurst, Mark; Driancourt, Remi	2005	10.1145/3388769.3407543	ACM	E8
3096	Usability Recommendations in the Design of Mixed Interactive Systems	Charfi, Syrine; Dubois, Emmanuel; Scapin, Dominique L.	2005	10.1145/1570433.1570475	ACM	E6
3097	Use of the Curiosity Cabinet Metaphor to Support Inclusive Learning	Charlton, Patricia; Preston, Anne; Karagiannidis, Charalampos; Kouroupetroglou, Christos; Grenon, Muriel; Handschuh, Siegfried; Koumpis, Adamantios	2005	10.1145/3019943.3019988	ACM	E8
3098	User Experiences with Mobile Phone Camera Game Interfaces	Bucolo, Sam; Billinghurst, Mark; Sickinger, David	2005	10.1145/1149488.1149503	ACM	E8
3099	Virtual Reality Aided Assembly with Directional Vibro-Tactile Feedback	Regenbrecht, Holger; Hauber, Joerg; Schoenfelder, Ralph; Maegerlein, Andreas	2005	10.1145/1101389.1101464	ACM	E8
3100	VisAr3D: An Innovative 3D Visualization of UML Models	Rodrigues, Claudia Susie C.; Werner, Cláudia M. L.; Landau, Luiz	2005	10.1145/2889160.2889199	ACM	E8
3101	VRST '19: 25th ACM Symposium on Virtual Reality Software and Technology		2005	10.1145/3359996	ACM	E4
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3103	When Design Novices and LEGO® Meet: Stimulating Creative Thinking for Interface Design	Bourdeau, Simon; Lesage, Annemarie; Couturier Caron, Béatrice; Léger, Pierre-Majorique	2005	10.1145/3313831.3376495	ACM	E8
3104	“Can You Help Me Move This over There?”: Training Children with ASD to Joint Action through Tangible Interaction and Virtual Agent	Giraud, Tom; Ravenet, Brian; Tai Dang, Chi; Nadel, Jacqueline; Prigent, Elise; Poli, Gael; Andre, Elisabeth; Martin, Jean-claude	2005	10.1145/3430524.3440646	ACM	E8
3105	In VR, Everything is Possible!: Sketching and Simulating Spatially-Aware Interactive Spaces in Virtual Reality	Jetter, Hans-Christian; Rädle, Roman; Feuchtner, Tiare; Anthes, Christoph; Friedl, Judith; Klokmose, Clemens Nylandsted	2005	10.1145/3313831.3376652	ACM	E6
3106	(Un)Acceptable!?! Re-Thinking the Social Acceptability of Emerging Technologies	Koelle, Marion; Boll, Susanne; Olsson, Thomas; Williamson, Julie; Profita, Halley; Kane, Shaun; Mitchell, Robb	2005	10.1145/3170427.3170620	ACM	E8
3107	A Collaborative Previsualization Tool for Filmmaking in Virtual Reality	Ardal, Dui; Alexandersson, Simon; Lempert, Mirko; Abelho Pereira, André Tiago	2005	10.1145/3359998.3369404	ACM	E8
3108	A Group Game Played in Interactive Virtual Space: Design and Evaluation	Strömberg, Hanna; Väätänen, Antti; Räty, Veli-Pekka	2005	10.1145/778712.778724	ACM	E8

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3112	A Study on the Quality of Experience of Crossmodal Mulsemedia	Covaci, Alexandra; Mesfin, Gebremariam; Hussain, Nadia; Kani-Zabihi, Elahe; Andres, Frederic; Ghinea, Gheorghita	2005	10.1145/3281375.3281387	ACM	E8
3113	A Survey on 360° Video Streaming: Acquisition, Transmission, and Display	Fan, Ching-Ling; Lo, Wen-Chih; Pai, Yu-Tung; Hsu, Cheng-Hsin	2005	10.1145/3329119	ACM	E8
3114	A Three-Dimensional Mirror Augmented by Medical Imaging: Questioning Self-Portraying at the Limit of Iintimacy	Giraud, Tom; Courgeon, Matthieu; Tardieu, Marion; Roatis, Alexandra; Maitre, Xavier	2005	10.1145/2559206.2578876	ACM	E8
3115	A Toolkit for Managing User Attention in Peripheral Displays	Matthews, Tara; Dey, Anind K.; Mankoff, Jennifer; Carter, Scott; Rattenbury, Tye	2005	10.1145/1029632.1029676	ACM	E8
3116	A Versatile Large-Scale Multimodal VR System for Cultural Heritage Visualization	Christou, Chris; Angus, Cameron; Loscos, Celine; Dettori, Andrea; Roussou, Maria	2005	10.1145/1180495.1180523	ACM	E8
3117	Active Pathways: Using Active Tangibles and Interactive Tabletops for Collaborative Modeling in Systems Biology	Mehta, Meghna; Arif, Ahmed Sabbir; Gupta, Apurva; DeLong, Sean; Manshaei, Roozbeh; Williams, Graceline; Lalwani, Manasvi; Chandrasekharan, Sanjay; Mazalek, Ali	2005	10.1145/2992154.2992176	ACM	E8
3118	ActivitySpace: Managing Device Ecologies in an Activity-Centric Configuration Space	Houben, Steven; Tell, Paolo; Bardram, Jakob E.	2005	10.1145/2669485.2669493	ACM	E8
3119	Aero-Plane: A Handheld Force-Feedback Device That Renders Weight Motion Illusion on a Virtual 2D Plane	Je, Seungwoo; Kim, Myung Jin; Lee, Woojin; Lee, Byungjoo; Yang, Xing-Dong; Lopes, Pedro; Bianchi, Andrea	2005	10.1145/3332165.3347926	ACM	E8
3120	Agent-Based Museum and Tour Guides: Applying the State of the Art	Richards, Deborah	2005	10.1145/2336727.2336742	ACM	E8
3121	AMITIES: Avatar-Mediated Interactive Training and Individualized Experience System	Nagendran, Arjun; Pillat, Remo; Kavanaugh, Adam; Welch, Greg; Hughes, Charles	2005	10.1145/2503713.2503731	ACM	E8
3122	Animal-Computer Interaction SIG	Mancini, Clara; Lawson, Shaun; van der Linden, Janet; Häkkilä, Jonna; Noz, Frank; Wingrave, Chadwick; Juhlin, Oskar	2005	10.1145/2212776.2212431	ACM	E8
3123	AnyLight: Programmable Ambient Illumination via Computational Light Fields	Takeuchi, Yuichiro; Suwa, Shunichi; Nagamine, Kunihiko	2005	10.1145/2992154.2992188	ACM	E8
3124	Arm-A-Dine: Towards Understanding the Design of Playful Embodied Eating Experiences	Mehta, Yash Dhanpal; Khot, Rohit Ashok; Patibanda, Rakesh; Mueller, Florian 'Floyd'	2005	10.1145/3242671.3242710	ACM	E8
3125	Augmented Manufacturing: A Study with Impaired Persons on Assistive Systems Using in-Situ Projection	Korn, Oliver; Schmidt, Albrecht; Hörz, Thomas	2005	10.1145/2504335.2504356	ACM	E8
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3128	Biometric Mirror: Exploring Ethical Opinions towards Facial Analysis and Automated Decision-Making	Wouters, Niels; Kelly, Ryan; Velloso, Eduardo; Wolf, Katrin; Ferdous, Hasan Shahid; Newn, Joshua; Joukhadar, Zaher; Vetere, Frank	2005	10.1145/3322276.3322304	ACM	E8
3129	Blended Learning Supports in Chinese Architectures with 360 Degree VR Contents and 3D Modelling VR Contents	Im, Siu Wo Tarloff; Chiu, Pit Ho Patrio; Li, Lin	2005	10.1145/3345120.3345124	ACM	E8

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3131	Breakbeat Narratives: A Personalized, Conversational Interactive Storytelling System for Museum Education	Olson, Danielle Marie; Soliman, Nouran; Wang, Angela; Price, Magdalena; Sahu, Rita; Harrell, D. Fox	2005	10.1145/3334480.3382974	ACM	E8
3132	BreathScreen: Design and Evaluation of an Ephemeral UI	Alakärppä, Ismo; Jaakkola, Elisa; Colley, Ashley; Häkkilä, Jonna	2005	10.1145/3025453.3025973	ACM	E8
3133	Bridging Book: A Not-so-Electronic Children's Picturebook	Figueiredo, Ana Carina; Pinto, Ana Lúcia; Branco, Pedro; Zagalo, Nelson; Coquet, Eduarda	2005	10.1145/2485760.2485867	ACM	E8
3134	Building Adaptive Touch Interfaces—Case Study 6	Buschek, Daniel; Alt, Florian	2005	10.1145/3447404.3447426	ACM	E2
3135	BulkScreen: Saliency-Based Automatic Shape Representation of Digital Images with a Vertical Pin-Array Screen	Arakawa, Riku; Tanaka, Yudai; Kawarasaki, Hiromu; Maeda, Kiyosu	2005	10.1145/3374920.3374973	ACM	E8
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3138	CHI 1994-2013: Mapping Two Decades of Intellectual Progress through Co-Word Analysis	Liu, Yong; Goncalves, Jorge; Ferreira, Denzil; Xiao, Bei; Hosio, Simo; Kostakos, Vassilis	2005	10.1145/2556288.2556969	ACM	E8
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3141	Co-Curator: Designing for Mobile Ideation in Groups	Porcheron, Martin; Lucero, Andrés; Fischer, Joel E.	2005	10.1145/2994310.2994350	ACM	E8
3142	COIN-O-RAMA: Designing an Interactive Exhibit for Exploring and Engaging with Coin Exhibitions	Grammenos, Dimitris; Zabulis, Xenophon; Antonis, Chatziantoniou; Stefanidi, Zinovia; Adami, Ilia; Neroutsou, Vassiliki	2005	10.1145/3197768.3197770	ACM	E6
3143	Commercialization of Multimodal Systems	Cohen, Philip R.; Tumuluri, Raj	2005	10.1145/3233795.3233812	ACM	E2
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3145	Comparing Social Robot, Screen and Voice Interfaces for Smart-Home Control	Luria, Michal; Hoffman, Guy; Zuckerman, Oren	2005	10.1145/3025453.3025786	ACM	E6
3146	Computer-Linked Autofabricated 3D Models for Teaching Structural Biology	Gillet, Alexandre; Weghorst, Suzanne; Winn, William; Stoffler, Daniel; Sanner, Michel; Goodsell, David; Olson, Arthur	2005	10.1145/1186223.1186258	ACM	E8
3147	Cross-Device Taxonomy: Survey, Opportunities and Challenges of Interactions Spanning Across Multiple Devices	Brudy, Frederik; Holz, Christian; Rädle, Roman; Wu, Chi-Jui; Houben, Steven; Klokmose, Clemens Nylandsted; Marquardt, Nicolai	2005	10.1145/3290605.3300792	ACM	E6
3148	Cultural Heritage and New Technologies: Trends and Challenges	Piccialli, Francesco; Chianese, Angelo	2005	10.1007/s00779-016-0984-y	ACM	E8
3149	Customisable Wearables: Exploring the Design Space of Wearable Technology	Jarusriboonchai, Pradthana; Häkkilä, Jonna	2005	10.1145/3365610.3365635	ACM	E6
3150	Design of a Health Monitoring Toy for Children	Vonach, Emanuel; Ternek, Marianne; Gerstweiler, Georg; Kaufmann, Hannes	2005	10.1145/2930674.2930694	ACM	E8

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3152	Design Space and Users' Preferences for Smartglasses Graphical Menus: A Vignette Study	Vatavu, Radu-Daniel; Vanderdonckt, Jean	2005	10.1145/3428361.3428467	ACM	I1
3153	Design to Eat Smart: A Design Framework for Pervasive Interventions of Eating Habits	Zhang, Zuoyi; Han, Teng; Swystun, John; Sakamoto, Yumiko; Irani, Pourang	2005	10.1145/3421937.3421974	ACM	E6
3154	Designable Visual Markers	Costanza, Enrico; Huang, Jeffrey	2005	10.1145/1518701.1518990	ACM	E8
3155	Designing and Evaluating the Tabletop Game Experience for Senior Citizens	Al Mahmud, Abdullah; Mubin, Omar; Shahid, Suleman; Martens, Jean-Bernard	2005	10.1145/1463160.1463205	ACM	E8
3156	Designing History Learning Games for Museums: An Alternative Approach for Visitors' Engagement	Aguirrezabal, Pablo; Peral, Rosa; Pérez, Ainhoa; Sillaurren, Sara	2005	10.1145/2617841.2617847	ACM	E8
3157	Designing Media Architecture: Tools and Approaches for Addressing the Main Design Challenges	Dalsgaard, Peter; Halskov, Kim; Wiethoff, Alexander	2005	10.1145/2858036.2858318	ACM	E8
3158	Designing Speech and Multimodal Interactions for Mobile, Wearable, and Pervasive Applications	Munteanu, Cosmin; Irani, Pourang; Oviatt, Sharon; Aylett, Matthew; Penn, Gerald; Pan, Shimei; Sharma, Nikhil; Rudzicz, Frank; Gomez, Randy; Nakamura, Keisuke; Nakadai, Kazuhiro	2005	10.1145/2851581.2856506	ACM	E8
3159	Designing Speech, Acoustic and Multimodal Interactions	Munteanu, Cosmin; Irani, Pourang; Oviatt, Sharon; Aylett, Matthew; Penn, Gerald; Pan, Shimei; Sharma, Nikhil; Rudzicz, Frank; Gomez, Randy; Cowan, Ben; Nakamura, Keisuke	2005	10.1145/3027063.3027086	ACM	E8
3160	Designing Voice Interfaces: Back to the (Curriculum) Basics	Murad, Christine; Munteanu, Cosmin	2005	10.1145/3313831.3376522	ACM	E8
3161	DialPlates: Enabling Pursuits-Based User Interfaces with Large Target Numbers	Drewes, Heiko; Khamis, Mohamed; Alt, Florian	2005	10.1145/3365610.3365626	ACM	E8
3162	Digitally Augmented Narratives for Physical Artifacts	Bellucci, Andrea; Diaz, Paloma; Aedo, Ignacio	2005	10.1145/2598153.2598192	ACM	E8
3163	Digitizer Auditory Graph: Making Graphs Accessible to the Visually Impaired	Choi, Stephen H.; Walker, Bruce N.	2005	10.1145/1753846.1753999	ACM	E8
3164	Discovering Eye Gaze Behavior during Human-Agent Conversation in an Interactive Storytelling Application	Bee, Nikolaus; Wagner, Johannes; André, Elisabeth; Vogt, Thurid; Charles, Fred; Pizzi, David; Cavazza, Marc	2005	10.1145/1891903.1891915	ACM	E8
3165	Distributed Interaction Design: Designing Human-Centered Interactions in a Time of Social Distancing	Ali, Abdullah X.; Morris, Meredith Ringel; Wobbrock, Jacob O.	2005	10.1145/3447790	ACM	E8
3166	DreamScope: Evaluating Interactive 360° Virtual Reality in a Physical Narrative Art Installation	Nisi, Valentina; Dionísio, Mara; Bala, Paulo; Gross, Tom; Nunes, Nuno J.	2005	10.1145/3106548.3106601	ACM	E8
3167	Drilling into Complex 3D Models with Gimlenses	Pindat, Cyprien; Pietriga, Emmanuel; Chapuis, Oliver; Puech, Claude	2005	10.1145/2503713.2503714	ACM	E8
3168	Elasticcon: Elastic Controllers for Casual Interaction	Klamka, Konstantin; Dachselt, Raimund	2005	10.1145/2785830.2785849	ACM	E6
3169	Enabling Beyond-Surface Interactions for Interactive Surface with an Invisible Projection	Chan, Li-Wei; Wu, Hsiang-Tao; Kao, Hui-Shan; Ko, Ju-Chun; Lin, Home-Ru; Chen, Mike Y.; Hsu, Jane; Hung, Yi-Ping	2005	10.1145/1866029.1866072	ACM	E8

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3171	Ergonomics for the Design of Multimodal Interfaces	Heloir, Alexis; Nunnari, Fabrizio; Bachynskyi, Myroslav	2005	10.1145/3233795.3233804	ACM	E2
3172	Evaluating Multimodal Affective Fusion Using Physiological Signals	Gilroy, Stephen W.; Cavazza, Marc O.; Vervondel, Valentin	2005	10.1145/1943403.1943413	ACM	E8
3173	Evaluating the Embodiment Benefits of a Paper-Based Tui for Educational Simulations	Shelley, Tia; Lyons, Leilah; Zellner, Moira; Minor, Emily	2005	10.1145/1979742.1979777	ACM	E8
3174	Explicit Interaction for Surgical Rehabilitation	Sokoler, Tomas; Löwgren, Jonas; Eriksen, Mette Agger; Linde, Per; Olofsson, Stefan	2005	10.1145/1226969.1226994	ACM	E8
3175	Exploring Emotions and Multimodality in Digitally Augmented Puppeteering	Liikkanen, Lassi A.; Jacucci, Giulio; Huvio, Eero; Laitinen, Toni; Andre, Elisabeth	2005	10.1145/1385569.1385627	ACM	E8
3176	Exploring User Defined Gestures for Ear-Based Interactions	Chen, Yu-Chun; Liao, Chia-Ying; Hsu, Shuo-wen; Huang, Da-Yuan; Chen, Bing-Yu	2005	10.1145/3427314	ACM	E8
3177	Finger in Air: Touch-Less Interaction on Smartphone	Lv, Zhihan; Halawani, Alaa; Lal Khan, Muhammad Sikandar; Réhman, Shafiq Ur; Li, Haibo	2005	10.1145/2541831.2541833	ACM	E8
3178	FingerReader2.0: Designing and Evaluating a Wearable Finger-Worn Camera to Assist People with Visual Impairments While Shopping	Boldu, Roger; Dancu, Alexandru; Matthies, Denys J. C.; Buddhika, Thisum; Siriwardhana, Shamane; Nanayakkara, Suranga	2005	10.1145/3264904	ACM	E8
3179	Flexi Card Game: A Design Toolkit for Unconventional Communication Systems for Long-Distance Relationships	Li, Hong; Khan, Awais Hameed; Hurtig, Kuisma Martin; Jarusriboonchai, Pradthana; Häkkilä, Jonna	2005	10.1145/3430524.3440650	ACM	E8
3180	From Big Data to Insights: Opportunities and Challenges for TEI in Genomics	Shaer, Orit; Mazalek, Ali; Ullmer, Brygg; Konkel, Miriam	2005	10.1145/2460625.2460642	ACM	E6
3181	Gaze-Assisted Typing for Smart Glasses	Ahn, Sunggeun; Lee, Geehyuk	2005	10.1145/3332165.3347883	ACM	E8
3182	Gelicit: A Cloud Platform for Distributed Gesture Elicitation Studies	Magrofuoco, Nathan; Vanderdonckt, Jean	2005	10.1145/3331148	ACM	E8
3183	Get a Grip: Evaluating Grip Gestures for VR Input Using a Lightweight Pen	Li, Nianlong; Han, Teng; Tian, Feng; Huang, Jin; Sun, Minghui; Irani, Pourang; Alexander, Jason	2005	10.1145/3313831.3376698	ACM	E8
3184	Gluey: Developing a Head-Worn Display Interface to Unify the Interaction Experience in Distributed Display Environments	Serrano, Marcos; Ens, Barrett; Yang, Xing-Dong; Irani, Pourang	2005	10.1145/2785830.2785838	ACM	E8
3185	Going beyond the Surface: Studying Multi-Layer Interaction above the Tabletop	Spindler, Martin; Martsch, Marcel; Dachselt, Raimund	2005	10.1145/2207676.2208583	ACM	E8
3186	HACHIStack: Dual-Layer Photo Touch Sensing for Haptic and Auditory Tapping Interaction	Hachisu, Taku; Kajimoto, Hiroyuki	2005	10.1145/2470654.2466187	ACM	E8
3187	HandLog: A Deformable Tangible Device for Continuous Input through Finger Flexion	Beven, Tristan; Hoang, Thuong; Carter, Marcus; Ploderer, Bernd	2005	10.1145/3010915.3010933	ACM	E8
3188	HCI Engineering: Charting the Way towards Methods and Tools for Advanced Interactive Systems	Ziegler, Juergen; Campos, Jose Creissac; Nigay, Laurence	2005	10.1145/2607023.2610289	ACM	E8
3189	How Far Is Up? Bringing the Counterpointed Triad Technique to Digital Storybook Apps	Sargeant, Betty; Mueller, Florian 'Floyd'	2005	10.1145/3173574.3174093	ACM	E8
3190	Hybrid Settlers - Integrating Dynamic Tiles into a Physical Board Game Using Electrochromic Displays	Jensen, Walther; Streubel Kristensen, Thomas; Sand Kirk, Christoffer; Hameed, Hassan Abdul; Bergmann Villadsen, Daniel; Löchtefeld, Markus	2005	10.1145/3334480.3382857	ACM	E8
3191	I'sFree: Eyes-Free Gesture Typing via a Touch-Enabled Remote Control	Zhu, Suwen; Zheng, Jingjie; Zhai, Shumin; Bi, Xiaojun	2005	10.1145/3290605.3300678	ACM	E8

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3193	Illimitable Space System as a Multimodal Interactive Artists' Toolbox for Real-Time Performance	Song, Miao; Mokhov, Serguei A.; Grogono, Peter; Mudur, Sudhir P.	2005	10.1145/2668947.2668953	ACM	E8
3194	Immersive Technologies in Higher Education: Applications, Challenges, and Good Practices	Calvet, Laura; Bourdin, Pierre; Prados, Ferran	2005	10.1145/3371647.3371667	ACM	E8
3195	Improvement of the Industrial Design Process by the Creation and Usage of Intermediate Representations of Technology, TechCards,,,,,,2011,New York	Ocnarescu, Ioana; Pain, Frédérique; Bouchard, Carole; Aoussat, Améziane; Sciamma, Dominique	2005	10.1145/2347504.2347559	ACM	E8
3196	INFEX: A Unifying Framework for Cross-Device Information Exploration and Exchange	Roels, Reinout; De Witte, Arno; Signer, Beat	2005	10.1145/3179427	ACM	E8
3197	InFORM: Dynamic Physical Affordances and Constraints through Shape and Object Actuation	Follmer, Sean; Leithinger, Daniel; Olwal, Alex; Hogge, Akimitsu; Ishii, Hiroshi	2005	10.1145/2501988.2502032	ACM	E8
3198	Information Exploration Using The Pond	Ståhl, Olov; Wallberg, Anders; Söderberg, Jonas; Humble, Jan; Fahlén, Lennart E.; Bullock, Adrian; Lundberg, Jenny	2005	10.1145/571878.571890	ACM	E8
3199	Innovative Wearable Interfaces: An Exploratory Analysis of Paper-Based Interfaces with Camera-Glasses Device Unit	Zhou, Yun; Xu, Tao; David, Bertrand; Chalon, René	2005	10.1007/s00779-013-0697-4	ACM	E6
3200	Inside Looking out or Outside Looking in? An Evaluation of Visualisation Modalities to Support the Creation of a Substitutional Virtual Environment	Garcia, Jose F.; Simeone, Adalberto L.; Higgins, Matthew; Powell, Wendy; Powell, Vaughan	2005	10.1145/3206505.3206529	ACM	E8
3201	Interacting with Connected Devices through a Drawable User Interface	Exposito, Marc; Miralles, David	2005	10.1145/2851581.2892365	ACM	E8
3202	Interacting with Social Networks of Intelligent Things and People in the World of Gastronomy	Console, Luca; Antonelli, Fabrizio; Biamino, Giulia; Carmagnola, Francesca; Cena, Federica; Chiabrando, Elisa; Cuciti, Vincenzo; Demichelis, Matteo; Fassio, Franco; Franceschi, Fabrizio; Furnari, Roberto; Gena, Cristina; Geymonat, Marina; Grimaldi, Piercarlo; Grillo, Pierluige; Likavec, Silvia; Lombardi, Ilaria; Mana, Dario; Marcengo, Alessandro; Mioli, Michele; Mirabelli, Mario; Perrero, Monica; Picardi, Claudia; Protti, Federica; Rapp, Amon; Simeoni, Rossana; Dupré, Daniele Theseider; Torre,	2005	10.1145/2448116.2448120	ACM	E8
3203	Interaction Can Hurt - Exploring Gesture-Based Interaction for Users with Chronic Pain	Poor, G. Michael; Jude, Alvin	2005	10.1145/3357251.3357589	ACM	E8
3204	Investigating Interaction in CAVE Virtual Environments	Sutcliffe, Alistair; Gault, Brian; Fernando, Terence; Tan, Kevin	2005	10.1145/1165734.1165738	ACM	E8
3205	Investigating the Educational Effectiveness of Multiplayer Online Games for Children	Garzotto, Franca	2005	10.1145/1297277.1297284	ACM	E8
3206	IoT for the Circular Economy: The Case of a Mobile Set for Video-Makers	Forlastro, Gianni; Gena, Cristina; Chiesa, Ilaria; Cietto, Valerio	2005	10.1145/3236112.3236125	ACM	E8
3207	Is Multimedia Multisensorial? - A Review of Mulsemedia Systems	Covaci, Alexandra; Zou, Longhao; Tal, Irina; Muntean, Gabriel-Miro; Ghinea, Gheorghita	2005	10.1145/3233774	ACM	E1
3208	Iterative Design		2005	10.1145/2792790.2792826	ACM	E2

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3209	JeL: Breathing Together to Connect with Others and Nature	Stepanova, Ekaterina R.; Desnoyers-Stewart, John; Pasquier, Philippe; Riecke, Bernhard E.	2005	10.1145/3357236.3395532	ACM	E8
3210	Light on Horizontal Interactive Surfaces: Input Space for Tabletop Computing	Bellucci, Andrea; Malizia, Alessio; Aedo, Ignacio	2005	10.1145/2500467	ACM	E8
3211	MagicHOLO: A Collaborative 3D Experience in the Museum	Kasomoulis, Aristotelis; Vayanou, Maria; Katifori, Akrivi; Ioannidis, Yannis	2005	10.1145/3003733.3003813	ACM	E8
3212	Mesh-Grab and Arcball-3D: Ray-Based 6-DOF Object Manipulation	Katzakis, Nicholas; Seki, Kazuteru; Kiyokawa, Kiyoshi; Takemura, Haruo	2005	10.1145/2525194.2525198	ACM	E8
3213	Mixing Disciplines in Anticipation of Convergence: A Curriculum for Teaching Interaction Design to Industrial Designers	Kolko, Jon	2005	10.1145/1005261.1005272	ACM	E8
3214	Mobile Haptic E-Book System to Support 3D Immersive Reading in Ubiquitous Environments	Alam, Kazi Masudul; Rahman, Abu Saleh Md Mahfujur; Saddik, Abdulmotaleb El	2005	10.1145/2501643.2501649	ACM	E8
3215	Mobile Maze: A Comparison of Camera Based Mobile Game Human Interfaces	Bucolo, Sam; Billinghurst, Mark; Sickinger, David	2005	10.1145/1085777.1085850	ACM	E8
3216	Mobile Pointing Task in the Physical World: Balancing Focus and Performance While Disambiguating	Delamare, William; Coutrix, Céline; Nigay, Laurence	2005	10.1145/2493190.2493232	ACM	E8
3217	ModelCraft: Capturing Freehand Annotations and Edits on Physical 3D Models	Song, Hyunyoung; Guimbretière, François; Hu, Chang; Lipson, Hod	2005	10.1145/1166253.1166258	ACM	E8
3218	Motion Correlation: Selecting Objects by Matching Their Movement	Velloso, Eduardo; Carter, Marcus; Newn, Joshua; Esteves, Augusto; Clarke, Christopher; Gellersen, Hans	2005	10.1145/3064937	ACM	E8
3219	MulseBox: New Multisensory Interaction Device	Jost, Céline; Pévédic, Brigitte Le; Uzan, Gérard	2005	10.1145/3366550.3372251	ACM	E6
3220	Mulsemedia DIY: A Survey of Devices and a Tutorial for Building Your Own Mulsemedia Environment	Saleme, Estêvão B.; Covaci, Alexandra; Mesfin, Gebremariam; Santos, Celso A. S.; Ghinea, Gheorghita	2005	10.1145/3319853	ACM	E8
3221	New Metaphors: A Workshop Method for Generating Ideas and Reframing Problems in Design and Beyond	Lockton, Dan; Singh, Devika; Sabnis, Saloni; Chou, Michelle; Foley, Sarah; Pantoja, Alejandro	2005	10.1145/3325480.3326570	ACM	E8
3222	NordiCHI 2006: Learning from a Regional Conference	Grudin, Jonathan	2005	10.1145/1242421.1242458	ACM	E8
3223	On the Development of Electronic Design Tools and Associated Guidelines for Supporting the Early Stages of the Design Process	Ozcelik, Derya; Quevedo-Fernandez, Javier; Thalen, Jos; Terken, Jacques	2005	10.1145/2079216.2079232	ACM	E8
3224	PaperChains: Dynamic Sketch+Voice Annotations	Pearson, Jennifer; Robinson, Simon; Jones, Matt	2005	10.1145/2675133.2675138	ACM	E8
3225	PART Bench: A Hybrid Search Tool for Floor Plans in Architecture	Krauß, Veronika; Fuchkina, Ekaterina; Molina León, Gabriela; Popescu, Oana-Iuliana; Echtler, Florian; Bertel, Sven	2005	10.1145/2817721.2823491	ACM	E8
3226	Persona: A Portable Tool for Augmenting Proactive Applications with Multimodal Personalization Support	Kawsar, Fahim; Nakajima, Tatsuo	2005	10.1145/1329469.1329491	ACM	E8
3227	Pervasive Displays for Public Transport: An Overview of Ubiquitous Interactive Passenger Services	Baldauf, Matthias; Tomitsch, Martin	2005	10.1145/3393712.3395335	ACM	E8
3228	Pinsight: A Novel Way of Creating and Sharing Digital Content through 'Things' in the Wild	Liu, Can; Bengler, Ben; Di Cuia, Danilo; Seaborn, Katie; Nunes Vilaza, Giovanna; Gallacher, Sarah; Capra, Licia; Rogers, Yvonne	2005	10.1145/3196709.3196782	ACM	E8
3229	Posing and Acting as Input for Personalizing Furniture	Lee, Bokyung; Cho, Minjoo; Min, Joonhee; Saakes, Daniel	2005	10.1145/2971485.2971487	ACM	E8

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3231	Presenting Spoken Advice: Information Pull or Push?	de Haan, Geert	2005	10.1145/633292.633371	ACM	E8
3232	Probabilistic Text Entry—Case Study 3	Vertanen, Keith	2005	10.1145/3447404.3447420	ACM	E8
3233	$Q: A Super-Quick, Articulation-Invariant Stroke-Gesture Recognizer for Low-Resource Devices	Vatavu, Radu-Daniel; Anthony, Lisa; Wobbrock, Jacob O.	2005	10.1145/3229434.3229465	ACM	E8
3234	Read-It: Five-to-Seven-Year-Old Children Learn to Read in a Tabletop Environment	Sluis, R. J. W.; Weevers, I.; van Schijndel, C. H. G. J.; Kolos-Mazuryk, L.; Fitrianie, S.; Martens, J. B. O. S.	2005	10.1145/1017833.1017843	ACM	E8
3235	Real-Time Recognition of Guitar Performance Using Two Sensor Groups for Interactive Lesson	Shin, Yejin; Hwang, Jemin; Park, Jeonghyeok; Seol, Soonuk	2005	10.1145/3173225.3173235	ACM	E8
3236	Reclaiming Public Space: Designing for Public Interaction with Private Devices	Eriksson, Eva; Hansen, Thomas Riisgaard; Lykke-Olesen, Andreas	2005	10.1145/1226969.1226976	ACM	E8
3237	RehaBot: Gamified Virtual Assistants Towards Adaptive TeleRehabilitation	Afyouni, Imad; Einea, Anas; Murad, Abdullah	2005	10.1145/3314183.3324988	ACM	E8
3238	Reshaping Touch Communication: An Interdisciplinary Research Agenda	Price, Sara; Leder Mackley, Kerstin; Jewitt, Carey; Huisman, Gijs; Petreca, Bruna; Berthouze, Nadia; Prattichizzo, Domenico; Hayward, Vincent	2005	10.1145/3170427.3170603	ACM	E8
3239	Review of Quantitative Empirical Evaluations of Technology for People with Visual Impairments	Brulé, Emeline; Tomlinson, Brianna J.; Metatla, Oussama; Jouffrais, Christophe; Serrano, Marcos	2005	10.1145/3313831.3376749	ACM	E6
3240	SA '14: SIGGRAPH Asia 2014 Emerging Technologies		2005	10.1145/2669047	ACM	E8
3241	SA '14: SIGGRAPH Asia 2014 Mobile Graphics and Interactive Applications		2005	10.1145/2669062	ACM	E8
3242	SA '16: SIGGRAPH ASIA 2016 Mobile Graphics and Interactive Applications		2005	10.1145/2999508	ACM	E6
3243	SA '17: SIGGRAPH Asia 2017 Posters		2005	10.1145/3145690	ACM	E8
3244	SA '17: SIGGRAPH Asia 2017 Symposium on Education		2005	10.1145/3134368	ACM	E8
3245	Sandboxed Interaction for Casual Users in Shared Spaces	Albarelli, Andrea; Celentano, Augusto	2005	10.1145/2598153.2598176	ACM	E8
3246	SAP '18: Proceedings of the 15th ACM Symposium on Applied Perception		2005	10.1145/3225153	ACM	E4
3247	Scaptics and Highlight-Planes: Immersive Interaction Techniques for Finding Occluded Features in 3D Scatterplots	Prouzeau, Arnaud; Cordeil, Maxime; Robin, Clement; Ens, Barrett; Thomas, Bruce H.; Dwyer, Tim	2005	10.1145/3290605.3300555	ACM	E6
3248	Scents and Sensibility: Evaluating Information Olfactation	Batch, Andrea; Patnaik, Biswaksen; Akazue, Moses; Elmqvist, Niklas	2005	10.1145/3313831.3376733	ACM	E8
3249	Secure Gestures—Case Study 4	Liu, Can; Lindqvist, Janne	2005	10.1145/3447404.3447422	ACM	E8
3250	Self-Determination Theory in HCI Games Research: Current Uses and Open Questions	Tyack, April; Mekler, Elisa D.	2005	10.1145/3313831.3376723	ACM	E8
3251	Semantic Ambient Media Experiences Same 2008 Pre-Workshop Review (NAMU Series)	Lugmayr, Artur; Risse, Thomas; Stockleben, Bjorn; Kaario, Juha; Laurila, Kari	2005	10.1145/1461912.1461914	ACM	E8

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3253	Shared-Screen Social Gaming with Portable Devices	Kauko, Jarmo; Häkkilä, Jonna	2005	10.1145/1851600.1851657	ACM	E8
3254	Short-Range Optical Interaction between Smartphones and Public Displays	Ostkamp, Morin; Heitmann, Sven; Kray, Christian	2005	10.1145/2757710.2757716	ACM	E8
3255	SIGGRAPH '13: ACM SIGGRAPH 2013 Posters		2005	10.1145/2503385	ACM	E8
3256	SIGGRAPH '13: ACM SIGGRAPH 2013 Studio Talks		2005	10.1145/2503673	ACM	E8
3257	SIGGRAPH '14: ACM SIGGRAPH 2014 Posters		2005	10.1145/2614217	ACM	E8
3258	SIGGRAPH '16: ACM SIGGRAPH 2016 Emerging Technologies		2005	10.1145/2929464	ACM	E8
3259	SIGGRAPH '16: ACM SIGGRAPH 2016 Posters		2005	10.1145/2945078	ACM	E8
3260	SIGGRAPH '17: ACM SIGGRAPH 2017 Art Gallery		2005	10.1145/3072940	ACM	E8
3261	SIGGRAPH '17: ACM SIGGRAPH 2017 Posters		2005	10.1145/3102163	ACM	E8
3262	SIGGRAPH '18: ACM SIGGRAPH 2018 Art Gallery		2005	10.1145/3202918	ACM	E8
3263	Sketch-Play-Learn - An Augmented Paper Based Environment for Learning the Concepts of Optics	Agarwal, Bhawna; Tripathi, Richa	2005	10.1145/2757226.2764558	ACM	E8
3264	SmartManikin: Virtual Humans with Agency for Design Tools	Lee, Bokyung; Jin, Taeil; Lee, Sung-Hee; Saakes, Daniel	2005	10.1145/3290605.3300814	ACM	E8
3265	StateLens: A Reverse Engineering Solution for Making Existing Dynamic Touchscreens Accessible	Guo, Anhong; Kong, Junhan; Rivera, Michael; Xu, Frank F.; Bigham, Jeffrey P.	2005	10.1145/3332165.3347873	ACM	E8
3266	Strip'TIC: Exploring Augmented Paper Strips for Air Traffic Controllers	Hurter, Christophe; Lesbordes, Rémi; Letondal, Catherine; Vinot, Jean-Luc; Conversy, Stéphane	2005	10.1145/2254556.2254598	ACM	E8
3267	Surface Drawing: Creating Organic 3D Shapes with the Hand and Tangible Tools	Schkolne, Steven; Pruett, Michael; Schröder, Peter	2005	10.1145/365024.365114	ACM	E8
3268	Surround-See: Enabling Peripheral Vision on Smartphones during Active Use	Yang, Xing-Dong; Hasan, Khalad; Bruce, Neil; Irani, Pourang	2005	10.1145/2501988.2502049	ACM	E8
3269	Taking Styles of Interaction from Generation Y Office Workers: Designing with Interaction Qualities	Liu, Wei	2005	10.1145/2948708.2948710	ACM	E8
3270	TastyFloats: A Contactless Food Delivery System	Vi, Chi Thanh; Marzo, Asier; Ablart, Damien; Memoli, Gianluca; Subramanian, Sriram; Drinkwater, Bruce; Obrist, Marianna	2005	10.1145/3132272.3134123	ACM	E8
3271	Teaching Internet of Things (IoT) Literacy: A Systems Engineering Approach	Silvis-Cividjian, Natalia	2005	10.1109/ICSE-SEET.2019.00014	ACM	E6
3272	The Anatomy of Prototypes: Prototypes as Filters, Prototypes as Manifestations of Design Ideas	Lim, Youn-Kyung; Stolterman, Erik; Tenenberg, Josh	2005	10.1145/1375761.1375762	ACM	E8
3273	The Bodies of TEI – Investigating Norms and Assumptions in the Design of Embodied Interaction	Spiel, Katta	2005	10.1145/3430524.3440651	ACM	E8
3274	The BooTable Experience: Iterative Design and Prototyping of an Alternative Interactive Tabletop	Grammenos, Dimitris; Georgalis, Yannis; Kazepis, Nikolaos; Drossis, Giannis; Ftylitakis, Nikolaos	2005	10.1145/1858171.1858221	ACM	E8

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3276	The Feel Dimension of Technology Interaction: Exploring Tangibles through Movement and Touch	Larssen, Astrid Twenebowa; Robertson, Toni; Edwards, Jenny	2005	10.1145/1226969.1227024	ACM	E8
3277	The Fun.Tast.Tisch. Project: A Novel Approach to Neuro-Rehabilitation Using an Interactive Multiuser Multitouch Tabletop	Augstein, Mirjam; Neumayr, Thomas; Ruckser-Scherb, Renate; Karlhuber, Isabel; Altmann, Josef	2005	10.1145/2512349.2512808	ACM	E6
3278	The Trouble with Social Computing Systems Research	Bernstein, Michael S.; Ackerman, Mark S.; Chi, Ed H.; Miller, Robert C.	2005	10.1145/1979742.1979618	ACM	E8
3279	The VR Book: Human-Centered Design for Virtual Reality	Jerald, Jason	2005	10.1145/2792790	ACM	E6
3280	Touch Me Gently: Recreating the Perception of Touch Using a Shape-Memory Alloy Matrix	Muthukumarana, Sachith; Elvitigala, Don Samitha; Forero Cortes, Juan Pablo; Matthies, Denys J. C.; Nanayakkara, Suranga	2005	10.1145/3313831.3376491	ACM	E8
3281	Touching the Sphere: Leveraging Joint-Centered Kinespheres for Spatial User Interaction	Lubos, Paul; Bruder, Gerd; Ariza, Oscar; Steinicke, Frank	2005	10.1145/2983310.2985753	ACM	E6
3282	TouchTools: Leveraging Familiarity and Skill with Physical Tools to Augment Touch Interaction	Harrison, Chris; Xiao, Robert; Schwarz, Julia; Hudson, Scott E.	2005	10.1145/2556288.2557012	ACM	E8
3283	Towards Standardized Processes for Physical Therapists to Quantify Patient Rehabilitation	Kelliher, Aisling; Zilevu, Setor; Rikakis, Thanassis; Ahmed, Tamim; Truong, Yen; Wolf, Steven L.	2005	10.1145/3313831.3376706	ACM	E6
3284	Towards the Holodeck: Fully Immersive Virtual Reality Visualisation of Scientific and Engineering Data	Marks, Stefan; Estevez, Javier E.; Connor, Andy M.	2005	10.1145/2683405.2683424	ACM	E8
3285	TransceiVR: Bridging Asymmetrical Communication Between VR Users and External Collaborators	Thoravi Kumaravel, Balasaravanan; Nguyen, Cuong; DiVerdi, Stephen; Hartmann, Bjoern	2005	10.1145/3379337.3415827	ACM	E8
3286	Translations and Boundaries in the Gap Between HCI Theory and Design Practice	Velt, Raphael; Benford, Steve; Reeves, Stuart	2005	10.1145/3386247	ACM	E8
3287	Trends on Engineering Interactive Systems: An Overview of Works Presented in Workshops at EICS 2019	Distante, Damiano; Winckler, Marco; Bernhaupt, Regina; Bowen, Judy; Campos, José Creissac; Müller, Florian; Palanque, Philippe; Van den Bergh, Jan; Weyers, Benjamin; Voit, Alexandra	2005	10.1145/3319499.3335655	ACM	E8
3288	Uncovering Analogness and Digitalness in Interactive Media	Koh, Jeffrey Tzu Kwan Valino; Peiris, Roshan Lalintha; Zhu, Kening; Polydorou, Doros; Nakatsu, Ryohei	2005	10.1145/2379057.2379103	ACM	E8
3289	Understanding and Researching through Making: A Plea for Functional Prototypes	Schmidt, Albrecht	2005	10.1145/3058498	ACM	E8
3290	User Preferences of Voice Controlled Smart Light Systems	Faltaous, Sarah; Eljaki, Salma; Schneegass, Stefan	2005	10.1145/3340764.3344437	ACM	E8
3291	User-Defined Motion Gestures for Mobile Interaction	Ruiz, Jaime; Li, Yang; Lank, Edward	2005	10.1145/1978942.1978971	ACM	E8
3292	Using Actuated Devices in Location-Aware Systems	Fraser, Mike; Cater, Kirsten; Duff, Paul	2005	10.1145/1347390.1347397	ACM	E8
3293	VARI-SOUND: A Varifocal Lens for Sound	Memoli, Gianluca; Chisari, Letizia; Eccles, Jonathan P.; Caleap, Mihai; Drinkwater, Bruce W.; Subramanian, Sriram	2005	10.1145/3290605.3300713	ACM	E8
3294	Video Puppetry: A Performative Interface for Cutout Animation	Barnes, Connelly; Jacobs, David E.; Sanders, Jason; Goldman, Dan B.; Rusinkiewicz, Szymon; Finkelstein, Adam; Agrawala, Maneesh	2005	10.1145/1409060.1409077	ACM	E8
3295	Video Puppetry: A Performative Interface for Cutout Animation	Barnes, Connelly; Jacobs, David E.; Sanders, Jason; Goldman, Dan B.; Rusinkiewicz, Szymon; Finkelstein, Adam; Agrawala, Maneesh	2005	10.1145/1457515.1409077	ACM	E8

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3296	ViFin: Harness Passive Vibration to Continuous Micro Finger Writing with a Commodity Smartwatch	Chen, Wenqiang; Chen, Lin; Ma, Meiyi; Parizi, Farshid Salemi; Patel, Shwetak; Stankovic, John	2005	10.1145/3448119	ACM	E8
3297	Virtual Encyclopedia of Islamic Civilization VEIC	Elrawi, Osama	2005	10.1145/3383812.3383842	ACM	E8
3298	Vision-Based Hand-Gesture Applications	Wachs, Juan Pablo; Kölsch, Mathias; Stern, Helman; Edan, Yael	2005	10.1145/1897816.1897838	ACM	E8
3299	Visiting a Virtual Graveyard: Designing Virtual Reality Cultural Heritage Experiences	Häkkilä, Jonna; Hannula, Petri; Luiro, Elina; Launne, Emilia; Mustonen, Sanni; Westerlund, Toni; Colley, Ashley	2005	10.1145/3365610.3368425	ACM	E8
3300	Watch+Strap: Extending Smartwatches with Interactive StrapDisplays	Klamka, Konstantin; Horak, Tom; Dachselt, Raimund	2005	10.1145/3313831.3376199	ACM	E6
3301	What Is Interaction?	Hornbæk, Kasper; Oulasvirta, Antti	2005	10.1145/3025453.3025765	ACM	E8
3302	Windy Sight Surfers: Sensing and Awareness of 360° Immersive Videos on the Move	Ramalho, João; Chambel, Teresa	2005	10.1145/2465958.2465969	ACM	E8
3303	Workshops Are Now Required to Be Conducted Remotely: Is This a Bad Thing?	Singh, Vikram	2005	10.1145/3406102	ACM	E8
3304	Wrapping up LinguaBytes, for Now	Hengeveld, Bart; Hummels, Caroline; van Balkom, Hans; Voort, Riny; de Moor, Jan	2005	10.1145/2460625.2460664	ACM	E8
3305	2d Touching of 3d Stereoscopic Objects	Valkov, Dimitar; Steinicke, Frank; Bruder, Gerd; Hinrichs, Klaus	2005	10.1145/1978942.1979142	ACM	E8
3306	3D Spatial Interaction: Applications for Art, Design, and Science	LaViola, Joseph J.; Keefe, Daniel F.	2005	10.1145/2037636.2037637	ACM	E8
3307	A Creative Game Design and Programming App	Chatain, Julia; Bitter, Olivier; Fayolle, Violaine; Sumner, Robert W.; Magnenat, Stéphane	2005	10.1145/3359566.3360056	ACM	E8
3308	A Field Study of Human-Agent Interaction for Electricity Tariff Switching	Alan, Alper; Costanza, Enrico; Fischer, Joel; Ramchurn, Sarvapali D.; Rodden, Tom; Jennings, Nicholas R.	2005	10.5555/2615731.2617400	ACM	E8
3309	A Natural, Tiered and Executable UIDL for 3D User Interfaces Based on Concept-Oriented Design	Wingrave, Chadwick A.; Laviola, Joseph J.; Bowman, Doug A.	2005	10.1145/1614390.1614396	ACM	E8
3310	ABBOT: A Smart Toy Motivating Children to Become Outdoor Explorers	Delprino, Federica; Piva, Chiara; Tommasi, Giovanni; Gelsomini, Mirko; Izzo, Niccoló; Matera, Maristella	2005	10.1145/3206505.3206512	ACM	E6
3311	Activating People with Dementia Using Natural User Interface Interaction on a Surface Computer	Gündogdu, Ramazan; Bejan, Alexander; Kunze, Christophe; Wölfel, Matthias	2005	10.1145/3154862.3154929	ACM	E8
3312	ActuEating: Designing, Studying and Exploring Actuating Decorative Artefacts	Nabil, Sara; Everitt, Aluna; Sturdee, Miriam; Alexander, Jason; Bowen, Simon; Wright, Peter; Kirk, David	2005	10.1145/3196709.3196761	ACM	E8
3313	Alternative Representations of 3D-Reconstructed Heritage Data	Miles, Helen C.; Wilson, Andrew T.; Labrosse, Frédéric; Tiddeman, Bernard; Griffiths, Seren; Edwards, Ben; Ritsos, Panagiotis D.; Mearman, Joseph W.; Möller, Katharina; Karl, Raimund; Roberts, Jonathan C.	2005	10.1145/2795233	ACM	E8
3314	Ambient Touch: Designing Tactile Interfaces for Handheld Devices	Poupyrev, Ivan; Maruyama, Shigeaki; Rekimoto, Jun	2005	10.1145/571985.571993	ACM	E8
3315	Ambiguity as a Resource for Design	Gaver, William W.; Beaver, Jacob; Benford, Steve	2005	10.1145/642611.642653	ACM	E8

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3316	An Introduction to 3D Gestural Interfaces	LaViola, Joseph J.	2005	10.1145/2614028.2615424	ACM	E8
3317	Animal-Computer Interaction: A Manifesto	Mancini, Clara	2005	10.1145/1978822.1978836	ACM	E8
3318	AutoGami: A Low-Cost Rapid Prototyping Toolkit for Automated Movable Paper Craft	Zhu, Kening; Zhao, Shengdong	2005	10.1145/2470654.2470748	ACM	E8
3319	Barriers to End-User Designers of Augmented Fabrication	Mahapatra, Chandan; Jensen, Jonas Kjeldmand; McQuaid, Michael; Ashbrook, Daniel	2005	10.1145/3290605.3300613	ACM	E8
3320	Bigger is Not Always Better: Display Size, Performance, and Task Load during Peephole Map Navigation	Rädle, Roman; Jetter, Hans-Christian; Müller, Jens; Reiterer, Harald	2005	10.1145/2556288.2557071	ACM	E8
3321	Blended Interaction: Understanding Natural Human---Computer Interaction in Post-WIMP Interactive Spaces	Jetter, Hans-Christian; Reiterer, Harald; Geyer, Florian	2005	10.1007/s00779-013-0725-4	ACM	E8
3322	BlueSky: Crowd-Powered Uniform Sampling of Idea Spaces	Huang, Gaoping; Quinn, Alexander J.	2005	10.1145/3059454.3059481	ACM	E8
3323	Building Consensus via a Semantic Web Collaborative Space	Anadiotis, George; Kafentzis, Konstantinos; Pavlopoulos, Iannis; Westerski, Adam	2005	10.1145/2187980.2188247	ACM	E8
3324	Can Android Run on Time? Extending and Measuring the Android Platform's Timeliness	Yan, Yin; Gokul, Girish; Dantu, Karthik; Ko, Steven Y.; Ziarek, Lukasz; Vitek, Jan	2005	10.1145/3289257	ACM	E8
3325	Challenge Discussion: Advancing Multimodal Dialogue	Allen, James; André, Elisabeth; Cohen, Philip R.; Hakkani-Tür, Dilek; Kaplan, Ronald; Lemon, Oliver; Traum, David	2005	10.1145/3233795.3233802	ACM	E8
3326	Child Computer Interaction: Workshop on UI Technologies and Educational Pedagogy	Tse, Edward; Schöning, Johannes; Huber, Jochen; Marentette, Lynn; Beckwith, Richard; Rogers, Yvonne; Mühlhäuser, Max	2005	10.1145/1979742.1979580	ACM	E8
3327	CINCH: A Cooperatively Designed Marking Interface for 3D Pathway Selection	Akers, David	2005	10.1145/1166253.1166260	ACM	E8
3328	Cloud Gaming	Chen, Kuan-Ta; Cai, Wei; Shea, Ryan; Huang, Chun-Ying; Liu, Jiangchuan; Leung, Victor C. M.; Hsu, Cheng-Hsin	2005	10.1145/3122865.3122877	ACM	E8
3329	Comparing Input Methods and Cursors for 3D Positioning with Head-Mounted Displays	Sun, Junwei; Stuerzlinger, Wolfgang; Riecke, Bernhard E.	2005	10.1145/3225153.3225167	ACM	E8
3330	Computational Design and Fabrication of Customized Gamepads	Rajguru, Chinmay; Mousas, Christos; Yu, Lap-Fai	2005	10.1145/3359997.3365695	ACM	E6
3331	Configuring Gestures as Expressive Interactions to Navigate Multimedia Recordings from Visits on Multiple Projections	Jacucci, Giulio; Kela, Juha; Plomp, Johan	2005	10.1145/1052380.1052402	ACM	E8
3332	Context Aware 3D Gesture Recognition for Games and Virtual Reality	LaViola, Joseph J.	2005	10.1145/2776880.2792711	ACM	E8
3333	Context Aware, Multimodal, and Semantic Rendering Engine	Salamin, Patrick; Thalmann, Daniel; Vexo, Frédéric	2005	10.1145/1670252.1670257	ACM	E6
3334	Context-Aware Computing: A Test Case	Burrell, Jenna; Gay, Geri K.; Kubo, Kiyo; Farina, Nick	2005	10.5555/647988.741474	ACM	E8
3335	Contextual Virtual Interaction as Part of Ubiquitous Game Design and Development	Manninen, Tony	2005	10.1007/s007790200044	ACM	E8
3336	Conversational Chat Circles: Being All Here Without Having to Hear It All	Miller, Matthew K.; Tang, John C.; Venolia, Gina; Wilkinson, Gerard; Inkpen, Kori	2005	10.1145/3025453.3025621	ACM	E8

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3338	Creativity Interventions: Physical-Digital Activities for Promoting Group Creativity	Tolentino, Lisa M.; Kelliher, Aisling; Birchfield, David A.; Stern, Rebecca P.	2005	10.1145/1358628.1358771	ACM	E8
3339	Creativity Meets Automation: Combining Nonverbal Action Authoring with Rules and Machine Learning	Kipp, Michael	2005	10.1007/11821830_19	ACM	E8
3340	Critiquing Physical Prototypes for a Remote Audience	Mok, Terrance; Oehlberg, Lora	2005	10.1145/3064663.3064722	ACM	E8
3341	Cubely: Virtual Reality Block-Based Programming Environment	Vincur, Juraj; Konopka, Martin; Tvarozek, Jozef; Hoang, Martin; Navrat, Pavol	2005	10.1145/3139131.3141785	ACM	E8
3342	Curve Shape and Curvature Perception through Interactive Sonification	Alonso-Arevalo, Miguel A.; Shelley, Simon; Hermes, Dik; Hollowood, Jacqueline; Pettitt, Michael; Sharples, Sarah; Kohlrausch, Armin	2005	10.1145/2355598.2355600	ACM	E8
3343	D-Coil: A Hands-on Approach to Digital 3D Models Design	Peng, Huaishu; Zoran, Amit; Guimbretière, François V.	2005	10.1145/2702123.2702381	ACM	E8
3344	Design of Smart Ships for the IoT	Muñoz, Jesús A.; Pérez, Rodrigo	2005	10.1145/3018896.3018930	ACM	E8
3345	Design: (Inter)Facing the Millennium: Where Are We (Going)?	Ehrlich, K.; Henderson, A.	2005	10.1145/328595.328605	ACM	E8
3346	Designing Disambiguation Techniques for Pointing in the Physical World	Delamare, William; Coutrix, Céline; Nigay, Laurence	2005	10.1145/2494603.2480309	ACM	E8
3347	Designing for Bodily Interplay in Social Exertion Games	Mueller, Florian 'Floyd'; Gibbs, Martin R.; Vetere, Frank; Edge, Darren	2005	10.1145/3064938	ACM	E6
3348	Designing Interaction, Not Interfaces	Beaudouin-Lafon, Michel	2005	10.1145/989863.989865	ACM	E8
3349	Designing Interactive Manual Wheelchair Skills Training for Children	Gerling, Kathrin; Hicks, Kieran; Szymanezyk, Olivier; Linehan, Conor	2005	10.1145/3322276.3322281	ACM	E8
3350	Designing Touch-Enabled Electronic Flight Bags in SAR Helicopter Operations	Avsar, Huseyin; Fischer, Joel E.; Rodden, Tom	2005	10.1145/2950112.2964591	ACM	E8
3351	Designing Universally Accessible Games	Grammenos, Dimitris; Savidis, Anthony; Stephanidis, Constantine	2005	10.1145/1486508.1486516	ACM	E8
3352	Display Blocks: Cubic Displays for Multi-Perspective Visualization	Pla, Pol; Maes, Pattie	2005	10.1145/2212776.2223745	ACM	E8
3353	DSP Basics	Alexander, Jason; Thanh Vi, Chi	2005	10.1145/3447404.3447412	ACM	E8
3354	Early Integration for Movement Modeling in Latent Spaces	Hornung, Rachel; Chen, Nutan; van der Smagt, Patrick	2005	10.1145/3233795.3233805	ACM	E8
3355	Educating Creative Technology for the Internet of Things - Research and Practice-Oriented Approaches Compared	de Haan, Geert	2005	10.1145/2814464.2814469	ACM	E8
3356	Efficient Similarity Search	Jeundefinedou, Hervé	2005	10.1145/3122865.3122871	ACM	E2
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3359	Embedded Multimodal Interfaces in Robotics: Applications, Future Trends, and Societal Implications	Kirchner, Elsa A.; Fairclough, Stephen H.; Kirchner, Frank	2005	10.1145/3233795.3233810	ACM	E8
3360	Entanglement HCI The Next Wave?	Frauenberger, Christopher	2005	10.1145/3364998	ACM	E8
3361	Evaluating Digital Cultural Heritage 'In the Wild': The Case For Reflexivity	Galani, Areti; Kidd, Jenny	2005	10.1145/3287272	ACM	E8
3362	Evaluating Interface Characteristics for Shared Lighting Systems in the Office Environment	van de Werff, Thomas; Niemantsverdriet, Karin; van Essen, Harm; Eggen, Berry	2005	10.1145/3064663.3064749	ACM	E8
3363	Evaluating Realistic Visualizations for Safety-Related in-Car Information Systems	Froehlich, Peter; Schatz, Raimund; Leitner, Peter; Mantler, Stephan; Baldauf, Matthias	2005	10.1145/1753846.1754067	ACM	E8
3364	Evaluating the Social Context of ICT Applications in Museum Exhibitions	Tost, L. Pujol; Economou, Maria	2005	10.5555/2384301.2384337	ACM	E8
3365	Event-Driven Programming in Programming Education: A Mapping Review	Lukkarinen, Aleksi; Malmi, Lauri; Haaranen, Lassi	2005	10.1145/3423956	ACM	E8
3366	EXHI-Bit: A Mechanical Structure for Prototyping EXpandable Handheld Interfaces	Ortega, Michaël; Maisonnasse, Jérôme; Nigay, Laurence	2005	10.1145/3098279.3098533	ACM	E8
3367	Exploration of Alternative Vision Modes Using Depth and Thermal Cameras	Abdelrahman, Yomna; Wozniak, Pawel; Knierim, Pascal; Henze, Niels; Schmidt, Albrecht	2005	10.1145/3282894.3282920	ACM	E8
3368	Exploring Novice Approaches to Smartphone-Based Thermographic Energy Auditing: A Field Study	Mauriello, Matthew Louis; Saha, Manaswi; Brown, Erica Brown; Froehlich, Jon E.	2005	10.1145/3025453.3025471	ACM	E8
3369	Exploring the World through Small Green Steps: Improving Sustainable School Transportation with a Game-Based Learning Interface	Marconi, Annapaola; Schiavo, Gianluca; Zancanaro, Massimo; Valetto, Giuseppe; Pistore, Marco	2005	10.1145/3206505.3206521	ACM	E8
3370	Exploring Video Streaming in Public Settings: Shared Geocaching over Distance Using Mobile Video Chat	Procyk, Jason; Neustaedter, Carman; Pang, Carolyn; Tang, Anthony; Judge, Tejinder K.	2005	10.1145/2556288.2557198	ACM	E8
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3372	Facetons: Face Primitives with Adaptive Bounds for Building 3D Architectural Models in Virtual Environment	Sasaki, Naoki; Chen, Hsiang-Ting; Sakamoto, Daisuke; Igarashi, Takeo	2005	10.1145/2503713.2503718	ACM	E8
3373	From Use to Presence: On the Expressions and Aesthetics of Everyday Computational Things	Hallnäs, Lars; Redström, Johan	2005	10.1145/513665.513668	ACM	E8
3374	From Users to Citizens: Some Thoughts on Designing for Polity and Civics	Foth, Marcus; Tomitsch, Martin; Satchell, Christine; Haeusler, M. Hank	2005	10.1145/2838739.2838769	ACM	E8
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3382	Hyperstories and Social Interaction in 2D and 3D Edutainment Spaces for Children	Garzotto, Franca; Forfori, Matteo	2005	10.1145/1149941.1149955	ACM	E8
3383	ICMI '16: Proceedings of the 18th ACM International Conference on Multimodal Interaction		2005	10.1145/2993148	ACM	E4
3384	Imperceptible Depth Shifts for Touch Interaction with Stereoscopic Objects	Valkov, Dimitar; Giesler, Alexander; Hinrichs, Klaus H.	2005	10.1145/2556288.2557134	ACM	E8
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3387	Inspiring AWE: Transforming Clinic Waiting Rooms into Informal Learning Environments with Active Waiting Education	Leong, Zeina Atrash; Horn, Michael S.; Thaniel, Lisa; Meier, Emily	2005	10.1145/3173574.3173672	ACM	E8
3388	InstInt: Enacting a Small-Scale Interactive Installation through Co-Design	Duarte, Emanuel Felipe; Gonçalves, Fabrício Matheus; Baranauskas, M. Cecília C.	2005	10.1145/3292147.3292158	ACM	E8
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3391	Interaction with Large Displays: A Survey	Ardito, Carmelo; Buono, Paolo; Costabile, Maria Francesca; Desolda, Giuseppe	2005	10.1145/2682623	ACM	E8
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3393	Introduction to Human-Building Interaction (HBI): Interfacing HCI with Architecture and Urban Design	Alavi, Hamed S.; Churchill, Elizabeth F.; Wiberg, Mikael; Lalanne, Denis; Dalsgaard, Peter; Fatah gen Schieck, Ava; Rogers, Yvonne	2005	10.1145/3309714	ACM	E8
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3395	IoT-Based Omni Channel Service for Smart Exhibition and Value of Data	Park, Arum; Han, Jae Yoon; Lee, Kyoung Jun	2005	10.1145/3154943.3154966	ACM	E8
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3398	Let's Play Together: Adaptation Guidelines of Board Games for Players with Visual Impairment	da Rocha Tomé Filho, Frederico; Mirza-Babaei, Pejman; Kapralos, Bill; Moreira Mendonça Junior, Glaudiney	2005	10.1145/3290605.3300861	ACM	E8
3399	Listen By Looking: A Mobile Application for Augmented Fruition of Live Music and Interactive Learning	Pitteri, Giulio; Micheloni, Edoardo; Rodà, Antonio; Fantozzi, Carlo; Orio, Nicola	2005	10.1145/3342428.3342684	ACM	E8
3400	Lumitrack: Low Cost, High Precision, High Speed Tracking with Projected m-Sequences	Xiao, Robert; Harrison, Chris; Willis, Karl D. D.; Poupyrev, Ivan; Hudson, Scott E.	2005	10.1145/2501988.2502022	ACM	E8

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3401	M+m: A Novel Middleware for Distributed, Movement Based Interactive Multimedia Systems	Bernardet, Ulysses; Adhia, Dhruv; Jaffe, Norman; Wang, Johnty; Nixon, Michael; Alemi, Omid; Phillips, Jordon; DiPaola, Steve; Pasquier, Philippe; Schiphorst, Thecla	2005	10.1145/2948910.2948942	ACM	E8
3402	MACS: Combination of a Formal Mixed Interaction Model with an Informal Creative Session	Bortolaso, Christophe; Bach, Cédric; Dubois, Emmanuel	2005	10.1145/1996461.1996496	ACM	E8
3403	Magic Cards: A Paper Tag Interface for Implicit Robot Control	Zhao, Shengdong; Nakamura, Koichi; Ishii, Kentaro; Igarashi, Takeo	2005	10.1145/1518701.1518730	ACM	E8
3404	Medical and Health Systems	Sonntag, Daniel	2005	10.1145/3233795.3233808	ACM	E8
3405	MEMENTO: A Digital-Physical Scrapbook for Memory Sharing	West, David; Quigley, Aaron; Kay, Judy	2005	10.1007/s00779-006-0090-7	ACM	E8
3406	Mobile Learning: Tendencies and Lines of Research	Sánchez Prieto, José Carlos; Migueláñez, Susana Olmos; García-Peñalvo, Francisco J.	2005	10.1145/2536536.2536609	ACM	E8
3407	Model for Adaptable Context-Based Biometric Authentication for Mobile Devices	Wójtowicz, Adam; Joachimiak, Krzysztof	2005	10.1007/s00779-016-0905-0	ACM	E8
3408	Modeling and Simulating the Web of Things from an Information Retrieval Perspective	Manta-Caro, Cristyan; Fernández-Luna, Juan M.	2005	10.1145/3132732	ACM	E8
3409	Modelling and Simulation to Facilitate Policy Choices: The Impact of Policy Modelling Gaps on Good Governance	Bicking, Melanie	2005	10.1145/2037556.2037572	ACM	E8
3410	Moving across Sonic Atmospheres	Toppano, Elio; Toppano, Sveva; Basiaco, Alessandro	2005	10.1145/3356590.3356612	ACM	E8
3411	Moving Virtual Reality out of Its Comfort Zone and Into the African Kalahari Desert Field: Experiences From Technological Co-Exploration With an Indigenous San Community in Namibia	Rodil, Kasper; Maasz, Donovan; Winschiers-Theophilus, Heike	2005	10.1145/3385956.3418955	ACM	E8
3412	Multimedia Fog Computing: Minions in the Cloud and Crowd	Hsu, Cheng-Hsin; Hong, Hua-Jun; Elgamal, Tarek; Nahrstedt, Klara; Venkatasubramanian, Nalini	2005	10.1145/3122865.3122876	ACM	E2
3413	Multimodal Analysis of Free-Standing Conversational Groups	Alameda-Pineda, Xavier; Ricci, Elisa; Sebe, Nicu	2005	10.1145/3122865.3122869	ACM	E2
3414	Multimodal Behavioral and Physiological Signals as Indicators of Cognitive Load	Zhou, Jianlong; Yu, Kun; Chen, Fang; Wang, Yang; Arshad, Syed Z.	2005	10.1145/3107990.3108002	ACM	E8
3415	Multimodal Conversational Interaction with Robots	Skantze, Gabriel; Gustafson, Joakim; Beskow, Jonas	2005	10.1145/3233795.3233799	ACM	E8
3416	Multimodal Databases	Valstar, Michel	2005	10.1145/3233795.3233807	ACM	E8
3417	Multimodal Dialogue Processing for Machine Translation	Waibel, Alexander	2005	10.1145/3233795.3233811	ACM	E8
3418	Multimodal Integration for Interactive Conversational Systems	Johnston, Michael	2005	10.1145/3233795.3233798	ACM	E2
3419	Multimodal Physiological Signals for Workload Prediction in Robot-Assisted Surgery	Zhou, Tian; Cha, Jackie S.; Gonzalez, Glebys; Wachs, Juan P.; Sundaram, Chandru P.; Yu, Denny	2005	10.1145/3368589	ACM	E8
3420	New Literacy Theories for Participatory Design: Lessons from Three Design Cases with Australian Aboriginal Communities	Taylor, Jennyfer Lawrence; Soro, Alessandro; Brereton, Margot	2005	10.1145/3210586.3210588	ACM	E8

Id	Title	Authors	Year	DOI	S	C
3421	Nonverbal Behavior in Multimodal Performances	Cafaro, Angelo; Pelachaud, Catherine; Marsella, Stacy C.	2005	10.1145/3233795.3233803	ACM	E2
3422	ON MODELING SUPPLEMENT Mobile Devices Should Be about Neither Mobility nor Devices. Discuss.	Pangaro, Paul	2005	10.1145/1620693.1620704	ACM	E8
3423	ON MODELING A Model of Mobile Community: Designing User Interfaces to Support Group Interaction	Rhee, Youngho; Lee, Juyeon	2005	10.1145/1620693.1620705	ACM	E8
3424	PaperLens: Advanced Magic Lens Interaction above the Tabletop	Spindler, Martin; Stellmach, Sophie; Dachselt, Raimund	2005	10.1145/1731903.1731920	ACM	E8
3425	Papiercraft: A Gesture-Based Command System for Interactive Paper	Liao, Chunyuan; Guimbretière, François; Hinckley, Ken; Hollan, Jim	2005	10.1145/1314683.1314686	ACM	E8
3426	Paradigms of Games Research in HCI: A Review of 10 Years of Research at CHI	Carter, Marcus; Downs, John; Nansen, Bjorn; Harrop, Mitchell; Gibbs, Martin	2005	10.1145/2658537.2658708	ACM	E8
3427	PCubee: A Perspective-Corrected Handheld Cubic Display	Stavness, Ian; Lam, Billy; Fels, Sidney	2005	10.1145/1753326.1753535	ACM	E8
3428	Performance Benefits of High-Fidelity Passive Haptic Feedback in Virtual Reality Training	Franzluebbers, Anton; Johnsen, Kyle	2005	10.1145/3267782.3267790	ACM	E8
3429	Photoportals: Shared References in Space and Time	Kunert, André; Kulik, Alexander; Beck, Stephan; Froehlich, Bernd	2005	10.1145/2531602.2531727	ACM	E6
3430	Phylo-Genie: Engaging Students in Collaborative 'tree-Thinking' through Tabletop Techniques	Schneider, Bertrand; Strait, Megan; Muller, Laurence; Elfenbein, Sarah; Shaer, Orit; Shen, Chia	2005	10.1145/2207676.2208720	ACM	E6
3431	Physical Computing and Multimodal Input in Human-Computer Interfaces	Scarlatos, Lori; Scarlatos, Tony	2005	10.5555/1059888.1059890	ACM	E8
3432	PicLight: User-Centered Lighting Control Interface for Residential Space	Lee, Jeongmin; Choi, Kyungah; Suk, Hyeon-Jeong	2005	10.1145/2702613.2732891	ACM	E8
3433	Plant Shadow Morphing as a Peripheral Display	Colley, Ashley; Raudanjoki, \{O}zge; Mikkonen, Kirsi; Häkkilä, Jonna	2005	10.1145/3365610.3368410	ACM	E8
3434	Preface		2005	10.1145/3122865.3122866	ACM	E2
3435	Privacy Concerns of Multimodal Sensor Systems	Friedland, Gerald; Tschantz, Michael Carl	2005	10.1145/3233795.3233813	ACM	E8
3436	Project Star Catcher: A Novel Immersive Virtual Reality Experience for Upper Limb Rehabilitation	Elor, Aviv; Teodorescu, Mircea; Kurniawan, Sri	2005	10.1145/3265755	ACM	E6
3437	Projectors: Advanced Graphics and Vision Techniques	Raskar, Ramesh	2005	10.1145/1103900.1103923	ACM	E8
3438	Promoting Local Culture and Enriching Airport Experiences through Interactive Storytelling	Burova, Alisa; Kelling, Chelsea; Keskinen, Tuuli; Hakulinen, Jaakko; Kallioniemi, Pekka; Väätäjä, Heli; Turunen, Markku	2005	10.1145/3365610.3365640	ACM	E8
3439	Promoting Physical Activity In Seniors: Future Opportunities with Emerging Technologies	Araullo, Jake; Potter, Leigh Ellen	2005	10.1145/2890602.2890616	ACM	E8
3440	Rapid Smart Environment Prototyping for Early Conceptual Design	Kim, Han-Jong	2005	10.1145/3197391.3205383	ACM	E8
3441	Reactile: Programming Swarm User Interfaces through Direct Physical Manipulation	Suzuki, Ryo; Kato, Jun; Gross, Mark D.; Yeh, Tom	2005	10.1145/3173574.3173773	ACM	E8

Id	Title	Authors	Year	DOI	S	C
3442	Reactive Video: Adaptive Video Playback Based on User Motion for Supporting Physical Activity	Clarke, Christopher; Cavdir, Doga; Chiu, Patrick; Denoue, Laurent; Kimber, Don	2005	10.1145/3379337.3415591	ACM	E6
3443	Rehabilitation Centred Design	Balaam, Madeline; Rennick Egglestone, Stefan; Hughes, Ann-Marie; Nind, Thomas; Wilkinson, Anna; Harris, Eric; Axelrod, Lesley; Fitzpatrick, Geraldine	2005	10.1145/1753846.1754197	ACM	E8
3444	Rulers on Our Arms: Waving to Measure Object Size through Contactless Sensing	Liu, Yang; Jiang, Yonghang; Li, Zhenjiang; Wang, Jianping	2005	10.1145/3289183	ACM	E8
3445	SA '14: SIGGRAPH Asia 2014 Designing Tools For Crafting Interactive Artifacts		2005	10.1145/2668947	ACM	E8
3446	SA '16: SIGGRAPH ASIA 2016 Symposium on Education		2005	10.1145/2993352	ACM	E8
3447	SA '16: SIGGRAPH ASIA 2016 VR Showcase		2005	10.1145/2996376	ACM	E8
3448	School's Back: Scaffolding Reminiscence in Social Virtual Reality with Older Adults	Baker, Steven; Kelly, Ryan M.; Waycott, Jenny; Carrasco, Romina; Bell, Roger; Joukhadar, Zaher; Hoang, Thuong; Ozanne, Elizabeth; Vetere, Frank	2005	10.1145/3434176	ACM	E8
3449	Science Fiction and the Reality of HCI: Inspirations, Achievements or a Mismatch	Mubin, Omar; Obaid, Mohammad; Barendregt, Wolmet; Simoff, Simeon; Fjeld, Morten	2005	10.1145/2838739.2838835	ACM	E8
3450	Seeing, Hearing, and Touching: Putting It All Together	Fisher, Brian; Fels, Sidney; MacLean, Karon; Munzner, Tamara; Rensink, Ronald	2005	10.1145/1103900.1103908	ACM	E8
3451	Sensing History: Contextualizing Artifacts with Sensory Interactions and Narrative Design	Chu, Jean Ho; Harley, Daniel; Kwan, Jamie; McBride, Melanie; Mazalek, Ali	2005	10.1145/2901790.2901829	ACM	E8
3452	SIGGRAPH '14: ACM SIGGRAPH 2014 Courses		2005	10.1145/2614028	ACM	E8
3453	SIGGRAPH '14: ACM SIGGRAPH 2014 Studio		2005	10.1145/2619195	ACM	E8
3454	SIGGRAPH '15: ACM SIGGRAPH 2015 Talks		2005	10.1145/2775280	ACM	E8
3455	SIGGRAPH '16: ACM SIGGRAPH 2016 Art Gallery		2005	10.1145/2897843	ACM	E8
3456	SIGGRAPH '16: ACM SIGGRAPH 2016 Courses		2005	10.1145/2897826	ACM	E8
3457	SIGGRAPH '16: ACM SIGGRAPH 2016 Talks		2005	10.1145/2897839	ACM	E8
3458	SIGGRAPH '17: ACM SIGGRAPH 2017 Talks		2005	10.1145/3084363	ACM	E8
3459	Simplifying Cyber Foraging for Mobile Devices	Balan, Rajesh Krishna; Gergle, Darren; Satyanarayanan, Mahadev; Herbsleb, James	2005	10.1145/1247660.1247692	ACM	E8
3460	Situated Interaction	Bohus, Dan; Horvitz, Eric	2005	10.1145/3233795.3233800	ACM	E2
3461	Situation Recognition Using Multimodal Data	Singh, Vivek	2005	10.1145/3122865.3122873	ACM	E2
3462	Situational Ethics: Re-Thinking Approaches to Formal Ethics Requirements for Human-Computer Interaction	Munteanu, Cosmin; Molyneaux, Heather; Moncur, Wendy; Romero, Mario; O'Donnell, Susan; Vines, John	2005	10.1145/2702123.2702481	ACM	E8
3463	Situational When: Designing for Time Across Cultures	Taylor, Jennyfer Lawrence; Soro, Alessandro; Roe, Paul; Lee Hong, Anita; Brereton, Margot	2005	10.1145/3025453.3025936	ACM	E8
3464	Social-Sensed Multimedia Computing	Cui, Peng	2005	10.1145/3122865.3122872	ACM	E2
3465	Software Platforms and Toolkits for Building Multimodal Systems and Applications	Feld, Michael; Ne?elrath, Robert; Schwartz, Tim	2005	10.1145/3233795.3233801	ACM	E2

Id	Title	Authors	Year	DOI	S	C
3466	Software Theater—Teaching Demo-Oriented Prototyping	Krusche, Stephan; Dzvonyar, Dora; Xu, Han; Bruegge, Bernd	2005	10.1145/3145454	ACM	E8
3467	Sotto Voce: Exploring the Interplay of Conversation and Mobile Audio Spaces	Aoki, Paul M.; Grinter, Rebecca E.; Hurst, Amy; Szymanski, Margaret H.; Thornton, James D.; Woodruff, Allison	2005	10.1145/503376.503454	ACM	E8
3468	SRA, NAIST & JST	Nakakoji, Kumiyo; Yamamoto, Yasuhiro; Atsushi, Aoki	2005	10.1145/505103.505133	ACM	E2
3469	Standardized Representations and Markup Languages for Multimodal Interaction	Tumuluri, Raj; Dahl, Deborah; Paternó, Fabio; Zancanaro, Massimo	2005	10.1145/3233795.3233806	ACM	E8
3470	Strategies in Creative Professionals' Use of Digital Tools Across Domains	Frich, Jonas; Biskjaer, Michael Mose; MacDonald Vermeulen, Lindsay; Remy, Christian; Dalsgaard, Peter	2005	10.1145/3325480.3325494	ACM	E8
3471	Subtletee: Augmenting Posture Awareness for Beginner Golfers	Woundefinedniak, Miko?aj P.; Dominiak, Julia; Pieprzowski, Micha?; undefinedado?ski, Piotr; Grudzie?, Krzysztof; Lischke, Lars; Romanowski, Andrzej; Woundefinedniak, Pawe? W.	2005	10.1145/3427332	ACM	E6
3472	Supporting Cultural Heritage Professionals Adopting and Shaping Interactive Technologies in Museums	Maye, Laura A.; Bouchard, Dominique; Avram, Gabriela; Ciolfi, Luigina	2005	10.1145/3064663.3064753	ACM	E8
3473	Supporting Elder Connectedness through Cognitively Sustainable Design Interactions with the Memory Music Box	Kleinberger, Rebecca; Rieger, Alexandra; Sands, Janelle; Baker, Janet	2005	10.1145/3332165.3347877	ACM	E8
3474	Supporting Parent-Child Collaborative Learning through Haptic Feedback Displays	Beheshti, Elham; Borgos-Rodriguez, Katya; Piper, Anne Marie	2005	10.1145/3311927.3323137	ACM	E8
3475	Supporting Spatial Skill Learning with Gesture-Based Embodied Design	Chiu, Po-Tsung; Wauck, Helen; Xiao, Ziang; Yao, Yuqi; Fu, Wai-Tat	2005	10.1145/3172944.3172994	ACM	E8
3476	SurfaceBrush: From Virtual Reality Drawings to Manifold Surfaces	Rosales, Enrique; Rodriguez, Jafet; SHEFFER, A. L. L. A.	2005	10.1145/3306346.3322970	ACM	E8
3477	Teacher Tracking with Integrity: What Indoor Positioning Can Reveal About Instructional Proxemics	Martinez-Maldonado, Roberto; Mangaroska, Katerina; Schulte, Jurgen; Elliott, Doug; Axisa, Carmen; Shum, Simon Buckingham	2005	10.1145/3381017	ACM	E8
3478	Teaching Interaction Design by Research through Design	Hansen, Nicolai Brodersen; Halskov, Kim	2005	10.1145/3292147.3292159	ACM	E8
3479	The 2nd Workshop on Localization vs. Internationalization: Impact of COVID-19 Pandemic on AutomotiveUI Activities from the View of Diversity and Inclusion	Lee, Seul Chan; Stojmenova, Kristina; Prabhakar, Gowdham; Bao, Shan; Sodnik, Jaka; Jeon, Myounghoon	2005	10.1145/3409251.3411735	ACM	E8
3480	The Design of Social Drones: A Review of Studies on Autonomous Flyers in Inhabited Environments	Baytas, Mehmet Aydin; \c{C}ay, Damla; Zhang, Yuchong; Obaid, Mohammad; Yantaç, Asim Evren; Fjeld, Morten	2005	10.1145/3290605.3300480	ACM	E6
3481	The Essentials of Modern Software Engineering: Free the Practices from the Method Prisons!	Jacobson, Ivar; Lawson, Harold Bud; Ng, Pan-Wei; McMahon, Paul E.; Goedicke, Michael	2005	10.1145/3277669	ACM	E2
3482	The Handbook of Multimodal-Multisensor Interfaces: Foundations, User Modeling, and Common Modality Combinations - Volume 1		2005	10.1145/3015783	ACM	E2
3483	The Handbook of Multimodal-Multisensor Interfaces: Language Processing, Software, Commercialization, and Emerging Directions		2005	10.1145/3233795	ACM	E2
3484	Toolkit Support for Interactive Projected Displays	Hardy, John; Alexander, Jason	2005	10.1145/2406367.2406419	ACM	E8
3485	Toward Haptic Mathematics: Why and How	Bernareggi, C.; Marcante, A.; Mussio, P.; Provenza, L. Parasiliti; Vanzi, Sara	2005	10.1145/1385569.1385657	ACM	E8

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3486	Towards the Temporally Perfect Virtual Button: Touch-Feedback Simultaneity and Perceived Quality in Mobile Touchscreen Press Interactions	Kaaresoja, Topi; Brewster, Stephen; Lantz, Vuokko	2005	10.1145/2611387	ACM	E8
3487	Towards Visualising People's Ecology of Hybrid Personal Learning Environments	Caldwell, Glenda; Bilandzic, Mark; Foth, Marcus	2005	10.1145/2421076.2421080	ACM	E8
3488	Trends in Computer Science Research	Hoonlor, Apirak; Szymanski, Boleslaw K.; Zaki, Mohammed J.	2005	10.1145/2500892	ACM	E8
3489	Trust Triggers for Multimodal Command and Control Interfaces	Hastie, Helen; Liu, Xingkun; Patron, Pedro	2005	10.1145/3136755.3136764	ACM	E8
3490	UD Co-Spaces: A Table-Centred Multi-Display Environment for Public Engagement in Urban Design Charrettes	Mahyar, Narges; Burke, Kelly J.; Xiang, Jialiang (Ernest); Meng, Siyi (Cathy); Booth, Kellogg S.; Girling, Cynthia L.; Kellett, Ronald W.	2005	10.1145/2992154.2992163	ACM	E8
3491	Understanding CS Undergraduate Students' Professional Identity through the Lens of Their Professional Development	Kapoor, Amanpreet; Gardner-McCune, Christina	2005	10.1145/3304221.3319764	ACM	E8
3492	Understanding the Effects of Contextual Constraints on Performative Behaviour in Interactive Media Installations	Hespanhol, Luke; Tomitsch, Martin	2005	10.1007/s00779-014-0765-4	ACM	E8
3493	Understanding the Role of Interactive Machine Learning in Movement Interaction Design	Gillies, Marco	2005	10.1145/3287307	ACM	E8
3494	Understanding Videowork	Kirk, David; Sellen, Abigail; Harper, Richard; Wood, Ken	2005	10.1145/1240624.1240634	ACM	E8
3495	Using Participatory Design with Proxies with Children with Limited Communication	Hamidi, Foad; Baljko, Melanie; Gómez, Isabel	2005	10.1145/3132525.3132527	ACM	E8
3496	Using Sensing Technologies to Explain Children's Self-Representation in Motion-Based Educational Games	Lee-Cultura, Serena; Sharma, Kshitij; Papavlasopoulou, Sofia; Retalis, Symeon; Giannakos, Michail	2005	10.1145/3392063.3394419	ACM	E6
3497	Utilizing Implicit User Cues for Multimedia Analytics	Ramanathan, Subramanian; Gilani, Syed Omer; Sebe, Nicu	2005	10.1145/3122865.3122875	ACM	E8
3498	Video Interaction Tools: A Survey of Recent Work	Schoeffmann, Klaus; Hudelist, Marco A.; Huber, Jochen	2005	10.1145/2808796	ACM	E8
3499	Visibility Perception and Dynamic Viewsheds for Topographic Maps and Models	Li, Nico; Willett, Wesley; Sharlin, Ehud; Sousa, Mario Costa	2005	10.1145/3131277.3132178	ACM	E8
3500	Visually Augmented Audio-Tactile Graphics for Visually Impaired People	Götzelmann, T.	2005	10.1145/3186894	ACM	E8
3501	Voices from the War: Design as a Means of Understanding the Experience of Visiting Heritage	Petrelli, Daniela; Dulake, Nick; Marshall, Mark T.; Pisetti, Anna; Not, Elena	2005	10.1145/2858036.2858287	ACM	E6
3502	WatchOut: Obstacle Sonification for People with Visual Impairment or Blindness	Presti, Giorgio; Ahmetovic, Dragan; Ducci, Mattia; Bernareggi, Cristian; Ludovico, Luca; Baratè, Adriano; Avanzini, Federico; Mascetti, Sergio	2005	10.1145/3308561.3353779	ACM	E8
3503	Whole-Body Interaction in Natural Environments Benefits Children's Cognitive Function Compared to Sedentary Interaction Indoors	Ferraz, Marta; Resta, Paul E.; O'neill, Afonso	2005	10.1145/3041164.3041177	ACM	E8
3504	Worlds of Information: Designing for Engagement at a Public Multi-Touch Display	Jacucci, Giulio; Morrison, Ann; Richard, Gabriela T.; Kleimola, Jari; Peltonen, Peter; Parisi, Lorenza; Laitinen, Toni	2005	10.1145/1753326.1753669	ACM	E8
3505	A Great and Troubling Beauty: Cognitive Speculation and Ubiquitous Computing	Bardzell, Jeffrey; Bardzell, Shaowen	2005	10.1007/s00779-013-0677-8	ACM	E5
3506	A Perspective on Multi-User Interaction Design Based on an Understanding of Domestic Lighting Conflicts	Niemantsverdriet, Karin; Essen, Harm; Eggen, Berry	2005	10.1007/s00779-016-0998-5	ACM	E8

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3507	Audition for Multimedia Computing	Friedland, Gerald; Smaragdis, Paris; McDermott, Josh; Raj, Bhiksha	2005	10.1145/3122865.3122868	ACM	E2
3508	Computer Graphics, Interactive Technologies and Collaborative Learning Synergy Supporting Individuals' Skills Development	Franco, Jorge Ferreira; da Cruz, Sandra Regina; de Deus Lopes, Roseli	2005	10.1145/1179295.1179338	ACM	E8
3509	Computer Science Curricula 2013: Curriculum Guidelines for Undergraduate Degree Programs in Computer Science	Joint Task Force on Computing Curricula, Association for Computing Machinery (ACM); Society, I.E.E.E. Computer	2005	10.1145/2534860	ACM	E8
3510	CSCW '17: Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing		2005	10.1145/2998181	ACM	E8
3511	Deep Learning for Video Classification and Captioning	Wu, Zuxuan; Yao, Ting; Fu, Yanwei; Jiang, Yu-Gang	2005	10.1145/3122865.3122867	ACM	E8
3512	Dynamically Transparent Window	Dalsgaard, Peter; Halskov, Kim	2005	10.1145/1520340.1520429	ACM	E8
3513	Embodied Interactions for Novel Immersive Presentational Experiences	Matulic, Fabrice; Engeln, Lars; Träger, Christoph; Dachselt, Raimund	2005	10.1145/2851581.2892501	ACM	E8
3514	Encrypted Domain Multimedia Content Analysis	Atrey, Pradeep K.; Lathey, Ankita; Yakubu, Abukari M.	2005	10.1145/3122865.3122870	ACM	E8
3515	Expressive '18: Proceedings of the Joint Symposium on Computational Aesthetics and Sketch-Based Interfaces and Modeling and Non-Photorealistic Animation and Rendering		2005	10.1145/3229147	ACM	E4
3516	Hawkes Processes for Events in Social Media	Rizoiu, Marian-Andrei; Lee, Young; Mishra, Swapnil; Xie, Lexing	2005	10.1145/3122865.3122874	ACM	E2
3517	Implications of Location and Touch for On-Body Projected Interfaces	Harrison, Chris; Faste, Haakon	2005	10.1145/2598510.2598587	ACM	E8
3518	Probing, Mocking and Prototyping: Participatory Approaches to Identity Infrastructuring	Clement, Andrew; McPhail, Brenda; Smith, Karen Louise; Ferenbok, Joseph	2005	10.1145/2347635.2347639	ACM	E8
3519	SA '14: SIGGRAPH Asia 2014 Autonomous Virtual Humans and Social Robot for Telepresence		2005	10.1145/2668956	ACM	E8
3520	SA '15: SIGGRAPH Asia 2015 Symposium on Education		2005	10.1145/2818498	ACM	E8
3521	SA '15: SIGGRAPH Asia 2015 Technical Briefs		2005	10.1145/2820903	ACM	E8
3522	SA '16: SIGGRAPH ASIA 2016 Courses		2005	10.1145/2988458	ACM	E8
3523	SA '16: SIGGRAPH ASIA 2016 Symposium on Visualization		2005	10.1145/3002151	ACM	E8
3524	SIGGRAPH '13: ACM SIGGRAPH 2013 Art Gallery		2005	10.1145/2503649	ACM	E8
3525	SIGGRAPH '15: ACM SIGGRAPH 2015 Courses		2005	10.1145/2776880	ACM	E8
3526	SIGGRAPH '17: ACM SIGGRAPH 2017 Courses		2005	10.1145/3084873	ACM	E8
3527	Strong Concepts: Intermediate-Level Knowledge in Interaction Design Research	Höök, Kristina; Löwgren, Jonas	2005	10.1145/2362364.2362371	ACM	E8
3528	The Handbook of Multimodal-Multisensor Interfaces: Signal Processing, Architectures, and Detection of Emotion and Cognition - Volume 2		2005	10.1145/3107990	ACM	E2
3529	Toward an Understanding of Trust Repair in Human-Robot Interaction: Current Research and Future Directions	Baker, Anthony L.; Phillips, Elizabeth K.; Ullman, Daniel; Keebler, Joseph R.	2005	10.1145/3181671	ACM	E8

Id	Title	Authors	Year	DOI	S	C
3530	WWW '19: Companion Proceedings of The 2019 World Wide Web Conference		2005	10.1145/3308560	ACM	E4
3531	Virtual Tangible Widgets: Seamless Universal Interaction with Personal Sensing Devices	Tokunaga, Eiji and Kimura, Hiroaki and Kobayashi, Nobuyuki and Nakajima, Tatsuo	2005	10.1145/1088463.1088518	ACM	E8

Appendix 2 – All Data Extraction

Data Extraction Form

Porifera ID	14
Title, Authors and Year	Understanding Multimodal User Gesture and Speech Behavior for Object Manipulation in Augmented Reality Using Elicitation; Williams A.S., Garcia J., Ortega F.; 2020
DOI	10.1109/TVCG.2020.3023566
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* *The authors are with the Computer Science Department, Colorado State University, Fort Collins, Colorado. E-mail:AdamWil, J.S.Garcia, F.Ortega@colostate.edu*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
T1	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA-TLX	No

Extracted evidence from publication:

NASA-TLX aspects: *mental demand, physical demand, temporal demand, performance, effort, frustation*

To ensure constancy of proposal modality in the GS block both an utterance and a gesture had to be proposed before the referent was executed. After each interaction modality, the NASA TLX [18] survey was administered.

Hart, S. G. and Staveland, L. E. (1 jan 1988). Development of NASA-TLX (Task Load Index): Results of Empirical and Theoretical Research. *Advances in Psychology*, v. 52, n. C, p. 139–183.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	24 *The study consisted of 24 volunteers (4 female, 20 male). Participants were recruited using emails and through word of mouth*
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative *Score NASA TLX, Kappa and agreement.* **5.5 NASA Task Load Index** The NASA TLX is a survey that is used to measure a participant's perceived workload for a given task [18]. The mean scores for the NASA TLX overall workload for the three blocks are shown in Table 7. An ANOVA showed that there is evidence of a difference between the means of the three groups (df=2,69, p = .053). We take this to mean that producing both gestures and speech combined had a higher perceived workload than producing either individually. This follows the logical intuition that producing two inputs is harder than producing one. We speculate that given an interaction set, thus not needing to create proposals, there would be lower perceived workload with multimodal inputs. As is seen in other multimodal studies [19,21]. Admittedly a p-value of 0.053 is not equal to 0.05. That said with previous findings suggesting the same conclusion we speculate that given a larger N a difference in the overall workload would have been found. Table 7. Average NASA TLX scores by block Gesture | Speech | Gesture and Speech Mean | 39.3 | 33.5 | 43.5 SD | 13.4 | 15.6 | 13.3
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other

	1.1 Contributions The main contributions of this paper are: 1. A novel within-subjects multimodal and unimodal elicitation study for object manipulation tasks in optical see-through AR-HMDs (Setup seen in Figure 1). 2. Gesture only (producing a gesture set) and speech only elicitation study to highlight the individual strengths of these input modalities and a co-occurring gesture and speech elicitation study to highlight the synergies found when combining those modalities. 3. We present findings on the timing windows and syntax of co-occurring gesture and speech interactions and compare that with the syntax used in speech only interactions. 4. Design guidelines for AR interactions based on the synergies and individual strengths of gesture and speech interactions.
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena 
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Magic Leap 1* *This experiment was conducted using a Magic Leap One optical seethrough AR-HMD. The WoZ system was developed in Unreal Engine 4.23.0. A Windows 10 professional computer with an Intel i9-9900k 3.6GHz processor and an Nvidia RTX 2080Ti graphics card was used for development.*
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Magic Leap 1*

<table>
<tr><td>SQ13. What is the purpose of the holographic solution?</td><td>Gestures Elicitation</td></tr>
<tr><td>SQ14. Which are the types/styles of touchable gestures allowed by the solution?</td><td>
a) <u>Pointing</u>
b) Pantomimic
c) <u>Manipulation</u>
Table 2. Referents used by category
<table>
<tr><th>Translation</th><th>Rotation</th><th>Abstract</th><th>Scale</th></tr>
<tr><td>Move (Left / Right)</td><td>Roll (C / CC)</td><td>Create</td><td>Enlarge</td></tr>
<tr><td>Move (Up / Down)</td><td>Yaw (Left / Right)</td><td>Destroy</td><td>Shrink</td></tr>
<tr><td>Move (Towards / Away) from self</td><td>Pitch (Up / Down)</td><td>Select</td><td></td></tr>
</table>
Legend: C: Clockwise; CC: Counter Clockwise
</td></tr>
<tr><td>SQ15. Which is the image quality of the touchable hologram?</td><td>
a) WIMP
b) <u>3D RAW object</u>
c) 3D enhanced (with lights/shadow/texture)
</td></tr>
<tr><td>SQ16. Is there feedback for the touch action? Which it is the means?</td><td>
a) No
b) <u>Yes, visual.</u>
c) Yes, auditive.
d) Yes, haptic (describe).
e) Other
</td></tr>
</table>

Data Extraction Form

Porifera ID	19
Title, Authors and Year	Touching holograms with windows mixed reality: Renovating the consumer retailing services; Dehghani M., Lee S.H.M., Mashatan A.; 2020
DOI	10.1016/j.techsoc.2020.101394
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research **b) <u>Proposal of Solution</u>** c) Validation Research d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Business/Gestão/Administração Milad Dehghani [a,*], Seung Hwan (Mark) Lee [b], Atefeh Mashatan [b] [a] Cork University Business School, University College Cork, Ireland [b] Ted Rogers School of Management, Ryerson University, Canada

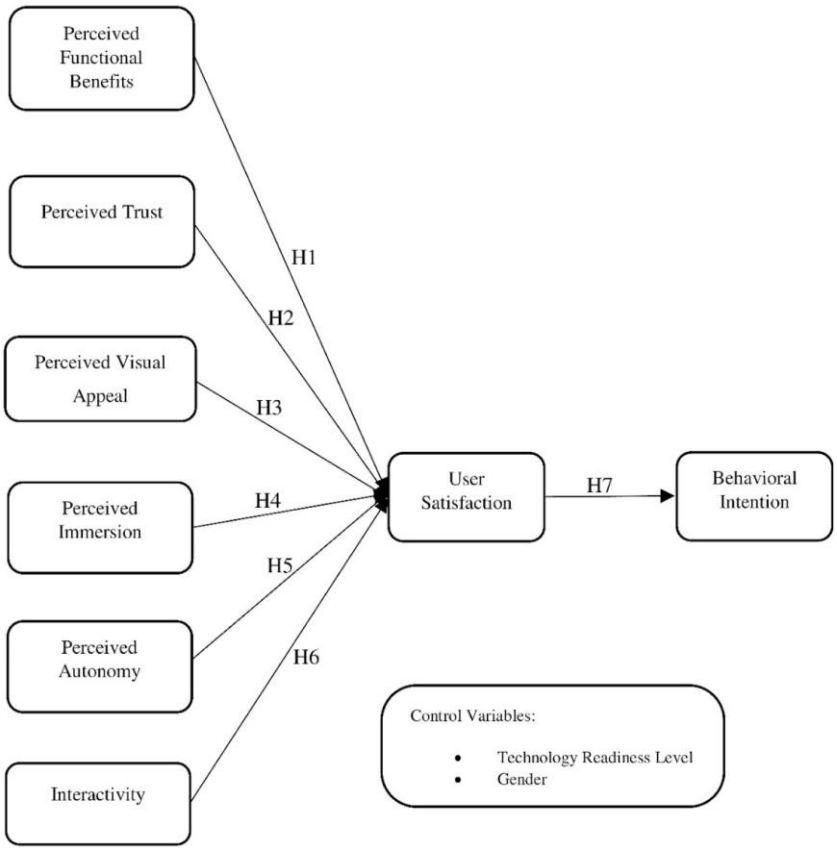
For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
T1	Usability/UX	Inquiry/Survey	Usability: perceived funcional benefits, perceived visual appeal, interactivity, user satisfaction UX: perceived trust, perceived autonomy, perceived immersion, behavioural intention	Yes, extends	ESP, CAMBS, REE, RSPPA, DVE, CAMBS, RNGVT, IVP, CAUIT	Yes

Extracted evidence from publication:

4. Methodology and research design

Drawing from our literature review, we developed the survey, as shown in Appendix 1. The survey instruments were adapted from established scales with slight modifications. To further strengthen the



Questionnaire items

Perceived Trust (PT) - Adapted from [49]
Service experience based on WMR is reliable.
Services carried out while using WMR are guaranteed.
The service providers take full responsibility for any insecurity while using WMR.
Legal and technological policies from the service provider adequately protect me from problems on WMR.
Perceived Functional Benefit (PFB) - Adapted from [49]
The ability to access WMR service from anywhere is convenient for me.
The ability to access WMR service at any time is convenient for me.
I find WMR services more efficient than traditional (in person) services.
Perceived Visual Appeal (PVA) - Adapted from Ref. [28] – [101]
While using WMR services I find the experience visually attractive.
WMR experience presents a way to experience a virtual physical presence while receiving services.
Overall, the WMR experience is visually appealing.
WMR enhances my visual experience while receiving services.
Interactivity – adapted by [19]
A lot of customers' questions and relevant concerns, in the service interaction, can be addressed by using WMR.
The presented information in WMR is highly responsive to users.
Overall, it is convenient to share and find information while using WMR.
Perceived Autonomy (PA) - Adapted from [23]
While using WMR, I could choose freely what I wanted to do.
While using WMR I had control over my experience.
While using Mixed-Reality, my actions lead to expected experiences.
Perceived Immersion (PI) – Inspired from Yim (2017)
I felt that I am genuinely in a physical service branch while using WMR.

While using WMR, I had a sense of presence with my surroundings.
While using WMR, I felt that I absorbed in the environment.
While using WMR, I felt fully immersed in the virtual environment.
While using WMR, I felt as if I were in a real service experience.

User Satisfaction (US) - Adapted from [58]
I was satisfied with the overall WMR experience.
I was content with the overall WMR experience.
I was delighted with the overall WMR experience.

Behavioural Intention (BI) – Adapted from [60]
I will use WMR in the near future.
I will recommend WMR to others.
I intend to find out more information about WMR.

[19] C.D. Huang, J. Goo, K. Nam, C.W. Yoo, Smart tourism technologies in travel planning: the role of exploration and exploitation, Inf. Manag. 54 (6) (2017) 757–770

[23] Y. Jung, Understanding the role of sense of presence and perceived autonomy in users' continued use of social virtual worlds, J. Computer-Mediated Commun. 16 (4) (2011) 492–510.

[28] A. Marasco, P. Buonincontri, M. van Niekerk, M. Orlowski, F. Okumus, Exploring the role of next-generation virtual technologies in destination marketing, Journal of Destination Marketing & Management 9 (2018) 138–148.

[49] M.A. Shareef, A. Baabdullah, S. Dutta, V. Kumar, Y.K. Dwivedi, Consumer adoption of mobile banking services: an empirical examination of factors according to adoption stages, J. Retailing Consum. Serv. 43 (2018) 54–67

[58] M.C. tom Dieck, T.H. Jung, P.A. Rauschnabel, Determining visitor engagement through augmented reality at science festivals: an experience economy perspective, Comput. Hum. Behav. 82 (2018) 44–53.

[60] V. Venkatesh, J.Y. Thong, X. Xu, Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology, MIS Q. 36 (1) (2012) 157–178.

[101] M. Dehghani, K.J. Kim, Past and present research on wearable technologies: bibliometric and cluster analyses of published research from 2000 to 2016, Int. J. Innovat. Technol. Manag. 16 (01) (2019) 1950007

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) Controlled experiment** c) Case Study d) Ethnography e) Research-Action

<table>
<tr><td></td><td>While the aim of this research was not to provide an experimental study, a wide range of WMR content parameters were provided for each participant; which is meant to measure the research questions realistically. Also, all of the participants had no previous experience of usage with WMR. The description of the research design and contents have been provided in Tables 2 and 3

Table 2
The description of phases of research design.
<table><tr><th>Research Design</th><th>Description</th><th>Time Lasted (minutes)</th></tr><tr><td>  </td><td>For each participant, the objective of the research was described in detail and Mixed-Reality was defined accordingly.</td><td>3 m</td></tr><tr><td>  </td><td>Two movies were shown to participants including some instructions about how to use WMR and its applicability in retail services with some customer shopping experiences.</td><td>5m40s</td></tr><tr><td>  </td><td>Each participant was given the opportunity to interact with the device and carry out some related tasks. These tasks include use of Holograms, opening and closing related pages with voice recognition command, interaction with virtual objects (smaller bigger, rotation, etc.) and walking within the 3D environment, watching the MR movie.</td><td>15 m</td></tr><tr><td>  </td><td>The structured survey was provided at the end of the experiment to each student.</td><td>15 m</td></tr></table></td></tr>
<tr><td>SQ8.2. How many people participated in study?</td><td>98

Ninety-eight participants (50 female and 48 male) were recruited via a university-sanctioned participant pool for bonus course credits. All the participants were based in Toronto, and the data was collected from April to July 2019. We employed a scenario-based task in a WMR</td></tr>
<tr><td>SQ8.3. Which was the type of results analysis?</td><td>a) <u>Quantitative</u>
b) Qualitative

4.1. Data analysis

This study utilizes PLS-SEM through SmartPLS 3.2.8 to assess the research model to analyze the measurement model and the structural model [92]. Smart PLS is well suited to analyze the data. First, with limited sample sizes, PLS is advantageous for highly complex predictive models. Second, PLS can test complex cause-effect relationships [6,93] and is, therefore, more appropriate than other statistical applications for this study. This study also utilized procedural and statistical remedies to eliminate the influence of common method bias (CMB) that stems from data that is self-reported and obtained from a single source [94]. In terms of procedure, clearness and brevity were maintained during the 19-items questionnaire design stage. Moreover, respondents were informed that no specific answers were preferred and considered correct during the administration of the questionnaire and that anonymity and discretion of respondents were guaranteed. In terms of statistics, Harman single-factor test was used to test whether a single factor appears from the factor analysis or if a general construct accounts for the majority of covariance among all constructs.</td></tr>
</table>

SQ9. How was the holography designed in the study?	a) AR **b) <u>MR</u>** c) VR d) Other *Windows Mixed Reality*
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens*
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	*Retail service*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic **c) <u>Manipulation</u>**
SQ15. Which is the image quality of the touchable hologram?	a) WIMP b) 3D RAW object c) 3D enhanced (with lights/shadow/texture) *Not Available*
SQ16. Is there feedback for the touch action? Which it is the means?	a) No b) Yes, visual. c) Yes, auditive. d) Yes, haptic (describe). e) Other *Not Available*

Data Extraction Form

Porifera ID	29
Title, Authors and Year	PrintARface: Supporting the Exploration of Cyber-Physical Systems through Augmented Reality; Jasche F., Ludwig T.; 2020
DOI	10.1145/3419249.3420162
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* *Authors linked to https://cps.wineme.fb5.uni-siegen.de/team/*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Overall usability	Yes, full	Think Aloud	No
ET2	Usability	Inquiry	potential issues, liked, disliked, what would change, features would like to add, felt about support 3D printing	No	Discussion	No
ET3	Usability	Inspection	Points of view, potential areas for improvement	No	No known heuristic	No

Extracted evidence from publication:

To improve the scope for observation, we connected the HoloLens wireless to a monitor via a MiraCast adapter. This enabled us to see what the participants were seeing. We located the monitor out of their field of view to avoid distracting them. This phase was limited to 15 minutes.

After the exploration phase, we discussed the functionality of *PrintARface* with the participants. During this discussion, the participants kept the HoloLens on to facilitate the explanation of potential issues. We then disconnected the HoloLens from the monitor and asked specific questions about the points they had mentioned in the thinking-aloud phase. We also asked what they liked or disliked about *PrintARface*, what they would change, what features they would like to add, and whether they felt the application would support the appropriation of 3D printing. This phase also took around 15 minutes.

7 EVALUATION WITH 3D PRINTING EXPERTS

Aside from the assessment with prospective end users, we also conducted an evaluation with the five experts involved in our previous empirical study to discuss *PrintARface* from their point of view and identify potential areas for improvement. To this end, we had the experts explore the application and asked how *PrintARface* serve as a user interface for supporting the appropriation of 3D printing.

6.2 Methodology

We split the evaluation in three different phases. Before the participants were equipped with the HoloLens, we asked for some background information (see Table 1). We then asked the participants to work through the "Learn Gestures"-app to obtain an introduction to the gestures used for the HoloLens. This phase took around 10 minutes. In the next phase, we instructed the participants to explore *PrintARface*. We only provided the following introduction: "PrintARface is an application for visualizing your 3D models before printing and for operating the actual physical printer through AR." We also asked them to express their impressions and think aloud during the exploration [27]. Prior to the exploration, we informed

15 minutes.

The audio during the evaluation was recorded and subsequently transcribed. We were primarily concerned with identifying the ways in which *PrintARface* might be used and the difficulties that might then be encountered. The philosophy behind the assessment was derived from the notion of "situated evaluation" [45], in which qualitative methods are used to draw conclusions about the real-world use of a technology. The aim here was to generate end user views about the extent of the tool's usefulness while actually using it.

Situated Evaluation:

Michael Twidale, David Randall, and Richard Bentley. 1994. Situated evaluation for cooperative systems. Lancester. 441–452 pages. https://doi.org/10.1145/192844.

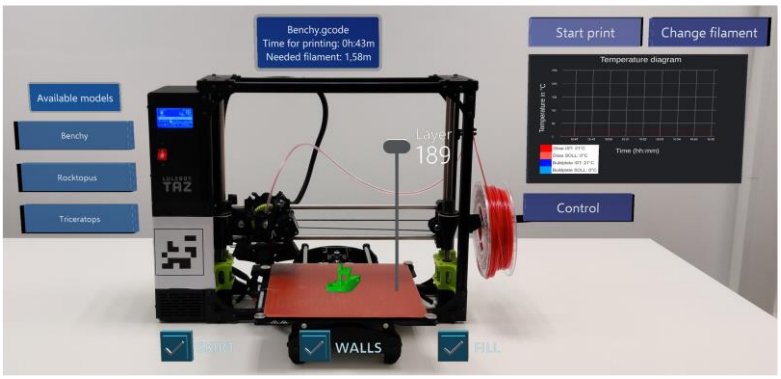
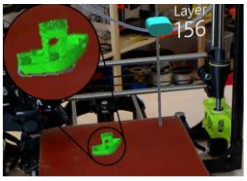
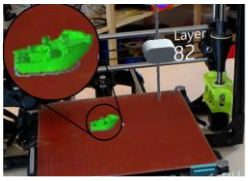
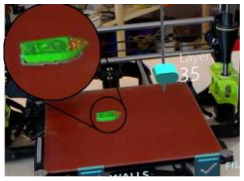
Think Aloud:

Jakob Nielsen. 1993. Usability Engineering. Interactive Technologies, Vol. 44. Morgan Kaufmann. 362 pages. https://doi.org/10.1145/1508044.1508050

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography

	e) Research-Action end users when using 3D printers, we have focused instead on 3D printing expert users. Our goal was to identify frequently asked questions (FAQs) about 3D printing, how experts explain 3D printers to non-experienced users and how they structure their explanations. We conducted an interview study within a local Fab Lab. Fab Labs are a global network of fabrication laboratories, which are
SQ8.2. How many people participated in study?	5 (interview) / 12 (case study) / 5 (expert users)
SQ8.3. Which was the type of results analysis?	a) Quantitative **b) <u>Qualitative</u>** The interviews were audio- and video-recorded and then later transcribed. The analysis was based on an inductive approach informed by grounded theory [43], with open-coding techniques being used to derive categories from the empirical data. The participants' statements and behaviors were divided into textual groupings and then into categories. The interviews took an average of 20 minutes, with the explanation of the 3D printer taking about 10 minutes. Anselm L. Strauss. 1987. Qualitative analysis for social scientists. Vol. 1. Cambridge University Press. 319 pages. https://doi.org/10.1017/CBO9780511557842
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* 5.1 Technological Architecture of PrintARface The *PrintARface* technical infrastructure contains of three parts: (1) the 3D printer itself (in our case, a Lulzbot TAZ6), (2) a Raspberry Pi 3 running the OctoPrint software, and (3) a Microsoft HoloLens. The
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and	*MS Hololens*

model of used devices for interaction detection?	
SQ13. What is the purpose of the holographic solution?	*3D Printing*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation *Slider*
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)    
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	36
Title, Authors and Year	Evaluation of the biomechanical stress in the neck and shoulders during augmented reality interactions; Kim J.H., Ari H., Madasu C., Hwang J.; 2020
DOI	10.1016/j.apergo.2020.103175
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Industrial Engineering Jeong Ho Kim [a], Hemateja Ari [b], Charan Madasu [b], Jaejin Hwang [b,*] [a] *School of Biological and Population Health Sciences, College of Public Health and Human Sciences, Oregon State Uni* [b] *Department of Industrial and Systems Engineering, College of Engineering and Engineering Technology, Northern Illino*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	perceived discomfort/fatigue	Yes, full	Borg CR-10	No
ET2	Usability	Inquiry	perceived comfort, overall usability, preference	Yes, extends	IKC-Q (ISO 9241-410)	No
ET3	Usability	Testing	Performance	No	Record data	No

Extracted evidence from publication:

Before and after each session, the participants rated the levels of their perceived discomfort/fatigue using the Borg CR-10 questionnaire (Borg, 1982). After each session, perceived comfort, usability, and preference were measured using a modified 7-point Likert scale questionnaire adapted from the ISO keyboard comfort questionnaire (ISO 9241–410; 2008) with 1 being the worst and 7 being the best. Verbal anchors were used at both ends of each scale.

Before and after each session, the participants rated the levels of their perceived discomfort/fatigue using the Borg CR-10 questionnaire (Borg, 1982). After each session, perceived comfort, usability, and preference were measured using a modified 7-point Likert scale questionnaire adapted from the ISO keyboard comfort questionnaire (ISO 9241–410; 2008) with 1 being the worst and 7 being the best. Verbal anchors were used at both ends of each scale.

For the 3-D cube and omni-directional pointing tasks, speed (task completion time in seconds) was measured as the task performance. The omni-directional pointing task software program measured the duration from when the task began to when a participant completed all the targets in each task. For the web-browsing task, the number of questions answered during the 3-min task was collected as the performance measure.

Perceived discomfort/fatigue (Inquiry, Borg CR-10)

Perceived Comfort, usability, and preference (Inquiry, adapted)

Performance (Testing):

- speed (task completion time in seconds) was measured as the task performance.

- the duration from when the task began to when a participant completed all the targets in each task.

- for the web-browsing task, the number of questions answered during the 3-min task was collected as the performance measure.

Borg, G.A., 1982. Psychophysical bases of perceived exertion. Med. Sci. Sports Exerc. 14 (5), 377–381. https://pubmed.ncbi.nlm.nih.gov/7154893/

ISO keyboard comfort questionnaire (ISO 9241-410):
https://www.iso.org/obp/ui/#iso:std:iso:9241:-410:em

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	20 *2.2. Participants* A total of 20 participants (10 males and 10 females) were recruited to this repeated-measures laboratory-based study via e-mail solicitation and printed flyers in a university community. All participants were
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other

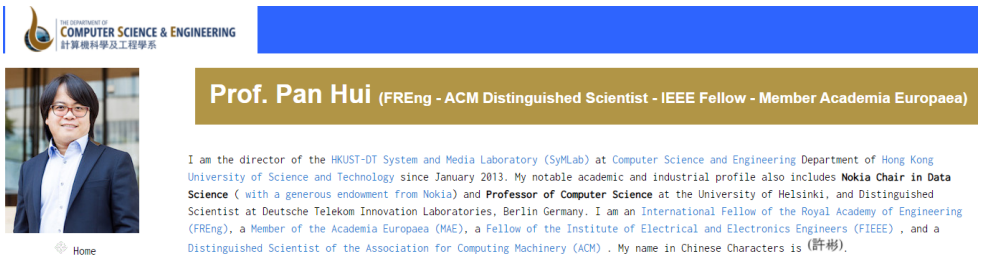
	2.3. Apparatus Microsoft HoloLens (Microsoft Corporation; Redmond, WA) was used as the wearable head mounted display to create AR interface and interactions. A 3-D optical motion capture system with 8 cameras (Flex 13; Optitrack; Natural Point, OR) was used to collect the kinematic data at a rate of 100 frames per second. A 8-channel wireless surface electromyography (EMG) data acquisition system (WBA; Mega Electronics; Kuopio, Finland) with Ag/AgCl surface electrodes (Blue Sensor N-00-S; Ambu; Ballerup, Denmark) was used to collect the muscle activities in the TRAP, AD, and MD on the right side of the participants as well as bilaterally in the SPL at a sampling rate of 1000 Hz.
SQ11.1 What is the manufacturer and model of used devices for projection?	MS Hololens
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** **e) <u>RGB-D external camera</u>**
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens* *Flex 13; Optitrack*
SQ13. What is the purpose of the holographic solution?	*interaction study (ergonomy)*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>** time (i.e., speed) was measured as the performance outcome. <u>Omni-directional pointing task</u>: The participants pinched a randomly appeared target out of the 18 evenly spaced targets in a circular space using their right index finger and thumb finger (Fig. 1). This task has been developed based on fitt's law and extensively used in previous mance outcome. <u>Web-browsing task</u>: The participants performed the web-browsing task for 3 min while the web-browser hologram was displayed with three different window sizes in a random order: small (30% smaller than default), medium (default: 1.0 × 1.1 m), and large (30% larger than default). This web-browsing task was developed in the AR interface based on Harvard University's web-browsing task program (Dennerlein and Johnson, 2006; Kim et al., 2015) to create more realistic and practical interactions involving various AR-related gestures including gazing, tapping, pinching, and scrolling. For instance, the participants matched an object with its name through multiple-choice questions and
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** *(web browsing)* **b) <u>3D RAW object</u>** (*3D cube task*) c) 3D enhanced (with lights/shadow/texture)

SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	98
Title, Authors and Year	UbiPoint: Towards non-intrusive mid-air interaction for hardware constrained smart glasses; Lee L.H., Braud T., Bijarbooneh F.H., Hui P.; 2020
DOI	10.1145/3339825.3391870
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Ciência da Computação 

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	No	Record data	No

Extracted evidence from publication:

Realizou quatro experimentos de dois tipos (performance e usabilidade).

1) velocidade; precisão (seção 5.1);

2) uso de CPU e consumo de energia (seção 5.2);

3) usabilidade no movimento do cursor (seção 5.3) e;

4) usabilidade na entrada de texto (seção 5.4).

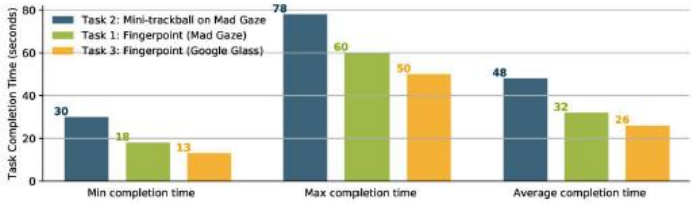
Nos interessa 3 e 4.

> We first evaluate the system performance (speed, accuracy, CPU utilization, and energy consumption). We then conduct a usability study to analyze the users' benefits from UbiPoint.

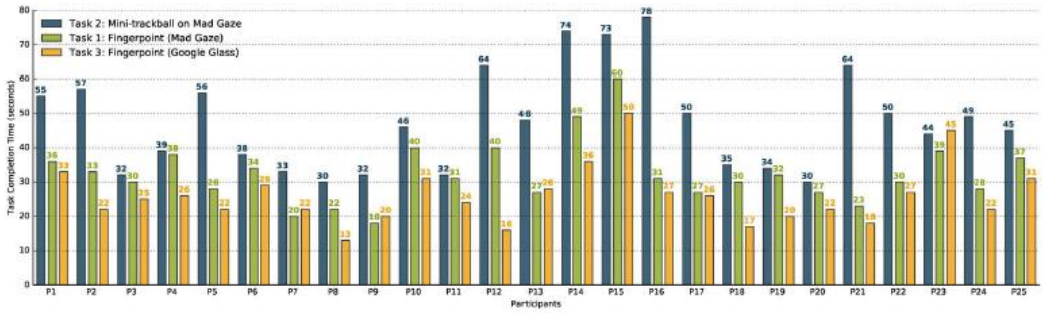
min completion time, max completion time, average completion time



igure 11: UbiPoint implementation in our evaluation app, nd the user posture with *Fast-repetitive mode*.



(a) Min, max and average user performance for three tasks performed on Google Glass and Mad Gaze glass.



(b) Individual user performance for three tasks performed on Google Glass and Mad Gaze glass.

Figure 10: User performance for three tasks performed on Google Glass and Mad Gaze Glass with 25 participants (Participant 1-25). Participants complete the task 1.46 times faster with Mad Gaze and 1.82 times faster with Google Glass.

words per minute, number of errors

We design an application named *Fingerpoint* to measure the performance of users when using UbiPoint in a WIMP environment. The application contains an array of 24 boxes (1–24), as shown in Figure 11. We ask the users to select the box of a given randomly generated number shown on the top of the interface. For instance, the user is required to select boxes No.7, No.17, No.24 in a sequence. The user guides the cursor with his left hand in mid-air to the requested boxes and performs the click by pressing the button on the body of smartglasses with their right hand. We recruit a total of

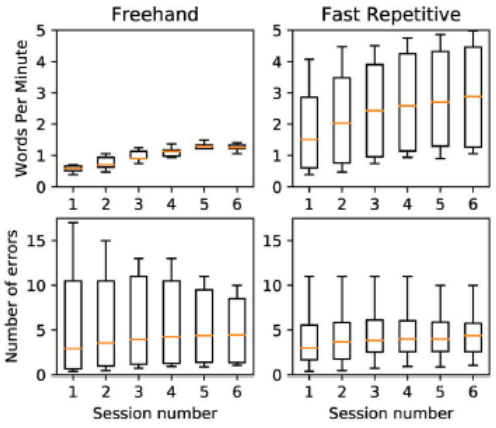


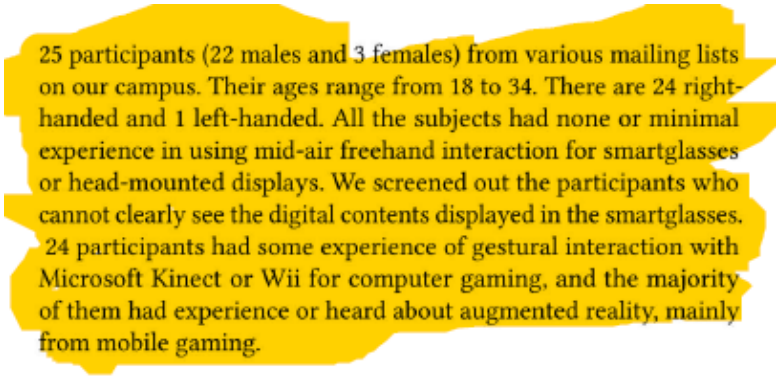
Figure 12: UbiPoint character input speed with Fast-repetitive and Freehand modes (5 participants).

5.4 Experiment 4: Usability Test on Text Input

5.4.1 ***Experiment Setup.*** This experiment aims at understanding the performance of Freehand and fast-repetitive modes in mid-air interface, where text input is regarded as a fast and repetitive task [27]. Participants are asked to select character keys across the QWERTY virtual keyboard on MAD GAZE using our system-wide implementation of UbiPoint. The text material comes from Project Gutenberg[11], and we randomly select word phrases from 'Letters to a Friend' written by John Muir. The selected script is written in an easy-to-understand style so the experiment can be regarded as a reasonable mock-up of everyday typing tasks. We perform this experiment on 5 participants (3 males and 2 females), recruited among the students and staff of the university. English is the second language for all participants, and none of them had tried Mad Gaze before. Regarding the screening process, the participants should have good vision to receive the contents inside the digital overlay of the smartglasses. We run 6 experiment sessions for each mode, and the two modes are counterbalanced. Before running the experiment, we provide the participants with a 10-minute training for each interaction method. In each session, participants are asked to type words as they appear on the screen of the smartglasses. We only allow the users to perform single character input (no word completion).

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study

	d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	25  25 participants (22 males and 3 females) from various mailing lists on our campus. Their ages range from 18 to 34. There are 24 right-handed and 1 left-handed. All the subjects had none or minimal experience in using mid-air freehand interaction for smartglasses or head-mounted displays. We screened out the participants who cannot clearly see the digital contents displayed in the smartglasses. 24 participants had some experience of gestural interaction with Microsoft Kinect or Wii for computer gaming, and the majority of them had experience or heard about augmented reality, mainly from mobile gaming. 5 in an easy-to-understand style so the experiment can be regarded as a reasonable mock-up of everyday typing tasks. We perform this experiment on 5 participants (3 males and 2 females), recruited among the students and staff of the university. English is the second language for all participants, and none of them had tried Mad Gaze before. Regarding the screening process, the participants should
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) <u>Smart glass</u>** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Google Glass v.1.0* *Mad Gaze ARES Glass*

	To demonstrate that UbiPoint applies to smartglasses with various hardware specifications, we implement it on Google Glass v.1.0 and Mad Gaze ARES Glass. Google Glass runs on Android 4.4.0 with a 1.2 GHz Dual Core CPU, 1.0 GB RAM, 16GB storage capacity, 5-megapixel camera, and 570 mAH battery life. Mad Gaze has the following specifications: CPU with 1.2 GHz Quad Core, 512 MB RAM, 4GB storage capacity, 5-megapixel camera, and 370 mAH battery life, Android 4.2.2. We choose Mad Gaze smartglasses because the device has slightly more challenging hardware. Both have similar characteristics with current mass-market glasses and are representative of what can be achieved with present hardware.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera **b) <u>RGB internal (built-in) camera</u>** c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Google Glass v.1.0 + CV* *Mad Gaze ARES Glass + CV*
SQ13. What is the purpose of the holographic solution?	*Keyboard input*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic **c) <u>Manipulation</u>** Figures 3 depicts the states of two modes. ***Freehand mode*** . The cursor directly follows the user's finger. Actions can be triggered after hovering the cursor on top of a point of interest with visual clues. As shown in 4, we define three gesture: (1) *Mid-air click (Figure 4-(1a – 1d))* allows users to click on icons in the headset interface.After hovering the cursor for a given time on top of the object, the user slightly lowers his fingertip to perform a click at the designated location. As described in our implementation in the next section, a hovering time of 500ms is recommended, which strike a balance between usability and performance. (2) *Center-to-edge swipe (Figure 4-(2a – 2d))*. After hovering the cursor for a given time (e.g. 500ms) in the center of the screen, the user can swipe by moving his fingertip towards the edges. This gesture allows scrolling on pages or flipping to previous or next pages on a web browser. (3) *Corner-to-corner swipe (Figure 4-(3a – 3d))*. This mode is activated when the cursor hovers in the corner of the screen for a given time (e.g. 500ms), then swiping to another corner. Corner-to-corner offers 12 additional input options, which can be used to handle objects with up to 6 attributes. However, due to the potential distance from corner to corner, these gestures should be kept to a minimum to prevent additional arm fatigue.

SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture) **5.3 Experiment 3: Usability Test** *5.3.1* ***Experiment Setup.*** We examine UbiPoint within the 2D WIMP user interface in which click operation and cursor movement are the most important operations. One may argue that the WIMP interface might not be the most suitable for smartglasses. However, after a quick survey, most commercial glasses exploit a barebone version of Android – based on the WIMP paradigm – with the notable exception of Google Glass with their TimeLine interface (which significantly reduces the possible usages), or higher-end solutions such as Microsoft Hololens. As UbiPoint is a direct pointing solution similar to a mouse, testing our solution in the environment for which the mouse has been designed seemed the best way to perform the evaluation. For this first experiment, we focus on the fast-repetitive mode
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	0171
Title, Authors and Year	Mrcat: in situ prototyping of interactive ar environments; Whitlock M., Mitchell J., Pfeufer N., Arnot B., Craig R., Wilson B., Chung B., Szafir D.A.; 2020
DOI	10.1007/978-3-030-49695-1_16
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Computer Science Matt Whitlock[1], Jake Mitchell[1], Nick Pfeufer[1], Brad Arnot[1], Ryan Craig[1], Bryce Wilson[1], Brian Chung[1], and Danielle Albers Szafir[1,2,3] [1] Department of Computer Science, [2] Department of Information Science [3] ATLAS Institute, University of Colorado Boulder, Boulder, CO 80309, USA {matthew.whitlock, jake.mitchell, nicholas.pfeufer, bradley.arnot, ryan.craig, bryce.d.wilson, brian.chung, danielle.szafir}@colorado.edu

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET2	Usability	Inquiry	user feedback	No	Questionnaire	No

Extracted evidence from publication:

With our preliminary evaluation of MRCAT, we explored its ability to serve the needs of *in situ* prototyping. With the nature of the exploratory nature of the study tasks, we focused primarily on subjective metrics and user feedback, rather than objective metrics such as accuracy. We administered three questionnaires to participants—one after each prototyping tool and a comparisons questionnaire at the end of the study. These questionnaires all had Likert-scale questions and gave the opportunity for open-ended feedback.

Subjective metrics (SUS) and user feedback.

SUS:

1. *I think that I would **like to use** this system **frequently**.*
2. *I found the system **unnecessarily complex**.*
3. *I thought the system was **easy to use**.*

4. *I think that I **would need the support** of a technical person to be able to use this system.*
5. *I found the various **functions** in this system were **well integrated**.*
6. *I thought there was **too much inconsistency** in this system.*
7. *I would imagine that most people would **learn** to use this system very **quickly**.*
8. *I found the system **very cumbersome to use**.*
9. *I felt **very confident using** the system.*
10. *I **needed to learn a lot** of things before I could get going with this system.*

5.2 Results

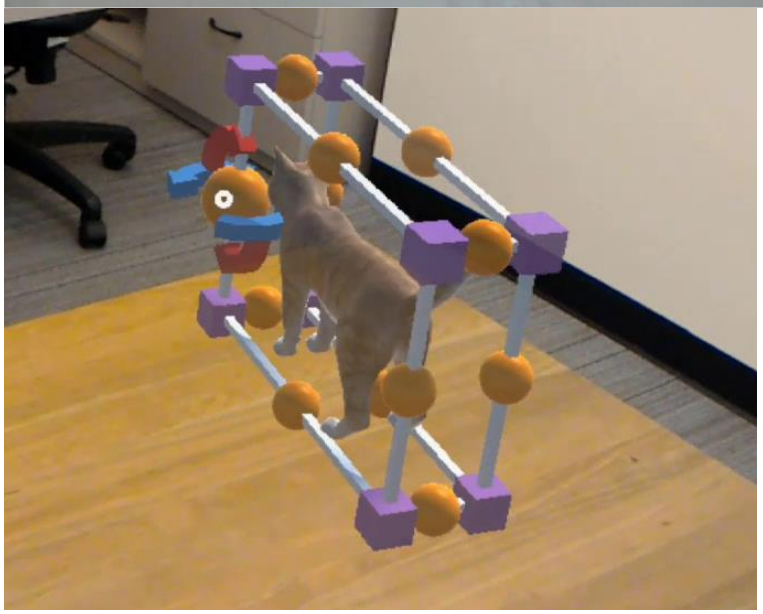
With our preliminary evaluation of MRCAT, we explored its ability to serve the needs of *in situ* prototyping. With the nature of the exploratory nature of the study tasks, we focused primarily on subjective metrics and user feedback, rather than objective metrics such as accuracy. We administered three questionnaires to participants—one after each prototyping tool and a comparisons questionnaire at the end of the study. These questionnaires all had Likert-scale questions and gave the opportunity for open-ended feedback.

$\sigma = 10.75$ min). Participants reported higher System Usability Score (SUS) for the 2D prototyping tool ($\mu = 72.1$) than for MRCAT ($\mu = 51.9$). Participants

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) <u>Case Study</u>** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	14 5 Evaluation To evaluate MRCAT against a 2D alternative, we conducted a 2 (prototyping tools) x 2 (scenario) mixed factors user study with 14 participants (12M, 2F).
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>** 5.2 Results With our preliminary evaluation of MRCAT, we explored its ability to serve the needs of *in situ* prototyping. With the nature of the exploratory nature of the study tasks, we focused primarily on subjective metrics and user feedback, rather than objective metrics such as accuracy. We administered three questionnaires to participants—one after each prototyping tool and a comparisons questionnaire at the end of the study. These questionnaires all had Likert-scale questions and gave the opportunity for open-ended feedback.

SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	MS Hololens MRCAT is a prototyping tool built for the MS HoloLens[1] that allows users to place and manipulate objects in the environment. Prior to running MRCAT,
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	*prototyping of museum exhibition*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**

SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object **c) <u>3D enhanced (with lights/shadow/texture)</u>**  
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other times "[drag their] hand outside the screen several times on accident." (P1). Since freehand gestures cannot provide any haptic feedback like a vibration or the sensation of a released button, we supplement MRCAT with a subtle visual flash when hand-tracking is lost. This allows the user to understand that the headset is no longer processing their input and that they will need to restart the gaze-drag in order to continue. transform manipulations with MRCAT, we add an additional design guideline: *D4: Visual & Continuous Transform Manipulation* to supplement the guidelines from §??. With this guideline we prioritize providing the user with visual feedback to manage transform manipulation continuously, rather than explicitly switching between "Rotation", "Translation" and "Scale" modes. Despite this explicit mode switching effectively mapping multiple functions to mouse dragging in 2D, visual cues can enable a more fluid experience in 3D.

Data Extraction Form

Porifera ID	#250
Title, Authors and Year	Enhancing interaction with Augmented Reality through mid-air haptic feedback: Architecture design and user feedback; Vaquero-Melchor D., Bernardos A.M.; 2019
DOI	10.3390/app9235123
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Engineering **Diego Vaquero-Melchor *,† and Ana M. Bernardos †** Information Processing and Telecommunications Center, Universidad Politécnica de Madrid, 28040 Madrid, Spain; abernardos@grpss.ssr.upm.es * Correspondence: diego.vaquero@grpss.ssr.upm.es † Current address: ETSIT, Av. Complutense 30, 28040 Madrid, Spain.

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	No	Record data	No
ET2	Usability	Inquiry	intuitivityness, effectiveness	No	Likert Scale	No

Extracted evidence from publication:

- **Task 3, usefulness of haptic aids for AR resizing tasks:** For this task, visual and haptic representations are again merged and delivered. In this task, the system presents the participant a certain figure with preset dimensions. We have preset a virtual ground at 17 cm from the surface of the Ultrahaptics; thus, every figure stands over this ground. With this information in mind, participants are asked to resize the figure to reach a given dimension (height). A haptic anchor on the target height is deliver through the haptic device. To perform the task, the participant must put their hand over the Ultrahaptics and move it up and down as required. The process should be supported by estimations using the augmented reality. Once a participant determines that the target height has been reached, the actual size of the model is recorded as well as the required time to perform the process.

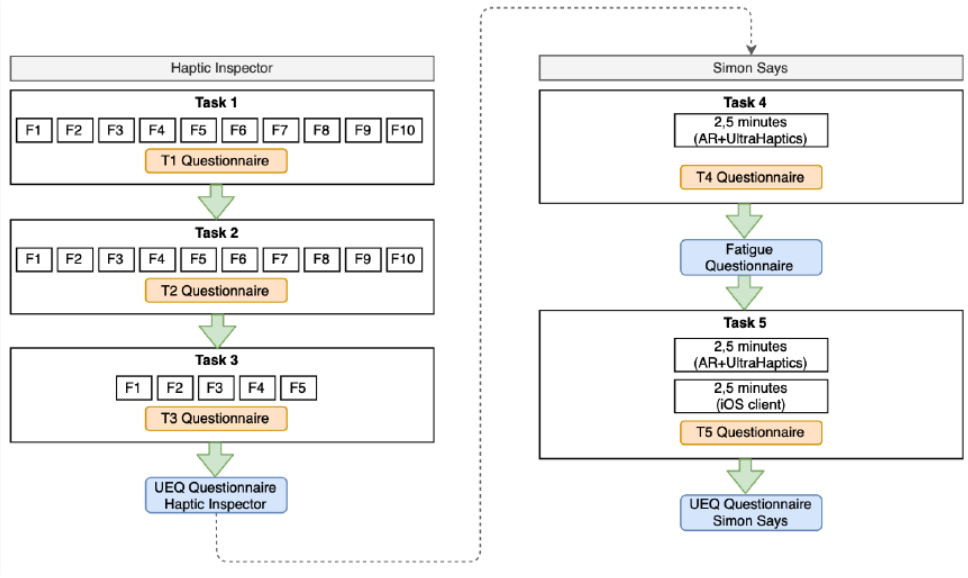


Figure 13. Stages of the users study.

Apesar da imagem citar o uso de UEQ, não há outra referência nem apresentação de resultados referente a esta tecnologia já conhecida.

- **Task 4, mimicking real-life interaction metaphors for AR with mid-air haptics**: Both, this task and Task 5 are based on the Simon prototype. Again, the user is wearing the HoloLens which shows four colored buttons over the Ultrahaptics. Once the task starts, the user has two and a half minutes to complete as many sequences as possible. The participants are told to press the buttons, with no reference about how to do it. If the user hits the sequence, the system generates a new one with one more color. Otherwise, if the user fails, the system generates a new sequence with the same size but with different colors and the fail is saved. Besides that, the number of correct sequences is stored.
- **Task 5, acceptance of AR with mid-air haptics with respect to a standard mobile baseline**: At this stage of the test, the participant is already familiar with the system. In this task, the user is asked to participate in a collaborative Simon game in two rounds. In the first round, the user will be interacting with the game through HoloLens and UHK while the facilitator will be using an AR iOS version of the game. The goal is the same as in Task 4, i.e., to hit as many correct sequences as possible within two and a half minutes. However, in this case, the user and the *facilitator* must act in turns. First, the HoloLens client has to push a button and, then, the iOS client has to push the next one and so on. Both users receive the sequence at the same time, each one in their own device; at any time, it is possible to ask for help or instructions from the other user. Once this is finished, both users exchange the positions. Now, the *facilitator* works with the HoloLens and the Ultrahaptics and the participant uses the iOS application. A new round begins then, just like the previous one.

ET1

Size of the model (size error)

Time to perform the process

ET2

how intuitive the process is

whether the haptic feedback helped them for the manipulation process

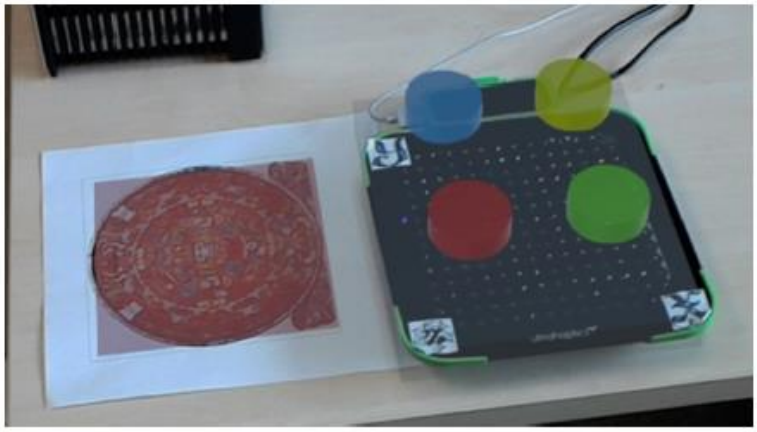
8.3. Usefulness of Haptic Aids for AR Resizing Tasks

In Task 3, users are proposed to resize some of the figures above (octahedron, cylinder, pyramid, cube, and sphere) with the help of a haptic reference that is of the size to be reached. From there, they have labeled the difficulty of manipulation process with a 3.57 on average (σ :1.04) and a 3.71 (σ : 1.03) regarding how intuitive the process is (1 is not intuitive at all, and 5 is very intuitive). When rating whether the haptic feedback helped them for the manipulation process, there seems to be a discrepancy (2.12 on average, σ : 1.45). The fact is that some users ignored the part of the task statement in which they were told that the system helped them to identify the right position by means of haptic feedback.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	9 *7.2. Participants and Apparatus* The study was carried out in July 2019 with a total of 9 independent volunteers recruited at the university (PhD students, professors, and master students). None of them had any previous knowledge about the project or the technology in use. Their ages range between 23 and 57 (μ: 32.62, σ: 12.17); all of them were males: 44.4% of users use AR applications sporadically and 11.1% use it once a month, while the remaining 44.4% never use AR. The tests have an average time of 62 min (σ: 10.48). The apparatus in use for the tests are the two prototypes described in Section 6. In the
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer	*MS Hololens*

and model of used devices for projection?	**6. Development over HARP: Process and Prototypes** To validate the HARP architecture, we have developed two different applications using it. The first one, the "Haptic Inspector", allows the user to haptically inspect a 3D digital model and has been built to analyze the expressiveness and complementarity of the mid-air haptic representation over AR. Functionally, it is built to reproduce shapes and does not include active interaction. The second prototype is an AR-haptic (harpic) version of the "Simon" game [3], and it includes bidirectional exchange of information between the *Ultrahaptics client* and the *HoloLens client*. Both prototypes have been evaluated within two users trials (Section 7). Next, we describe the application implementations over HARP architecture. *6.1. Building a New Application: The Haptic Inspector* In this prototype, a user equipped with HoloLens can haptically inspect a 3D object. By inspecting, we understand to visualize the digital AR 3D model over the UHDK5 and to perceive it in the hand thanks to the haptic feedback. Because we seek to offer a haptic representation as accurate as possible, the *high-fidelity* representation has been used. The application works as follows. First, the user can select a 3D model from an AR menu, which is displayed through HoloLens in front of them. The left side of Figure 9 shows some of the available options in the system. Once a 3D model has been selected, the system generates the proper haptic representation aligned with the AR object over it, as shown in Figure 9. As can be seen in the Figure, a red AR square has been placed over the 2D physical mark to show the automatic alignment process. From here, the user can now inspect the HARptic element or select another one to explore.
SQ12. Which technology type was used to interaction detection (touch)?	**a) Infrared Stereo Camera** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Ultraleap UHDK5, that it include the Leap Motion.*
SQ13. What is the purpose of the holographic solution?	*Interaction study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) Pointing** **b) Pantomimic** c) Manipulation

<table>
<tr><td></td><td> 
Figure 10. Second proof of concept: Simon game based on the combination of Augmented Reality (AR) and haptic feedback.
 
Figure 12. Three participants trying to guess a figure from haptic feedback only in Task 2.</td></tr>
<tr><td>SQ15. Which is the image quality of the touchable hologram?</td><td>a) WIMP
b) <u>3D RAW object</u>
c) 3D enhanced (with lights/shadow/texture)</td></tr>
<tr><td>SQ16. Is there feedback for the touch action? Which it is the means?</td><td>a) No
b) <u>Yes, visual.</u>
c) Yes, auditive.
d) <u>Yes, haptic (ultrassom).</u>
e) Other</td></tr>
</table>

Data Extraction Form

Porifera ID	#268
Title, Authors and Year	HoloFlows: modelling of processes for the Internet of Things in mixed reality; Seiger R., Kühn R., Korzetz M., Aßmann U.; 2021
DOI	10.1007/s10270-020-00859-6
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution c) Validation Research d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Computer Science

95. Norman, D.: The design of everyday things: Revised and expanded edition. Basic books (2013)
96. Huber, S., Seiger, R., Kühnert, A., Theodorou, V., Schlegel, T.: Goal-based semantic queries for dynamic processes in the internet of things. Int. J. Semant. Comput. **10**(02), 269–293 (2016)
97. Hart, S.G., Staveland, L.E.: Development of nasa-tlx (task load index): Results of empirical and theoretical research. In: Advances in psychology, vol. 52, pp. 139–183. Elsevier (1988)
98. Davis, F.D.: A technology acceptance model for empirically testing new end-user information systems: Theory and results. Ph.D. thesis, Massachusetts Institute of Technology (1985)
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101. Sauter, T.: Integration aspects in automation-a technology survey. In: IEEE Conference on Emerging Technologies and Factory Automation, vol. 2, pp. 9. IEEE (2005)
102. Milgram, P., Takemura, H., Utsumi, A., Kishino, F.: Augmented reality: A class of displays on the reality-virtuality continuum. In: Telemanipulator and Telepresence Technologies, vol. 2351, pp. 282–293. International Society for Optics & Photonics (1995)
103. Shneiderman, B.: The eyes have it: A task by data type taxonomy for information visualizations. In: Proceedings 1996 IEEE Symposium on Visual Languages, pp. 336–343. IEEE (1996)

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Ronny Seiger received his diploma in computer science from Technische Universität Dresden, Germany, in 2011 and his PhD in 2018. He has been a member of the Software Engineering of Ubiquitous Systems group from 2012 to 2015. From 2015 to 2019, he has been a research assistant at the Software Technology group at TU Dresden. Since 2019, Ronny Seiger is working as a postdoc at the Chair for Software Systems Programming and Development at the University of St. Gallen, Switzerland. His PhD thesis was about self-managed workflows for cyber-physical systems. His research interests include workflows and processes, cyber-physical systems, Internet of Things, robotics, distributed systems, complex event processing and software engineering. His main focus is on applying workflow and process technologies for automating processes in cyber-physical systems.



Romina Kühn received her diploma in media computer science from Technische Universität Dresden, Germany. From 2011 to 2016, she was research associate at the Software Engineering of Ubiquitous Systems group at TU Dresden. Currently, she is a research associate at the of Software Technology group at TU Dresden. In her research, she focuses on CSCW, human–computer interaction and user experience specifically in the context of mobile and ubiquitous devices in collaborative work.



Mandy Korzetz is a research associate at the Software Technology group at Technische Universität Dresden, Germany. She received her diploma in media computer science in 2013 for investigating full-body gestures for elderly users. From 2013 to 2016, she was a research associate at the Software Engineering of Ubiquitous Systems group at TU Dresden and was involved in research on interactive mobile solutions for the public transport of the future. Her research interests include human-centred user experience engineering with a main focus on mobile and ubiquitous interaction and interface design.



Uwe Aßmann is head of the Software Technology Group of the Technische Universität Dresden. Uwe Aßmann got his PhD in 1995 at the Universität Karlsruhe on the generation of program optimizers from graph rewrite systems. Besides invasive model- and software composition, Uwe Aßmann works in the areas of self-adaptive architectures and software systems. He is a member of the IFIP Working Group 2.4 (System Implementation Languages) and member of the Gesellschaft für Informatik (GI). He is member of the scientific advisor board for Silicon Saxony in the area of "Software", one of the founding members of the "Cyber-Physical Systems Working Group" of Silicon Saxony, member of the working group "Microelectronics" of the state of Saxony. Uwe Aßmann is also reviewer of the European Union for "Complex Sys-

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	mental demand, physical demand, temporal demand, performance, effort, frustation	Yes, full	NASA TLX	No
ET2	Usability	Inquiry	advantages/disavantages, troubles, improvements	No	Likert Scale	No
ET3	Usability	Testing	Performance	No	Record Data	No

Extracted evidence from publication:

Video: https://www.youtube.com/watch?v=I-FxphsJjcI

modelled process. Afterwards, participants completed the NASA-TLX (Task Load Index) questionnaire [97]. This procedure was repeated with the other two tools.

A session concluded with a final questionnaire asking for an evaluation of required knowledge regarding (i) IoT, (ii) programming, and (iii) process modelling, each rated on a 5-point scale with "0=no experience" to "4=expert" and demographic data. It also included individual questions with free form text answers regarding the personal opinion about: (1) advantages/disadvantages of each tool; (2) experienced troubles with each tool; (3) advantages/disadvantages of modelling with desktop-based tools; (4) advantages/disadvantages of modelling in AR/MR; as well as (5) potential improvements of the HoloFlows app. During a session an observer took times and additional notes regarding a participant's performance and remarks. A session

As part of the final questionnaire the participants were asked to give their opinions about advantages and disadvantages of the individual approaches and comparison of desktop-based modelling using a "classical" GUI vs. modelling in MR.

variable was the task completion time. Furthermore, we examined the workload of each tool using the NASA-TLX questionnaire and enquired about the experience with and advantages/disadvantages of each tool.

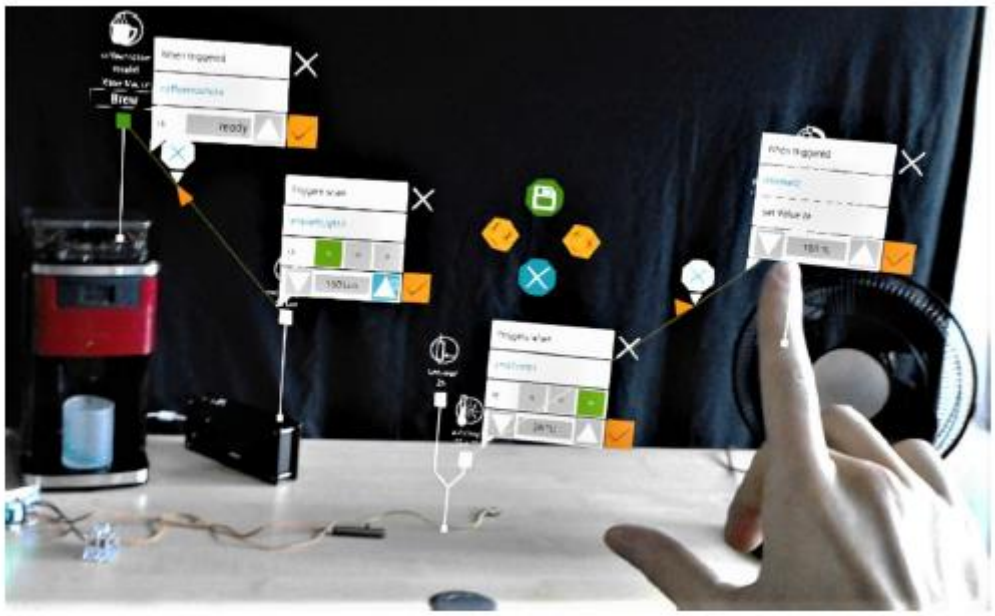
applications [69], we designed and performed a user study to evaluate the HoloFlows approach including the process modelling notation and MR user interface artefacts. We let

Hart, S.G., Staveland, L.E.: Development of nasa-tlx (task load index):Results of empirical and theoretical research. In: Advances in psychology, vol. 52, pp. 139–183. Elsevier (1988)

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	13 5.1.1 Participants Thirteen participants were recruited personally or via e-mail to participate in our user study. Eleven participants had an academic background in terms of working at the university. Their ages ranged from 21 to 36 years (M=30.1, SD=4.0). Participants assessed their experience with (i) IoT, (ii) process modelling, (iii) programming, and (iv) augmented reality (AR), each on a 5-point scale with "0=no experience" to "4=expert". With the answers "3" and "4", three participants had prior experience with IoT; three participants had experience with (business) process modelling; eleven participants had experience with programming; and two participants had experience with AR.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>**
SQ9. How was the holography designed in the study?	a) AR **b) <u>MR</u>** c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	MS Hololens

	The Microsoft® HoloLens™ (1st generation) smart glasses are used as an exemplary MR platform in our work [35]. These head-mounted smart glasses use multiple cameras to create a spatial 3D map of their surroundings. Thereby, it is possible to display holographic images in the see-through displays of the glasses and also fix these holograms at specific locations in the virtual scene. The user interacts with the holo-
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	MS Hololens
SQ13. What is the purpose of the holographic solution?	IoT Device Control The main goal of this work is to enable end-users to configure and combine the functionality of IoT devices to form IoT processes in an intuitive way without requiring a deep understanding of programming and process modelling.
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic **c) <u>Manipulation</u>** locations in the virtual scene. The user interacts with the holograms by controlling a virtual mouse pointer via head and eye movements and performing air tap gestures (pinching of thumb and index finger) to "click" the mouse pointer. We will present our mixed reality-based modelling approach for IoT processes—*HoloFlows*—in detail in Sect. 4. The HoloLens

	
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other as part of a process. Arrows indicate the direction of control or data flow from source to target. In addition, we provide visual feedback by highlighting actively focused and selected UI elements to facilitate navigation and control in the MR scene [93].

Data Extraction Form

Porifera ID	#375
Title, Authors and Year	Exploring Visual Techniques for Boundary Awareness During Interaction in Augmented Reality Head-Mounted Displays; Xu W., Liang H.-N., Chen Y., Li X., Yu K.; 2020
DOI	10.1109/VR46266.2020.1581268453415
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Computer Science Kangyou Yu Hi, this is Kangyou, a senior undergraduate student from Xi'an Jiaotong-Liverpool University in China and the University of Liverpool in the UK, expecting to get my Bachelor degree in Information and Computing Science in June, 2022. I work as a remote research intern in the VVISE Lab, supervised by Prof. Wolfgang Stuerzlinger (Simon Fraser University, Canada) and Prof. Anil Ufuk Batmaz (now at Kadir Has University, Turkey). I also work as a research assistant at the X-CHI Lab of Xi'an Jiaotong-Liverpool University since 2019, under the supervision of Prof. Hai-Ning Liang and Prof. Wenge Xu (now at Birmingham City University). I am interested in Human-Computer Interaction (HCI), AR, VR, MR, and Exergames. I am looking for an exalting Research-based/Thesis-based Master or PhD position of HCI and XR in 2022 fall.

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Troubles, improvements	Yes, full	Think Aloud	No
ET2	Usability	Testing	Performance, effectiveness	No	Record Data	No
ET3	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET4	Usability	Inquiry	mental demand, physical demand, temporal demand, performance, effort, frustation	Yes, full	NASA TLX	No
ET5	Usability	Inquiry	perceived exertion, physical fatigue	Yes, full	Borg CR-10	No
ET6	Usability	Inquiry	visual health	Yes, full	CSV-Q	No
ET7	UX	Survey	attractiveness, perspicuity, efficiency, dependability, stimulation, novelty	Yes, full	UEQ	No

Extracted evidence from publication:

5.2 Evaluation Metrics

We measured task performance in the form of objective data (speed and accuracy) and collected data describing users' preference to the methods, including subjective feedback (system usability, user experience, workload, arm tiredness, vision tiredness).

5.2.1 Task Performance

The task-completion time was the translation time from the first successful selection of the cube made by the participant to the time when the cube was dragged and dropped at the target location. The error was the number of times the cube hits the boundary as the participant's hand was not rendered by the AR system (i.e., moving outside of the boundary).

5.2.2 User Preference

User Preference was measured by 59 questions compiled from the System Usability Scale (SUS) questionnaire, NASA-TLX workload [16], User Experience Questionnaire (UEQ) [21], Borg CR10 [3], and Computer Vision Syndrome Questionnaire (CVSQ) [32].

[16] S. G. Hart. NASA Task load Index (TLX). Volume 1.0; Paper and pencil package. 1986.

[3] G. Borg. *Borg's perceived exertion and pain scales*. Borg's perceived exertion and pain scales. Human Kinetics, Champaign, IL, US, 1998.

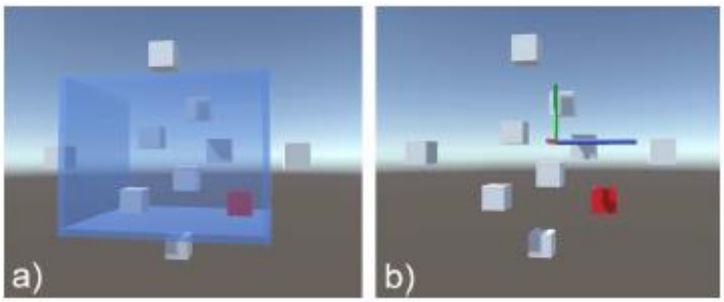
[32] M. d. M. Seguí, J. Cabrero-García, A. Crespo, J. Verdú, and E. Ronda. A reliable and valid questionnaire was developed to measure computer vision syndrome at the workplace. *Journal of Clinical Epidemiology*, 68(6):662–673, June 2015. doi: 10.1016/j.jclinepi.2015.01.015

[21] B. Laugwitz, T. Held, and M. Schrepp. Construction and Evaluation of a User Experience Questionnaire. In A. Holzinger, ed., *HCI and Usability for Education and Work*, vol. 5298, pp. 63–76. Springer Berlin Heidelberg, Berlin, Heidelberg, 2008. doi: 10.1007/978-3-540-89350-9_6

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**g) <u>Yes</u>** h) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	6

	3 FORMATIVE STUDY We could not find any prior work that has focused on boundary awareness in AR HMDs. To guide our design, we carried out a formative study to observe and identify challenges faced by users when interacting with AR HMDs with no explicit boundary awareness. **3.1 Formative Study: Method** We recruited six participants (2 females) from a local university, whose ages ranged from 18 to 27. During the one-hour study, we observed participants experiencing a variety of mid-air hand interaction tasks (e.g., manipulating virtual objects, sushi cat, HoloQuarium), while no boundary awareness was provided. After a tutorial, participants interacted with the AR HMD while following a thinking-aloud protocol. They were asked to talk about what they saw, what challenges they had, and possible improvements by having a boundary awareness method to guide their interaction explicitly.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**
SQ9. How was the holography designed in the study?	**a) AR** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) Screen projection** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) Head-mounted-display (HMD)** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Magic Leap 1* had prior experience with AR HMDs, but all were not frequent users. None had prior experience with the AR HMD used in the experiment—Magic Leap 1. The experiment was conducted in a university lab.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) RGB-D internal (built-in) camera** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Magic Leap 1*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*

SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation **5.4 Task** During the experiment, one cube would randomly change its color to become the target. Users could use their index finger to target the cube they want to select and select it by using a palm open gesture. The color of the cube would be changed back to the default color and the target location would appear when the selection of the cube was made successfully. To complete the task, the user would need to drag the cube and drop it on the target location (i.e., hitting the
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture) 
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other The color of the cube would be changed back to the default color and the target location would appear when the selection of the cube was made successfully. To complete the task, the user would need

Data Extraction Form

Porifera ID	#376
Title, Authors and Year	A Comparative Analysis of 3D User Interaction: How to Move Virtual Objects in Mixed Reality; Kang H.J., Shin J.-H., Ponto K.; 2020
DOI	10.1109/VR46266.2020.00047
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Digital Arts / Design*  Hyo Kang Assistant Professor in Digital Arts & Sciences Digital Worlds Institute / UI/UX Design, VR/AR

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Discoverability (time to complete task 1 and 2) Efficiency (time to complete task 3) Accuracy (average deviation of items positions)	No	Record data	No
ET2	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET3	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA-TLX	No
ET4	UX	Survey	Perceived level of Naturalism	No	Likert Scale	No
ET5	UX	Survey	Perceived level of Enjoyment	Yes, extends	TAM	No
ET6	UX	Survey	User Experience in general	No	Interview	No

Extracted evidence from publication:

failed" then asked participants to proceed to the next task.

Efficiency and Accuracy: The efficiency of interaction design was examined by measuring the time it took to complete the task 3. The accuracy of interaction design was examined using position data of five furniture items: four stools, and one table. Participants were asked to arrange four stools so that they are perpendicular to each other. The average deviation from 90-degree was calculated to examine accuracy.

Usability: The perceived usability of each interaction design was evaluated using the System Usability Scale (SUS) [6]. The system usability scale includes 10 items with five responses that range from strongly agree to strongly disagree. The example questionnaire includes: "I found the system was easy to use," and "I would imagine that most people would learn to use this system very quickly." In order to examine perceived task loads, the NASA Task Load Index (NASA-TLX) questionnaire was also included in the survey [14].

4.4 Measures

4.4.1 Evaluation of three interaction designs

Discoverability: Discoverability was examined by measuring the time it took to complete the task 1 and task 2 [29]. In our pilot study with 7 graduate students, we asked them to notify us when they could not figure out the interaction and wanted to give up the tasks. The pilot study indicated that people feel a great level of frustration when they failed to interact with the virtual objects after 1.5 minute. Based on this result, when participants could not figure

Naturalism and Enjoyment: To measure the perceived level of naturalism, we used five-point Likert scale questionnaires. The questionnaire includes three items: "interaction with a virtual object was similar to how I would interact with an object in a real-world," "interaction with a virtual object felt familiar," "interaction with a virtual object seems intuitive and natural." The questionnaire for the enjoyment was adopted from previous literature on extended Technology Acceptance Model [11]. The enjoyment questionnaire includes two items: "It was enjoyable to use this system," "It was fun to use this system." Cronbach's alpha for both variables was above 0.7 ($\alpha_{naturalism} = 0.78$; $\alpha_{enjoyment} = 0.81$).

which interaction did you prefer the most? 2) why do you prefer interaction X over others? 3) what do you like or dislike about other interactions? 4) What's the hardest part about the interaction you experienced? 5) How would you like to provide a solution to make an improvement? In addition to these five questions, we also asked questions based on our observation, for instance, what specific gesture participants used and why.

[6] J. Brooke. System usability scale (sus): A quick-and-dirty method of system evaluation user information. digital equipment co ltd. *Reading, UK*, pp. 1–7, 1986.

[14] S. G. Hart and L. E. Staveland. Development of nasa-tlx (task load index): Results of empirical and theoretical research. In *Advances in psychology*, vol. 52, pp. 139–183. Elsevier, 1988.

[11] F. D. Davis, R. P. Bagozzi, and P. R. Warshaw. User acceptance of computer technology: a comparison of two theoretical models. *Management science*, 35(8):982–1003, 1989.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	21 **4 USER STUDY** **4.1 Participants** 21 participants were recruited through mailing lists and flyers in the campus. Participants' age ranged from 18 to 44 with a mean of 24.2 (SD = 7.8) and the majority of them were university students. We specifically sought participants who had no prior experience with head-worn mixed reality devices and hand tracking devices. None of the participants had previous experience with mixed reality headsets or hand tracking device, but nine participants had prior experience with head-worn VR devices such as an Oculus Rift or HTC Vive. On average, participants spend a significant amount of time working on a computer on a daily basis (5-8 hours a day: 47%, more than 8 hours: 28%).
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>**
SQ9. How was the holography designed in the study?	a) AR **b) <u>MR</u>** c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and	*Oculus Rift and ZED Mini*

model of used devices for projection?	*Mixed Reality Setup:* In order to create a mixed reality environment, We used an Oculus Rift and a ZED Mini camera. A ZED Mini is an attachable depth-camera which features dual 2K image sensors, providing mixed-reality experience for head-worn VR devices with real-virtual occlusion. The purpose of using a ZED mini is to achieve a wider field of view. ZED mini offers 110-degree fields of view, which makes it easier to interact with large furniture objects. A ZED mini supports spatial mapping with depth occlusion which is useful for collision detection, as it allows users to place the virtual objects in the real environments. A ZED mini camera was mounted on an Oculus Rift headset. The tracking area was set up with Oculus two sensors, and the size of the tracking area was approximately 3 meters by 2.5 meters, the optimal play area for an Oculus.
SQ12. Which technology type was used to interaction detection (touch)?	**a) Infrared Stereo Camera** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Hand Tracking:* We used a Leap Motion for hand tracking. Leap Motion uses image processing with infrared stereoscopic video [36] Unlike other gesture recognition devices such as Kinnect, a Leap Motion does not return a complete depth map but only a set of relevant hand points and some hand pose features; thus, we used preset hand pose features of Leap motion—grabbing, pinching, and pointing. Virtual hand was always rendered in the scene letting users know their hands are tracked well. Leap motion was attached to the front of the Oculus Rift.
SQ13. What is the purpose of the holographic solution?	*Architecture / Interior Design* design, thereby providing insights into natural hand interaction. We particularly focused on an interaction that involves selecting and arranging furniture items. Architecture and interior design are one of the most promising application areas in MR; thus findings from this
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) Pointing** **b) Pantomimic** c) Manipulation In this study, we aim to provide a more comprehensive understanding of 3D user interaction by examining three interaction techniques in accomplishing series of tasks—selecting a menu, selecting an object, and positioning the object. We further examined the discoverability of three interaction design by observing participants' hand gestures. Contribution of this study lies in providing a broader
SQ15. Which is the image quality of the touchable hologram?	**a) WIMP** b) 3D RAW object **c) 3D enhanced (with lights/shadow/texture)**

	
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#384
Title, Authors and Year	Adapting Usability Metrics for a Socially Assistive, Kinesthetic, Mixed Reality Robot Tutoring Environment; Mahajan K., Groechel T., Pakkar R., Cordero J., Lee H., Matarić M.J.; 2020
DOI	10.1007/978-3-030-62056-1_32
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Engineering* Viterbi School of Engineering, University of Southern California, Los Angeles, California, USA {kmahajan, groechel, pakkar, jrcorder, haeminle, mataric}@usc.edu

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Student Performance via Problem-Solving Policies, Manipulation Time, Gaze Concentation	No	Record data	No
ET2	Usability	Inquiry	Overall usability	Yes, full	SUS	No

Extracted evidence from publication:

Video: https://www.youtube.com/watch?v=s7udZXa2wEw

studies of programming tutors [18] and web interfaces [27], and chose three commonly used reliable metrics: user performance, manipulation time, and gaze concentration.

Student Performance via Problem-Solving Policies: We measured a participant's performance by counting the number of good and bad policies created during a time frame. Introduced by Piech et al. [18], a *policy* is defined as any group of two or more code blocks. For example, if the participant was tasked with adding integer block 1 and integer block 2, a correct solution would include combining the two integer blocks with an addition block. A *Good* Policy (GP) for this task includes combining the integer block 1 with the addition block. A *Bad* Policy (BP) includes some other, incorrect step(s), such as combining the integer block 3 and the addition block.

Manipulation Time: MT is defined as the amount of time it takes a participant to grab a coding block and *snap* it to another block as can be seen in Fig. 1. *Snapping* was defined as the action grabbing a code block, dragging it to be in contact with another code block, and then releasing the currently held block to snap it to the contacted block. A successful manipulation event was logged from the time when an object was first grabbed (t_{grab}) to when an object was *snapped* to another object (t_{snap}).

Gaze Concentration: GC is defined as the amount of time a participant looked a 2D (x,y) pixel (i.e., cell) within the *interaction space* over a rolling time window tw_{GC}. The *interaction space*, shown in Fig. 1, included the MoveToCode interface and the physical robot tutor. The interaction space, measured in meters, was a 4m x 2.25m grid, totalling 3,600 cells measuring 0.05m x 0.05m each. A cell's score increased by 0.01 every frame the participant looked at that cell during tw_{GC}. The maximum cell score was capped at 1.

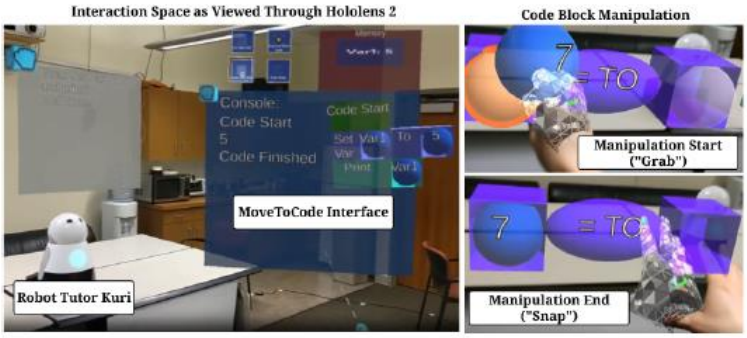
We calculated post-interaction SUS scores for all participants based on a 10-question survey, as shown in Fig. 2 ($\bar{x} = 53.06, \tilde{x} = 55.0, \sigma^x = 17.2, CV = 32.8\%$).

11. Kaya, A., Ozturk, R., Gumussoy, C.A.: Usability measurement of mobile applications with system usability scale (sus). In: Industrial Engineering in the Big Data Era, pp. 389–400. Springer (2019)

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	9 The dataset used in this work was from a within subjects ($n = 9$) pilot study performed with a mixed reality visual programming language MoveToCode [7]

SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	a) AR **b) <u>MR</u>** c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens*
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	Programming Learning
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation *Ability* (RC), a metric involving the multimodal measure of a student's involvement and curiosity. In the interaction, students combined *coding blocks* (e.g., if-blocks, print-blocks) by grabbing, dragging, and snapping blocks together in order to solve 7 beginner-level coding exercises. The acts of grabbing, dragging, and snapping blocks are part of the **manipulation time** metric, described in Sec. 4. Preset coding blocks were available to the participant at the beginning
SQ15. Which is the image quality	**a) <u>WIMP</u>** **b) <u>3D RAW object</u>**

of the touchable hologram?	c) 3D enhanced (with lights/shadow/texture)  Fig. 1: MoveToCode (left) as seen by the participant through the Hololens 2. Code block manipulation (right) with a participant grabbing the block and letting it go to snap code blocks together.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#435
Title, Authors and Year	Tabletop AR with HMD and tablet: A comparative study for 3D selection; Plasson C., Cunin D., Laurillau Y., Nigay L.; 2019
DOI	10.1145/3343055.3360760
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Computer Science Article from thesis of Carole Plasson at Laboratoire d'Informatique de Grenoble

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Completion time of task	No	Record data	No
ET2	Usability	Inquiry	NASA-TLX aspects, level of fatigue - easy to understand, easy to use, quickly performing, physical demand, mentally demand and frustration	Yes, extends	NASA-TLX, Likert Scale	No

Extracted evidence from publication:

nique, participants fill a questionnaire inspired by NASA-TLX (same questionnaire of [5] to compare our results with theirs), with additional questions about participants' level of fatigue (4-point Likert scale) for several body areas. We conclude with a final questionnaire to compare the techniques (preference and fatigue) and an interview.

[5] Julian Looser et al. 2007. An Evaluation of Virtual Lenses for Object Selection in Augmented Reality *(GRAPHITE '07)*. ACM, New York, NY, USA, 203–210. DOI:http://dx.doi.org/10.1145/1321261.1321297

Questions:

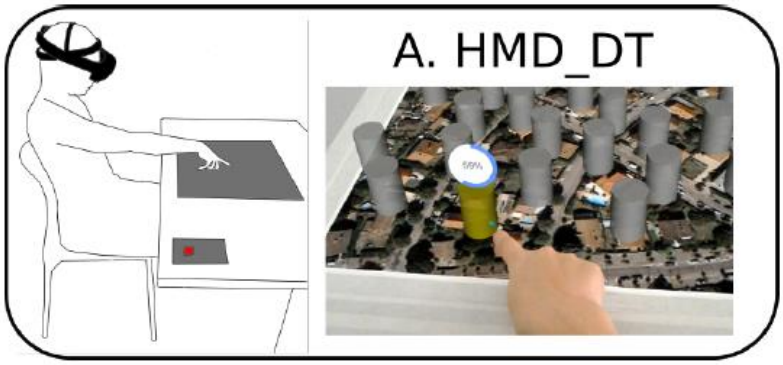
1. I found the selection technique **easy to understand**
2. I found it **easy to select** the target
3. I feel that I **performed quickly** with this technique

4. If I had to use AR interfaces like this regulary, this is a technique I **would appreciate having avaiable**
5. I found using this technique **physically demanding**
6. I found using this technique **mentally demanding**
7. I found this technique **frustrating**

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12 cate a target in the scene. The goals of this experiment are to compare the techniques for each of the 2 phases and compare our results with those of the similar study [5]. We recruited 12 volunteers from our lab, aged 24 to 40 years old ($mean = 31.4$, $sd = 5.78$). All participants had a previous experience in AR, especially with a HMD, but none of them were experts.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>** From our qualitative evaluation, we find that HMD-based techniques (and especially HMD_RC) are preferred and less tiring than tablet interaction. They rank the interaction techniques as follows: 5/12 participants preferred HMD_RC, 5/12 HMD_DT, and 2/12 Tablet. According to participants, holding a tablet is more physically demanding than performing large movements with HMD_DT and wearing a HMD. For qualitative results, participants find it easy to select the target with all the techniques, but the HMD is better perceived than Tablet for both visibility conditions. We note that the three techniques have a lower ranking for the occlusion condition than with visible condition. HMD_DT is the most preferred, easiest, fastest and accurate technique.
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena

SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens 1* For the two devices, we use a Microsoft HoloLens 1 HMD and a Samsung Galaxy Tab S3 tablet (9.7" display with a resolution of 2048x1536 and weights 429g). For implementing the 3 techniques, we use Unity to create and manage the 3D scene and Vuforia to track the image of the residential area stuck to the table. The Optitrack technology (high-speed infrared cameras) and reflective markers are used to track the stick and the user's fingertip. As the majority of prior work is about map exploration or selection of points of interest, we focus on these fundamental tasks of search and selection of 3D virtual objects in sparse and dense environments in the two following experiments.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera **e) <u>RGB-D external camera</u>**
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Optitrack*
SQ13. What is the purpose of the holographic solution?	*GIS (Geographic Information System)*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation - **HMD_DT.** HMD with direct touch (close interaction). An augmented sphere follows users' fingertip and selection occurs when the sphere collides with a cylinder;
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)

	 **(a)** HMD direct touch (close interaction)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#453
Title, Authors and Year	Put that hologram there-probing mobile interaction experiences for a vision of mixed material public spaces; Aslan I., Dang C.T., Schlagowski R., Dietz M., Brain F., André E.; 2019
DOI	10.1145/3365871.3365877
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Computer Science

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
T1	Usability	Testing	Task complete, overall usability	Yes	Think Aloud	No
T2	UX	Survey	Expectations of a future Where holograms were pervasively displayed	No	Interview	No

Extracted evidence from publication:

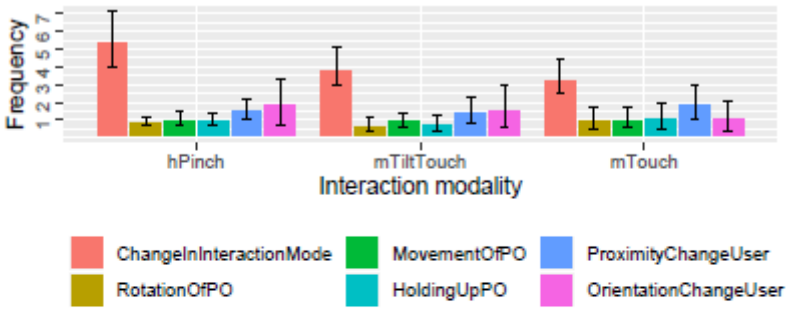
late the physical counterpart. A researcher who was observing the HoloLens's video-stream decided when the task was successfully completed. Participants were instructed to "think aloud" through-

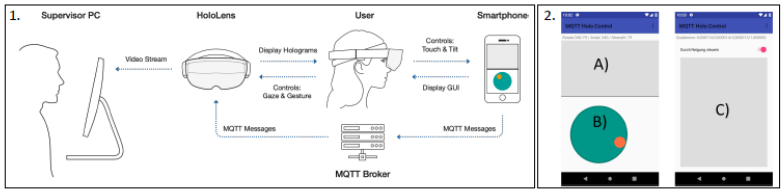
around 4 minutes to successfully complete their task. Overall, the study took for each participant about 45 minutes, including a semi-structured interview, which was conducted at the end with each participant, querying for example participants' anticipated expectations of a future where holograms were pervasively displayed.

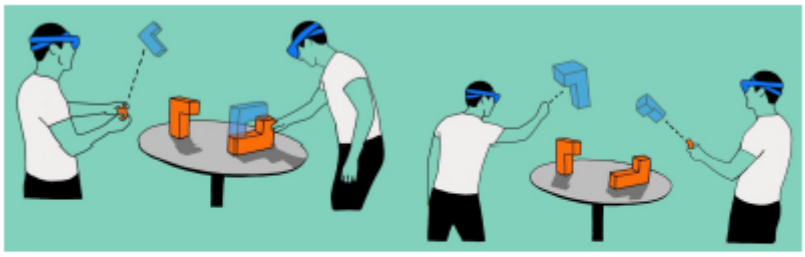
4.2 Results

All of the data was collected through observations. The main analysis consisted of a thematic analysis [4], which included the creation of mind maps for each participant based on all observations, including participants' utterances during the "think aloud" protocol [7], which the researchers identified as important with respect to the research objectives (i.e., exploring potentials and limitations of hologram usage in future mixed-material public and urban spaces).

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) <u>Case Study</u>** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative  **Figure 3: Overview of quantifiable observations describing interaction behavior during completing the task with the three different modalities. PO refers to physical object. Interaction mode refers to changing the "mode" from rotating to moving the hologram and vice versa. (Error bars denote 95% confidence intervals)**
SQ9. How was the holography designed in the study?	a) AR **b) <u>MR</u>** c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and	MS Hololens

model of used devices for projection?	**3 PROTOTYPE** The prototype combines the Augmented Reality HMD *HoloLens* running a Unity3d app with a custom-built mobile app for Android OS on a smartphone. Figure 1 illustrates all components included  **Figure 1: 1. Technical setup of the prototype used in the user study 2. GUI layouts of the mobile app used for the interaction modalities *mTouch* (left) and *mTiltTouch* (right).**
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	*input devices preference*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation space: In *hPinch* users can drag/move the hologram by using the tap-and-hold gesture (natively) supported by the HoloLens device [12]. The rotation of the hologram can be adjusted after performing an air-tap gesture on the hologram switching between the movement and rotation mode. The hologram changes its color to indicate the activated mode. In *mTouch* the user can drag/move and rotate the holograms by using the touch screen on the smartphone (see Fig-
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)

	 **Figure 2: Overview of interaction techniques for manipulating a "hologram" and a real object in order to position them next to each other in a predefined way.**
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#456
Title, Authors and Year	Portal-ble: Intuitive free-hand manipulation in unbounded smartphone-based augmented reality; Qian J., Ma J., Li X., Attal B., Lai H., Tompkin J., Hughes J.F., Huang J.; 2019
DOI	10.1145/3332165.3347904
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	User issues, participant feedback	Yes, full	Think Aloud	No
ET2	UX	Survey	Overall experience, what they did or did not enjoy, discovered perception, manipulation, behavior issues	No	Interview	No
ET3	Usability	Testing	Completion time, success rate, scale of task quality	No	Record data	No
ET4	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA-TLX	No
ET5	UX	Survey	Preferences and helpfulness	No	Likert Scale	No

Extracted evidence from publication:

Online Content:

https://portalble.cs.brown.edu/

https://github.com/jasonta/Portalble

O artigo apresenta um experimento realizado para obter insights sobre a interação com objetos de RA com as mãos em smartphone (PARTE 1), em seguida, apresenta um sistema (diretrizes/requisitos) com estes aprendizados e testa (PARTE 2) se ele melhora os aspectos de percepção de profundidade, sucesso em agarrar e manipular objetos virtuais e reduz o esforço cognitivo do usuário. Antes dos dois experimentos, um estudo preliminar sobre protótipo foi realizado, com think-aloud e entrevista.

To test their experiences, each of the 12 student researchers recruited two participants (24 total). Tests occurred in a 3 × 8 m room, and each session was video recorded. To begin, student researchers explained the concept of free-hand direct manipulation, and asked them to think aloud. Then, during the tasks, student researchers noted any user issues and recorded participant feedback, e.g., a participant trying to reach for a virtual object multiple times. Next, student researchers interviewed each participant after the session about their overall experience to identify what they did or did not enjoy about the prototype, and what specific problems were encountered. Finally, we categorized the discovered perception, manipulation, and behavior issues that impeded user ability to manipulate and create content.

participants arrived, they were given a tour of the space while experimenters explained the tasks. Before signing the consent form, participants were notified that the session would be recorded and were asked to think aloud. The experimenters then set up and configured Portal-ble for the participants, which included calibrating participants' hands and guiding them through Portal-ble's tutorial. The automatic and interactive tutorial walked participants through basic system functionalities,

Procedure

At the end of every subtask or task, participants were asked to complete a NASA-TLX form, rating their effort, frustration, mental demand, performance, physical demand and temporal demand (perception of time). The NASA-TLX reports were collected using the official NASA app downloaded from the iOS App Store. The ratings were later combined into *Portal-ble* and *baseline* systems for comparison. At the end of the study, participants were asked to rate their preferences and rate the helpfulness of each condition on a 5-point Likert scale.

Measures: We collected completion time and success rate for each trial, and used a logging script to record the *timestamp*, *detected gesture*, *hand distance*, *body distance*, and *target object* of the participants' interactions. We also added an on-screen button to manually timestamp trial start and end times.

Measures: We used a three-category rating scale to evaluate the quality of each AR house created by participants (see example houses representing each rating in Figure 8). Two of the authors rated the finished houses separately and the two ratings were averaged. The rating scale was defined as follows:

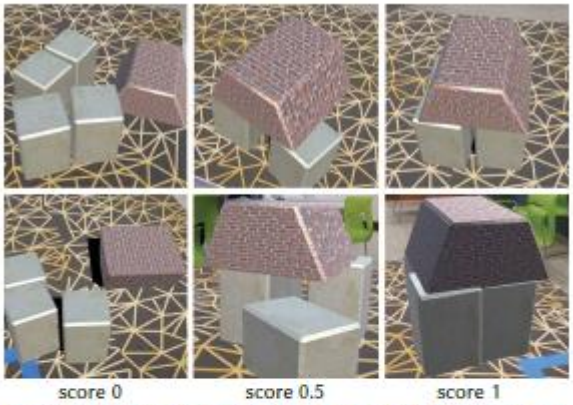


Figure 8. Examples of the scores assigned to houses constructed at varying levels of completeness for Task 2. Incomplete houses received 0 points, partially complete (having at least two pillars) houses received 0.5 points, and completed houses received 1 point.

- 0 if any component was missing, or the assembled house did not look like the photograph;
- 0.5 if the house was finished but some blocks were oriented incorrectly;
- 1 if the house looked like the photograph with correct orientation and no missing pieces.

We test the research hypothesis: *Portal-ble will improve user depth perception and success in grabbing and manipulating virtual objects, and reduce user cognitive effort.* We designed two main tasks to evaluate our questions by measuring how fast participants completed tasks and how successful they were in grabbing virtual objects. Additionally, cognitive ratings were measured using the NASA-TLX assessment tool.

At the end of every subtask or task, participants were asked to complete a NASA-TLX form, rating their effort, frustration, mental demand, performance, physical demand and temporal demand (perception of time). The NASA-TLX reports were collected using the official NASA app downloaded from the iOS App Store. The ratings were later combined into *Portal-ble* and *baseline* systems for comparison. At the end of the study, participants were asked to rate their preferences and rate the helpfulness of each condition on a 5-point Likert scale.

To test their experiences, each of the 12 student researchers recruited two participants (24 total). Tests occurred in a 3 × 8 m room, and each session was video recorded. To begin, student researchers explained the concept of free-hand direct manipulation, and asked them to think aloud. Then, during the tasks, student researchers noted any user issues and recorded participant feedback, e.g., a participant trying to reach for a virtual object multiple times. Next, student researchers interviewed each participant after the session about their overall experience to identify what they did or did not enjoy about the prototype, and what specific problems were encountered. Finally, we categorized the discovered perception, manipulation, and behavior issues that impeded user ability to manipulate and create content.

and *baseline* systems for comparison. At the end of the study, participants were asked to rate their preferences and rate the helpfulness of each condition on a 5-point Likert scale.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) Controlled experiment** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	24, 12 To test their experiences, each of the 12 student researchers recruited two participants (24 total). Tests occurred in a 3 × 8 m room, and each session was video recorded. To begin, student researchers explained the concept of free-hand direct manipulation, and asked them to think aloud. Then, during the tasks, student researchers noted any user issues and recorded participant feedback, e.g., a participant trying to reach for a virtual object multiple times. Next, student researchers interviewed each participant after the session about their overall experience to identify what they did or did not enjoy about the prototype, and what specific problems were encountered. Finally, we categorized the discovered perception, manipulation, and behavior issues that impeded user ability to manipulate and create content.

	Participants Electronic flyers were sent to students on various university list-servs and advertised on social networking applications. Twelve participants (4 male and 8 female) were recruited for the study, ranging from 19–28 years old ($\bar{x} = 23$, $\sigma = 3$). Eight of the participants had prior experience with smartphone AR systems, but none had any experience with free-hand manipulation on smartphones. Participants were compensated $15 an hour for their time, with the actual average study taking 55 minutes.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**
SQ9. How was the holography designed in the study?	**a) AR** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) Screen projection** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display **c) Smartphone or tablet** d) Head-mounted-display (HMD) e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Samsung S9+*
SQ12. Which technology type was used to interaction detection (touch)?	**a) Infrared Stereo Camera** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	Leap Motion, combinado com Intel CS325. To detect 3D hand positions and rotations, we use a Leap Motion: a dual wide-angle stereo depth-sensing camera system. We attach the Leap Motion to our smartphone using a 3D-printed mount with suction cups (Figure 1). This setup allows for simultaneous spatial and 3D hand tracking in the same coordinate system if we can combine the two camera systems via *intrinsic* and *extrinsic* calibrations. ARCore and Leap Motion both provide intrinsic calibrations and define their object positions in metric space. For extrinsic calibration, we measure the physical distance between the smartphone's back camera and the midpoint of Leap Motion's two front cameras. Leap Motion does not directly support smartphones as its software driver only works on desktop-class operating systems. As such, we bypass this technical issue by introducing a wearable computation unit as a data relay (Intel CS325 compute

	 **Figure 1. A: The initial prototype in use, which has the same hardware setup as the Portal-ble system; B: Portal-ble in use; C: The hardware components of the initial prototype.**
SQ13. What is the purpose of the holographic solution?	*Input device preferences*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation We asked 12 student researchers to design tasks with our smartphone prototype. Each researcher was given general guidelines from which to design two tasks: one *content manipulation* task and one *content creation* task. We define *content manipulation* as interactions such as selection, translation, and confirmation via direct manipulation. The designed tasks included throwing darts, ten-pin bowling, stacking cubes, and moving objects across the room. We define *content creation* as various free-hand mid-air drawings. The designed tasks included drawing cubes, drawing lines across the room, and participants drawing their names.
SQ15. Which is the image quality of the touchable hologram?	a) WIMP b) 3D RAW object **c) <u>3D enhanced (with lights/shadow/texture)</u>**
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

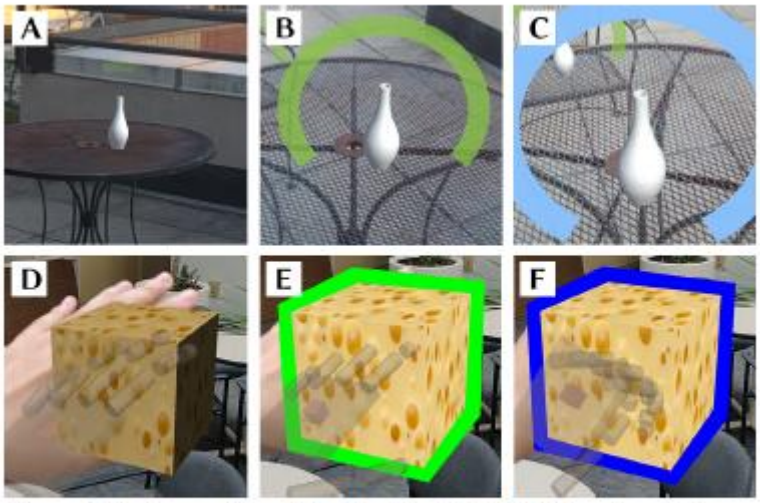


Figure 5. Two types of visual feedback for Portal-ble's free-hand interaction. *Top:* A *progress wheel* demonstrates when a user A) is far away; B) getting closer, C) within reach of the object. *Bottom:* Different highlights represent that a user's hand is D) nearby, E) hovering, or F) grabbing.

Data Extraction Form

Porifera ID	#473
Title, Authors and Year	Three-dimensional aerial image interface, 3DAII; Matsumaru T., Septiana A.I., Horiuchi K.; 2019
DOI	10.20965/jrm.2019.p0657
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Graduate School of Information, Production, and Systems, Waseda University 2-7 Hibikino, Wakamatsu-ku, Kitakyushu, Fukuoka 808-0135, Japan E-mail: {matsumaru@, asyifa@ruri., znki@fuji.}waseda.jp [Received February 24, 2018; accepted July 31, 2019]

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Execution time for perfoming a task	No	Record data	No
ET2	Usability	Inquiry	Comfort, fatigue	Yes, extends	ISO/TS 9241-411, Annex C	No
ET3	Usability	Inquiry	Ease of learning, satisfaction	Yes, partial	USE Questionnaire	No

Information gets on internet:

A parabólica é um produto comercial usado para refletir objetos reais. Ver vídeo:

https://www.youtube.com/watch?v=lFqlQiTTHRs

https://www.youtube.com/watch?v=QK8snVSG_n8

Produto Comercial: Desktop Mirage

https://optigone.com/index.php/desktop-mirage/

Extracted evidence from publication:

The evaluation index for making comparisons among operating devices is primarily the execution time for performing a task. In addition, we conducted a survey concerning *comfort*, *fatigue*, *ease of learning*, and *satisfaction* of 3DAII on the participants after finishing the five types of the tasks.

4.3.2. Questionnaire Survey

After completing all tasks, we asked participants to answer questions based on ISO/TS 9241-411 (JIS Z8219 Appendix C) and the USE (usefulness, satisfaction, and ease of use) questionnaire to assess their feelings and opinions of 3DAII. Because other operating devices used for performance tests are commercially available and commonly used, the survey was conducted only for 3DAII.

(1) *Comfort* and *fatigue*

The independent rating scale for single devices introduced in ISO/TS 9241-411 [37] (JIS Z8219 Appendix C [38]) asks about *comfort* (seven indices) and *fatigue* (five indices). We verified each index on a five-point scale (**Fig. 22**) and determined that the *comfort* level of 3DAII is almost moderate, although the score of two indices (*effort required for operation* and *accuracy*) is a little lower than the intermediate value.

(2) *Ease of learning* and *satisfaction*

To determine the feelings and opinions of participants concerning their user experience (UX), we asked four questions on the *ease of learning* factor and five questions on the *satisfaction* factor (except two questions concerning recommendation and possessions) of the USE questionnaire [40] on a five-point scale of the Likert scale [41]

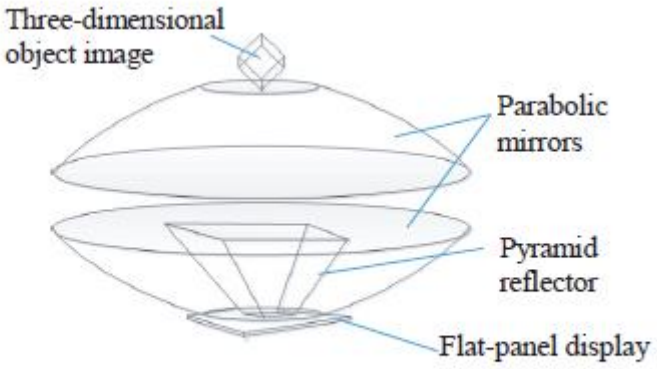
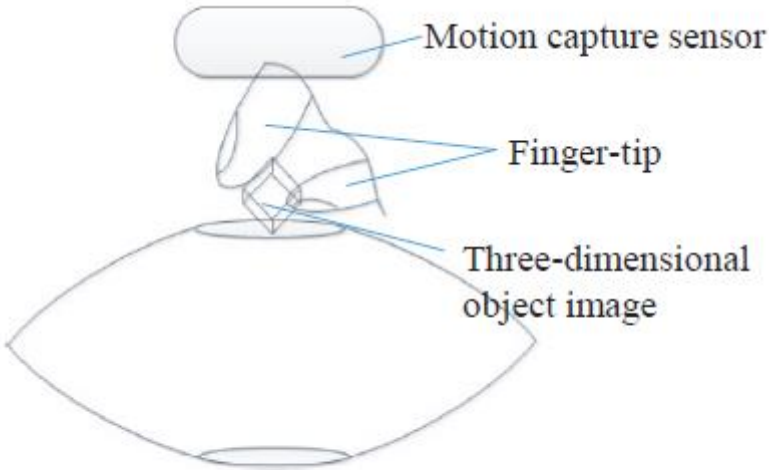
[37] ISO/TS 9241-411, "Ergonomics of human-system interaction – Part 411: Evaluation methods for the design of physical input devices," ISO Int. Organization for Standardization, 2012.

[38] JIS Z8519, "Ergonomic requirements for office work with visual displayerminals (VDTs) – Requirements for non-keyboard input devises," JISC (Japanese Industrial Standards Committee) JSA (Japanese Standards Association), 2007 (in Japanese).

[40] A. M. Lund, “Measuring Usability with the USE Questionnaire,” STC Usability SIG Newsletter, Vol.8, No.2, pp. 3-6, 2001.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	**a) Survey** b) Controlled experiment c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	5
SQ8.3. Which was the type of results analysis?	**a) Quantitative** b) Qualitative
SQ9. How was the holography designed in the study?	a) AR b) MR c) VR **d) Other** **3. Three-Dimensional Aerial Image Interface, 3DAII** We developed a prototype model (PM) to confirm the feasibility of a three-dimensional aerial image interface, 3DAII (**Fig. 3**) [28]. The pyramid reflector on a flat-panel
SQ10. How way was the holography presented to the user?	a) Screen projection **b) Physical optical phenomena**
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass **f) Reflexive Material**

	 **Fig. 1.** Pyramid reflector and parabolic mirrors.
SQ11.1 What is the manufacturer and model of used devices for projection?	Pirâmide de Acrílico Transparente (sem marca) Espelho Parabólico, Mirage Desktop (produto comercial) Display (flat-panel), não especificado
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	Leap Motion  **Fig. 2.** Motion capture sensor.
SQ13. What is the purpose of the holographic solution?	Input device preferences
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation

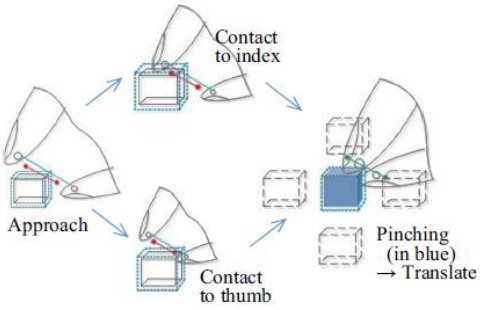
<table>
<tr>
<td></td>
<td>


Fig. 11. Hand-finger interaction: pinching.


(a) before pinching (b) after pinching
Fig. 12. Discoloration.
</td>
</tr>
<tr>
<td>SQ15. Which is the image quality of the touchable hologram?</td>
<td>a) WIMP
b) <u>3D RAW object</u>
c) 3D enhanced (with lights/shadow/texture)</td>
</tr>
<tr>
<td>SQ16. Is there feedback for the touch action? Which it is the means?</td>
<td>a) No
b) <u>Yes, visual.</u>
c) <u>Yes, auditive.</u>
d) Yes, haptic (describe).
e) Other

action (USI) based on his/her hand-finger. When an index finger and a thumb simultaneously approach a three-dimensional object image (contact) and the distance between two fingertips is smaller than a predetermined value (pinching), 3DAII makes an identification sound, changes the color of the three-dimensional object image, and translates the object image according to the fingertip position. Fig. 12 illustrates the discoloration of a cubic object image before/after pinching.</td>
</tr>
</table>

Data Extraction Form

Porifera ID	#476
Title, Authors and Year	Pointing and selection methods for text entry in augmented reality head mounted displays; Xu W., Liang H.-N., He A., Wang Z.; 2019
DOI	10.1109/ISMAR.2019.00026
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Text Entry Performance	No	Record data	No
ET2	Usability	Inquiry	NASA-TLX aspects	Yes, full	NASA-TLX	No
ET3	Usability	Inquiry	Motion Sickness	Yes, full	MSAQ	No
ET4	UX	Survey	Immersion	Yes, full	Slater-Usoh-Steed	No
ET5	UX	Survey	Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, Novelty	Yes, full	UEQ	No

Extracted evidence from publication:

3 Empirical Study

We conducted an experiment at a university lab with the four pointing methods (Head, Hand, Hybrid, and Controller) and two input mechanisms (Swype and Tap) to assess their relative performance (speed and error rates) and user preference (workload, motion sickness, user experience, and immersion level).

warm-up phrases. After the warm-up phrases, participants needed to complete eight phrases for each condition. The conditions were separated by a 5-minute break during which participants filled out the NASA TLX questionnaire [19], Motion Sickness Assessment Questionnaire (MSAQ) [11], Slater-Usoh-Steed Questionnaire (SUS), and User Experience Questionnaire (UEQ) [23]. After the experiment, we interviewed participants and asked them to comment on the techniques. The whole experiment lasted approximately one

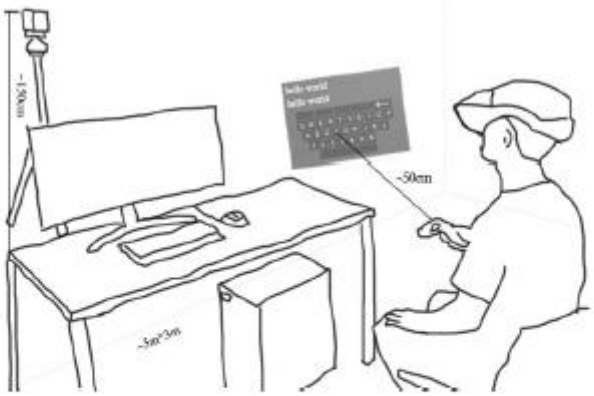
[11] P. J. Gianaros, E. R. Muth, J. T. Mordkoff, M. E. Levine, and R. M. Stern. A Questionnaire for the Assessment of the Multiple Dimensions of Motion Sickness. *Aviation, space, and environmental medicine*, 72(2):115–119, Feb. 2001.

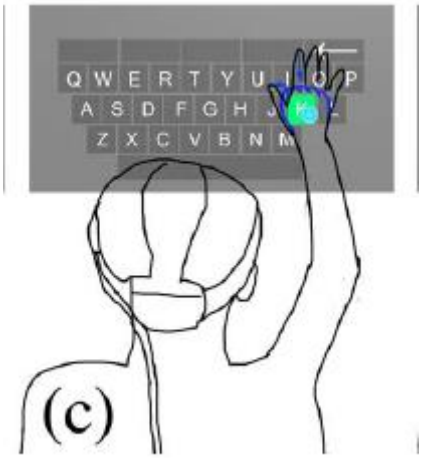
[19] S. G. Hart. NASA Task load Index (TLX). Volume 1.0; Paper and pencil package. 1986.

[23] B. Laugwitz, T. Held, and M. Schrepp. Construction and Evaluation of a User Experience Questionnaire. In A. Holzinger, ed., *HCI and Usability for Education and Work*, vol. 5298, pp. 63–76. Springer Berlin Heidelberg, Berlin, Heidelberg, 2008. doi: 10.1007/978-3-540-89350-9_6

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	24 **3.1 Participants and Apparatus** 24 unpaid participants (8 males and 4 females in each of the two groups) between the ages of 18-28 (M=21) were recruited randomly from the local university campus through a database of participants. All participants were familiar with the English alphabet because the
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and	*Meta 2 AR*

model of used devices for projection?	corrected-to-normal vision and did not have any difficulties moving their arms and heads. The experiment was conducted using a Meta 2 AR HMD connected to a Windows 10 machine running Unity3D. A standard desktop computer was used; it had an i7 CPU, 16 GB RAM and a Nvidia GeForce GTX 1080Ti GPU. Figure 5 shows the experimental setup.  Figure 5: This figure shows the experimental setup. The HTC Vive optical trackers were placed at 1.5m high and had a tracking space with $3 \times 3m^2$. The keyboard is roughly 0.5m away from the participant which is recommended by the developers of the Meta 2.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	Meta 2 AR
SQ13. What is the purpose of the holographic solution?	*Input device preference*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) Pointing** b) Pantomimic c) Manipulation

	
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#493
Title, Authors and Year	The usability of the microsoft hololens for an augmented reality game to teach elementary school children; Munsinger B., White G., Quarles J.; 2019
DOI	10.1109/VS-Games.2019.8864548
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) Validation Research** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Brita Munsinger, *Department of Computer Science*, *University of Texas at San Antonio*, San Antonio, Texas, USA, brita.munsinger@my.utsa.edu Greg White, *Department of Computer Science*, *University of Texas at San Antonio*, San Antonio, Texas, USA, greg.white@utsa.edu John Quarles, *Department of Computer Science*, *University of Texas at San Antonio*, San Antonio, Texas, USA, john.quarles@utsa.edu

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Number of Input Errors, Time taken to complete the tasks	No	Record Data	No

Extracted evidence from publication:

D. Metrics

In our study we collected data on the total number of input errors generated by participants and the time taken to complete the tasks in game. Input errors are the total number of voice commands, air tap gestures or clicker presses that exceed the minimum required number (15) to complete the tutorial and game. Tutorial time is the elapsed time in minutes to

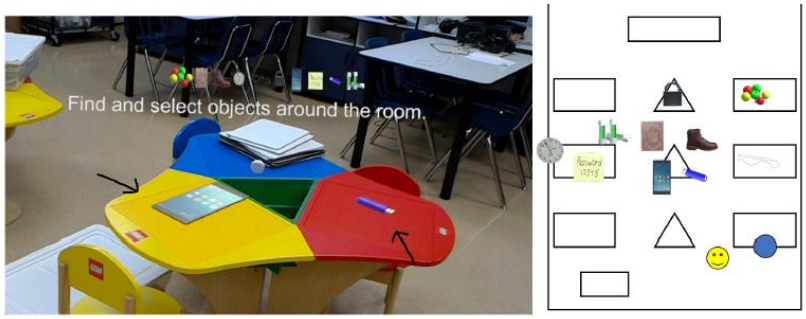
TABLE I
MEAN AND (STANDARD ERROR) FOR INPUT ERRORS, TUTORIAL TIME AND GAME TIME

Factor	Input errors	Tutorial time	Game time
Voice	35.75 (15.42)	2.67 (0.78)	4.39 (0.62)
Gesture	4.54 (2.03)	1.85 (0.58)	3.83 (0.61)
Clicker	8.1 (2.21)	0.44 (0.06)	2.98 (0.47)

complete the pre-game tutorial. Game time is the elapsed time in minutes to complete the game.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	29 *B. Participants* Our study participants were students from an elementary school in the southwestern United States. The students were all in the fifth grade and ranged in age from 10-13. The ethnic composition of our study population was over 90% Hispanic, with the remainder of the students split between Caucasian and African American. We had a total of 29 participants, 13 males and 16 females.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass

	f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* The Usability of the Microsoft HoloLens for an Augmented Reality Game to Teach Elementary School Children
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	Game / Entertainment
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	a) WIMP b) 3D RAW object **c) <u>3D enhanced (with lights/shadow/texture)</u>**  Fig. 2. On the left is a screen shot from the HoloLens showing a virtual smartphone and virtual USB stick drive in game. On the right is a drawing that shows the layout of the classroom in which we ran our study. The rectangles and triangles represent tables and desks within the classroom. The yellow circle shows the starting position of the participant. The blue circle shows the position of the researcher. The small graphics represent the locations of holograms placed in the room.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#506
Title, Authors and Year	User interactions for augmented reality smart glasses: A comparative evaluation of visual contexts and interaction gestures; Kim M., Choi S.H., Park K.-B., Lee J.Y.; 2019
DOI	10.3390/app9153171
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Industrial Engineering* Minseok Kim, Sung Ho Choi, Kyeong-Beom Park and Jae Yeol Lee * Department of Industrial Engineering, Chonnam National University, Gwangju 61186, Korea * Correspondence: jaeyeol@chonnam.ac.kr; Tel.: +82-62-530-1782

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	No	Record Data	No
ET2	Usability	Inquiry	Overall usability	Yes	SUS	No
ET3	Usability	Inquiry	NASA-TLX aspects	Yes	NASA-TLX	No
ET4	Usability	Inquiry	User feedback	No	Interview	No

Extracted evidence from publication:

Ambos: Usabilidade, quando enfatiza métricas relacionadas a eficácia, eficiência e satisfação ou;

For the comparative evaluation of visual contexts and interaction gestures in the wearable AR environment, we designed two user studies. Three experimental tasks, such as (1) selection, (2) dragging and dropping, and (3) 3D matching, were designed to compare and evaluate the usability and task performance concerning the visual context and interaction gesture in wearable AR. Among the three

The experiments in Sections 4 and 5 were performed in a controlled laboratory environment. However, because there might be a difference between the controlled environment and the actual manufacturing environment, an additional qualitative evaluation was performed on industrial workers of a small and medium-sized company that assembles air conditioners and heaters, as shown in Figure 23.

For this real use case analysis, seven industrial workers (average age: 29.7 years old, SD: 3.59) participated in the experiment, and none of them had any prior knowledge of smart glasses. First, we explained the purpose of the experiment to the workers and presented the concept, methods, and functionality of devices, such as smart glasses, visual context, and interaction methods. Then, the workers experienced the task assistance manual required for the actual assembly through smart glasses. Besides, we showed related AR manufacturing services through videos and animations.

After the experiment, the workers were asked to fill out the questionnaire. We analyzed the cognitive load in performing manufacturing tasks since the real industrial field is different from a controlled environment, and wearable AR should not provide additional cognitive burden. We conducted another qualitative evaluation based on the validated questions from NASA task load index (NASA-TLX) (1: very low, 7: very high) [48]. Questions in the NASA-TLX questionnaire include (1) required-mental and perceptual activity, (2) required-physical activity, (3) time pressure felt, (4) hard to work, (5) successful in accomplishing goals, and (6) stressed. We also used these questions without any modifications. Details are shown in Reference [48]. According to the questionnaire analysis (Figure 24),

Through the experiment, quantitative and qualitative assessments of visual contexts and interaction gestures were conducted. For the quantitative evaluation, the completion time of each task was measured. After the completion of all the tasks, surveys and interviews were also conducted for qualitative evaluation. The questionnaire consisted of questions that were evaluated based on a 7-point Likert scale (1: strongly disagree, 7: strongly agree). In particular, we used all the questions from the System Usability Scale (SUS) [45] without any modification. SUS is well-known as an objective questionnaire for usability evaluation. We have not listed them in this paper. Figure 11 shows a

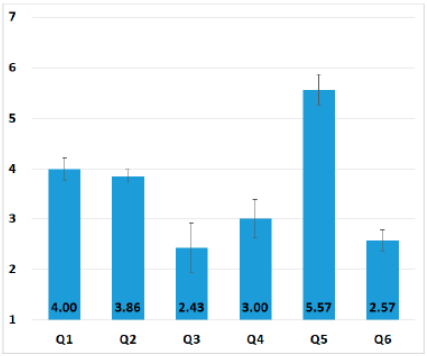
After the experiment, the workers were asked to fill out the questionnaire. We analyzed the cognitive load in performing manufacturing tasks since the real industrial field is different from a controlled environment, and wearable AR should not provide additional cognitive burden. We conducted another qualitative evaluation based on the validated questions from NASA task load index (NASA-TLX) (1: very low, 7: very high) [48]. Questions in the NASA-TLX questionnaire include (1) required-mental and perceptual activity, (2) required-physical activity, (3) time pressure felt, (4) hard to work, (5) successful in accomplishing goals, and (6) stressed. We also used these questions without any modifications. Details are shown in Reference [48]. According to the questionnaire analysis (Figure 24),

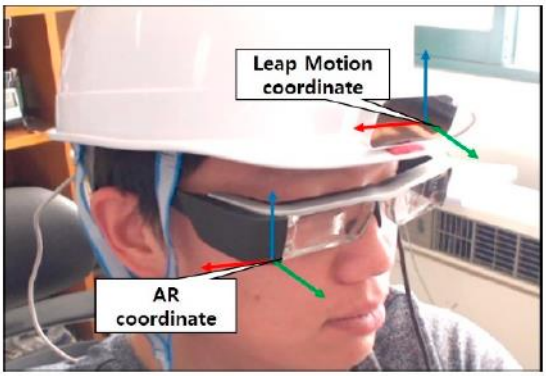
Bangor, A.; Kortum, P.; Miller, J. Determining what individual SUS scores mean: Adding an adjective rating scale. J. Usability Stud. 2009, 4, 114–123.

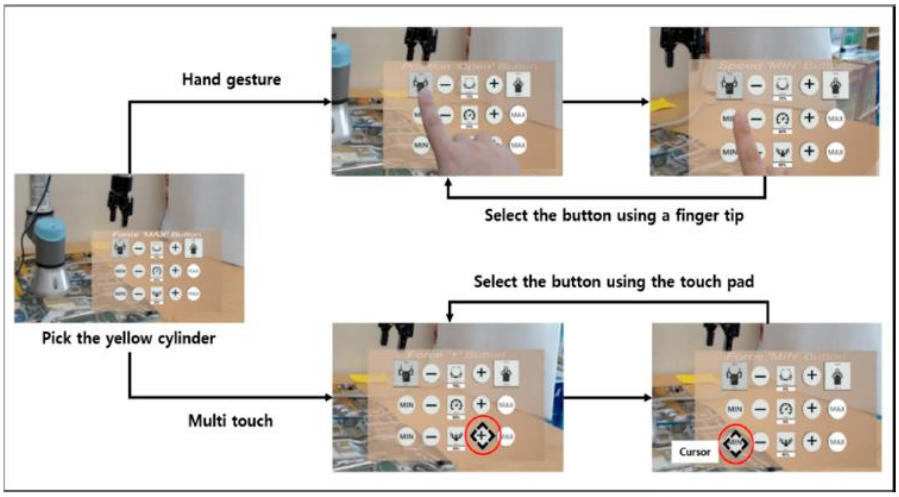
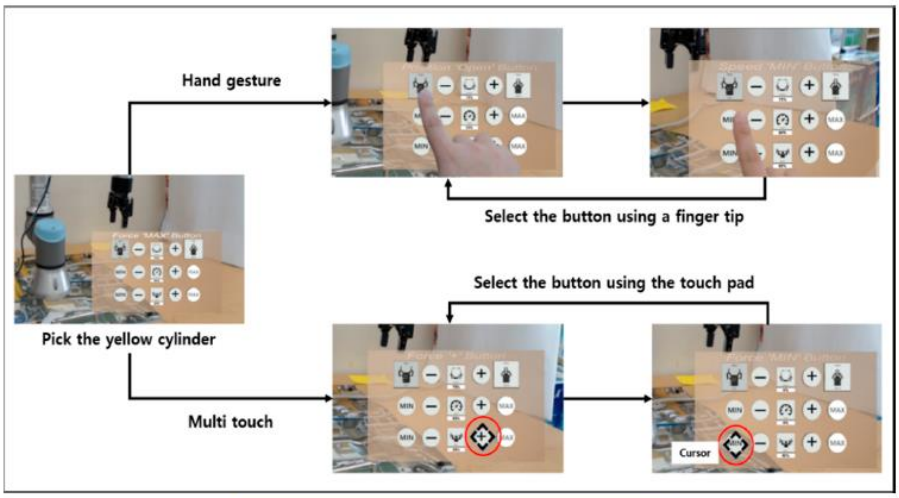
Hart, S.G.; Staveland, L.E. Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. Adv. Psychol. 1988, 52, 139–183

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	20 Twenty university students (fourteen males and six females) were recruited with an average age of 25.9 (SD = 1.25) in a controlled laboratory environment [44]. Four of them had experience in AR applications, two had experience in using Leap Motion, and the others had no such experience. Before
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>**

	Through the experiment, quantitative and qualitative assessments of visual contexts and interaction gestures were conducted. For the quantitative evaluation, the completion time of each task was measured. After the completion of all the tasks, surveys and interviews were also conducted for qualitative evaluation. The questionnaire consisted of questions that were evaluated based on a 7-point Likert scale (1: strongly disagree, 7: strongly agree). In particular, we used all the questions from the System Usability Scale (SUS) [45] without any modification. SUS is well-known as an objective The qualitative analysis was conducted based on the validated ten questions from the SUS questionnaire [45]. Summarized ten questions in the SUS questionnaire include (1) frequent system use, (2) unnecessarily complex, (3) easy to use, (4) need technical support, (5) functions well integrated, (6) too much inconsistency, (7) easy to learn, (8) very cumbersome, (9) confident using the system, and (10) need to learn many things beforehand. However, original questions without any modification were given to the subject and used for the questionnaire evaluation. Readers are referred to see the questions in Reference [45]. After the experiment, the workers were asked to fill out the questionnaire. We analyzed the cognitive load in performing manufacturing tasks since the real industrial field is different from a controlled environment, and wearable AR should not provide additional cognitive burden. We conducted another qualitative evaluation based on the validated questions from NASA task load index (NASA-TLX) (1: very low, 7: very high) [48]. Questions in the NASA-TLX questionnaire include (1) required-mental and perceptual activity, (2) required-physical activity, (3) time pressure felt, (4) hard to work, (5) successful in accomplishing goals, and (6) stressed. We also used these questions without any modifications. Details are shown in Reference [48]. According to the questionnaire analysis (Figure 24),  **Figure 24.** Evaluation result based on NASA-TLX of the real use case.
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) <u>Smart glass</u>** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Epson Moverio BT-200*

	4.2. Experimental Setup Epson's Moverio BT-200 was used as the AR smart glasses [6,10]. The transparent screen is located at the front of the user's view (eyewear-central), and a separate touchpad connected to the smart glasses is provided to enable multi-touch interaction. The wearable AR system was implemented using Unity3D [39]. We also used the Vuforia software development kit (SDK) [40] to track natural feature-based AR markers, which was used to overlay virtual objects onto the physical environment.
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Leap Motion* We used a Leap Motion sensor [41] as a depth sensor to track the user's actual hands to support the hand gesture interaction. As shown in Figure 8, the Leap Motion sensor was attached to the front of the safety helmet of the worker or the smart glasses, while the AR camera was embedded in the AR smart glasses. The absolute orientation algorithm [42,43] was used for the calibration of the two coordinate systems.  **Figure 8.** Difference between the wearable AR coordinate and the depth sensor coordinate.
SQ13. What is the purpose of the holographic solution?	Robot User Interface
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)

	 Figure 12. Selection task to operate the UR3 robot.  Figure 12. Selection task to operate the UR3 robot.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#0584
Title, Authors and Year	Investigating universal appliance control throughwearable augmented reality; Becker V., Rauchenstein F., Soros G.; 2019
DOI	10.1145/3311823.3311853
Is it a Brazilian work?	No

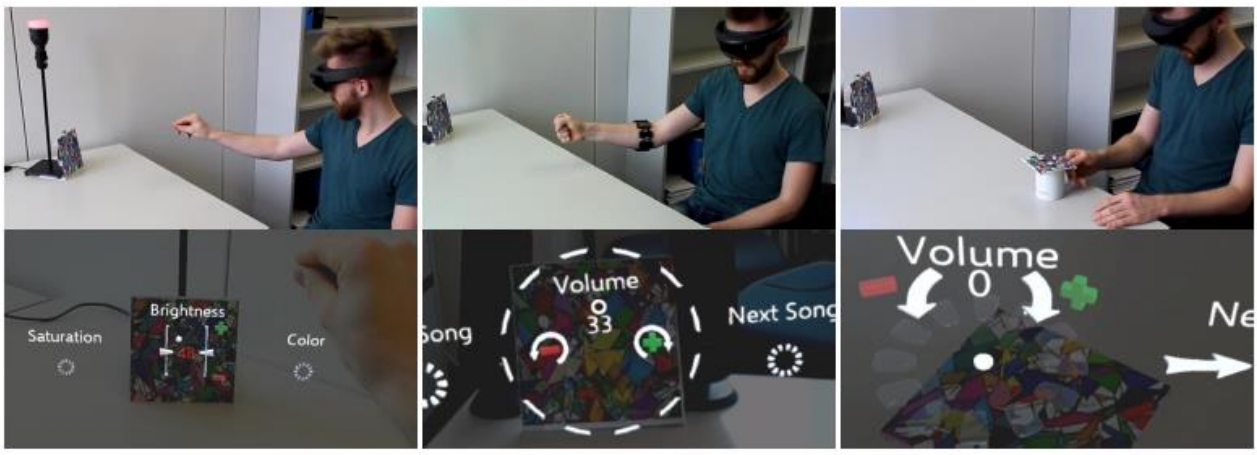
About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Vincent Becker, vincent.becker@inf.ethz.ch, Department of Computer Science, ETH Zurich, Switzerland Felix Rauchenstein, rafelix@ethz.ch, Department of Computer Science, ETH Zurich, Switzerland Gábor Sörös, gabor.soros@inf.ethz.ch, Department of Computer Science, ETH Zurich, Switzerland

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	Não	Record Data	No
ET2	Usability	Inquiry	Overall usability	Não		No
ET3	UX	Survey	UEQ Aspects: Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, Novelty	Sim	UEQ	No

Extracted evidence from publication:



(1) (2) (3)

pants were briefly instructed on the new type of interaction. After finishing with each scenario, the participants filled in a questionnaire on the scenario containing the following questions, each to be answered on a five-point Likert scale from "disagree" to "agree" with a score ranging from -2 to 2 with neutral score at 0:

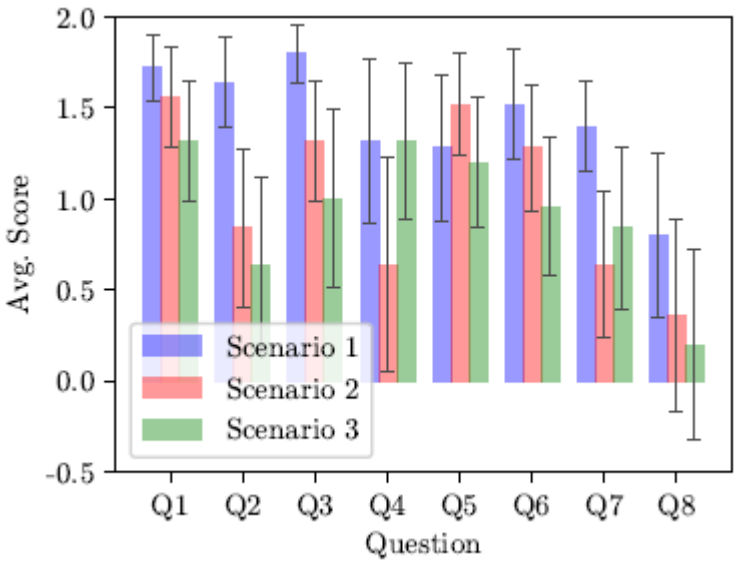
Q1 The way how to control devices was easy to understand.
Q2 It was fast.
Q3 It was appealing.
Q4 It was not physically demanding.
Q5 It was not mentally demanding.
Q6 I felt comfortable.
Q7 I felt that I was in control of the devices.
Q8 I can imagine to use this method in my daily life.

Besides, we measured the task completion time from the moment the investigator instructed the participant to perform a task until it was fulfilled. One entire session took around 45 minutes.

[15] B. Laugwitz, T. Held, and M. Schrepp. 2008. Construction and Evaluation of a User Experience Questionnaire. In *USAB '08*.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) Controlled experiment** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	25 *Participant Population.* We recruited five participants for the pilot study (average age 24.0 with a standard deviation of 1.9, ranging from 22 to 26, two females), whose data are not included in the results, and 25 further participants (average age 29.3 with a standard deviation of 9.7, ranging from 21 to 52, six females) for the actual study. 36% of the participants had previous experience with VR (virtual reality) and 16% had previous experience with AR applications (some had experience in both). The participants took part on a voluntary basis without compensation.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**



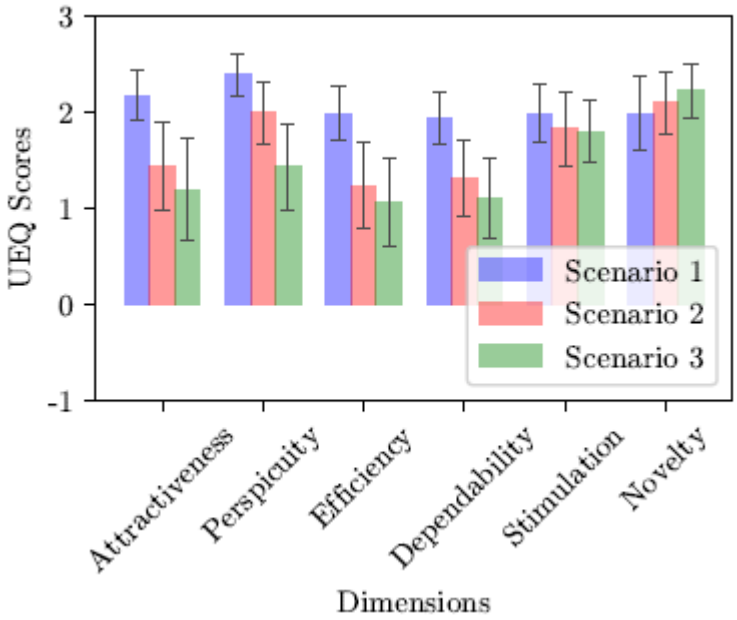
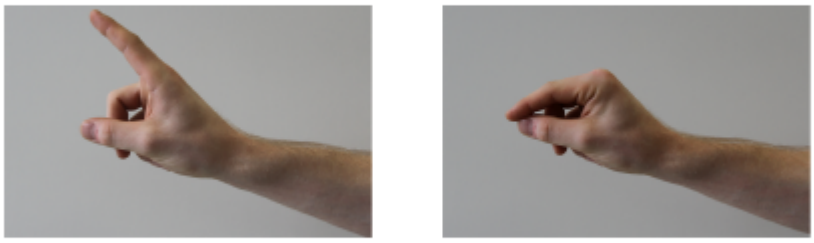


Table 1: Mean completion times for each measured task over all participants for each scenario.

	T1	T2	T3	T4	T5	T7	T9	T10	all
S1	31.8	9.0	21.2	3.5	3.6	1.2	8.4	1.6	10.0
S2	51.5	17.0	42.4	4.8	5.1	5.6	20.2	6.1	19.1
S3	41.1	12.3	32.6	4.0	4.9	5.4	17.6	4.2	15.3

even amazed at this new way of interaction. We received many comments, such as "It was a great experience", "So cool, this is amazing" and "I am mind-blown". Besides the general appeal, all participants found the system to be innovative.

SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* **4 IMPLEMENTATION** The main component of our system is a Microsoft HoloLens, which tracks the three appliances and the mug used in scenario 3 by detecting visual markers attached to them. We chose the HoloLens because at the time of the study, it was the only high-quality HMD which fulfilled our requirements of having a see-through display and robust and accurate inside-out tracking to place the interaction elements in space. For the recognition and tracking, we use the Vuforia SDK[1]. All the visual AR representations are implemented in Unity. In our prototype, the primitives are fixed for the specific
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	Interaction Study
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation

	Scenario 1. In the first scenario, we aim at a simple mode of control, composed of simple gestures and simple widgets, which allows for a direct interaction with the devices, i.e. the user will also look at the devices while interacting because the widgets are placed on the devices themselves. We use the predefined HoloLens gesture, pinching thumb and forefinger as depicted in Figure 3, as the only option for user input. The gesture is recognized by the HoloLens based on visual recognition. It can be used to click on an AR element by simply tapping as well as dragging an element by holding the closed form of the gesture as shown in Figure 1.1. This enables us to use virtual sliders and buttons as AR representations augmenting the real appliance, which the user can directly interact with. For example, we show a volume slider above a sound system. The user can select the volume level by looking at it and then employ the pinch gesture to hold and drag the slider and alter the volume level.  **Figure 3: Left: The beginning of the pinching gesture. Right: The gesture while holding a control element, e.g. a slider.**
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#0624
Title, Authors and Year	Head Mounted Display Interaction Evaluation: Manipulating Virtual Objects in Augmented Reality; Frutos-Pascual M., Creed C., Williams I.; 2019
DOI	10.1007/978-3-030-29390-1_16
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* DMT Lab, School of Computing and Digital Technology, Birmingham City University, United Kingdom maite.frutos@bcu.ac.uk

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Time to complete and accuracy	No	Record Data	No
ET2	Usability	Inquiry	NASA-TLX aspects	Yes	NASA-TLX	No
ET3	Usability	Inquiry	Overall usability	Yes	SUS	No
ET4	Usability	Inquiry	Perceived FOV, Hand Recognition, Tracking Accuracy, Preferred Interaction Method	No	Likert Scale	No

Extracted evidence from publication:

– **Precision metrics.** Precision metrics were defined as follows: *time to completion* as the time it took to complete the task and *accuracy* as the difference between the target and the interactive object at the end of the task. For move being a cube with the same colour surfaces.

– **Interaction metrics.** Interaction metrics were defined as the subjective metrics obtained from users using observation, NASA TLX [23], the System Usability Scale (SUS) [11] and a post-test questionnaire.

– **Post-Questionnaire.** Participants were asked to complete a post-test questionnaire to gain a better understanding of their preferred interaction paradigm. They were asked to rate the performance of each of the devices (Microsoft HoloLens v1 and Meta's Meta2), in terms of their perceived FOV, hand recognition, tracking accuracy and preferred interaction method.

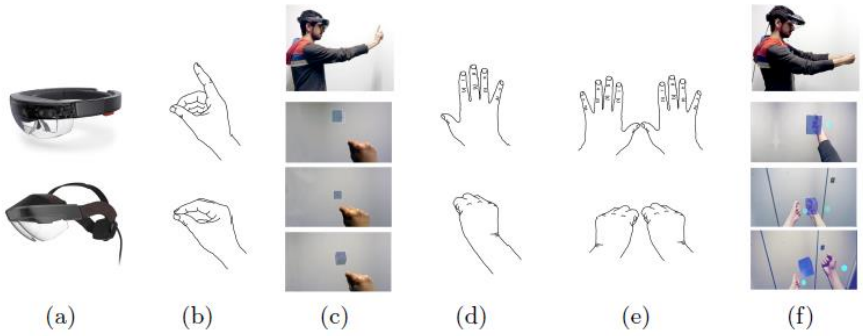
11. Brooke, J., et al.: Sus-a quick and dirty usability scale. Usability evaluation in industry **189**(194), 4–7 (1996)

23. Hart, S.G., Staveland, L.E.: Development of nasa-tlx (task load index): Results of empirical and theoretical research. In: Advances in psychology, vol. 52, pp. 139–183. Elsevier (1988)

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	20 **3.6 Participants** 20 right-handed participants (5 female, 15 male) from a population of university students and staff members were recruited to take part in this study. Participants' mean age was 28.05 (SD: 9.78).
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative – **Observations and feedback.** Twelve participants (60%) reported fatigue or pain during the metaphoric mapped interaction condition while 8 (40%) reported it during the isomorphic mapped interaction condition.
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens v1* *Metavision Meta2*

	3.2 Apparatus We built a custom experimental framework for the HoloLens v1 and Meta2 using Unity 2017.3, Windows Holographic platform[3] and the Mixed Reality Toolkit[4] for the HoloLens v1, and Meta2 SDK 2.7 [5] for the Meta2. C# was used as scripting language. – **Microsoft HoloLens v1.** The HoloLens v1 is a wireless, optical see-through stereographic AR HMD with a 30 × 17 Field of View (FOV). The device has built-in integrated Inertial Measurement Uni sensor, a depth camera, four environment understanding cameras, HD video camera enabling Mixed Reality capture and four microphones. It supports voice input, gesture recognition and head/gaze positioning tracking. It weights 579g, as per its specification description. – **Meta's Meta2.** The Meta2 is a tethered, optical see-through stereographic AR HMD with a 90 degrees FOV. The device has built-in hand interaction and positional tracking sensors, a 720p front-facing RGB camera, four surround speakers and three microphones. It natively supports hand tracking and head/gaze positioning tracking. It weights 500g, as per its specification description.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) RGB-D internal (built-in) camera** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens v1* *Metavision Meta2*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) Pointing** **b) Pantomimic** **c) Manipulation** – **Move Tasks.** Participants were asked to move a virtual interactive cube in the 3D space to match the position of a target. Three different move tasks – **Resize Task.** Participants were asked to uniformly resize a virtual interactive cube in the 3D space to match the size of a target. The task was to grow or shrink a 10 cm width x 10 cm height x 10 cm depth virtual cube to different target sizes. Target size distribution is shown in Figure 4 and target sizes are reported in Table 1. – **Rotate Task.** Participants were asked to rotate a virtual cube in the 3D space to match the rotation of a target. Target distribution is displayed in Figure 5 and specific target rotation values are reported in Table 1; covering roll (x axis rotation), pitch (y axis rotation) and yaw (z axis rotation) as described by [42] and a combination of the three (x, y and z axis rotation).
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) 3D RAW object** c) 3D enhanced (with lights/shadow/texture)

	 (a) (b) (c) (d) (e) (f) **Fig. 1.** Microsoft HoloLens v1 1(a) supports metaphoric interaction via the head/gaze and tap 1(b) 1(c). Meta2 1(a) supports a isomorphic interaction in both Manual 1(d) 1(f) and BiManual configurations 1(e) 1(f).
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#0703
Title, Authors and Year	Fast and precise touch-based text entry for head-mounted augmented reality with variable occlusion; Dudley J.J., Vertanen K., Ola Kristensson P.; 2018
DOI	10.1145/3232163
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Engineering Intelligent Interactive Systems Group / Cambridge Engineering Design Centre (EDC) https://www-edc.eng.cam.ac.uk/research/intelligentinteractivesystems/

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	No	Record Data	No
ET2	Usability	Inquiry	Performance, Effectiveness, Comfort	No	Likert Scale	No
ET3	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET4	UX	Survey	Participant Feedback	No	Interview	No

Extracted evidence from publication:

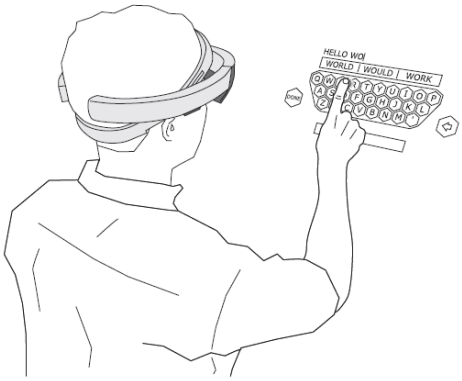


Fig. 1. Illustration of a user typing on the VISAR keyboard.

At the completion of both conditions, participants responded to three statements in a short questionnaire targeting their experience with the two conditions. The three statements are included in Table 2 and examined perceptions of typing speed, accuracy and comfort. Responses were recorded on a Likert scale from 1-strongly disagree to 5-strongly agree. The full response distribution is shown in Figure 9 while median scores are presented in Table 2.

Participant entry rates were recorded. Following the experiment, participants were also requested to complete a system usability scale (SUS) survey (Brooke 1996) targeting their experience of the system as a whole. A short semi-structured interview was also conducted to obtain participant feedback on the user experience in the spatial annotation exercise.

Entry rate (word per minute)

Error rate (character error rate)

Table 1. Entry Rate (wpm) and Character Error Rate (CER%) Descriptive Statistics from Experiment 1

Condition	Entry rate (wpm)	Error rate (CER)
BASELINE	5.86 ± 1.12 [3.92, 7.48]	1.10 ± 1.30 [0.00, 3.75]
VISAR	6.45 ± 1.83 [3.54, 9.60]	1.40 ± 1.48 [0.00, 4.59]

Results show mean ±1 standard deviation [min, max].

Perceptions of typing speed, accuracy and comfort.

At the completion of both conditions, participants responded to three statements in a short questionnaire targeting their experience with the two conditions. The three statements are included in Table 2 and examined perceptions of typing speed, accuracy and comfort. Responses were recorded on a Likert scale from 1-strongly disagree to 5-strongly agree. The full response distribution is shown in Figure 9 while median scores are presented in Table 2.

Table 2. Median Questionnaire Response to Questions 1 to 3 in Experiment 1

Statement		BASELINE	VISAR
Q1	The keyboard made it easy to type quickly.	2.5	4.0
Q2	The keyboard made it easy to type accurately.	4.0	2.0
Q3	The keyboard was comfortable to use.	3.5	3.0

Responses were recorded on a five-point Likert scale from 1-strongly disagree to 5-strongly agree.

SUS

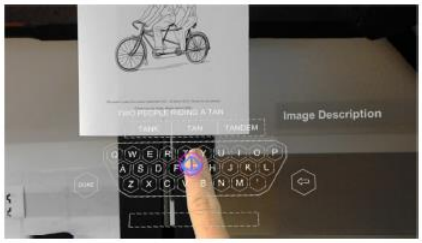
Participant entry rates were recorded. Following the experiment, participants were also requested to complete a system usability scale (SUS) survey (Brooke 1996) targeting their experience of the system as a whole. A short semi-structured interview was also conducted to obtain participant feedback on the user experience in the spatial annotation exercise.

John Brooke. 1996. SUS: A 'quick and dirty' usability scale. In *Usability Evaluation In Industry*. CRC Press, 189–194.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**c) <u>Yes</u>** a) No

SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12, 4 We recruited 12 participants for a single 1-hour session (4 female, 8 male). Participants received a £5 Amazon voucher in compensation for their time. We briefed participants on the experimental protocol and fitted them with the AR headset. The order of the two conditions was counterbalanced. Four participants were recruited for the study (four male). The experiment session lasted for approximately 1 hour and participants were compensated with a £10 Amazon voucher.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens*
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	*Keyboard input*
SQ14. Which are the types/styles of touchable gestures	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation

allowed by the solution?	 Fig. 27. A DESCRIPTION sub-task requiring the user to describe an image in four words or more.  Fig. 28. The keyboard appears after selecting the task, allowing the user to enter the description.
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)  Fig. 5. Appearance of the BASELINE keyboard condition as viewed through the HoloLens.  Fig. 6. Appearance of the VISAR keyboard condition as viewed through the HoloLens.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other Users continued to receive visual feedback of the detected touch intersection with the keyboard plane via the small circular marker indicating the most recent touch location. In the VISAR RE-

Data Extraction Form

Porifera ID	#0756
Title, Authors and Year	Interacting with Distant Objects in Augmented Reality; Whitlock M., Harnner E., Brubaker J.R., Kane S., Szafir D.A.; 2018
DOI	10.1109/VR.2018.8446381
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* https://cmci.colorado.edu/mattwhitlock/#!/home

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance (completion time, accuracy, number of attempted)	No	Record Data	No
ET2	Usability	Inquiry	Perceived effectiveness, overall usability, naturalness, concentration, frustration, social acceptability, user feedback	Yes, extends	SUS	No

Extracted evidence from publication:

4.4 Measures

We used three objective measures to capture user performance: completion time, accuracy, and the number of times participants attempted each interaction. We measured completion time as the time elapsed between the "Start" and "Done" commands for each task

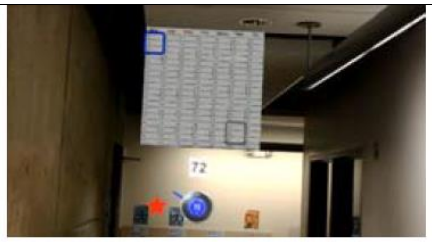
was used for post-hoc analysis.

Our subjective metrics described factors of perceived effectiveness and usability collected through four questionnaires: one for each modality and one comparing all three modalities. The modality questionnaire included a version of the System Usability Scale (SUS) with language modified to match our system implementation, 19 supplemental questions using 5-point Likert scales, and six free-response questions to gather data on frustration, intuitiveness of selection, rotation and translation. We constructed four scales from the subjective responses pertaining to naturalness, concentration, frustration, and social acceptability (Cronbach's $\alpha > .75$ for all factors). Our closing questionnaire collected perceptions of relative efficacy and preference across modalities as well as demographic information and data about participants' previous experience with relevant technologies. Scales were analyzed using a two-factor ANCOVA (modality and prior familiarity with AR) with modality ordering and distance ordering as random covariates and Tukey's HSD for post-hoc analysis. We analyzed rankings from the comparative questionnaire using a Wilcoxon Signed Rank Test. Questionnaires are available at cmci.colorado.edu/visualab/ARDistanceInteractions.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	20 **4.5 Participants** We collected data from 20 participants recruited from the local campus community (11 male, 9 female). Participants ranged in age from 18-65 years ($\mu_{age} = 21.3, \sigma_{age} = 6.0$). Participants reported low prior familiarity with AR ($\mu = 2.5$), the HoloLens ($\mu = 2.1$), and gesture input ($\mu = 2.4$); medium familiarity with voice-based inputs ($\mu = 3.2$); and high familiarity with Wiimote input ($\mu = 4.4$). All participants were native English speakers to avoid potential ambiguity around voice commands.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>** (Section 6)
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena

SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* **4.2 Apparatus** We conducted the experiment using a Microsoft HoloLens, a popular commercial see-through stereographic AR-HMD, with a 30° × 17° field of view. We leveraged the head-tracking, voice, and gesture tracking capabilities native to the HoloLens to assist with our interactions whenever possible to ensure reproducibility. Because the
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	IoT devices or appliance control
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)

	 (a) Initial Configuration  (b) Configuration after Selection  (c) Configuration after Rotation  (d) Configuration after Translation
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#0828
Title, Authors and Year	Ani-bot: A modular robotics system supporting creation, tweaking, and usage with mixed-reality interactions; Cao Y., Xu Z., Glenn T., Huo K., Ramani K.; 2018
DOI	10.1145/3173225.3173226
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution c) Validation Research d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Mechanical Engineering* Yuanzhi Cao; Zhuangying Xu; Terrell Glenn, Ke Huo, Karthik Ramani School of Mechanical Engineering, Purdue University, West Lafayette, IN 47907 USA [cao158, xu970, glenn3, khuo, ramani]@purdue.edu

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing (Preliminary)	Overall usability	Yes, full	Think Aloud	No
ET2	Usability	Inquiry (Session 1)	Easy of follow Can freely observe Active visual feedback MR NOT distracting Helpful to find solution Physiscal with virtual Time saving and risk-free Intuitive interaction Expressive UI Design Easy programming High controllability Clear visualization Easy to animate Environmental interaction	No	Likert Scale	No

Extracted evidence from publication:

Session 1: System Usability Evaluation

We designed four tasks for the first study session featuring the key functions of the system. We invited 10 users (7 male), 7 of them in the 20-25 age range and 3 in the 25-30 age range, with varies backgrounds. The goal of this study session was to evaluate the usability of the Ani-Bot system and explore the user experience of DIY robotics with MRI.

Session 2: Creating and Animating DIY Robots

The element of DIY is significant to Ani-Bot as the system is designed to support add-on DIY creativity by providing a modular platform and an effective method for controlling and programming. To evaluate this, we invited 10 users from diverse backgrounds for the second session of the study (7 male), with 8 of which in the 20-25 age range and 2 in the 25-30 age range.

Task 1:

Easy of follow (easiness)

Can freely observe

Active visual feedback

MR NOT distracting (distraction)



Figure 11. Task 1: Assembly guidance. Paper manual vs MR manual.

Feedback and Discussion. Due to the simplicity of this design, users were able to complete the assembly almost equally rapidly (less than 30 s) and accurately with both manuals. It is noted that the point of this task was not to systematically study the time efficiency and accuracy between the two approaches. Rather, we tried to focus on exploring the user experience of MR assembly guidance and compare it with the most commonly used paper manual method. From the post-study survey, most users (N=8) preferred the MR manual over the paper manual for assembly guidance. The two users who disagreed felt that the overlaying virtual model was distracting and they suggested a switch function to toggle the MR interface. *"I am having some trouble differentiating the virtual model from the real one (U2)."* However, they still admitted that the MR guidance for the DIY robot was useful (reporting 5 and 4). The assembly process included identifying the right module and putting it in the right location. Ani-Bot's MR system allows users to freely observe the guidance virtual model from different perspectives for module identification. One user disagreed with this because of the limited field-of-view of the HMD device. *"It is hard for me to see the whole guidance model without moving my head (U7)."* We found that the virtual feedback for confirming the assembly correctness was particularly appreciated by the users. *"The color*

Task 2:

Helpful to find solution (helpful)

Physical with virtual

Time saving and risk-free (efficiency, security)

Intuitive interaction (intuitiveness)



Figure 12. Task 2: Hands-on tweaking vs virtual tryout.

Task 3:

Expressive UI Design (ui appearance)

Easy programming

High controllability (controllability)

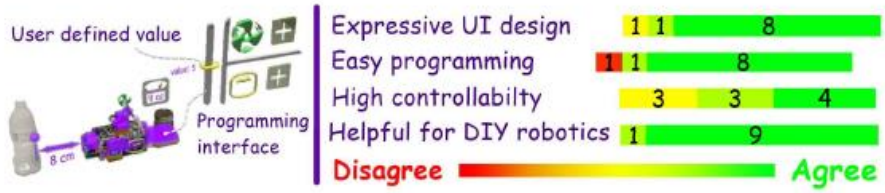


Figure 13. Task 3: Programming sensor driven events.

Task 4:

Clear visualization

Easy voice command

Easy to animate

Environmental interaction



Figure 14. Task 4: Creating mixed-reality keyframe animations.

Our preliminary system is demonstrated in Figure 2 with basic 'on-target' direct manipulating UI (Figure 6 (1)). We recruited 5 participants (3 male) who had substantial experience in DIY robotics and asked them to use the system. We encouraged the participants to think out loud. Also, a semi-structured post-study interview was conducted. We focused on investigating the design of a mixed-reality ready modular robotics kit, a coherent user interface, and appropriate interactions. After the study, we found that participants unanimously requested more modules with various structures and functionalities in order

tasks focusing on the three phases: **Creation**, **Tweaking**, and **Usage**. Users were given a questionnaire with Likert-type items and subjective questions after each task. Some of the

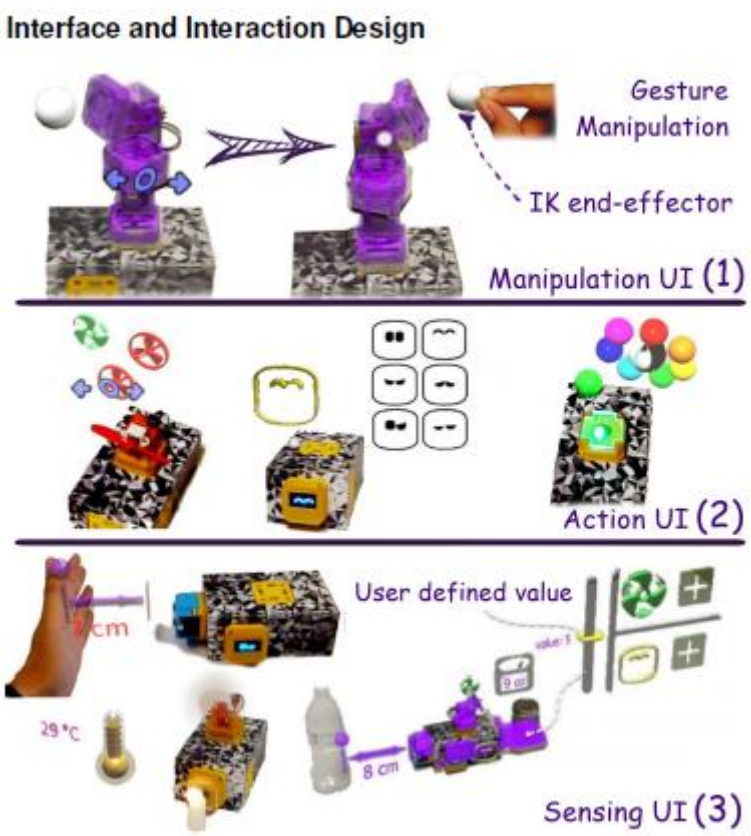
Summary. After this session, users generally agreed that the interaction of the system was intuitive and effective (avg=4.6) with well integrated functions that help to provide elevated user experiences in DIY modular robotics (avg=4.56). The System Usability Scale (SUS) survey was also deployed after the study session to evaluate the system with an average score of 83.25 and a standard deviation of 6.8, which indicated high usability of the proposed system.

Feedback and Discussion. From the post-study survey, we found that most users appreciated the system's coherent work-flow to create and animate the DIY robots. *"It was especially fun to make the cheerleader and then see her actually move and do things."* From our observation, we found that the idea of combining DIY with robotics really promotes users' interest in exploring more features and functionalities of the system. *"Just being able to add skin for a better appearance on my robots also encourages me to explore more designs and shapes."* During the ideation process, many users liked to test-play with multiple modules and put on the HMD to quickly test the animation performance.*"It responded well to what I wanted it to do."* The plug-and-play seamless user

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography e) Research-Action

SQ8.2. How many people participated in study?	20 **SYSTEM EVALUATION** To evaluate the Ani-Bot system, we invited 20 users to participate in our two-session user study (10 for each).
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**
SQ9. How was the holography designed in the study?	a) AR **b) MR** c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) Screen projection** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) Head-mounted-display (HMD)** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* **THE ANI-BOT SYSTEM DESIGN** **System Workflow** Ani-Bot embeds MRI with DIY modular robotics; the workflow is illustrated in Figure 3. All modules in the system have processing power and can be physically connected with each other to establish network communication. By organizing the configuration data from each device, the robot is aware of its own assembly configuration and sends the data to the AR headset (Microsoft HoloLens [4]) to generate the corresponding virtual model. By detecting and tracking an image marker (Vuforia [9]) on the Base Module, the virtual model is superimposed onto its physical target for the mixed-reality interaction. The kinematics data of the virtual model are constantly transmitted to drive the physical robot. In this way, users interact with the physical robot by manipulating the virtual representation from the view of the AR headset.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) RGB-D internal (built-in) camera** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*

SQ13. What is the purpose of the holographic solution?	*Robot User Interface*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation 
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#982
Title, Authors and Year	Ubii: Physical World Interaction Through Augmented Reality; Lin S., Cheng H.F., Li W., Huang Z., Hui P., Peylo C.; 2017
DOI	10.1109/TMC.2016.2567378
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 16, NO. 3, MARCH 2017 • *S. Lin, H.F. Cheng, W. Li, Z. Huang, and P. Hui are with the HKUST-DT System and Media Laboratory, Hong Kong University of Science and Technology, Hong Kong, China. E-mail: {sklin, hfchengab, weikaili, soaroc, panhui}@ust.hk.* • *C. Peylo is with the Deutsche Telekom AG Laboratories, Ernst-Reuter-Platz 7, Berlin 10587, Germany. E-mail: christoph.peylo@telekom.de.*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Task completion time, Success rate	No	Record Data	No
ET2	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET3	UX	Survey	Participant feedback	No	Open-ended quesions	No

Extracted evidence from publication:

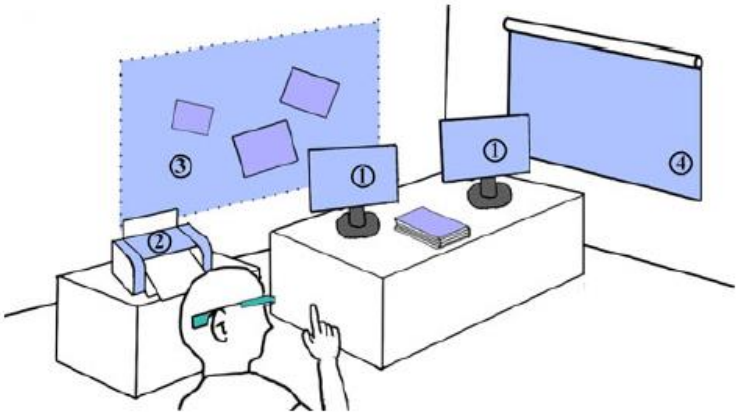


Fig. 1. Ubii enables users to perform in-situ interactions with physical objects using bare hands. Traditional operations such as file sharing, printing, or device pairing can be done just with a pair of smart glass and some defined hand gestures.

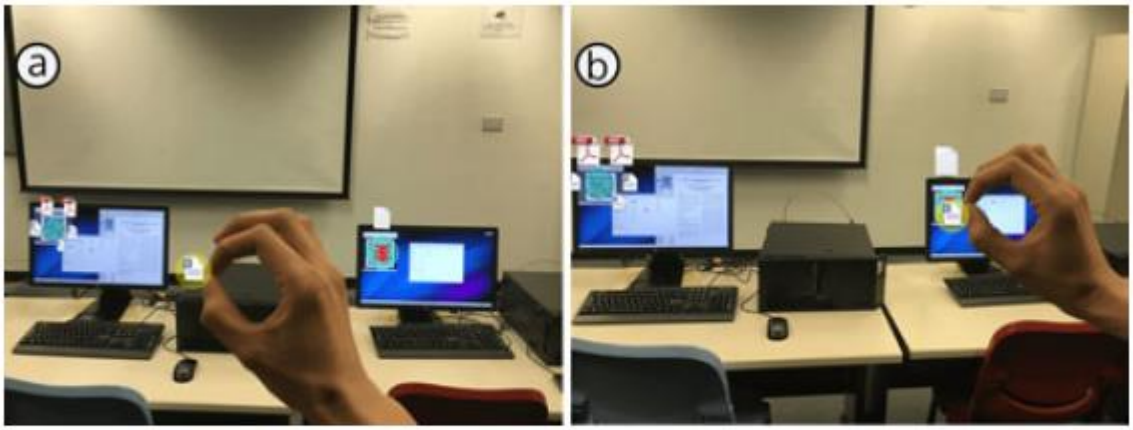


Fig. 2. (a) A user picks a document item from a computer and drags it towards another computer. The selected item is highlighted with a yellow circle around the virtual icon. (b) The user drops the document item onto the capture zone of another computer to finish document copying.

We evaluate the performance of Ubii from following areas:

1. *Task completion time*: For each given task, we measured the time taken for each participant to complete the task. The time taken using Ubii and the normal operation are recorded separately. If one operation method spends less time on a task, it is expected to be a indication that the method is the more efficient one. 2. *Success rate*: We measured the rate that user can complete the task without error in one attempt. An example of a failed attempt is transferring a wrong file from one device to another. Having a higher success rate indicates that the system is a more reliable, and more user friendly one.

3. *System Usability Scale* [52]: We measure the usability of Ubii with the System Usability Scale (SUS). SUS is a simple, subjective and effective way of accessing the usability of a system. The SUS score ranges from 0-100, and a higher score indicates greater usability of the system.

4. *Post-experiment questionnaire*: At the end of the experiment, participants were asked to express their ideas and comments by answering a few questions. The questionnaire includes open-ended questions (e.g., What is your overall experience of using Ubii?) for participants to leave their feedback.

3. *System Usability Scale*. To use SUS, participants are asked to score the following 10 items with one of five responses that range from Strongly Agree to Strongly disagree: [52]

Q1 I think that I would like to use this system frequently.
Q2 I found the system unnecessarily complex.
Q3 I thought the system was easy to use.
Q4 I think that I would need the support of a technical person to be able to use this system.
Q5 I found the various functions in this system were well integrated.
Q6 I thought there was too much inconsistency in this system.
Q7 I would imagine that most people would learn to use this system very quickly.
Q8 I found the system very cumbersome to use.
Q9 I felt very confident using the system.
Q10 I needed to learn a lot of things before I could get going with this system.

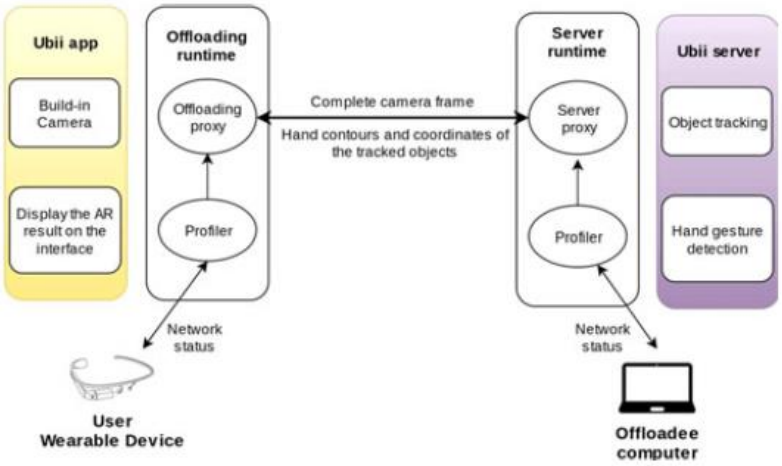
[52] J. Brooke et al., "Sus-a quick and dirty usability scale," *Usability Eval. Ind.*, vol. 189, no. 194, pp. 4–7, 1996.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No

SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	11 **5.3 User Evaluation** In this section, we tested and evaluated the practicality of using Ubii, and the feedback received from the testing users. 11 participants took part in the evaluation, they are students from the School of Engineering across different departments in the university. Seven participants are male and four participants are female, and their ages range from 19 to 31 (M = 26, SD = 4.24). All participants noted that they have no prior experience of using a Google Glass. Participants were invited to complete a series of task related to daily computer operations. Participants have to do each set of task twice using the Ubii system, and once using the traditional approach as a comparison. We showed the participants a simple video demonstrating how to operate Ubii. Instruction of the required tasks were also given. Each participant was given a pair of Google Glass. The experiment took place in our computer lab, in which three of the computers set-up for the participants. We also configured a printer, a screen projector, a Bluetooth speaker and two Android phones for the participants in the laboratory. Each device is attached with a QR code marker, which
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>** *4. Post-experiment comments.* Participants left different comments in the post-experiment questionnaire. Most noted that operating Ubii is a unique and refresh experience and is user-friendly. Many participants showed interest in seeing Ubii in the market in the future. Some specific comments by the participants are as follows: "Using hand gestures to control computers seems futuristic to me, and controlling a computer remotely looks cool. Just picking a specific file from the ring menu when there are too many files can be frustrating." "I like the idea and it's really more convenient for the simple tasks in the experiment." "Interesting experiment but sometimes I just want to sit down and use my computer. Standing still and dragging my hands around can be tiring." "Overall this is a novel concept. I'm just concerned with whether other users would be able to access all my files without my permission."
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other

SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) <u>Smart glass</u>** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Google Glass* **4 IMPLEMENTATION** Implementing our system requires technologies from fields of object tracking and hand gesture recognition. The physical marker-based method is used for both physical object tracking and camera pose evaluation. Two different approaches, including double-threshold algorithm, and pre-trained SVM with Bag-Of-Words model, are tried out and analysed for pinch gesture detection. Our work explores the synergetic benefits that go beyond the sum of multiple technologies to achieve our design goals. Fig. 6 shows the system work-flow. The built-in camera on Google Glass takes live videos of the scenes around users, which is streamed for image analysis of object tracking and hand recognition. The system extracts object information of IP address and object type from QR code, which is used for physical affordance recognition and network communication. Camera pose is also evaluated by calculating the homography of the QR code images. Virtual camera is updated according to the real camera pose to render 3D menus from corresponding viewpoint, making virtual menus align with surfaces of physical objects. Menus are rendered as AR overlays to blend with video stream, and then displayed on Google Glass display prism. Hand detection and pinch recognition are implemented with detailed descriptions in Section 4.2. Users are able
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera **b) <u>RGB internal (built-in) camera</u>** c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Google Glass + OpenCV*

	4.2 Hand Gesture Recognition Two approaches for hand detection and gesture recognition will be discussed in this section. The first one is the real-time contour-based method, mainly adopted by [28]. It is computationally easier, but less robust when the background is complex. The second method pre-trains an SVM classifier with Bag-Of-Words (BOW) model developed in [44], saving the classifier into XML file to support frame-wise pinch and non-pinch classification. *a. Real-time contour based recognition*  Fig. 15. The computation offloading process.
SQ13. What is the purpose of the holographic solution?	*Office: File Transfer, Pairing, Printing and Copying*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**

	dragging. Ubii integrates multiple hand gestures to support several types of freehand interaction: *Pick*: a pinch gesture (as illustrated in Fig. 5a) is interpreted as a pick operation. The pick operation should be performed on a menu item, otherwise it is invalid. *Drop*: an un-pinch gesture (as illustrated in Fig. 5b) acts as dropping the selected item. A pick operation should always finish with a drop operation. *Drag*: triggered when a directional gesture is performed with a pick operation (as illustrated in Fig. 5c). The selected item is moved along with directional gesture if only a single drag operation is acted. The drag interaction terminates whenever a drop operation happens. *Rotate*: a combined operation of two pinch gestures that move reversely along the Y direction on screen space (as illustrated in Fig. 5d). The interaction is used to rotate a ring menu which is located between the two pinch gestures. Relative distance is mapped as rotation angle. Rotation operation stops whenever either or both pinch gestures end.
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)  Fig. 3. (a) Dragging a shared file on a physical surface to own computer using Ubii. Virtual document icons are aligned with physical objects. (b) Pairing a bluetooth speaker to a mobile phone using Ubii.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1031
Title, Authors and Year	Touch and hand gesture-based interactions for directly manipulating 3D virtual objects in mobile augmented reality; Kim M., Lee J.Y.; 2016
DOI	10.1007/s11042-016-3355-9
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Industrial Engineering Department of Industrial Engineering, Chonnam National University, 500-757 Gwangju, South Korea

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Task completion time, failure rate	No	Record data	No
ET2	UX	Survey	Learnability, usefulness, easy of use, intuitiveness, natural behavior	No	Likert scale	No

Extracted evidence from publication:



Fig. 1 Touch and hand gesture-based interactions in mobile AR environment for object matching and assembly task



(a)

Fig. 13 Performance evaluation according to the device: (a) back, (b) front (Experiment 2)

A user study was conducted to evaluate the various aspects of the proposed touch and hand gesture-based interaction in the mobile AR. We made the following hypotheses,

- H_1: The touch and natural hand gesture-based interaction can provide faster and more accurate manipulation of AR objects than the multi-touch interaction and the vision-based interaction in terms of task completion time and failure rate.
- H_2: The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior.

O experimento um, tarefa 3, usava manipulação a mãos nuas (bare hand)

O experimento dois, comparou a performance da interação com o LeapMotion localizado atrás do tablet, o que, no meu entendimento, simularia a interação holográfica.

questionnaire to evaluate the qualitative aspects of the three approaches.

The experiment 2 was carried out to compare the performance of the proposed approach at different Leap Motion sensor locations as shown in Fig. 13 (e.g., the sensor can be attached to the back or front of the mobile device). The participants performed the same 3D object matching task. Indirect hand interaction was used since the direct hand interaction cannot be supported when the sensor is attached at the front of the mobile device. The purpose of this experiment was also to determine the difference in the performance between different locations of hand gestures.

Record:

- task completion time

- failure rate

H_1: The touch and natural hand gesture-based interaction can provide faster and more accurate manipulation of AR objects than the multi-touch interaction and the vision-based interaction in terms of task completion time and failure rate.

model is exactly matched with the target model. Each participant performed the 3D object matching task of the experiment four times. The mean value of the performance of each participant was recorded. After the experiment, the participants were asked to complete a questionnaire to evaluate the qualitative aspects of the three approaches.

Aspects: Natural Interaction, ease of use, usefulness.

- easy to learn
- easy to use
- useful
- intuitive
- natural

H_2: The proposed interaction can lead to a better user experience with respect to learnability, usefulness, ease of use, intuitiveness and natural behavior.

aspects evaluated involve human engagement such as feedback and experience by analyzing responses to questionnaire after users perform given tasks. User experience and preference have been measured in terms of natural interaction, ease of use, and usefulness.

Readers are referred to see the details of the ANOVA in the reference [1].

While performing the experiment 1, quantitative and qualitative evaluations were conducted to compare the proposed approach with the vision-based interaction and the multi touch-based interaction in terms of task completion time and failure rate. As shown in Fig. 15, a significant

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	20 *5.2.1 Experimental design* First of all, three essential experiments were performed. A total of 20 participants are recruited (15 male and 5 female students). Among them, 11 students have previous experience in augmented reality. Prior to the experiments, the hardware and software used in the study were introduced, including mobile AR, Leap Motion, etc. The participants were then given a demonstration of each task and were asked to attempt the task several times.

SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display **c) <u>Smartphone or tablet</u>** d) Head-mounted-display (HMD) e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Samsung Galaxy Tab S 10.5* **5.1 System implementation** AR tracking has been implemented over a natural feature tracking library, Vuforia, which supports Android-based apps [31]. Samsung Galaxy Tab S 10.5 was used as an experimental mobile device. Currently, the Leap Motion sensor is linked to a computer instead of a mobile
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Leap Motion*
SQ13. What is the purpose of the holographic solution?	*Assembly*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1099
Title, Authors and Year	Gesture-based interactive augmented reality content authoring system using HMD; Shim J., Yang Y., Kang N., Seo J., Han T.-D.; 2016
DOI	10.1007/s10055-016-0282-z
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* [1] Department of Computer Science, Yonsei University, 50, Yonsei-ro, Seodaemun-gu, Seoul 03722, Korea

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	Usefulness, ease of use, ease of learning, satisfaction	Não	Likert Scale	No

Extracted evidence from publication:

Usefulness

Ease of use

Ease of learning

Satisfaction

of the mobile device.

The experiment conducted in each environment was divided into three parts: (1) a touch recognition rate experiment of the touchable area in the HMD-based AR environment; (2) a gesture recognition rate experiment provided in the HMD-based AR environment; and (3) a fixed-monitor-based AR environment. Comparative analysis was subsequently performed using four features common to all three AR environments: usefulness, ease of use, ease of learning, and satisfaction (Lund 2001). A total of 30 questions were asked of the participants in the four categories. The major item, usefulness, was assessed by how well the system authored AR content and how useful the system that enabled AR content and interaction was for the users. The second, ease of use, assessed how fast and easy it was to author AR content and to operate the system. The third, ease of learning, assessed how easy it is to learn the method for authoring AR content with the interface and the method for interacting with AR content. The fourth, satisfaction, assessed how satisfied the users were with the system. For the final assessment, we conducted a one-way Analysis of Variance (ANOVA) test as a comparative experiment for mobile, fixed monitor, and HMD-based AR environments. A *t* test was carried out as post hoc analysis for each environment. We classified it according to the Likert scale, with values ranging from one (most negative) to seven (most positive).

Table 1 Simple experimental tasks and activities carried out by the participants

Experiment	Activities
Task 1: Authoring AR content	(1) Connect virtual object to marker by way of the interface
	(2) Apply interactions to AR content
	(a) Select tangible interaction
	(i) Merge or (ii) click
	(b) Select gesture-based interaction
	(i) Enlarge/shrink, (ii) rotate, or (iii) transfer
Task 2: Interacting with AR content	(1) Augment virtual object by executing AR content
	(2) Perform tangible interaction
	(3) Perform gesture-based interaction

5.2.3 Result of usability experiments

In Task 1 of the experiment, the participants created and assessed AR content with the authored interactive AR content provided in the respective AR environments. Task 2 involved the participants performing and assessing interaction with AR content (Lund 2001). Table 2 displays the one-way ANOVA test results for each AR environment divided into four categories. It shows that there is a significant difference between the ANOVA test result values in all the respective categories.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	28 **5.2 Experiments** *5.2.1 Design of the experiments* We invited 28 students to participate in our experiment: 18 males and 10 females, ages ranging from 21 to 34 years. Among the participants, seven majored in computer science, and four of them had experience with AR technology. We showed the participants video clips of each environment before the experiment and let them practice with demo applications for between 30 min and 1 h with each application. We provided the participants with three environments: our proposed HMD-based AR environment, a fixed-monitor desktop PC AR environment (Shim et al. 2014), and a mobile AR environment. All three AR environments were prototyped from the same system to perform all tasks (outlined in Table 1 and depicted in Fig. 8).
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena

SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Oculus Rift VR HMD* **5 Implementation and experimental evaluation** **5.1 Implementation** We implemented the system in a general office environment with illumination less than 900 lx. The system used in the experiment, shown in Fig. 7, was a video see-through HMD prototype, comprising an RGB-D camera, and SoftKinetic (model DS325) connected to an Oculus Rift VR HMD. The Oculus Rift had a resolution of 1280 × 800 (720p) and provided 640 × 800 resolution in each eye. The RGB-D camera (model DS325) had a resolution of 320 × 240. The display was designed so that it could be enlarged in accordance with the HMD display, depending on the experiment's respective participants, through calibration seen on the HMD—or adjusted to counter any dizziness or eyestrain reported by participants. The desktop PC was equipped with a quad core 3.4 GHz CPU and 12 GB RAM. The size of the marker provided for the participants in the experiment was 80 × 80 mm. The participants interacted with the system by recognizing the marker and their hands with the RGB-D camera, and performing the tasks requested.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera **e) <u>RGB-D external camera</u>**
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*SoftKinect DepthSense DS325 RGB-D*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**

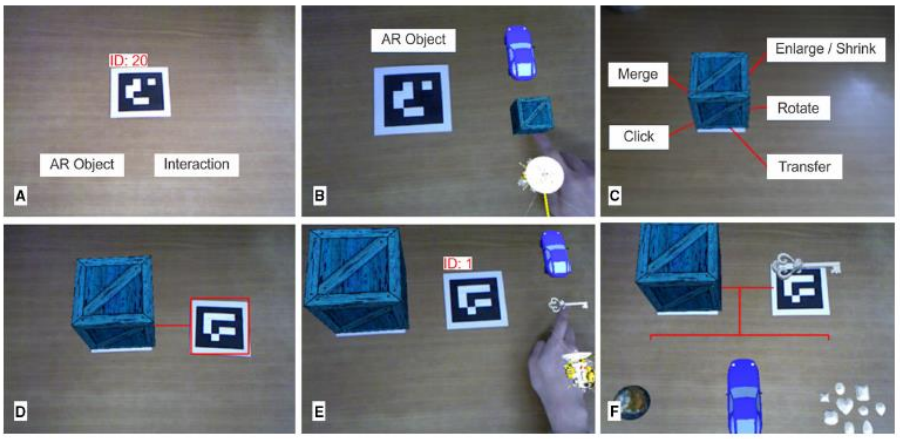
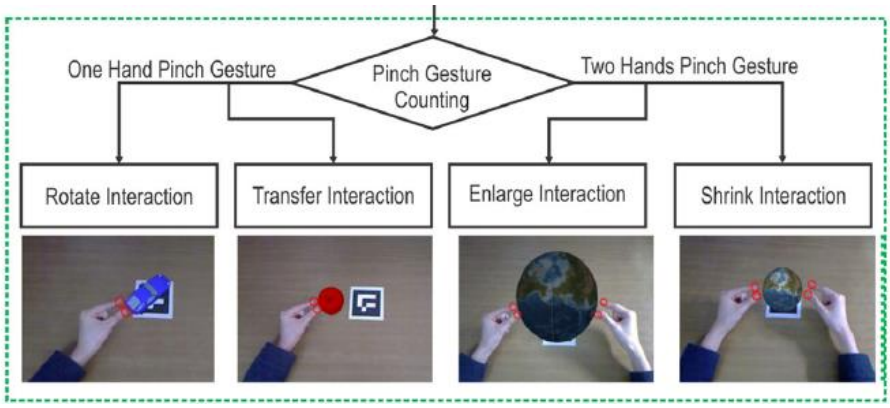
<table>
<tr><td></td><td>


Fig. 4 Authoring AR content interface: a marker is perceived, b selecting an augmenting object to the marker, c selecting interaction applying to the object, d connecting the second marker in case of merge interaction, e selecting an augmenting object for the second marker, f selecting an object authored through merge interaction



</td></tr>
<tr><td>SQ15. Which is the image quality of the touchable hologram?</td><td>a) WIMP
b) <u>3D RAW object</u>
c) 3D enhanced (with lights/shadow/texture)</td></tr>
<tr><td>SQ16. Is there feedback for the touch action? Which it is the means?</td><td>a) No
b) <u>Yes, visual.</u>
c) Yes, auditive.
d) Yes, haptic (describe).
e) Other</td></tr>
</table>

Data Extraction Form

Porifera ID	#1102
Title, Authors and Year	Usability Evaluation of a Wearable Augmented Reality System for the Enjoyment of the Cultural Heritage; Brancati N., Caggianese G., Pietro G.D., Frucci M., Gallo L., Neroni P.; 2016
DOI	10.1109/SITIS.2015.98
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* *Institute for High Performance Computing and Networking, National Research Council of Italy (ICAR-CNR), Naples, Italy*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	possible impressions of her/his experience (intentions and possible difficulties)	Yes, full	Think Aloud	No
ET2	Usability	Inquiry	Overall usability	Yes, full	SUS	No
ET3	UX	Survey	attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty	Yes, full	UEQ	No
ET4	Usability	Inquiry	usefulness, ease of use, ease of learning, satisfaction perceived	Yes, full	USE	No
ET5	Usability	Inquiry	physical effort required to use the system, the velocity and the accuracy of the system, the general physical comfort and finally a general evaluation of the perceived usability, mental effort	Yes, full	DAQ, ISO 9241-9:2000 part 9 annex C	No

Extracted evidence from publication:

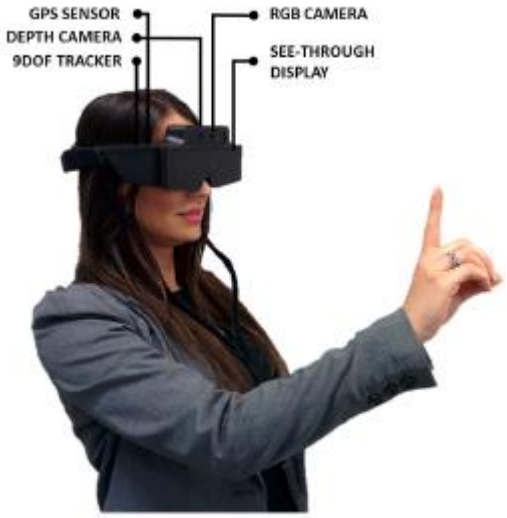


Figure 1. The wearable AR system.

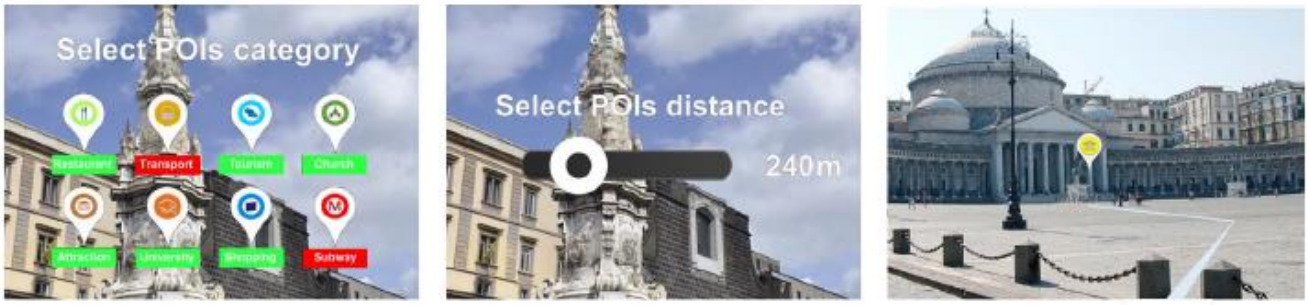


Figure 2. The control menu of the WAR system and the visualization of navigation aids and distance to reach the selected POI.

aid for one of the POIs visualized at that moment. No time limit was imposed on the participants during the use of the system; each user's interactions were observed to collect all the possible impressions of her/his experience and with the aim of better collecting information, all the participants were asked to think aloud, describing their intentions end possible difficulties. The test session was followed, systematically, by the request to compile four different questionnaire. As in the test session, no time limit was imposed on the completion of the proposed questionnaires. However, the participants were asked to give quick instinctive answer to the question rather than thinking about items for a long time. If they were undecided on the answer, they were asked to insert an average score.

The questionnaires used to measure both the usability and the user's experience are five (or seven) point Likert-scale questionnaires [21] structured to fulfill all of the criteria listed by Ubersax [22]. The participants answered the questions in a scale, generally, from 1 (very low) to 5 (very high) . In detail, the users were asked to complete four different questionnaires, the first a System Usability Scale (SUS) [23], which allows you to obtain a rapid evaluation of the system interaction expressed as a single number which ranges from 0 to 100; the second a User Experience Questionnaire (UEQ) [24] focused on the evaluation of some specific parameters such as attractiveness, perspicuity, efficiency, dependability, stimulation, and novelty (in this case the Likert-scale goes from 1 to 7); the third a Usefulness Satisfaction and Ease of Use Questionnaire (USE) [25], with which it is possible to test the usefulness, the ease of use, the ease of learning, and the satisfaction perceived by the users with the system; and, finally, the Device Assessment Questionnaire (ISO 9241-9:2000 part 9 annex C) [26] with which it is possible to test also the physical and mental effort required of the user during the interaction with the system.

[23] J. Brooke, "Sus: A quick and dirty usability scale," in *Usability evaluation in industry*, P. W. Jordan, B. Weerdmeester, A. Thomas, and I. L. Mclelland, Eds. Taylor and Francis, 1996.

[24] B. Laugwitz, T. Held, and M. Schrepp, "Construction and evaluation of a user experience questionnaire," in *HCI and Usability for Education and Work*, ser. Lecture Notes in Computer Science, A. Holzinger, Ed. Springer Berlin Heidelberg, 2008, vol. 5298, pp. 63–76.

[25] A. M. Lund, "Measuring usability with the use questionnaire," *Usability interface*, vol. 8, no. 2, pp. 3–6, 2001.

[26] S. A. Douglas, A. E. Kirkpatrick, and I. S. MacKenzie, "Testing pointing device performance and user assessment with the iso 9241, part 9 standard," in *Proceedings of the SIGCHI conference on Human Factors in Computing Systems*. ACM, 1999, pp. 215–222.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No

SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) <u>Case Study</u>** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	35 III. USER STUDY In order to perform a qualitative evaluation of the proposed natural user interface of the WAR System for the enjoyment of the cultural heritage, we conducted a user study in out-of-lab settings during a three day exhibition in the city of Naples. *A. Participants* The usability evaluation involved 35 non-skilled unpaid volunteers. The participants' age ranged from 21 to 70 years old, with 19 of them under 28 years old and an average age of 31.85. Moreover the group was composed of 20 male and 15 female and all of them were right-handed.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) <u>Smart glass</u>** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Meta 1 Developer Kit*

B. Hardware components

In order to realize such a system we used one of the first integrated wearable devices specifically devoted to AR and available off-the-shelf. The META 1 Developer Kit [16] integrates in a single device a WAR display, a low consumption 3-axis inertial sensor and a RGB-D camera. In more detail, the WAR system has been realized by integrating an augmented reality eye-wear equipped with a binocular see-through display with a FOV of 23°, together with an RGB-D sensor that allows you to capture RGB images using a standard CMOS sensor (Figure 1). The RGB sensor specifications are a horizontal FOV of 63.2°, a 49.3° vertical FOV and a HD resolution at 720p. The user's head movements are tracked by using the inertial sensors embedded in the device with 3 degrees of freedom



META

META 1 Developer Kit

$667.00

Get It »

Meta's product, Spaceglass, is a headset that will expand how we see and interact with the world through augmented reality. Using multiple tracking sensors, Spaceglass will allow us to control our environment through voice and hand motions. Meta 1 Developer Kit is available for pre-order for $667.00.



SQ12. Which technology type was used to	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera

interaction detection (touch)?	**d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*META 1 Developer Kit*
SQ13. What is the purpose of the holographic solution?	Points of interest visualization
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1228
Title, Authors and Year	Augmented Reality System for the Visualization and Interaction with 3D Digital Models in a Wide Environment; Caruso G., Carulli M., Bordegoni M.; 2015
DOI	10.1080/16864360.2014.949579
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Politecnico di Milano Giandomenico Caruso[1], Marina Carulli[2] and Monica Bordegoni[3] [1]Politecnico di Milano, giandomenico.caruso@polimi.it [2]Politecnico di Milano, marina.carulli@polimi.it [3]Politecnico di Milano, monica.bordegoni@polimi.it

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	Quality of the visualization, stereoscopic issues, task easiness, tracking quality, tracking delay, perspective image quality, coherence of the perspective during the head movements	No	Likert Scale	No

Extracted evidence from publication:

Quality of the visualization

Stereoscopic issues

Task easiness

Tracking quality

Tracking delay

Perspective image quality

Coherence of the perspective during the head movements

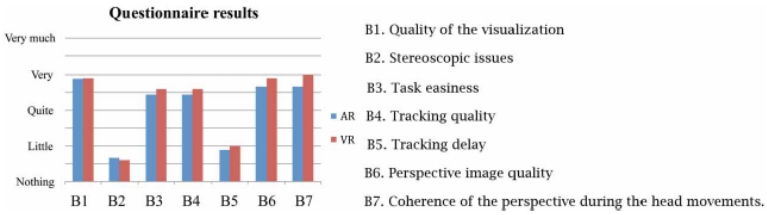


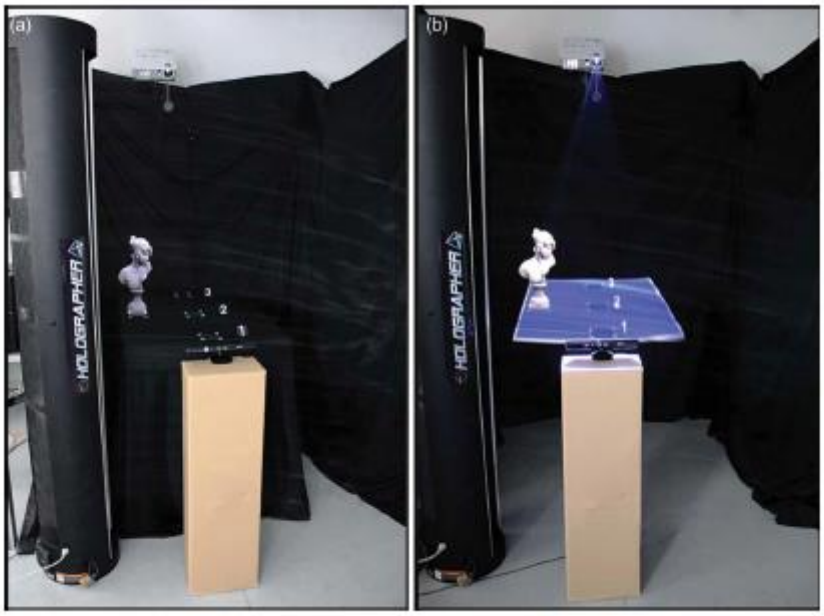
Fig. 8: Average values collected in the main sections of the questionnaire for the two different test variants.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action each task performed by the users, the coordinates o the obtained displacements, and the number of steps made to reach the target have been recorded. All these quantitative data have been used in the evaluation process of the variants of software application. The sequences of movements have been organized so as not to require consecutive displacements on the same target and have been also randomized to be different for each user. In this way, it was possible to prevent that the activities were subject to an improvement determined by the repetition and this has allowed the authors to analyze the learning activities more objectively. The test results have been then extensively analyzed. Besides, at the end of the test, each user was asked to fill in a short questionnaire in order to evaluate the usability of the developed system on the basis of both objective and subjective data
SQ8.2. How many people participated in study?	44 Forty-four people participated in the testing sessions. The participants were split into two heterogeneous groups. The data collected in the first testing session allowed making some software tuning, and also better defining the rules for the implementation of the second group of testing. In both testing sessions, users have attended a
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative

SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	a) Screen projection **b) <u>Physical optical phenomena</u>**
SQ11. Which technology type was used to reproduce the holography?	**a) <u>Fog screen + projector</u>** b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Fog Screen + NEC V300X + Shutter glasses from 3D Vision kit by NVIDIA* 2. FOG SCREEN DISPLAY TECHNOLOGY The AR system developed by the authors uses as projection element a thin layer of fog. This displa technology, commercially named FogScreen® wa patented in 2004 [12]. This kind of display syste is also called "intangible display" and is produce in different sizes and configurations. The commo functioning principle is based on the rear-projectio of images on a thin layer of fog. This type of di play allows obtaining images that appear floating i mid-air and can be easily crossed by the user's bod The operating principle makes this screen mainl usable in indoor environments (requiring the absenc of strong air movements), allowing a good quality the projected images and a wide viewing angle.

	3.1. System Architecture The architecture of the Fog Screen AR system is quite simple, since it is made up of commercial devices that ensure an easy management by means of stable software libraries. The Fog Screen device, which has been used to implement the system, is made up of a single vertical unit containing the piezoelectric ultrasound transducers and the ventilation system necessary to create the lamina of dry mist. The overall height of the unit is 220 cm and it produces an available display surface of 215 × 190 cm. The stereoscopic visualization is provided by a stereoscopic projector and active shutter glasses. The Fog Screen technology allows for a stereoscopic viewing with polarization, shutter glasses or any other stereoscopic method. After conducting some preliminary tests, the shutter glasses solution was preferred. Indeed, thanks to the shutter glasses, it is possible to have brighter and sharper images. The stereoscopic projector used is the Nec V300X [8], which is empowered by 3000 lumens provides bright and high-contrast images. The shutter glasses used are the 3D Vision kit by Nvidia [9]. The kit allows the development of applications based on Microsoft XNA Framework [5], which have been used to develop the software module that manages the whole AR system. The 3D Vision kit consists of shutter glasses remotely controlled by an IR emitter connected via USB to the computer. The tracking and the gesture recognition functions are managed by the MS Kinect device. This device does
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera **e) <u>RGB-D external camera</u>**
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Kinect*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation

SQ15. Which is the image quality of the touchable hologram?	d) WIMP **e) <u>3D RAW object</u>** f) 3D enhanced (with lights/shadow/texture)  Fig. 3: The two different setups designed for the testing sessions: (a) AR setup, (b) VR setup.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1246
Title, Authors and Year	Design and evaluation of freehand gesture interaction for light field display; Adhikarla V.K., Jakus G., Sodnik J.; 2015
DOI	10.1007/978-3-319-20916-6_6
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Electrical Engineering* Vamsi Kiran Adhikarla Researcher, Pazmany Peter Catholic University Verified email at itk.ppke.hu - Homepage Jaka Sodnik Professor of Electrical Engineering, University of Ljubljana Verified email at fe.uni-lj.si - Homepage Human-computer interaction Acoustics Web Technologies Driving simulation

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	task completion times	No	Record Data	No
ET2	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA-TLX	No
ET3	UX	Survey	UEQ Aspects	Yes, full	UEQ	No

Extracted evidence from publication:

The study design was within-subject. Each participant was asked to perform 11 trials within each condition. In each trial, three tiles of the same size were displayed simultaneously and the participant was asked to touch the surface of the red tile as perceived in space (Fig. 4). The positions of the tiles varied from trial to trial to cover the FOV of the display.

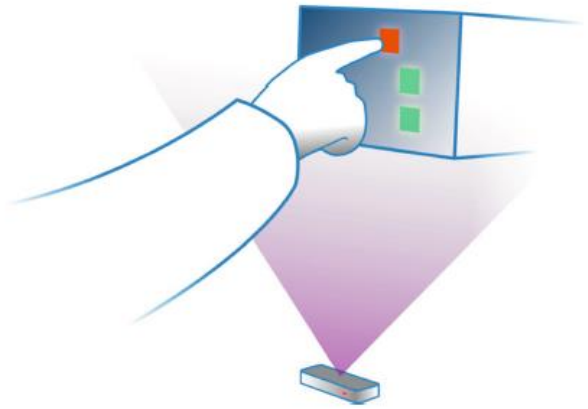


Fig. 4. The interaction with the content rendered on the light field display (Color figure online).

- task completion times;

- cognitive workload (NASA TLX)

The main variables measured in the experiment were:

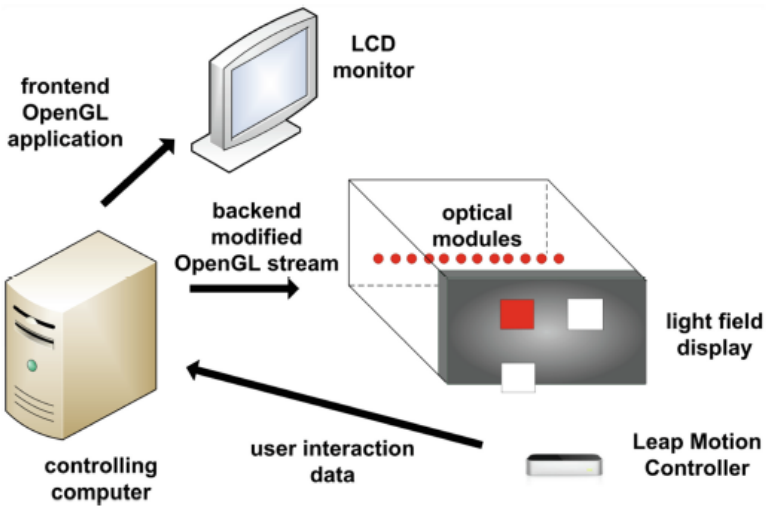
- task completion times;
- cognitive workload (measured through NASA TLX questionnaire);
- UEQ (User Experience Questionnaire) on the perceived user experience.

16. Hart, S.G., Staveland, L.E.: Development of a multi-dimensional workload rating scale: results of empirical and theoretical research. In: Hancock, P.A., Meshkati, N. (eds.) Human Mental Workload, pp. 139–183. Elsevier, Amsterdam (1988)

17. Laugwitz, B., Held, T., Schrepp, M.: Construction and Evaluation of a User Experience Questionnaire. Springer, Heidelberg (2008)

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12 **3.2 Test Subjects and Groups** A total of 12 test subjects (5 female and 7 male) participated in the study. The average age of the participants was 27 years and ranged from 20 to 36 years. All participants reported to have normal or corrected to normal sight.

SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	a) AR b) MR c) VR **d) <u>Other: Light Field Display (LFD)</u>**
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector **b) <u>Holographic display</u>** c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass f) Other **3.3 Technical Setup** A small-scale prototype light field display developed by Holografika was used for the study. The FOV of the display was comparable to the tracking volume of the LMC. The light field display was placed at the participants' eye-level at a distance of approximately 50 cm from the viewer. The gesture input was tracked by LMC placed on the table in front of the display. Figure 5 shows the technical setup. The controlling PC hosts two applications. The frontend OpenGL application renders content for 2D LCD display and also communicates with LMC in real-time in order to receive and process user interaction commands. The second application (backend wrapper) generates a modified stream for light field rendering and tracks the commands in the current instance of OpenGL (frontend application).  Fig. 5. Technical setup
SQ11.1 What is the manufacturer and model of used devices for projection?	*Holografika* https://holografika.com/
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera

	e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Leap Motion*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1257
Title, Authors and Year	WeARHand: Head-worn, RGB-D camera-based, bare-hand user interface with visually enhanced depth perception; Ha T., Feiner S., Woo W.; 2014
DOI	10.1109/ISMAR.2014.6948431
Is it a Brazilian work?	Não

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) Validation Research** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	Others *Ubiquitous Virtual Reality Lab* http://uvrlab.org/

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	task completion, distance error, completion time, clutching count (number of grasping motions)	No	Record Data	No
ET2	Usability	Inquiry	Accuracy, speed, easiness, perception	No	Likert Scale	No

Extracted evidence from publication:

Performance

- task completion
- distance error
- completion time
- clutching count (number of grasping motions)

Subjective (Likert 1-5)

- accuracy
- speed
- easiness
- perception

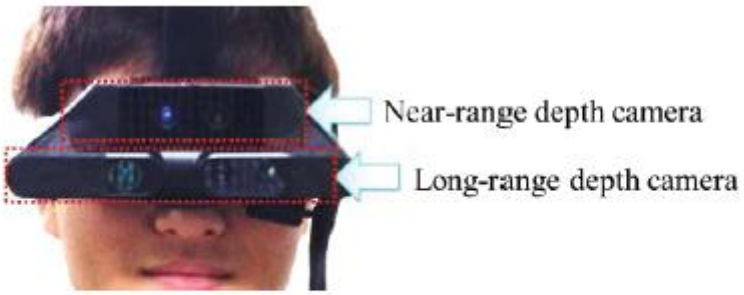
Independent variables in the evaluation are the visual feedback for the hand (Non-visual effect, occlusion visual effect, semi-transparent visual effect) with shadow and guidelines, and are repeated twice. There were a total of 84 trials (3 visualization types × 14 random positions × 2 blocks). The shadow and guidelines were given as a default condition, because task completion was very difficult for users in a pilot test, especially with the occlusion visual effect. Dependent variables are distance error, completion time, and clutching count (number of grasping motions). The distance error is the Euclidian distance between the hand's release position and the target position in the bounding area.

In addition, we surveyed participants' subjective ratings of the accuracy (How accurate was it to complete the task?), speed (How fast was it to complete the task?), easiness (How easy was it to complete the task?), and perception (How visually understandable was it to complete the task?), using a five-point Likert scale, from 1 (most negative) to 5 (most positive).

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	14 **4.3 Result of Task Evaluation** A total of 14 participants participated in our evaluation (12 male and 2 female, with mean age ca. 28). Of these, 13 had experience with AR software, such as commercial AR apps. None had ever used our system. 13 participants were right-handed. One participant experienced simulation sickness and decided not to complete the trials, so we did not analyze their data. Participants were given a demonstration of each visualization and then tried the technique in
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena

SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	ACCUPIX mybud **3.4 Implementation** WeARHand runs on a laptop computer with Intel i7 Core, 8 GB RAM, and NVIDIA GeForce GTX 765M. The Creative Interactive Gesture Camera near-range RGB-D camera has a color resolution of 640×480, and a depth-map resolution of 320×240 at 30 frames per second. The Xtion PRO LIVE far-range RGB-D camera has a resolution of 640×480 for both color and depth map images at 30 frames per second. The HWD is an ACCUPIX mybud, which has a resolution of 852 × 480 (WVGA) [41]. We use OpenCV for 2D image processing, PTAMM [14] for SLAM-based camera tracking, and OpenGL for rendering. 
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera **e) <u>RGB-D external camera</u>**
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	Creative Interactive Gesture Camera https://sg.creative.com/corporate/pressroom?id=13377 Xtion PRO LIVE far-range RGB-D http://xtionprolive.com/

	 Figure 3: Two depth cameras are combined. A near-range depth camera (top) is used for tracking the hand, while a long-range depth camera (bottom) is used for tracking the camera pair relative to the environment.
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**  Figure 15: Applications. (a) Virtual window manipulation. (b) Playing with a virtual dog. (c) Two hands being detected. (d) Rotation and scaling of a virtual object using two hands. (e) Menu selection using two hands. (f) Playing music with virtual buttons on a table.
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#1885
Title, Authors and Year	Light-weight immaterial particle displays with mid-air tactile feedback; A. Sand; I. Rakkolainen; P. Isokoski; R. Raisamo; K. Palovuori; 2020
DOI	10.1109/HAVE.2015.7359448
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Information Sciences/Electronics* Antti Sand, Ismo Rakkolainen, Poika Isokoski, Roope Raisamo School of Information Sciences University of Tampere 33014 Tampere, Finland name.surname@uta.fi Karri Palovuori Department of Electronics Tampere Univ. of Technology 33720 Tampere, Finland karri.palovuori@tut.fi

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance (text entry rate, error rate)	No	Record Data	No
ET2	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA TLX	No

Extracted evidence from publication:

Performance:

- text entry rate

- error rate

Workload

- NASA TLX

We ran a simple 3x2 numerical keyboard task (see Fig. 2) in two different conditions. The independent variable was the presence of tactile feedback. The visual feedback was identical in both conditions. The dependent variables were measures of tapping performance (text entry rate and error rate) and subjective ratings of workload. The actual pressing of a button was made with a slight push towards the screen. The pressing was affirmed with a 0.2 s visual flash (key changed its color) and in the tactile case also with a 0.2 s tactile burst of 200 Hz modulated ultrasound aimed at the location of the button being pressed. Whatever part of the hand was on the location received the feedback.

numbers. The system recorded the entered values and their timestamps, from which we calculated the entry speed and error rate. After each block the participant filled in also a TLX questionnaire [23] on paper and indicated whether he or she preferred to have the tactile feedback or not.

[23] S. Hart, "NASA-Task Load Index (NASA-TLX); 20 Years Later". In *Proc. Human Factors and Ergonomics Society 50th Annual Meeting*. HFES'2006, pp. 904-908, 2006.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12 V. USER TEST In order to evaluate the tacto-visual display, we compared it with and without the tactile feedback in a key pressing task. 12 participants (4 female, 8 male; from 27 to 59 years old) participated in the experiment.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** b) Qualitative
SQ9. How was the holography designed in the study?	a) AR **b) MR** c) VR d) Other
SQ10. How way was the holography presented to the user?	a) Screen projection **b) Physical optical phenomena**

SQ11. Which technology type was used to reproduce the holography?	**a) <u>Fog screen + projector</u>** b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass f) Other Our first hand-held fogscreen prototype [13] weighed 1069 g (Fig. 1, at left) and had a screen width of 250 mm. 3D printing helped to optimize many components. A lighter prototype (Fig. 1, at right) dimensions are 210 x 100 x 70 mm and a weight of 271 grams not including the projector. The screen size is 200 x140 mm.  Fig. 1. Light-weight fogscreen prototypes. The bigger one has an integrated projector on an extruding arm.
SQ11.1 What is the manufacturer and model of used devices for projection?	Fog Screen own prototype + Projectors Microvision ShowWX+ e Optoma ML750 We used Microvision ShowWX+ and Optoma ML750 pico projectors. Microvision is small (122 g) but not very bright (15 ANSI lumens). Optoma has 700 ANSI lumens, but it is heavier (380 g). It has also high contrast, which is good for fogscreen applications.
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Leap Motion*

	 Fig. 2. A user is pressing keys on a particle screen with finger tracking and tactile feedback. From front left to back right: Leap Motion Controller, FogScreen, phased ultrasonic 16x8 array and projector (masked with an R2D2 printout).
SQ13. What is the purpose of the holographic solution?	*Numeric Keyboard input*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. **d) Yes, haptic (ultrasound).** e) Other

air is still minuscule. The observable disturbance to the image is further reduced by the fact that the ultrasound is emitted only when tactile feedback is needed. The finger is partially blocking the visibility of the area of the display, which is slightly disturbed by the intersecting finger and by the ultrasound focus area.

The ultrasonic 2D-array consists of two infinitely tileable array modules (64 transducers each), thus the whole array has 128 transducers. The system is connected via a USB serial port to a PC, which controls the generation of the tactile feedback effects. Finger or hand is tracked with a Leap Motion Controller (https://www.leapmotion.com/). Fig. 3 shows the ultrasonic transducer array structure and its control. Fig. 4 shows the constructed ultrasonic 2D-array.

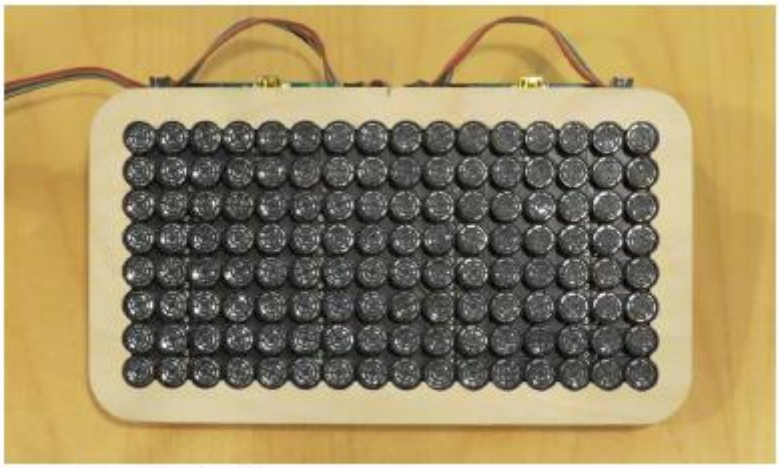


Fig. 4. The 16x8 phased ultrasonic transducer array.

Data Extraction Form

Porifera ID	#1928
Title, Authors and Year	HIBEY: Hide the Keyboard in Augmented Reality; L. H. Lee; K. Yung Lam; Y. P. Yau; T. Braud; P. Hui; 2020
DOI	10.1109/PERCOM.2019.8767420
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Lik Hang Lee*, Kit Yung Lam*, Yui Pan Yau*, Tristan Braud*, Pan Hui*† *Department of Computer Science and Engineeering, Hong Kong University of Science and Technology, Hong Kong †Department of Computer Science, University of Henlsinki, Helsinki, Finland lhleeac@connect.ust.hk, kylambd@connect.ust.hk, arthuryaucs@gmail.com, braudt@ust.hk, panhui@ust.hk

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance (text entry speed, error rate)	No	Record Data	No
ET2	Usability	Inquiry	NASA TLX aspects	Yes, full	NASA TLX	No

Extracted evidence from publication:

Text entry speed;

Error rate

the predicted word (the 3rd choice).

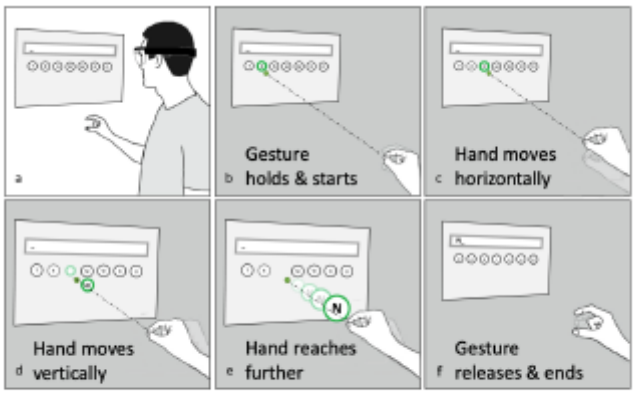
We design a text entry task to evaluate the system performance of HIBEY in terms of text entry speed and error rate. 18 Participants are invited to perform 8-day text input

and error rates. On the first day and the eighth day of the experiment, we ask the participants to answer the NASA TLX [42] survey assessing the user experience of 1-line and Non-key configurations through six qualitative metrics: Mental Demand, Physical Demand, Temporal Demand, Performance, Effort, and Frustration.

[42] N. A. R. C. Human Performance Research Group. (1999) Nasa task load index (tlx). [Online]. Available: https://humansystems.arc.nasa.gov/groups/TLX/downloads/TLX.pdf

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	18 We recruited 18 participants to evaluate the performance of HIBEY on Microsoft Hololens and 7,200 word phases were tested throughout the 8-day session. In our experiments, the participants were able to achieve an average text entry speed of 9.95 word per minutes (WPM) with an average accuracy of 96.06% across all the trials. During the final trial, participants achieved an average speed of 13.19 WPM, which is comparable to other state-of-the-art methods. In addition,
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	MS Hololens
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices	*MS Hololens*

for interaction detection?	
SQ13. What is the purpose of the holographic solution?	*Keyboard Input*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation  Fig. 3. Pictorial description of picking an invisible character in HIBEY
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)  Fig. 1. Keyboard-less interface of HIBEY in the holographic environment, where spectator mode is switching on to aid revealing character positions; Picking character through hand movement from preparation zone to fast-forward zone
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other horizontal movements allow choosing the target character (Figure 3.c). When the user's hand reaches the boundary between the preparation and fast-forward zone, the target character appears translucently in text box as visual feedback (Figure 3.d). In addition, moving the user's hand in the Fast-forward zone can adjust the character influx speed in case the

Data Extraction Form

Porifera ID	#1946
Title, Authors and Year	Leap Motion Performance in an Augmented Reality Workspace: Integrating Devices with an Interactive Platform; T. Wright; S. de Ribaupierre; R. Eagleson; 2020
DOI	10.1109/MCE.2018.2816302
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Biomedical Engineering* ABOUT THE AUTHORS ***Trinette Wright*** (twrigh43@uwo.ca) is currently pursuing an M.E.Sc. degree in biomedical engineering at Western University, Canada. ***Sandrine de Ribaupierre*** (sderibau@uwo.ca) is currently an associate professor in the Division of Neurosurgery at the University of Western Ontario, Canada, working as a pediatric neurosurgeon. ***Roy Eagleson*** (eagleson@uwo.ca) is a professor of engineering at the University of Western Ontario (UWO), Canada; an associate member of the UWO Brain and Mind Institute, London, Ontario; and a scientist and principal investigator at the Canadian Surgical Technologies and Advanced Robotics Research Centre, London, Ontario.

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance (task completion time, average distance)	No	Record Data	No

Extracted evidence from publication:

Accuracy of user performance

- task completion time

- average distance from the center of the sphere

to complete 15 sphere-targeting tasks. The application was evaluated on the accuracy of user performance, usability, and robustness.

The analysis of user performance was measured utilizing several metrics. Distance from the tip of the index finger to the center of the sphere in three dimensions and the time the user took to complete the task were selected as the user performance measurements. All distances were calculated employing unity units (uu), the default measure of length within the Unity environment. The distance between the fingertip and the center of the sphere were calculated in each direction individually. These measures were compared between users and by task.

A publicação não apresenta nenhuma tecnologia usada para avaliar de fato a usabilidade e robustez do sistema. Apenas cita na introdução e na conclusão.

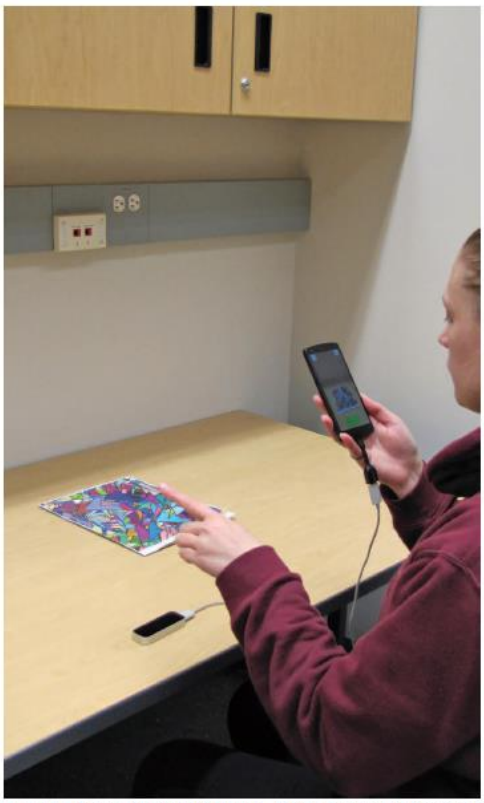
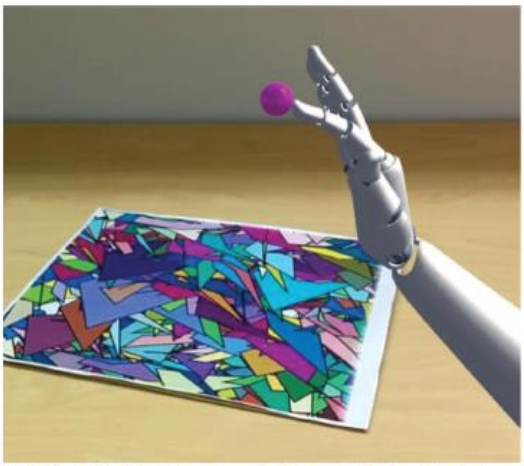
CONCLUSION

This study was designed to assess the accuracy, usability, and robustness of LM using a mobile platform. Overall, the designed application performed as expected, and participants found the system easy to learn and intuitive to use. The results

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) <u>Case Study</u>** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	7 of his/her dominate hand within the sphere, using the LM controller for this interaction. A total of seven participants were recruited for this study, and each participant was asked to complete 15 sphere-targeting tasks. The application
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative

SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display **c) <u>Smartphone or tablet</u>** d) Head-mounted-display (HMD) e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Nexus 5* **METHODOLOGY** An Android smartphone was selected as the mobile platform device for the application. LM for mobile was developed with the Qualcomm Snapdragon 800+ processor as the reference hardware, which limited the type of smartphone that can be used for this application. Specifically, the Nexus 5 smartphone was chosen because, although it is an older smartphone, it
SQ12. Which technology type was used to interaction detection (touch)?	**a) <u>Infrared Stereo Camera</u>** b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Leap Motion*
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation

	 FIGURE 4. The experimental setup. Participants could move the base image and LM each to a comfortable position.
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)  FIGURE 3. Virtual hands were used to interact with the virtual spheres. This type of interaction does not cause occlusion of the image.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2010
Title, Authors and Year	Computer-Assisted Culture Learning in an Online Augmented Reality Environment Based on Free-Hand Gesture Interaction; M. Yang; W. Liao; 2020
DOI	10.1109/TLT.2014.2307297
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* • *The authors are with the Department of Computer Science and Information Engineering, National Dong-Hwa University, Hualien, Taiwan. E-mail: {mtyang, m9921019}@mail.ndhu.edu.tw.*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	Overall usability	Yes, full	SUS	No

Extracted evidence from publication:

5 EVALUATION

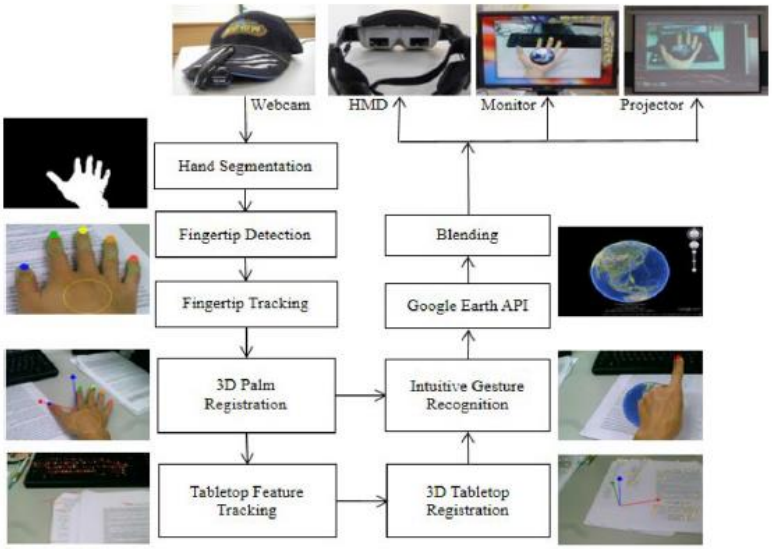
The goal of our research was threefold. The first research objective was to evaluate the students' learning effectiveness of cultural contents depending on whether the VECAR was used. The second research objective was to assess the interpersonal communication behaviors between teachers and students depending on whether the VECAR was used. The third research objective was to verify the usability and learnability of the VECAR. The participants included forty-

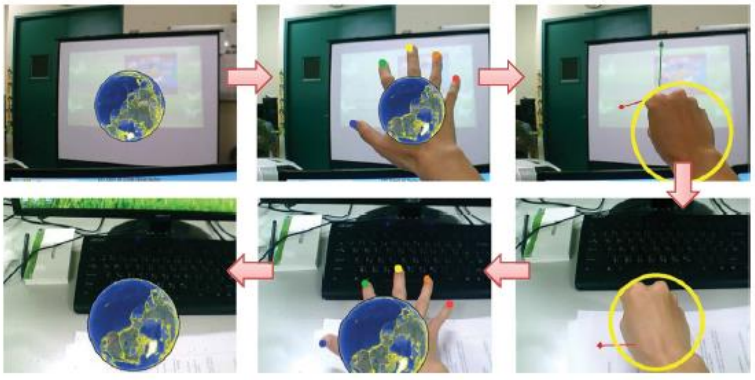
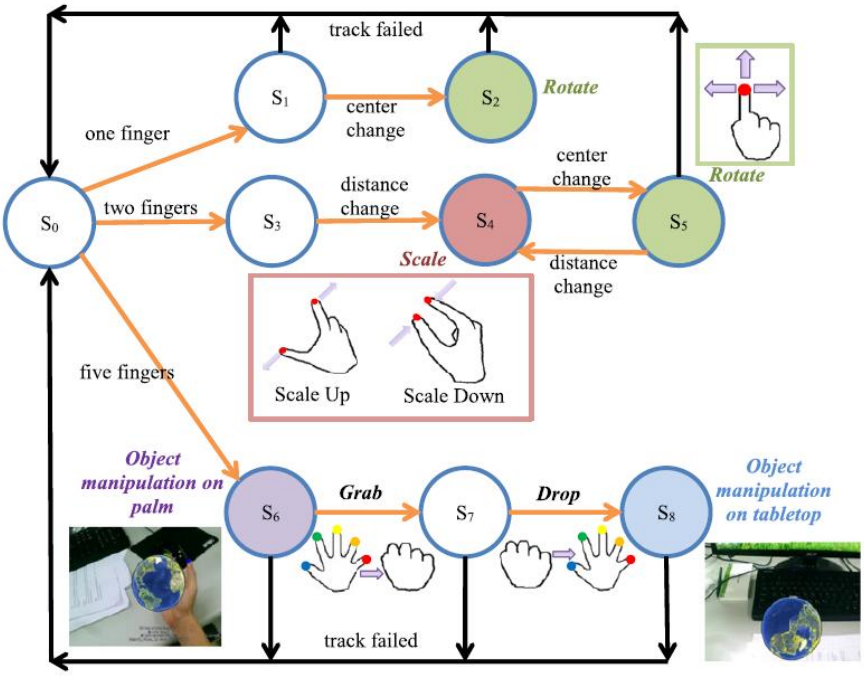
The system usability scale (SUS) [2] was used to verify the usability of the online learning system with the VECAR. The SUS is a simple, efficient, and reliable tool

[2] J. Brooke, "SUS - a quick and dirty usability scale," in *Usability Evaluation in Industry*, P. Jordan, B. Thomas, B. Weerdmeester, and A. McClelland, eds., New York, NY, USA: Taylor and Francis, 1996.
[3] J. Burg. (2013 Jul.) Google Lit Trips. [Online]. Available http://

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) Controlled experiment** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	*Not Available*
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative** interface using hand gestures. Besides, the vision-based algorithms in the VECAR are sensitive to visual occlusions, background noises, and illumination changes, so occasional miss-detections and false alarms can disengage learners' concentrations. Examples of comments regarding these problems are as follows: "How can I translate/rotate/scale the virtual object in 3D?" "How can I reset the virtual object to its original state?" "The system does not respond to my gestures sometimes." "I feel dizzy after long time use of the mobile computing glasses." Despite these problems, most participants soon got used to the new interface and successfully completed the assigned tasks in the VECAR. The technical problems were not sufficiently substantial to diminish the enthusiasm of students to try new technologies and accomplish the learning activities in the VECAR. Moreover, learners are not required to attend school and can freely access the VECAR from remote locations. The comments from learners indicated that they enjoy learning through VECAR "The virtual object seems to be right on my palm." "After getting familiar with the system, I find it is easy to use."

	"I am happy I can interact with the 3D model as I wish." "It is fun throughout the activity; I don't feel bored at all." We found an ideal instructor with the enthusiasm to promote cultural and language learning using new technologies. He prepared the online curriculum and familiarized himself with the system in advance. He was also well-prepared to face the confronting troublesome technical problems in class. His comments revealed the potential to enhance online cultural and language learning using the VECAR: "VECAR can be a tool to visualize 3D cultural contents and get learners to produce language." "Using lightweight glasses can make the learning experience more natural and less intrusive." "Learners' familiarity with technology makes them receptive to using it in the classroom."
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other 
SQ11.1 What is the manufacturer and model of used devices for projection?	*Not Available*

SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera **c) <u>RGB external camera</u>** d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Not Available*
SQ13. What is the purpose of the holographic solution?	*3D Map Manipulation*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**  Fig. 4. Getting a virtual object from the projector screen and dropping it on the tabletop.  diagram of hand gestures for virtual object manipulation.

SQ15. Which is the image quality of the touchable hologram?	a) WIMP b) 3D RAW object **c) <u>3D enhanced (with lights/shadow/texture)</u>**
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2552
Title, Authors and Year	BISHARE: Exploring Bidirectional Interactions Between Smartphones and Head-Mounted Augmented Reality; Zhu, Fengyuan; Grossman, Tovi; 2020
DOI	10.1145/3313831.3376233
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science*  Fengyuan Zhu PhD, Dynamic Graphics Project, University of Toronto Verified email at dgp.toronto.edu Human Computer Interaction Tovi Grossman, Ph.D. Associate Professor Alfred P. Sloan Research Fellow NSERC E.W.R. Steacie Memorial Fellow NSERC/Autodesk Industrial Research Chair in Human-Computer Interaction Department of Computer Science University of Toronto tovi@dgp.toronto.edu

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	UX	Survey	Overall experience	No	Likert Scale	No
ET2	UX	Survey	Favorite aspects of experience	No	interview	No

Extracted evidence from publication:

Results

The results of the study were positive and encouraging. Users enjoyed using the prototype, found the user experience compelling (and even magical), and were impressed with the variety of techniques that it offered.

After the study, participants completed a questionnaire together with a short interview. The questionnaire asked participants to rate each individual feature on a Likert scale from 1-7. In the interview, participants were asked about their most and least favorite aspects of their experience. Participants were then asked to share any other comments they had about the prototype and its features.

After the study, participants completed a questionnaire together with a short interview. The questionnaire asked participants to rate each individual feature on a Likert scale from 1-7. In the interview, participants were asked about their most and least favorite aspects of their experience. Participants were then asked to share any other comments they had about the prototype and its features.

Overall, the individual features of the interactive prototype were rated positively. Figure 13 shows the responses to each feature on a Likert scale from 1-7, grouped by their respective area of the design space. Across the design space,

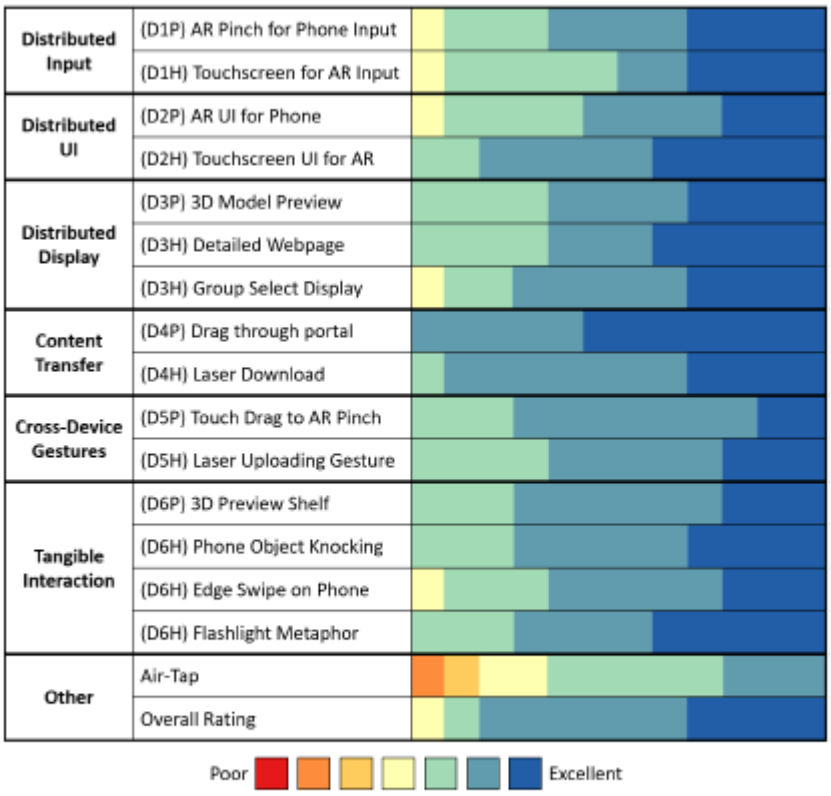


Figure 13. Responses to individual features, grouped by their associated area of the design space.

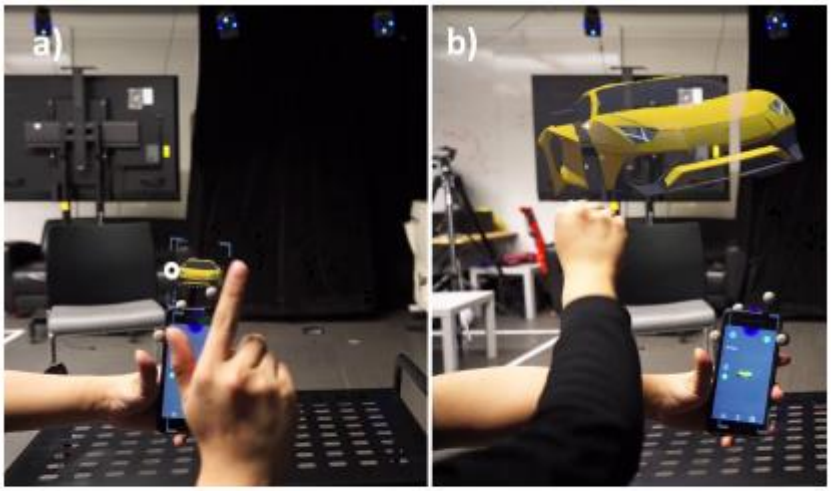


Figure 6. A freehand air tap and drag gesture can be used to move augmented content in the environment.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No

SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) <u>Case Study</u>** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	12 **Participants and Procedure** We invited twelve users to participate in a 30-minute session. Participants were aged 21–35 (7 male, 5 female). Participants had a range of experience with VR/AR systems: Three had extensive experience, three had light familiarity, and six had little or no experience.
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** **b) <u>Qualitative</u>** **Results** The results of the study were positive and encouraging. Users enjoyed using the prototype, found the user experience compelling (and even magical), and were impressed with the variety of techniques that it offered. Overall, users found the combination of the phone and ARHMD to be engaging: *"The usage of combining both a phone and AR screens turned out to be very smooth, and the designs provide the potential of incorporating multiple modalities into a user's view" (P1)* *"The combination of mobile + AR as an entire system is very good, intuitive." (P6)* An interesting set of comments was that mobile phones offered a familiar interaction paradigm for an otherwise unfamiliar platform, supporting our design principle of preserving known interaction patterns: *"I have very limited experience with AR, using mobile device easily transfer my previous knowledge into the AR world." (P6)* *"Distributed input from the mobile device to AR content is very useful, and I can easily transfer my previous experience on touch screen to spatial operation." (P11)*
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena

SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet **d) <u>Head-mounted-display (HMD)</u>** e) Smart glass f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*MS Hololens* **Implementation** We used a Google Pixel 2 smartphone and Microsoft HoloLens as our primary hardware components. Both the smartphone and HoloLens ran a mobile app written in Unity 2017.4, with a Host/Client gaming logic to synchronize objects and events within the network. In order to support accurate tracking with low latency, we used a *Vicon system to track the Pixel 2 and HoloLens, and synchronized their relative coordinate systems through a local network. One of the user's finger was also tracked by the Vicon, to support phone edge swiping. Other freehand gestures like gaze, air-tap and dragging were enabled natively by the HoloLens OS. As vision algorithms improve, external tracking equipment may not be necessary. However, the Vicon system served our purpose of fully exploring the interaction design space. As such, our hardware setup should be considered an enabling technology, rather than our envisioned configuration.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera **d) <u>RGB-D internal (built-in) camera</u>** e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Hololens*
SQ13. What is the purpose of the holographic solution?	Interaction Study
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** c) Manipulation

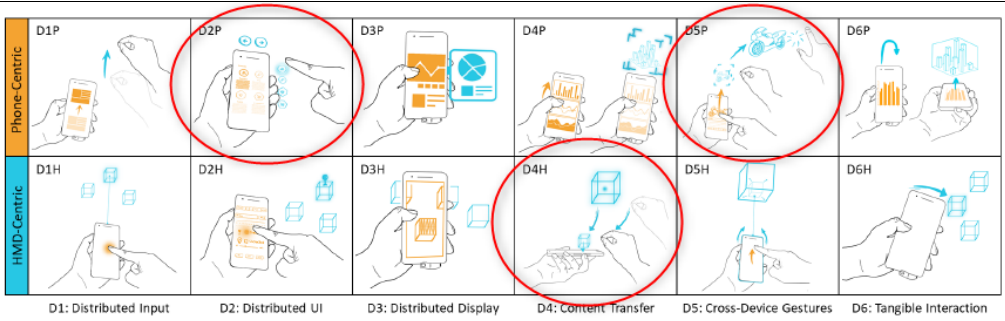
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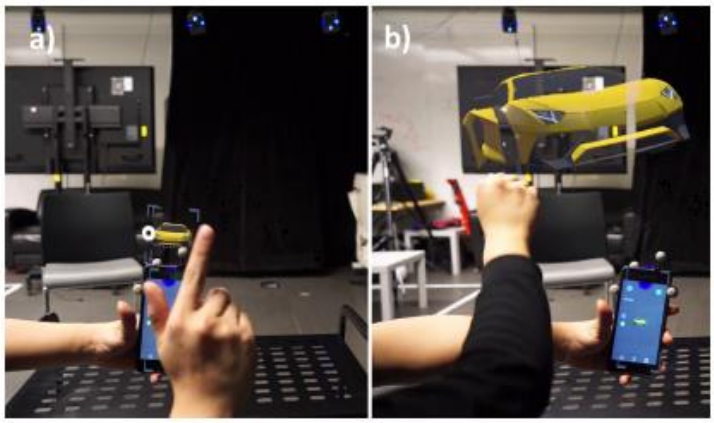
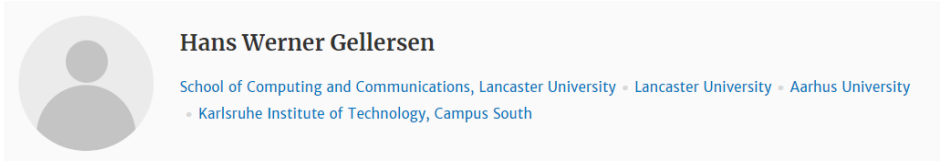
Figure 3. The BISHARE design space of joint interactions between a smartphone and augmented reality head-mounted display. Each cell contains a single example joint interaction, but represents a broader class of interaction techniques that may be possible.
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<tr>
<td>SQ15. Which is the image quality of the touchable hologram?</td>
<td>
a) WIMP
b) 3D RAW object
c) <u>3D enhanced (with lights/shadow/texture)</u>


Figure 6. A freehand air tap and drag gesture can be used to move augmented content in the environment.
</td>
</tr>
<tr>
<td>SQ16. Is there feedback for the touch action? Which it is the means?</td>
<td>
a) No
b) <u>Yes, visual.</u>
c) Yes, auditive.
d) Yes, haptic (describe).
e) Other
</td>
</tr>
</table>

Data Extraction Form

Porifera ID	#2637
Title, Authors and Year	MixFab: A Mixed-Reality Environment for Personal Fabrication; Weichel, Christian; Lau, Manfred; Kim, David; Villar, Nicolas; Gellersen, Hans W.; 2005
DOI	10.1145/2556288.2557090
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* 

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Inquiry	Usefulness of Existing Objects, Usefulness of Gestual Icons, Immersion, No arm fatigue, Sense of size, Easy to use, Not capable with other systems	No	Likert scale	No
ET2	Usability	Inquiry	Overall usability	No	interview	No

Extracted evidence from publication:

USER STUDY: SYSTEM EVALUATION

In this study, we evaluated the interaction cycle, design decisions and prototype implementation of MixFab. We were interested in how well non-engineering users could use the system. During the study, we collected primarily qualitative feedback to gain insight to the experience of using the system.

Tasks and Procedure

Participants were first asked to sign a consent form and given an introduction to the system. We started by introducing the idea of designing objects for 3D printing by showing example objects created with MixFab (Figure 1c). They were then shown the "desktop organizer" walk-through (Figure 9) and given five minutes to familiarize themselves with the system.

Building things

To guide users during their exploration of the system, we asked them to replicate the desktop organizer example. The

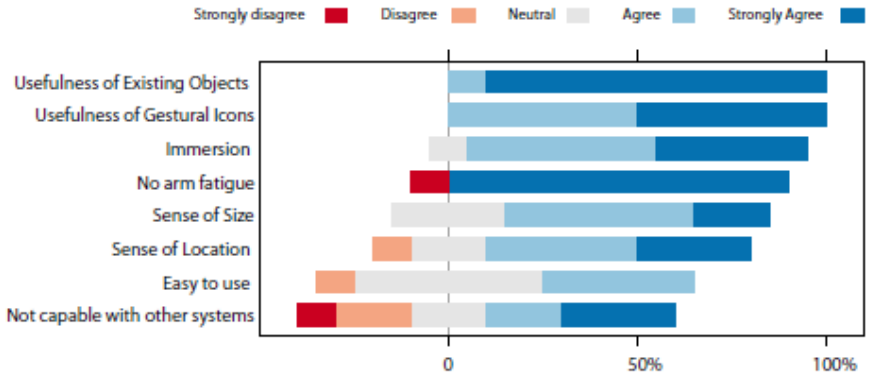


Figure 12. Agreement distribution of the post-task questionnaire. The further bars extend to the right (relative to zero), the more users agree.

glue-stick and pen were provided and we guided users when necessary. Once the example was completed, we asked users to design a phone dock and provided our phone dock example (Figure 1c). Participants could use their own phone or an LG Nexus4 we provided. Users were encouraged to design the object on their own, but were assisted when necessary.

Semi-structured interview

Upon completion of all design tasks, we presented users with a set of statements and asked them to rate how much they agreed with each of them, on a 5-point Likert scale. We then went into a semi-structured interview asking about their experience, trying to gain insight into the usability of the system.

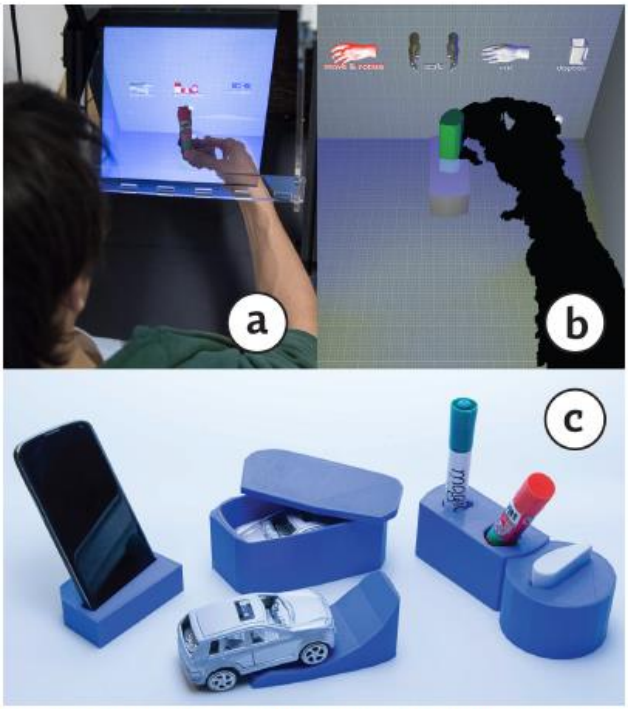


Figure 1. MixFab: mixed-reality environment for personal fabrication. (a) a user positioning a physical object in the MixFab prototype system, (b) screenshot of a user manipulating a virtual object, (c) 3D printed objects created with the system.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	10 **Participants** We invited 10 participants (5 female) from various departments on our campus. Participants were between 19 to 31 years old (M=24.3 years, SD=4.52), and all were right-handed. All except one participant had no experience with CAD systems or an engineering background (Rating scale, 1 a lot of experience to 5 no experience, M=4.56, SD=1.01).
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**

	Results and Discussion *Creation, Preparation, Assembly* MixFab's construction mechanism was quickly understood by all users. Knowing when to create a new object, modifying it and assembling two objects seemed to pose no problem for the participants. User 2 reported that *"when I was told to create the phone-dock I had a strategy in my head, thus knowing when to use a physical object."* The method of assembling objects to create new ones, was particularly well received – some users said that they *"[...] very much liked this way of putting things together, to compose objects"* (U6). *Using existing objects* Using existing objects during the design process was deemed useful by all users (100% agreement, Figure 12). Not having to measure objects and being able to place them in their desired position was highlighted by users *"I very much liked [...] the thing that you can bring real physical objects in there."* (U6). Being able to use an existing object as starting point or base for designing new ones was mentioned as one of the benefits of the system: *"I like the idea of being able to put my phone in there and design something around it."* (U8). The effortless integration of existing objects was even considered fun: *"[...] it's fun because you know there is no sort of effort required to replicate existing objects."* (U1)
SQ9. How was the holography designed in the study?	a) AR **b) MR** c) VR d) Other
SQ10. How way was the holography presented to the user?	a) Screen projection **b) Physical optical phenomena**
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass **f) Other: Reflexive Material**
SQ11.1 What is the manufacturer and model of used devices for projection?	Based in Holodesk. MixFab's mixed-reality environment is by virtue of a Holodesk-like structure [11] where the user sees virtual content merged with the real world. Users can introduce physical artifacts as size-reference or to capture their shape – Figure 1a shows a user placing a glue-stick inside a virtual object to create the glue-stick's virtual replica in place. In Figure 1b

SYSTEM IMPLEMENTATION

We built a prototype to implement the MixFab system by using *Holodesk's* hardware frame [11]. Holodesk provides an immersive environment with an interaction volume roughly the size of modern 3D printers. Our hardware differs in that we use a Kinect for Windows rather than a Kinect360 and mirror setup, and have a turntable built into the frame for 3D scanning. Most importantly, on the software side, we employ a different processing pipeline and provide a gesture-based interface rather than a physics-based one.

System Hardware

The hardware consists of a display mounted at a 45 degree angle, being reflected through a 50/50 half-mirror into the interaction space. A Microsoft Kinect depth sensor mounted at the top of the frame is used for capturing the interaction with the system, while a second camera placed between the display and half-mirror is used to implement perspective correction through face tracking. A motorized turntable for 3D scanning is built into the floor of the frame (Figure 10).

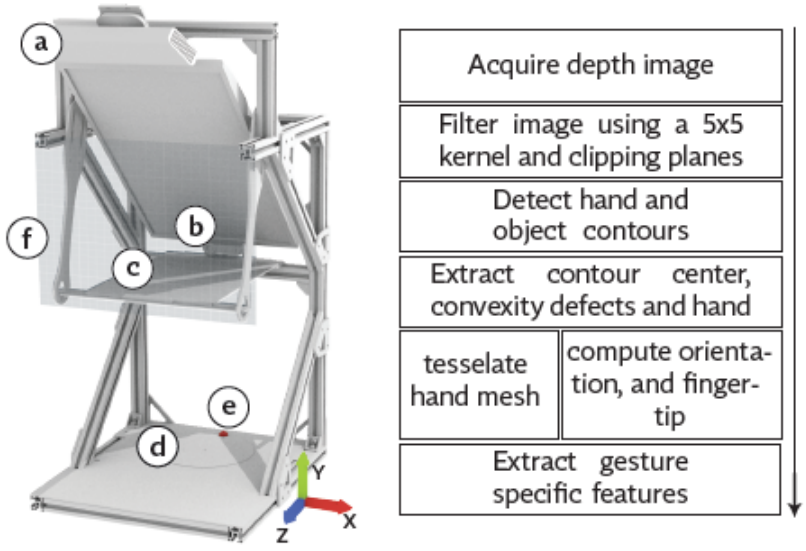


Figure 10. [left] The MixFab hardware (a) Microsoft Kinect depth sensor, (b) webcam used for face tracking, (c) 50T/50R half-mirror, (d) motorized turntable, (e) common world origin (virtual), (f) face-tracker calibration plane (virtual). [right] MixFab 's general processing pipeline

SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera

	e) <u>RGB-D external camera</u>
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	MS Kinect
SQ13. What is the purpose of the holographic solution?	3D Priting
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>** **Manipulating objects** Once an object has been created, it can be manipulated in three ways: translation & rotation, scaling and cutting off parts of the object. *Translation & Rotation* Translation and rotation is performed using a one-handed grabbing gesture, much like one would grab a cup. If the object is grabbed so that the hand intersects the object, it attaches to the user's hand so that the object can be moved freely within the interaction volume. Grabbing any point away from the object lets users change the object's orientation. A lever is formed between the base of the object and the hand-tip, which is then used to rotate the object. Translation and rotation both snap to common values (e.g. the floor for translation and 0/90 degrees for rotation). *Scaling* Objects can be uniformly scaled using a two-handed compression gesture. Users place their hands on either side and the scaling factor is a function of their distance. We implemented relative, yet direct scaling using a fixed control-display gain. When users first assume the compression posture, their hand distance is identified as 100% scale. Changing the distance between both hands then scales the object. *Cutting* Cutting objects removes material, rather than splitting objects. To perform a cut, the user indicates the desired position of the cut using their flat hand ("Shuto"/Karate gesture) along the X-axis. Tapping on the ground with the other hand con-
SQ15. Which is the image quality of the touchable hologram?	a) WIMP **b) <u>3D RAW object</u>** c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2678
Title, Authors and Year	TiPoint: Detecting Fingertip for Mid-Air Interaction on Computational Resource Constrained Smartglasses; Lee, Lik Hang; Braud, Tristan; Bijarbooneh, Farshid Hassani; Hui, Pan; 2019
DOI	10.1145/3341163.3347723
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science*

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Performance	No	Record Data	No
ET2	Usability	Inquiry	Accuracy, real-time, aware of slight deviation, preference, ease-of-use, useful	No	Likert scale	No

Extracted evidence from publication:

USER EVALUATION

Experiment Setup

We examine TiPoint within the 2D WIMP user interface in which click operation and cursor movement are the most important operations. One may argue that the WIMP interface might not be the most suitable for smartglasses. However, after a quick survey, most commercial glasses exploit a barebone

Performance

- Min Completion Time
- Max Completion Time
- Average Completion Time

Questions

- TiPoint is an accurate interaction technique (Q1)
- Tipoint is an real-time interaction technique (Q2)
- were not aware of the slight deviation between the cursor position and the fingertip position (Q3).

- According to results of Q4-6, direct pointing and manipulative interaction technique is preferable to mini-trackballs, because of the improved ease-of-use and task performance.

Q7 - TiPoint is a useful interaction technique and is applicable to other applications that relies on the WIMP paradigm.

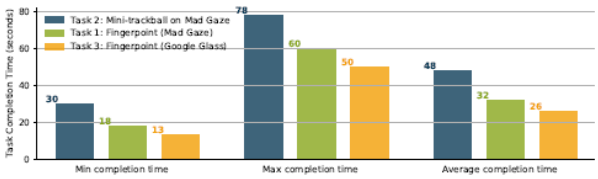


Figure 4: User performance (Min, max and average) for three tasks performed on Google Glass and Mad Gaze Glass with 25 participants (Participant 1-25). Participants complete the task 1.46 times faster with Mad Gaze and 1.82 times faster with Google Glass

We design an application to measure the performance of users when using TiPoint in a WIMP environment. The application contains an array of 24 boxes (1–24) as shown Figure 3. We ask the users to select the box of a given randomly generated number shown on the top of the interface and a total of 15 boxes are selected in each session. For instance, the user is required to select boxes No.7, No.17, No.24 in a sequence. The user guides the cursor with his left hand in mid-air to the requested boxes and performs the click by pressing the button on the body of smartglasses with their right hand. 25 participants (22 males and 3 females) are recruited from a various group of mailing lists in our campus. Their ages range from 18 to 34. There are 24 right-handed and 1 left-handed. All the subjects had none or very limited experience in using mid-air freehand interaction for smartglasses or head-mounted displays. 24 of the participants had some experience of gestural interaction with Microsoft Kinect or Wii for computer gaming, and the majority of them had experience or heard about augmented reality, mainly from mobile gaming.

Q	Strongly Disagree	Disagree	No Opinion	Agree	Strongly Agree
1	0	0	0	16	9
2	0	0	4	15	6
3	0	0	7	14	4
4	0	0	1	16	8
5	0	3	5	7	10
6	0	0	4	12	9
7	0	0	1	13	11
Sum	0	3	22	93	57

Table 1: The summary of the results from the participants in our survey study.

We present the results of our user survey in Table 1. Most of the participants agreed that TiPoint is an accurate and real-time interaction technique (Q1 & Q2). Moreover, the majority of participants reported that they were not aware of the slight deviation between the cursor position and the fingertip position (Q3). According to results of Q4-6, direct pointing and manipulative interaction technique is preferable to mini-trackballs, because of the improved ease-of-use and task performance. Five participants report that they will not use the mini-trackball in the future as it is too error-prone. Finally, 24 out of 25 participants agree that TiPoint is a useful interaction technique and is applicable to other applications that relies on the WIMP paradigm.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	25
SQ8.3. Which was the type of results analysis?	**a) Quantitative** b) Qualitative
SQ9. How was the holography designed in the study?	a) AR **b) MR** c) VR d) Other

SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) <u>Smart glass</u>** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Google Glass v.1.0* *Mad Gaze ARES Glass* To demonstrate that TiPoint is applicable to smartglasses with various hardware specifications, we implement it on Google Glass v.1.0 and Mad Gaze ARES Glass. Google Glass runs on Android 4.4.0 with a 1.2 GHz Dual Core CPU, 1.0 GB RAM,
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera **b) <u>RGB internal (built-in) camera</u>** c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Google Glass v.1.0 + OpenCV* *Mad Gaze ARES Glass + OpenCV*

	IMPLEMENTATION TiPoint is integrated into a standalone demonstration application. The hand detection algorithm itself are implemented as a library written in Java, in order to be easily included in other applications. We use a camera resolution of 320x240 pixels as it is more suitable for our image segmentation process. This resolution reduces the artifacts while providing acceptable ($> 15FPS$) performance. Moreover, it corresponds exactly to the screen resolution, making the mapping of the cursor to the fingertip easier. First, the *OpenCV* library converts the image from YUV420sp to HSV. We then split the image into 10x10 pixels squares to create our data structure of the extended disjoint union representation. Finally, we disable the Auto Exposure, Auto White Balance and set Focus to Infinity to keep a consistent image with lighting conditions changes, such as office area and outdoor environment with daylight, however, the detection algorithm does not work smoothly under insufficient illumination condition. The fingertip detection consists of three phases: image segmentation, disjoint union arborescence construction, and fingertip location estimation. These steps are represented in Figure 2. To demonstrate that TiPoint is applicable to smartglasses with various hardware specifications, we implement it on Google Glass v.1.0 and Mad Gaze ARES Glass. Google Glass runs on Android 4.4.0 with a 1.2 GHz Dual Core CPU, 1.0 GB RAM, 16GB storage capacity, 5-mega pixel camera, and 570 mAH battery life. Mad Gaze has the following specifications: CPU with 1.2 GHz Quad Core, 512 MB RAM, 4GB storage capacity, 5-megapixel camera, and 370 mAH battery life, Android
SQ13. What is the purpose of the holographic solution?	Keyboard Input  Figure 3: TiPoint implementation in our evaluation app, and User Posture
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2725
Title, Authors and Year	AR Typing Interface for Mobile Devices; Higuchi, Masakazu; Komuro, Takashi; 2005
DOI	10.1145/2541831.2541847
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) Validation Research** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Engineering* Masakazu Higuchi Graduate School of Science and Engineering, Saitama University 255, Shimo-Okubo, Sakura-ku, Saitama-shi, 338-8570, Japan mhiguchi@mail.saitama-u.ac.jp Takashi Komuro Graduate School of Science and Engineering, Saitama University 255, Shimo-Okubo, Sakura-ku, Saitama-shi, 338-8570, Japan komuro@mail.saitama-u.ac.jp

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Task completion time, The number of mistypes, Mistyped characters, word per minute	No	Record Data	No
ET2	Usability	Inquiry	Operability, Tiredness, Visibility	No	Likert scale	No
ET3	Usability	Inquiry	Wideness of operating area	No	Likert scale	No
ET4	UX	Survey	Reality, Amusement	No	Likert scale	No

Extracted evidence from publication:

5. EVALUATION EXPERIMENT 1 : SENSE OF REALITY

5.1 Overview

This experiment is button pressing, which mainly evaluates subjectively the sense of reality that the system provides. The subjects were 15 males and females in their 20s who are non-members of this project. Each subject was informed of the overview of the system and how to use the device at the beginning of the experiment. Then, each subject was asked to press the virtual three (red, green, blue) buttons freely which were placed in the center of the screen. There were two modes A and B and each subject pressed any of the buttons 30 times in each mode, and then answered the questionnaire. The image of the user's finger was overlaid on the button in Mode A and it was not overlaid in Mode B.

Task completion time

The number of mistypes

Mistyped characters

WPM

Operability

Tiredness

Visibility

Wideness of operating area

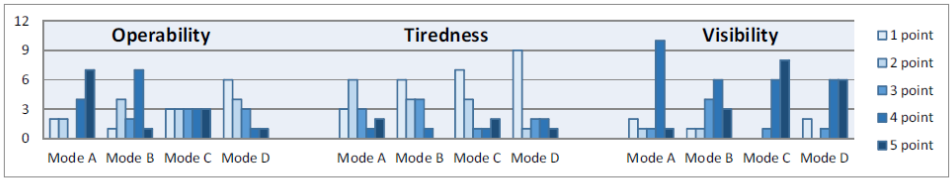


Figure 13: Questionnaire results of keyboard typing

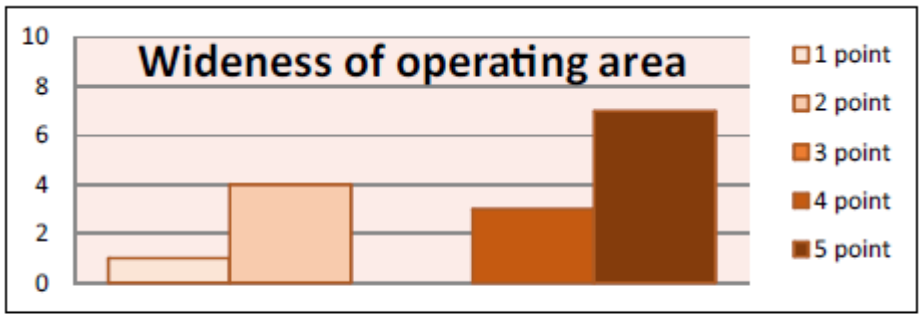
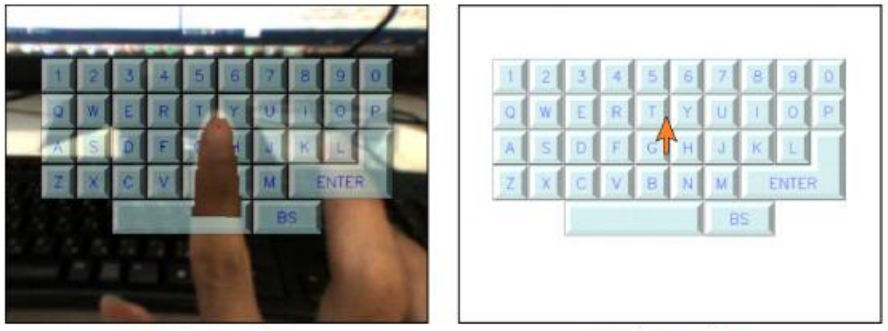


Figure 14: The questionnaire result of wideness of operating area

6. EVALUATION EXPERIMENT 2 : USABILITY

6.1 Overview

This experiment is keyboard typing, which mainly evaluates the usability of the system both quantitatively and subjectively. Our system can be used for various applications as well as keyboard typing. However, since the typing application relatively has much demand to improve its operability, we chose the key typing task for system evaluation. The subjects were the same as participants of Experiment 1. Each subject was asked to type a specific sentence using AR-keyboard. There were four modes A, B, C and D and each subject typed the sentence and then answered the questionnaire. Mode A was AR-on and Keyplane-unfixed, Mode B was AR-on and Keyplane-fixed, Mode C was AR-off and Keyplane-unfixed, Mode D was AR-off and Keyplane-fixed. "AR-on" means that the captured image and the user's finger image is displayed while "AR-off" means that the captured image is not displayed and a cursor is displayed instead of the finger image. "Keyplane-unfixed" means that the distance to the key-plane is not fixed and depends on the finger position while "Keyplane-fixed" means that the distance to the key-plane is fixed. The sentence to be typed was "the quick brown fox jumps over the lazy dog" and was common in all modes. This sentence is one of the English pangrams and is often used to test a keyboard. The screenshot of each mode is shown in Figure 9. The order of modes A, B, C and D was randomized per each subject in the experiment. Typ-



Mode A and B Mode C and D

Figure 9: Screenshots of modes in keyboard typing

Sense of reality

- Reality
- Amusement

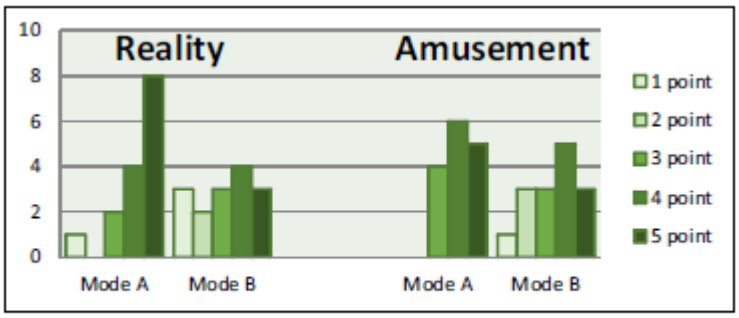
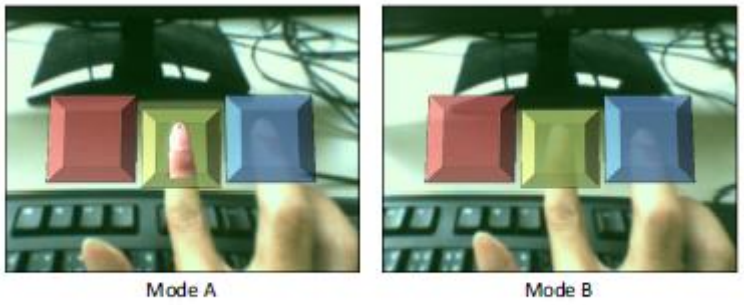


Figure 8: Questionnaire results of button pressing

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) <u>Yes</u>** b) No
SQ8.1. Which empirical method was used?	a) Survey **b) <u>Controlled experiment</u>** c) Case Study d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	15
SQ8.3. Which was the type of results analysis?	**a) <u>Quantitative</u>** b) Qualitative
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	a) Screen projection b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) e) Smart glass **f) <u>Other: LCD</u>**
SQ11.1 What is the manufacturer and model of used devices for projection?	4.3 inch Century Corporation

	3. SYSTEM CONFIGURATION **3.1 Hardware** The hardware configuration of our experimental system consists of a small display, a small monocular camera, and a PC. The display is a 4.3-inch display manufactured by Century Corporation, and the camera is Firefly MV from Point Grey Research Inc., with a lens having a focal length of 1.68 mm. The image size and frame rate of the camera are 320 × 240 pixels and 111 fps (frames per second), respectively. The PC is Optiplex 7010 from Dell Inc., with an Intel(R) Core(TM) i7-3770 (8 M Cache, 3.40 GHz) CPU and 4.00 GB RAM. The monocular camera, which captures the space behind the display, is attached to the back side  Figure 1: AR typing interface for mobile devices.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera **c) RGB external camera** d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*Firefly MV from Point Grey Research Inc.*

SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** b) Pantomimic c) Manipulation
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)  Figure 7: Screenshots of modes in button pressing
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2857
Title, Authors and Year	SpaceTop: Integrating 2D and Spatial 3D Interactions in a See-through Desktop Environment; Lee, Jinha; Olwal, Alex; Ishii, Hiroshi; Boulanger, Cati; 2005
DOI	10.1145/2470654.2470680
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* **Jinha Lee**[1,2] **Alex Olwal**[1] **Hiroshi Ishii**[1] **Cati Boulanger**[2] MIT Media Laboratory[1] Microsoft Applied Sciences Group[2] 75 Amherst St. Cambridge, MA, USA 1 Microsoft Way Redmond WA, USA {jinhalee, olwal, ishii}@media.mit.edu, catib@microsoft.com

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usabilily	Inquiry	Easy-to-learn, Slower than baseline, Less accurate than the baseline	No	Likert Scale	No

Extracted evidence from publication:



Figure 1. SpaceTop affords a) 3D direct spatial interaction, b) 2D direct touch, c) 2D indirect interaction, and d) typing. It aims to meld seams between these modalities by accommodating them in the same unified space and enabling fast switching between them.

Easy-to-learn

Slower than baseline

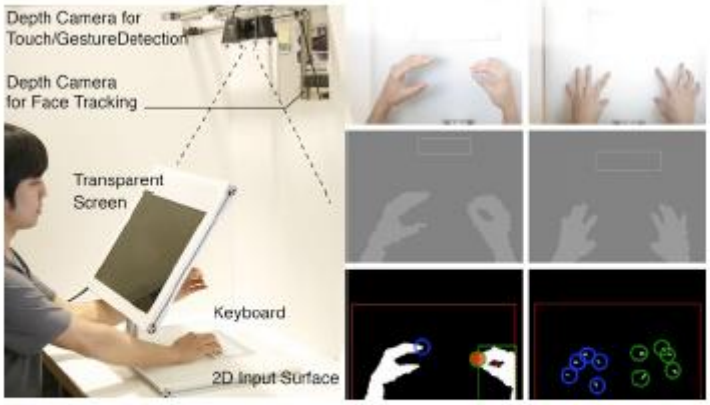
Less accurate than the baseline

Questionnaire responses (5-point Likert scale) indicate that the SpaceTop interactions were easy-to-learn (3.9). Participants did however find it slower (3.2 vs 4.2) and less accurate (3.2 vs 4.6) than the baseline. Users' comments include "after I repeated this task three times (with the same arrangement), my arm starts moving towards the target even before I see it", "switching to another window is as simple as grabbing another book on my (physical) desk". Another user commented that the physical setup constrains his arm's movement which makes him exhausted easier.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a) Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c) Case Study** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	10 **PRELIMINARY USER EVALUATION** Ten participants (age 19–29, 2 female) were recruited from a university mailing list, none of whom had previous experience with 3D user interfaces. They were able to familiarize themselves with the system until they performed each action comfortably (3–6 min). The total experiment time for participants was between 70-80 min.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** **b) Qualitative**

	Switching between indirect 2D vs. direct 3D interaction 12 partially overlapping colored windows (red, green, blue, or yellow), containing a shape (triangle, square or star), were shown. Participants were given tasks, such as "grab the yellow square and point to its corners", or "trace the outline of the blue triangle". They performed four different, randomized tasks for three spatial window configurations, for a total of 12 trials for each of two blocks. The *SpaceTop block* used spatial window placement with head-tracking and participants used a combination of gesture, mouse and keyboard interaction, for constant switching between typing, 2D selection and 3D interaction. In the *baseline block*, windows were shown in the display's 2D plane and only mouse and keyboard interaction was available. Questionnaire responses (5-point Likert scale) indicate that the SpaceTop interactions were easy-to-learn (3.9). Participants did however find it slower (3.2 vs 4.2) and less accurate (3.2 vs 4.6) than the baseline. Users' comments include "after I repeated this task three times (with the same arrangement), my arm starts moving towards the target even before I see it", "switching to another window is as simple as grabbing another book on my (physical) desk". Another user commented that the physical setup constrains his arm's movement which makes him exhausted easier. **Text editing: Search and copy/paste** Participants skimmed the contents of six different document pages placed in the 3D environment. They were then asked to find a specific word and pick-and-drop it into the document on the foreground screen (see Figure 5). Six participants commented that it felt compelling to be able to quickly rifle through a pile of documents with one hand while another hand is interacting with the main active task. One user commented: "it feels like I have a desktop computer and a physical book next to it". "This feels like a natural role division of right/left hand in the physical world". Three users reported that they had a hard time switching their mental models from 2D indirect mapping (touchpad) to 3D direct mapping (spatial interaction), which occurs when the user tries to drag a word out of a shadow.
SQ9. How was the holography designed in the study?	**a) <u>AR</u>** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) <u>Screen projection</u>** b) Physical optical phenomena
SQ11. Which technology type was used to	a) Fog screen + projector b) Holographic display c) Smartphone or tablet

reproduce the holography?	d) Head-mounted-display (HMD) e) Smart glass **f) <u>Other: Transparent Screen</u>**  **Figure 2. SpaceTop hardware configuration (left). Hand tracking and pinch detection (right).**
SQ11.1 What is the manufacturer and model of used devices for projection?	Prototype by Samsung **SPACETOP IMPLEMENTATION** At first glance, SpaceTop looks similar to a conventional desktop computer, except the transparent screen with keyboard/mouse behind it. Users place their hands behind the screen to scroll on the bottom surface, or type on the keyboard. Through the transparent screen, users can view graphical interface elements appearing to float, not only on the screen plane, but also in the 3D space behind it or on the bottom surface. The users can lift their hands off the bottom surface to grab and move floating windows or virtual objects using "pinch" gestures. We accommodate 3D direct interaction, 2D touch and typing, with an optically transparent LCD screen and two depth cameras (Figure 2) in a 50×25×25 cm^3 volume. **Display: Prototype LCD with per-pixel transparency** We use a display prototype by Samsung, designed to show graphics without backlights in contact with its transparent LCD. The 22" transparent LCD displays 1680×1050 pixels images at 60 Hz with 20% light transmission. It provides maximum transparency for white pixels, and full opaqueness for black pixels. We use the unique per-pixel transparency to control the opacity of graphical elements, allowing us to design UIs that do not suffer from the limitations of half-silver mirror setups, where pixels are always partially transparent. We ensure that all graphical elements include clearly visible opaque parts, and use additional lights for the physical space behind the screen, to improve the visibility of the user's hands and keyboard.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera b) RGB internal (built-in) camera c) RGB external camera d) RGB-D internal (built-in) camera

	e) <u>RGB-D external camera</u>
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	*MS Kinect* **Head and hand tracking with depth cameras** One depth camera (Microsoft Kinect) faces the user and tracks the head to enable motion parallax. This allows the user to view graphics correctly registered on top of the 3D interaction space wherein the hands are placed. Another depth camera points down towards the interaction space and detects position and pinch-gestures of the user's hands [11].
SQ13. What is the purpose of the holographic solution?	*Interaction Study*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**  Figure 3. a) 3D grid and cursor. b), c) Sliding door. d) Highlighting. e) Scroll to change the order of windows. f) Expansion of a stack. g) Shadow Touchpad. h) Inter-shadow translation.
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture) **INTERACTION AND VISUALIZATION** **2D in 3D: Stack Interaction** In SpaceTop, graphical UI elements are displayed on the screen or in the 3D space behind it. In our scenarios, details or 2D views of 3D elements are shown on the foreground plane (coinciding with the physical screen). While objects can take various forms in 3D space, we chose to focus on window interaction and 2D content placed in 3D space, such that the system can be used for existing desktop tasks. Another advantage of the window form factor in 3D is that it saves space when documents are stacked. It can, however, become challenging to select a particular window from the dense stack.
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other

Data Extraction Form

Porifera ID	#2889
Title, Authors and Year	Huang, Zhanpeng; Li, Weikai; Hui, Pan
DOI	10.1145/2733373.2806266
Is it a Brazilian work?	No

About the publication

SQ1. What is the type of contribution of the article?	a) Evaluation research b) Proposal of Solution **c) <u>Validation Research</u>** d) … of a Philosophical Nature e) … of opinion f) … from Personal Experience
SQ2. For which area was the research carried out?	*Computer Science* Zhanpeng Huang Weikai Li Pan Hui HKUST-DT System and Media Laboratory Hong Kong University of Science and Technology, Hong Kong, China {soaroc, weikaili, panhui}@ust.hk

For each Evaluation Technology found in the publication

Id	Criteria (SQ3)	Method Type (SQ4)	Aspects/Metrics (SQ5)	Based? (SQ6)	Details	Empirical Study (SQ7)?
ET1	Usability	Testing	Task completion time, failed trials	No	Record Data	No
ET2	UX	Survey	perceived enjoyment, perceived usefulness, perceived ease of use and, intention to use	Yes, full	UAHIS (TAM*)	No

Extracted evidence from publication:

5. EVALUATION

We designed several experiments to evaluate the system from different aspects. Participants were invited to perform the experiments. Their task completion time and failed trials were measured and compared. The participants were asked to answer paper questionnaires after the experiments. A technology acceptance model (TAM) [14] was adopted to evaluate user experience.

** User Acceptance for Hedonic Information Systems*

[14] A. C. Haugstvedt and J. Krogstie. Mobile augmented reality for cultural heritage: A technology acceptance study. In *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)*, pages 247–255, 2012.

In addition to profile the system from the aspect of runtime performance, we evaluated user experience of Ubii using the TAM model, which includes four criteria of perceived enjoyment (PE), perceived usefulness (PU), perceived ease of use (PEOU), and intention to use (IOU). We used the Likert scale[6] to quantitatively measure the four criteria, which scale from 1 to 5 scores, with strong disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). As illus-



Figure 2: Left panel: a user picks a document item from a computer and drags it towards another computer. Right Panel: the user drops the document item to the other computer to finish document copy.



Figure 3: Left panel: a user is dragging a document item towards a printer. The capture zone of the printer is indicated by a virtual blue overlay. Right Panel: The printer captures the document item and prints out the document.



Figure 4: Left panel: a user is dragging an image item from a computer with pinch gesture. Right Panel: the image item is captured by a projector screen and then displayed on the projector screen.



Figure 5: Left panel: a user is moving a document item on a physical surface with pinch gesture. Right Panel: the selected document is moving along with his hand on the physical surface.

About the Holographic Solution in the publication

SQ8. Was the holographic solution subject to an empirical study?	**a)** **Yes** b) No
SQ8.1. Which empirical method was used?	a) Survey b) Controlled experiment **c)** **Case Study** d) Ethnography e) Research-Action
SQ8.2. How many people participated in study?	10

	5.1 Participants We invited 10 participants (6 males and 4 females) from other departments in our campus, with ages between 19 and 31. They are frequently computer users and familiar with common computer operations including document copy, print, and projector display. Several (4) have some experience of gesture interaction, including Microsoft Kinect and Wii for computer games. Three of them have experience or hear about AR techniques.
SQ8.3. Which was the type of results analysis?	**a) Quantitative** b) Qualitative
SQ9. How was the holography designed in the study?	**a) AR** b) MR c) VR d) Other
SQ10. How way was the holography presented to the user?	**a) Screen projection** b) Physical optical phenomena
SQ11. Which technology type was used to reproduce the holography?	a) Fog screen + projector b) Holographic display c) Smartphone or tablet d) Head-mounted-display (HMD) **e) Smart glass** f) Other
SQ11.1 What is the manufacturer and model of used devices for projection?	*Google Glass*

	4. IMPLEMENTATION Implementing our system requires technologies from fields of object tracking and hand gesture recognition. We employed a QR-based method for both object tracking and pose evaluation. A double-threshold algorithm was proposed to accurately detect pinch gestures. Our work explored the synergetic benefits that go beyond the sum of multiple technologies to achieve our design goals. Figure 9 shows the system workflow. The built-in camera on Google Glass takes live video of the scene around users, which is streamed for image analysis of object tracking and hand recognition. The system extracts object information of IP address and object type from QR code, which is used for physical affordance recognition and network communication. Camera pose is also evaluated by calculating the homography of QR code images. Virtual camera is updated according to the real camera pose to render 3D menus from corresponding viewpoint, making virtual menus align with surfaces of physical objects. Menus are rendered as AR overlays to blend with video stream, and then displayed on Google Glass display prism. Hand contours are extracted from video stream using a modified inexpensive method based on [40]. The contours are then filtered using double thresholds to determine pinch gestures. Users are able to interact with physical objects through virtual menus using pinch gestures, which are interpreted as socket to perform communication between physical objects through underlying network.
SQ12. Which technology type was used to interaction detection (touch)?	a) Infrared Stereo Camera **b) <u>RGB internal (built-in) camera</u>** c) RGB external camera d) RGB-D internal (built-in) camera e) RGB-D external camera
SQ12.1 What is the manufacturer and model of used devices for interaction detection?	Google Glass + hand tracking by software Wilson's vision-based method **4.2 Hand gesture recognition** Pinch gesture provides a simple and reliable way to detect when interactions start and end without additional gesture delimiters. It can be determined by the thumb and index fingers touching together to make a hole as illustrated in the Figure 11a. We basically follow Wilson's vision-based method [40] to detect one and two-hand pinching gestures, with several improvements in our system. The first step is to distinguish hands and background
SQ13. What is the purpose of the holographic solution?	*Office: file copy, print, project and share docs.*
SQ14. Which are the types/styles of touchable gestures allowed by the solution?	**a) <u>Pointing</u>** **b) <u>Pantomimic</u>** **c) <u>Manipulation</u>**

	hands to finish document copy. Rotate operation may be required when the specified document items are folded in menus. *Ex2: Printing documents.* Participants were asked to print specified documents on assigned printers by using functions provided by computers and Ubii. In traditional way participants had to select "print" menu item and fill the configuration panel such as assigning printer name. In Ubii participants had to pick, drag, and then drop the specified document item to the capture zone of assigned printer. *Ex3: Displaying documents on projector screens.* Participants finished the task of displaying specified documents on the projector screen with traditional USB flash copy and alternative way of Ubii. In traditional way participants copied documents to the computer connected with projector using USB devices, and then opened the document for projection display. Using Ubii system, participants directly interacted with the projector screen rather than the computer connected with the projector. *Ex4: Sharing documents.* Participants had to share documents with other participants through Dropbox and Ubii. By using Dropbox participants had to copy specified documents to Dropbox share folders or share Dropbox link, and then wait for documents updating or received. In Ubii participants used an architecture wall as virtual share space for uploading and downloading document with drag and drop interaction. Each participant was required to perform the four tasks
SQ15. Which is the image quality of the touchable hologram?	**a) <u>WIMP</u>** b) 3D RAW object c) 3D enhanced (with lights/shadow/texture)
SQ16. Is there feedback for the touch action? Which it is the means?	a) No **b) <u>Yes, visual.</u>** c) Yes, auditive. d) Yes, haptic (describe). e) Other