Handheld, non-contact and 80°-wide-view retinal camera for Retinopathy of Prematurity

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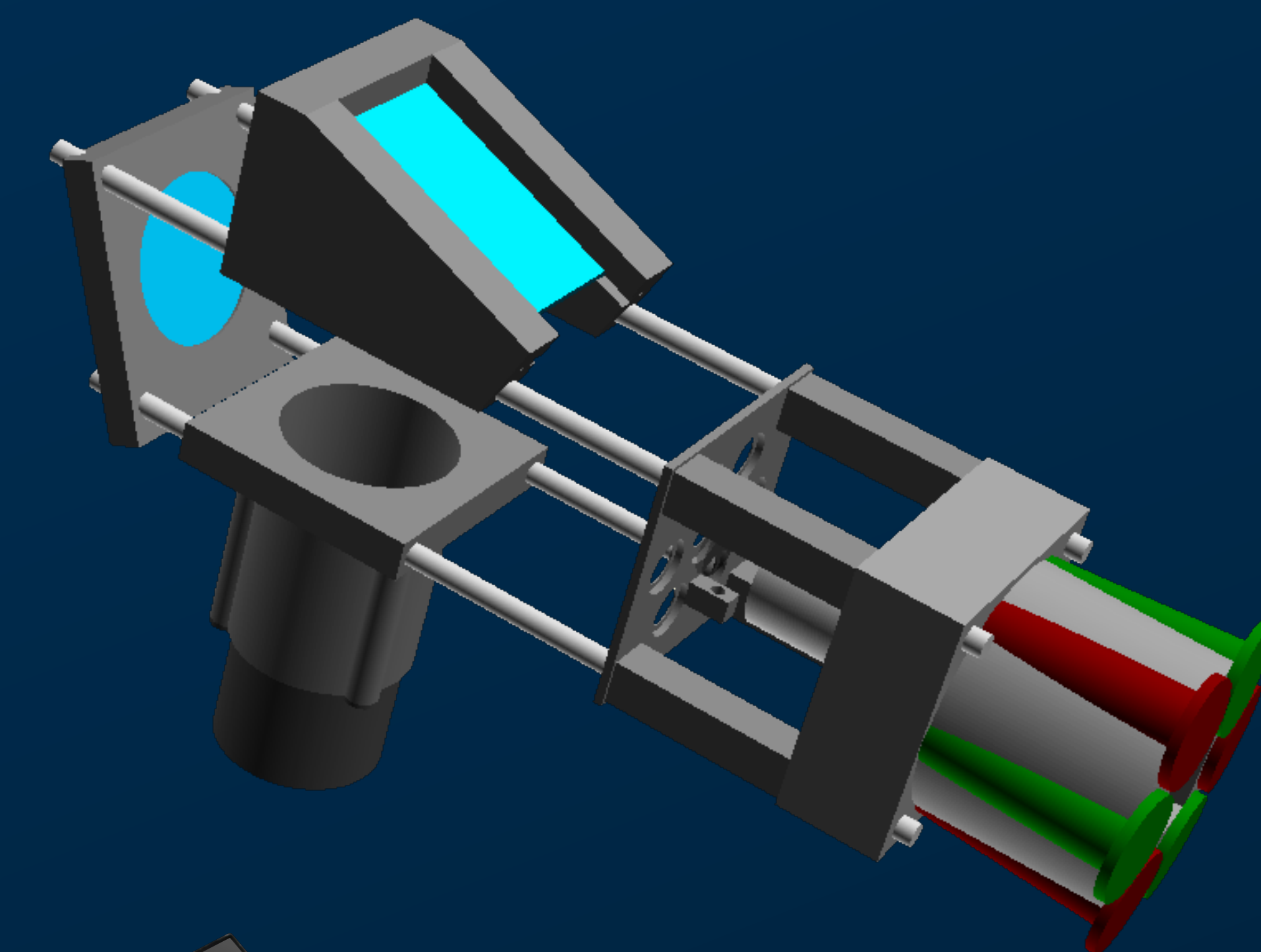
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IMAGING CONCEPTS GROUP

Background

- ➢ ROP diagonsis requires observing the retinal periphery
- ➢ Detection of Plus disease is important
- ➢ Mainly done using indirect ophthalmoscopes or
- ➢ Contact-based retinal camera *Retcam*
- ➢ Treatment is decided upon in situ retinal exploration
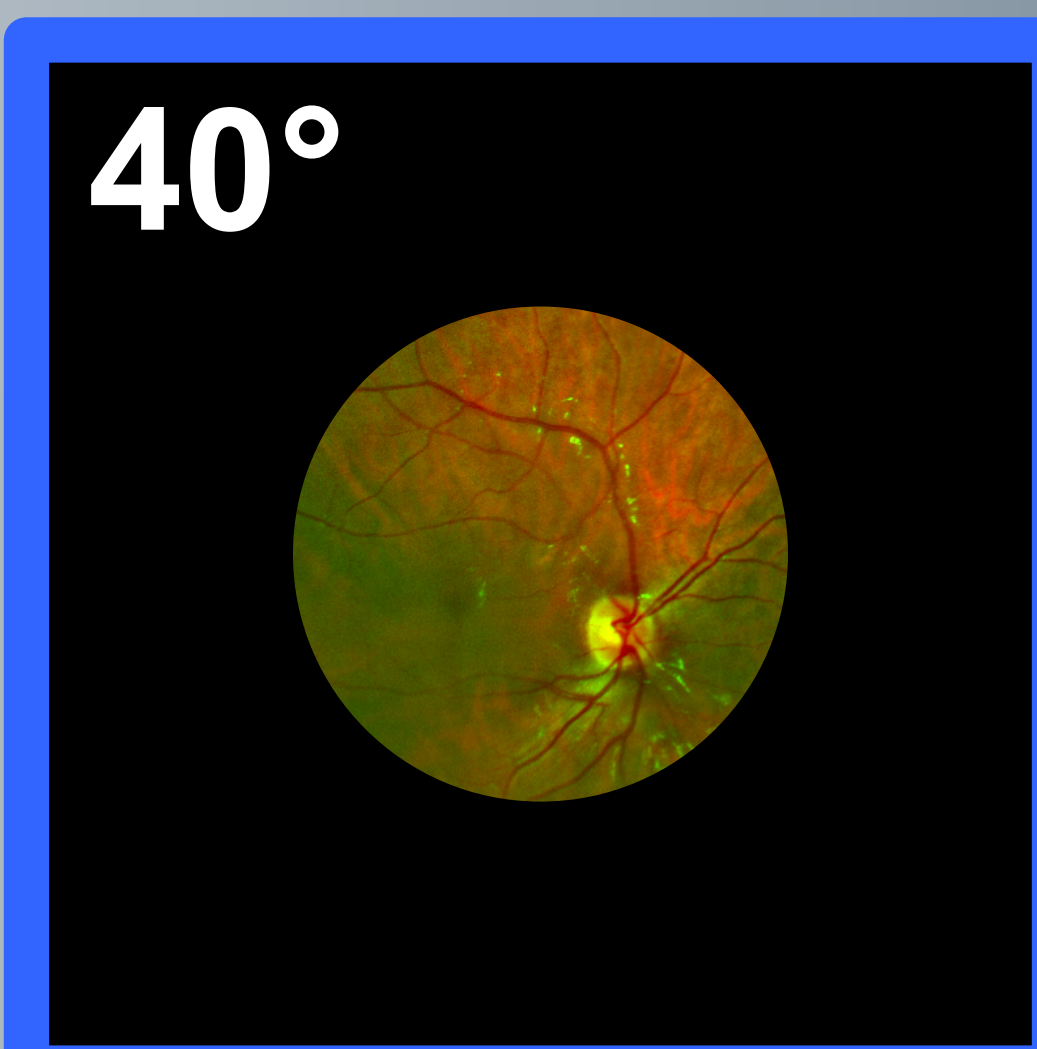- ➢ Decision/monitoring not based on recorded images

The goal

- ➢ Visualise retinal periphery, i.e. wide views
- ➢ Record images for monitoring and analysis
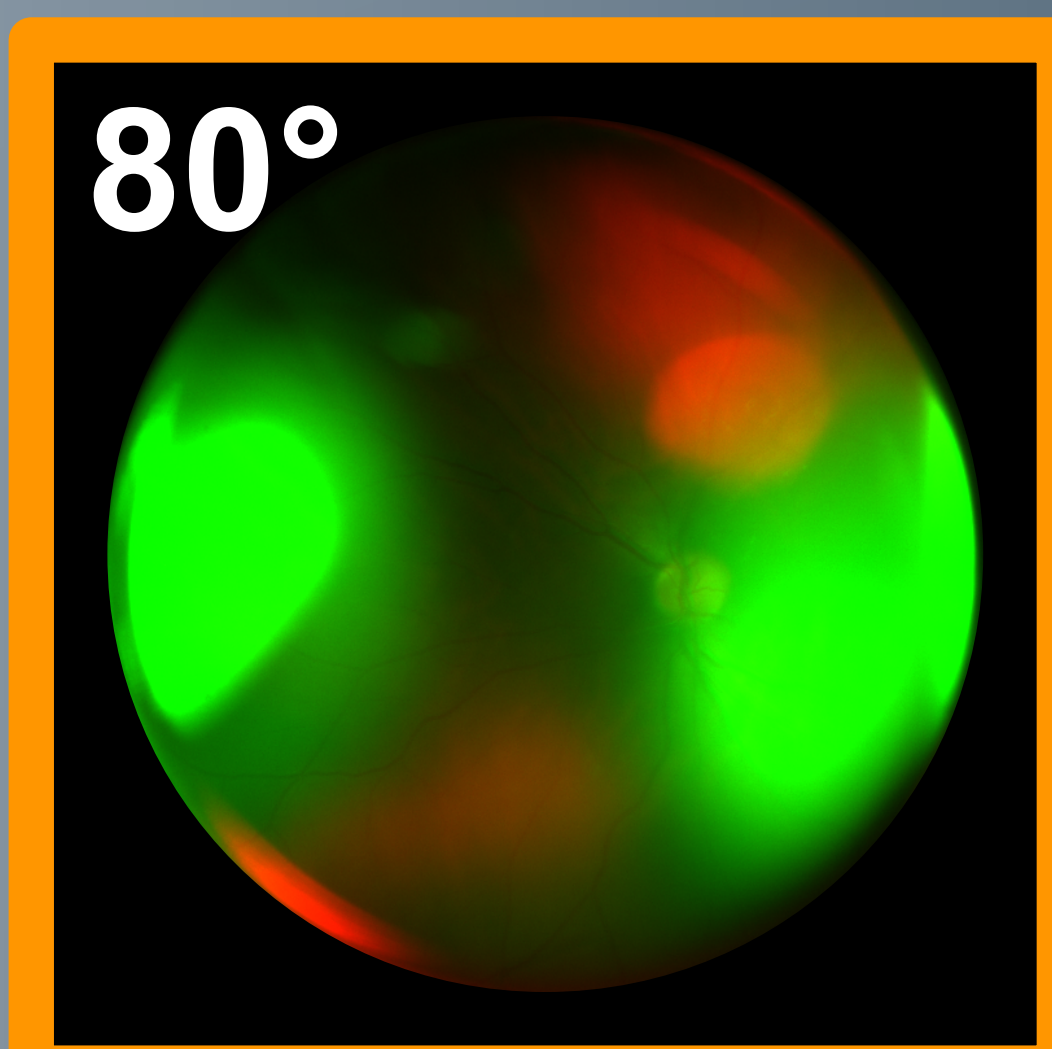- ➢ Handheld and compact

The problem

- ➢ Attempting wide field compromises image quality
- ➢ Images contaminated by reflections
- ➢ Especially using a handheld and non-contact device
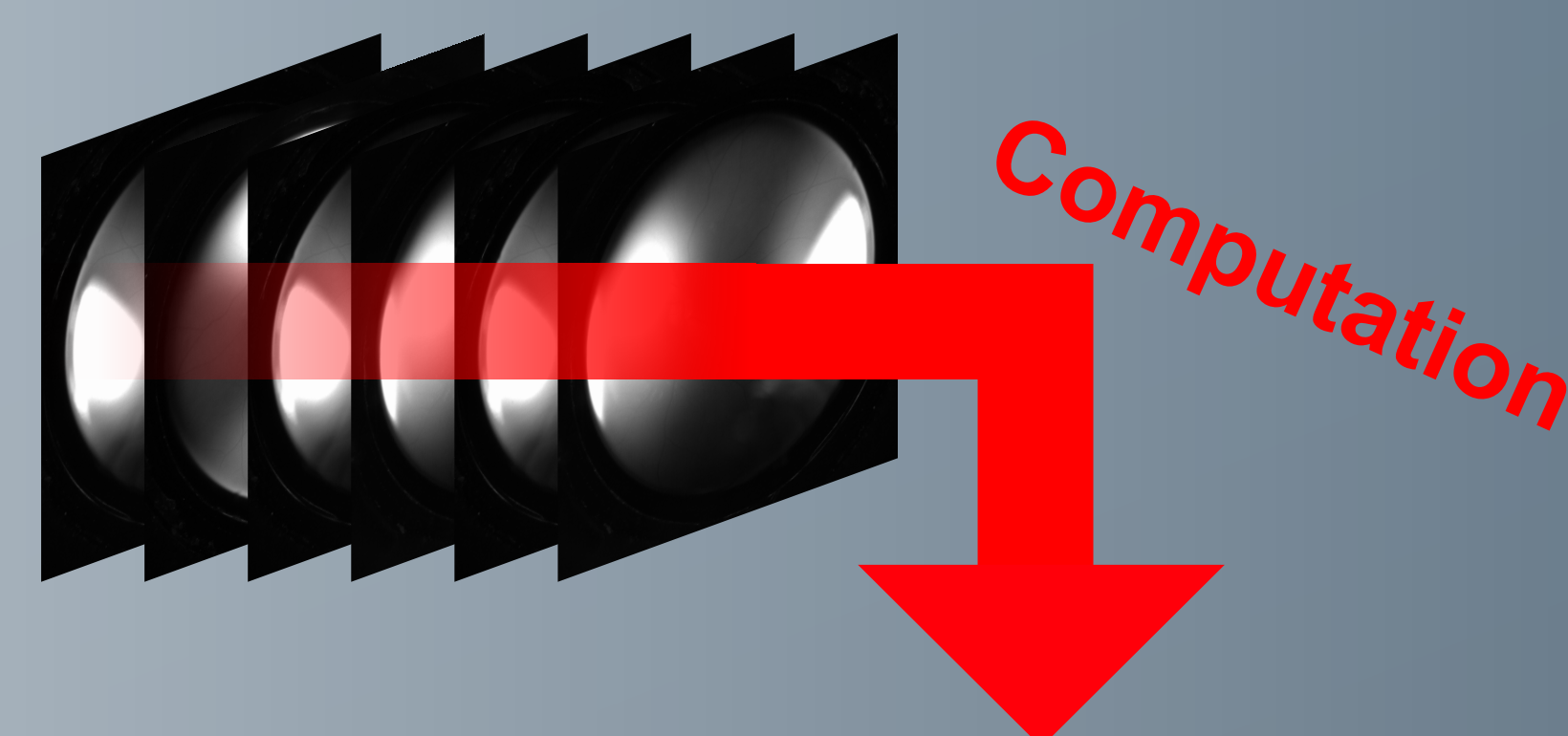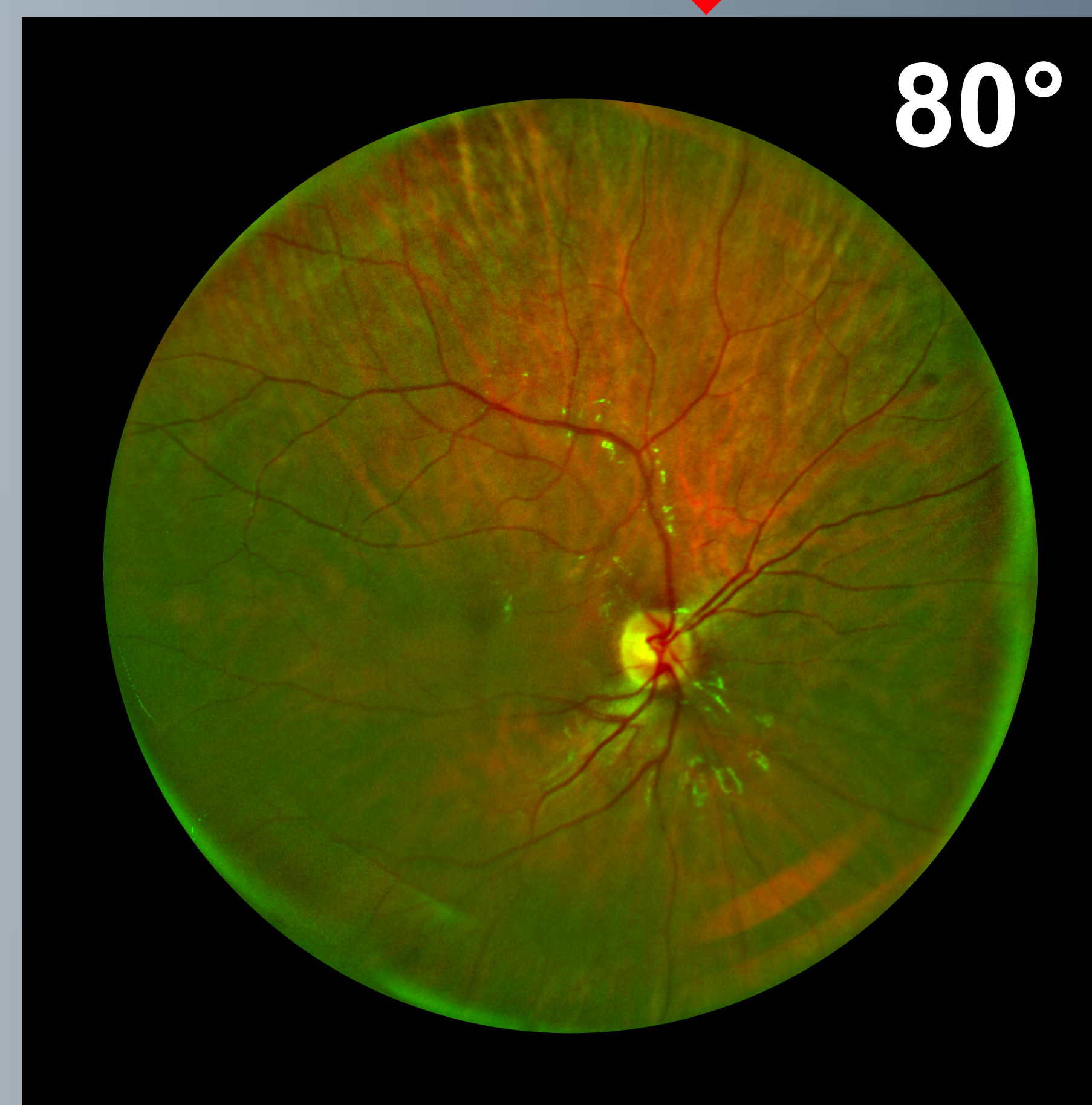
80°
40°
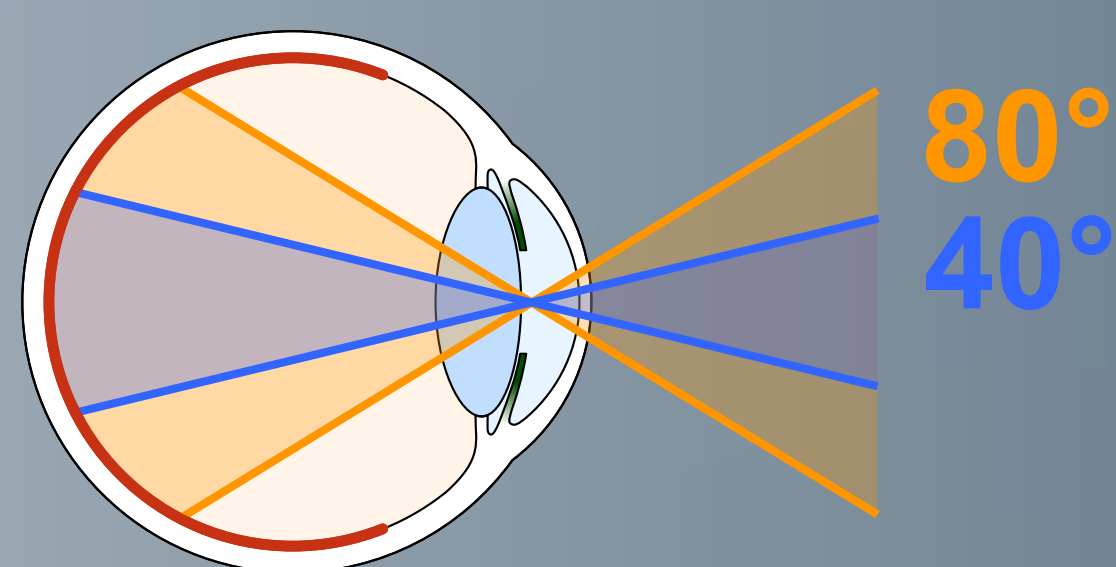
40°

80°

The solution

- ➢ Computational imaging: joint optics and computation design
- ➢ Series of images in a pseudo-snapshot, <200ms
- ➢ Illumination designed for diversity and non-redundancy
- ➢ Post-detection computation produces high-quality images

Computational imaging enables reflex-free wide-field images

Computation

80°

Wide-field, hanheld and no eye contact imaging for ROP

Conclusions

- ➢ 80° field-of-view handheld and non-contact retinal camera
  - ➢ Based on computational imaging for high-quality reflex-free
  - ➢ Demonstrated on adult volunteers
- ➢ Good quality for general-purpose wide-field screening
  - ➢ e.g. Diabetic Retinopathy
- ➢ Optimised for ROP monitoring:
  - ➢ Fits in incubator
  - ➢ No stress to infants due to contact
  - ➢ Oximetry enables vein/artery classification
  - ➢ Assists Plus disease diagnosing

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