Low-cost gigapixel microscopy

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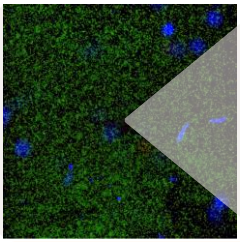
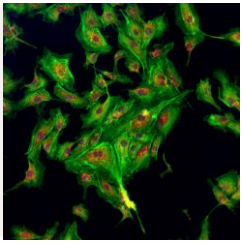
Gigapixel microscopy provides images for high-throughput applications such as:
- ✓Drug discovery
- ✓Digital pathology
- ✓Cell culture monitoring

However, conventional whole-slide scanning systems are:
- ×Expensive (>£50k)
- ×Require scanning
- ×No phase imaging

Thorlabs' TIDE™
£70k microscope





Bovine pulmonary artery endothelial (BPAE) cells obtained with Thorlabs' TIDE
15 mm x 15 mm scan area, 31X magnification

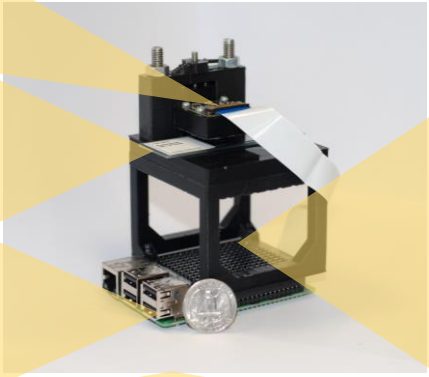
£100 wide-field high-resolution microscope

Our work is focused on replacing expensive optical components with cheap and abundant computational power to build high-performance, low-cost microscopes.

Raspberry Pi camera and lens
- Total cost <£30

3D printed parts
- Highly customizable design
- Effectively cost-free
- Easy manufacturing

Raspberry Pi 3 computer
- Image acquisition
- Wireless data-transfer
- No need for a PC
- Portable

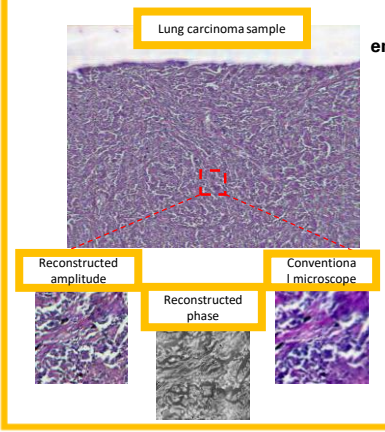


LED array for illumination

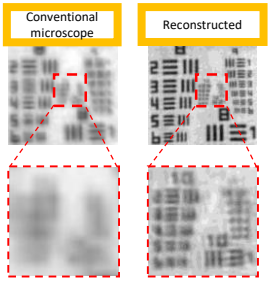
This microscope works on the principle of Fourier ptychography[1] which uses time-sequential illumination to recover gigapixel images for:
- Amplitude
- Phase (3D is also possible)
- Darkfield

[1] G. Zheng, R. Horstmeyer, C. Yang, G. Zheng, and C. Yang, "Wide-field, high-resolution Fourier ptychographic microscopy.," Nat. Photonics, vol. 7, no. 9, pp. 739–745, 2013.

Wide field, high-resolution phase imaging



Computational resolution enhancement from 5µm to 800nm



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