Docket #: S19-211

Octopi: Open, configurable high-throughput imaging platform for infectious disease diagnosis in the field

Stanford researchers at the Prakash Lab have developed Octopi, a low-cost ($250-$500) and reconfigurable autonomous microscopy platform capable of automated slide scanning and correlated bright-field and fluorescence imaging. Being highly modular, it also provides a framework for new disease-specific modules to be developed.

This low cost, automated system is specifically designed for resource constrained settings but can also be used in conventional settings. The team demonstrated the power of this platform by applying it to automated detection of malaria parasites in blood smears. Combined with automated slide scanning, real time computer vision and machine learning-based classification, Octopi was able to screen more than 1.5 million red blood cells per minute for parasitemia quantification, with estimated diagnostic sensitivity and specificity exceeding 90% at parasitemia of 50/ul and 100% for parasitemia higher than 150/l.

Octopi opens up the possibility of a large robotic microscope network for improved disease diagnosis while providing an avenue for collective efforts for development of modular instruments.

Figure

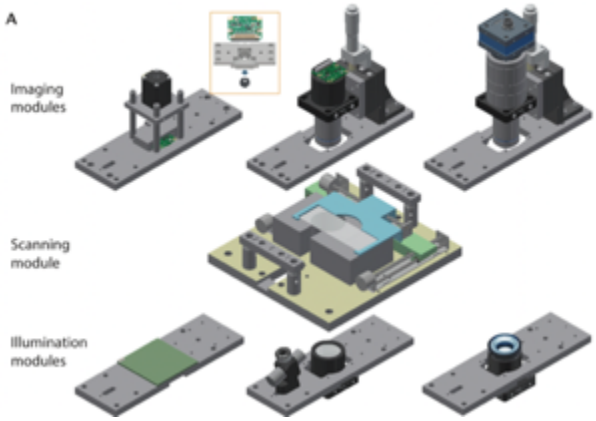


Figure description - Low-cost, open source and modular automated scanning/tracking fluorescent microscope. (A) Construction of the modular microscope with swappable parts.

Stage of Development

- Well-developed prototypes (~ $250-500)
- Testing device in a larger scale clinical validation test in field setting

Applications

- Malaria diagnostics
- Tb diagnostics
- Digital pathology

Advantages

- **High-throughput, low-cost microscope** useful in both resource-poor locations and conventional settings
- **Modular and reconfigurable** for different disease diagnostics
- **Can scan large areas**
- Multi-modal microscopy (brightfield, fluorescence, spectral) with **machine learning**
- **High sensitivity and specificity**
- Broad applications - unlike current solutions that are built for one specific disease diagnostic or application

- Can be a **fast path to commercialization**

Publications

- Li, H., Soto-Montoya, H., Voisin, M., Valenzuela, L.F. and Prakash, M., 2019. Octopi: Open configurable high-throughput imaging platform for infectious disease diagnosis in the field. *bioRxiv,* p.684423.

Patents

- Published Application: WO2020242978
- Published Application: 20220206007
- Issued: 12,474,344 (USA)

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