

Implementation of Asymmetric Illumination Phase Contrast Microscopy



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Introduction

Asymmetrical illumination phase-contrast imaging possess vast potential for the future of histopathology due to the relative lack of cell preparation required for the information gathered. In this presentation, we focus on the preparation of the ptychography apparatus for histopathological analysis.

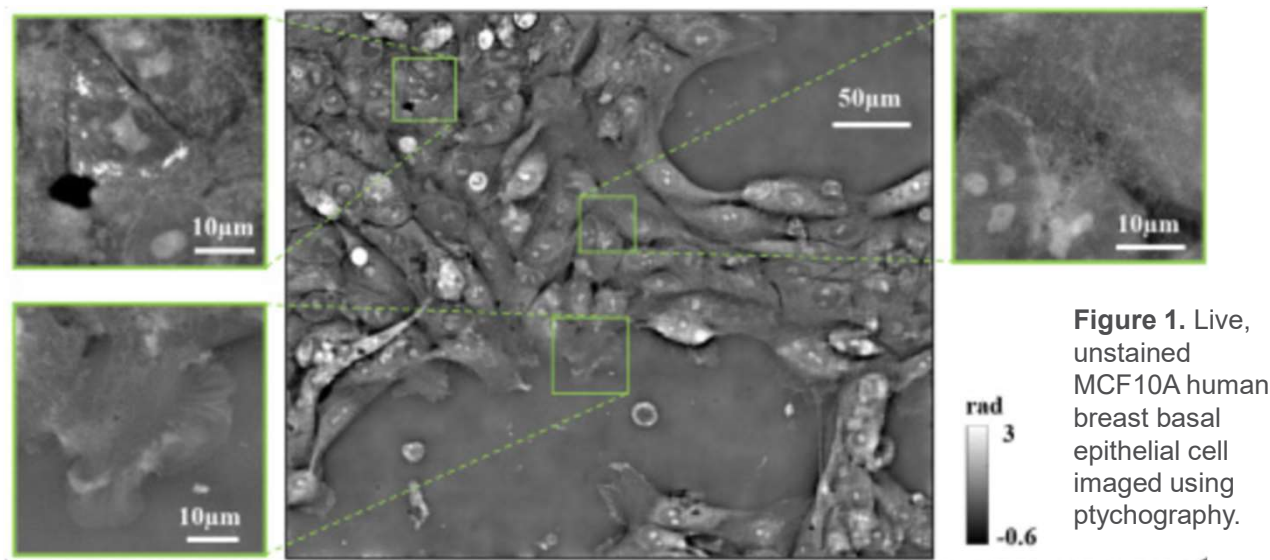


Figure 1. Live, unstained MCF10A human breast basal epithelial cell imaged using ptychography.



Methods

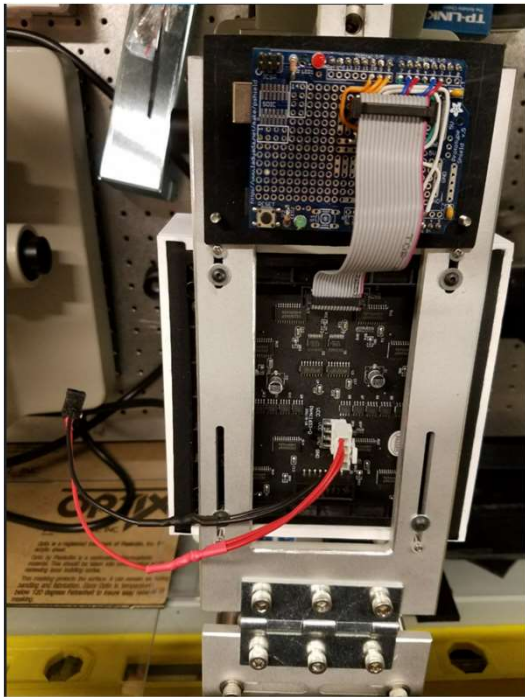


Figure 2. Our microcontroller setup.

We will utilize an Arduino microcontroller to control our LED array.

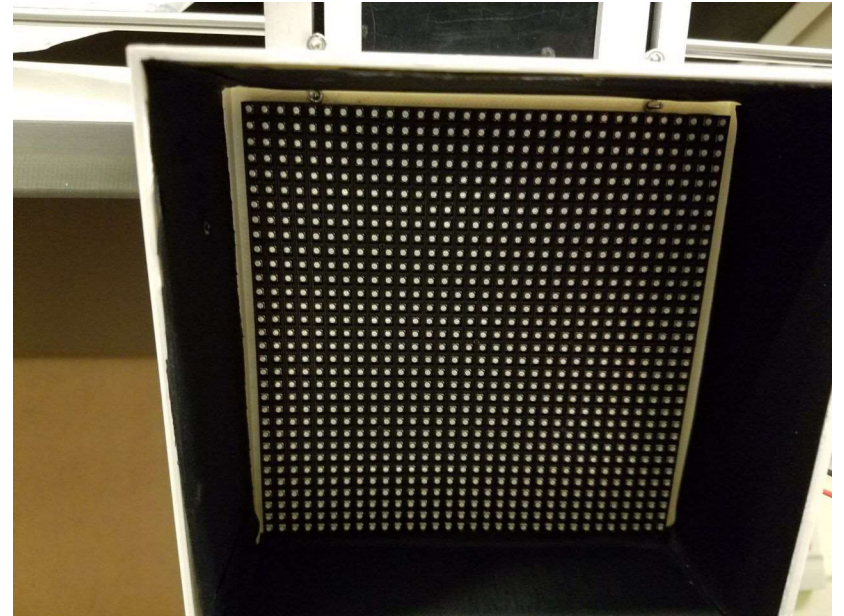


Figure 3. Our programmable LED array



Expected Results

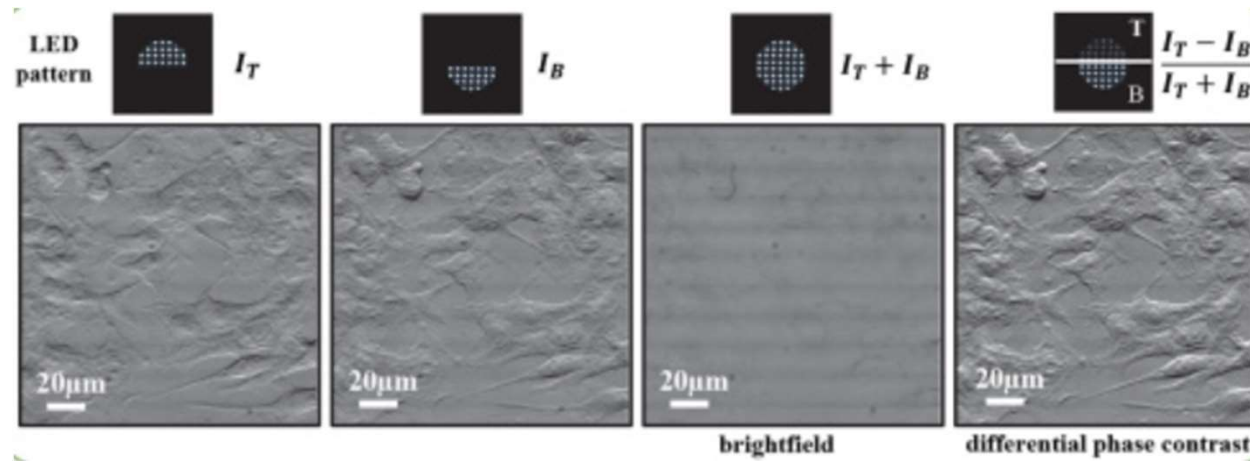


Figure 4. Example images of HeLa cells taken with differing illuminations and phase contrast techniques.



Next Steps

Our next steps are to employ our LED array to obtain phase contrasted images of histopathological slides to compare modalities.

Conclusions

At this point in time, our work is not finalized and most conclusions drawn would likely be inaccurate.



What benefits did you get from you SURE experience?

This experience was invaluable as it allowed me to access knowledge outside the typical scopes of my major and meet those I would be unlikely to meet otherwise.

References & Acknowledgements

- [1] Lei Tian and Laura Waller, "Quantitative differential phase contrast imaging in an LED array microscope," *Opt. Express* **23**, 11394-11403 (2015)
- [2] Michael Chen, Lei Tian, and Laura Waller, "3D differential phase contrast microscopy," *Biomed. Opt. Express* **7**, 3940-3950 (2016)

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Thank you



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