Melanoma Screening With Smartphone Spectroscopy
Justina Bonaventura\textsubscript{1}, Thomas Graham Knapp\textsubscript{2}, John Koshel\textsubscript{1}, Travis William Sawyer\textsubscript{1,2}
\textsuperscript{1}Wyant College of Optical Sciences, \textsuperscript{2}Department of Biomedical Engineering

Motivation
Melanoma accounts for 1\% of all skin cancer diagnoses in the US yet it results in the most deaths with an estimated 7,180 fatalities each year\textsuperscript{1}. This situation is made more dramatic by the higher incidence of melanoma cases in rural or remote places with less access to state-of-the-art medical care\textsuperscript{2}. Earlier diagnosis could be effective in increasing the survival rate and ease of treatment. Localized melanoma has a 99\% five-year survival rate, while distant melanoma which has spread to other areas of the body has only a 27\% five-year survival rate\textsuperscript{1}.

Objective
Develop a low cost, easy to use, in vivo diagnosis tool to increase accessibility and ease of melanoma screening.

Proposed Solution
- A smartphone spectrometer attachment that couples to the phone's camera.
- A corresponding application which provides spectral analysis to catch signatures of melanoma such as those documented in figure 2\textsuperscript{4}.

Results
Initial measurements made with the benchtop model show promise for key feature identification.

Spectrum can then be extracted from the image pixelwise into the individual color channels.

Next Steps
- Spectrum will be calibrated to wavelength.
- Spectrometer model will be fine tuned to maximize spectral resolution.
- Case to hold spectrometer directly to the phone will be developed.

Conclusions
- This method shows promise for detecting melanoma.
- When fully implemented this method would allow for low-cost point-of-care diagnosis.

Acknowledgements-
Special Thanks to Rachel Ulanch, and Tech Launch Arizona Grant Number UA21-241

References-
1 American Cancer Society publications, Cancer Facts & Figures