

# POINT OF CARE SENSORS FOR IRON DETECTION

Emily Montoya<sup>1</sup>, Erica Forzani<sup>2</sup>, Aoife Morrin<sup>3</sup>, Margaret McCaul<sup>3</sup>



# AGENDA

- Preparation and training at ASU before departure
- Problem and previous work conducted
- Proposed solution
- Personal contributions
- Results
- Next steps
- Overall experience



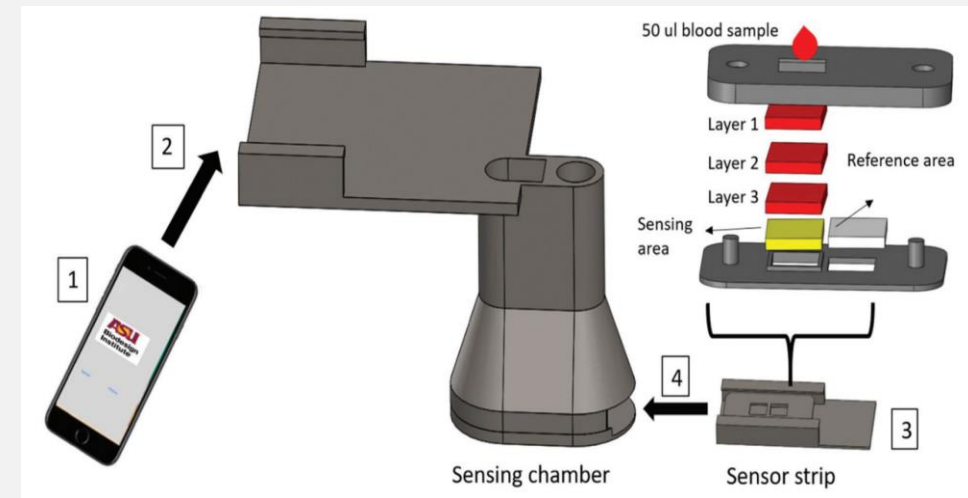
# PRE-TRAINING AT ASU

- Python, Machine Learning, and MATLAB introduction modules
- Writing resources
- Introductions to our mentors and lab tours
- Preparation of sensors



# PROBLEM/PREVIOUS WORK

- Low/High iron in your blood can lead to future health issues
- Without access to healthcare, many do not have access to this information
- Previous work had been done to build and test sensors
- Prior project included an iPhone mount and an app for interpretation



[1] Sensing System

# PROPOSED SOLUTION

- Use previous sensor to develop a way to allow for any type of camera in varying conditions to obtain accurate results
- Using ImageJ and MATLAB
- We wanted to make the point of care sensor to be more easily used without the inclusion of the iPhone mount

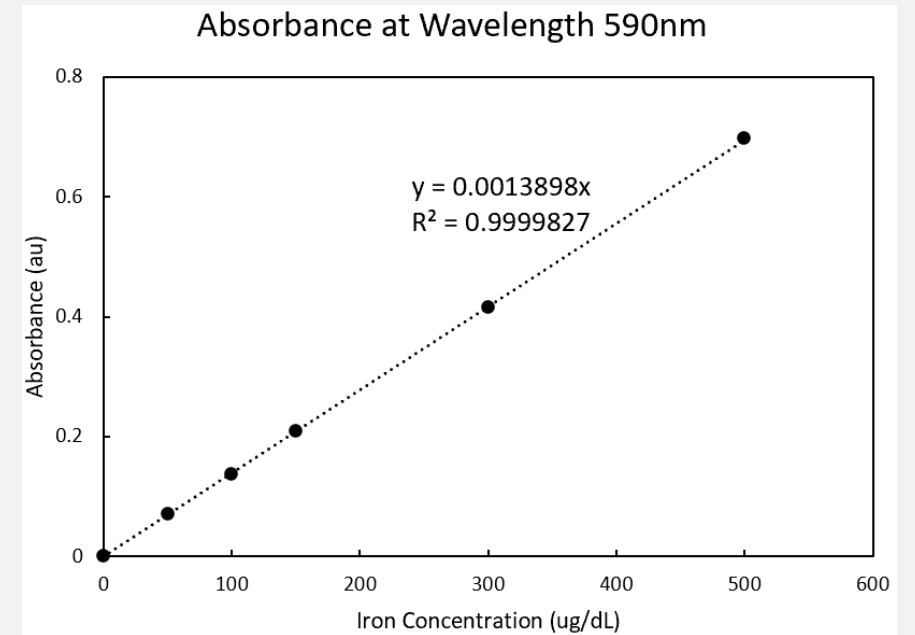
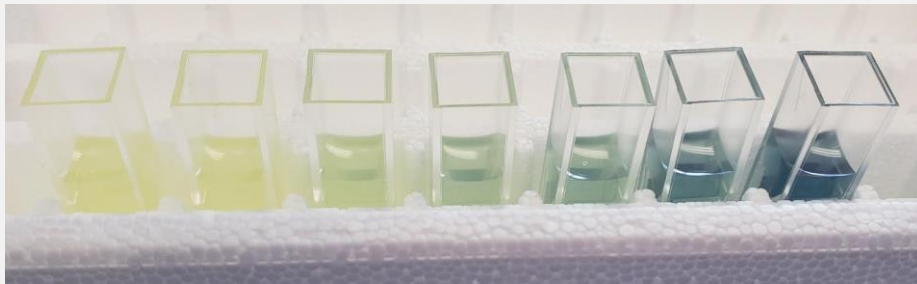


# MY CONTRIBUTIONS

- Prepared standards for testing the sensors
- Conducted sensor testing
- Worked to process results through ImageJ
- Compared RGB values

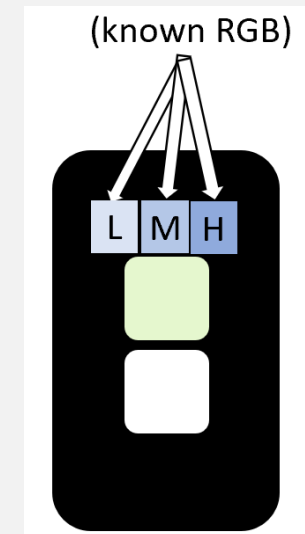
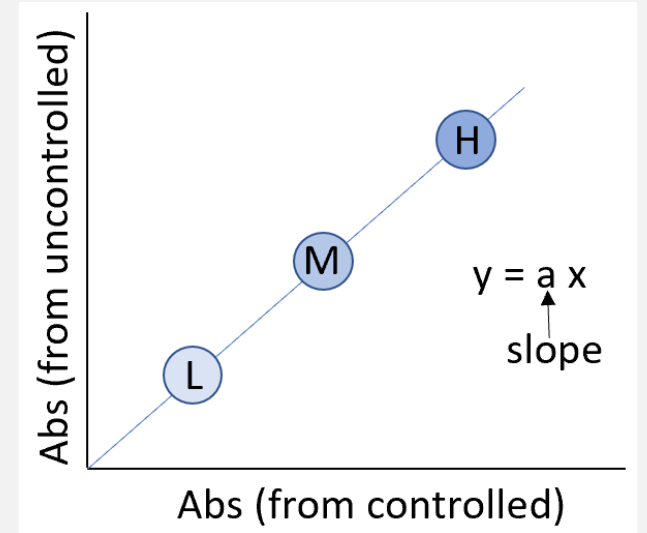
# RESULTS

- First, we used spectrophotometry to obtain a calibration curve
- The test was run 3 times with coefficient of variation = 1.6%



# RESULTS

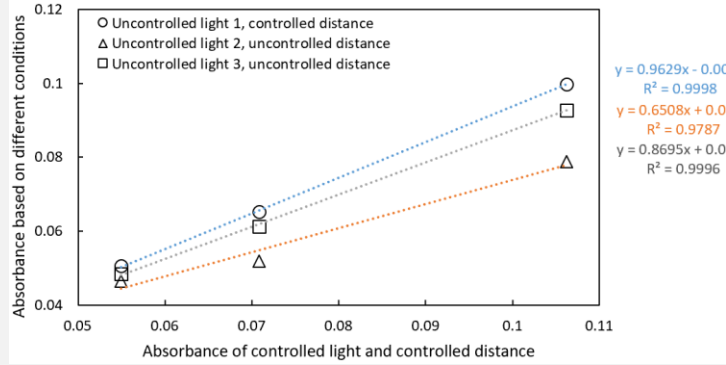
- Using images shown on previous slides
- We used added reference stickers labeled L,M,H
- This aided us in analyzing our results under varying conditions



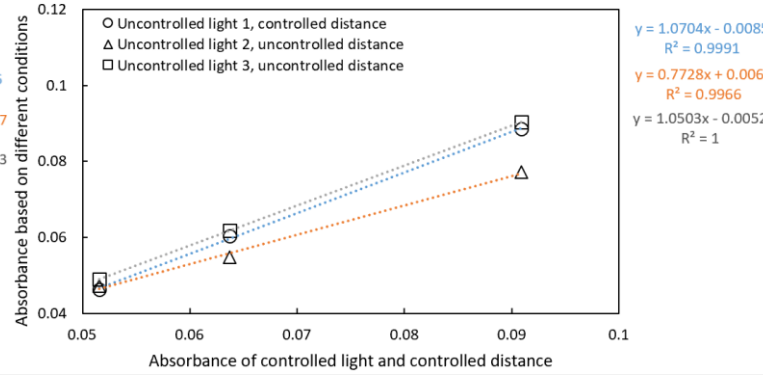
$$\text{Corrected abs} = \frac{\text{Abs}_{\text{sensing area}}}{\text{slope of Abs}_{\text{reference area}}}$$



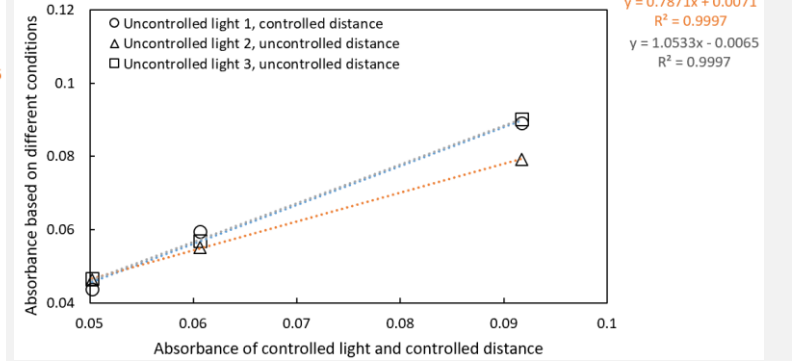
Correlation Plot for C = 0 ug/dL



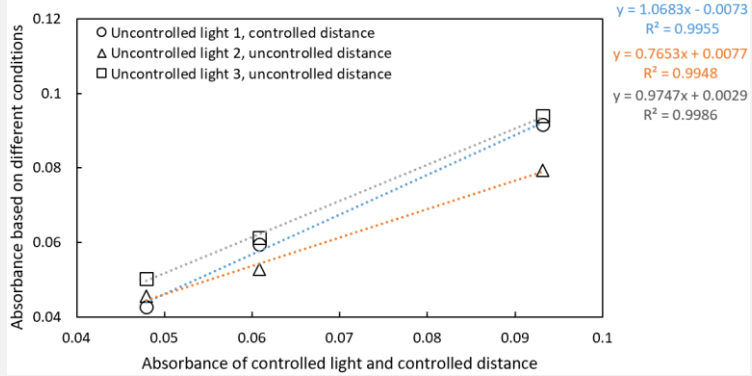
Correlation Plot for C = 50 ug/dL



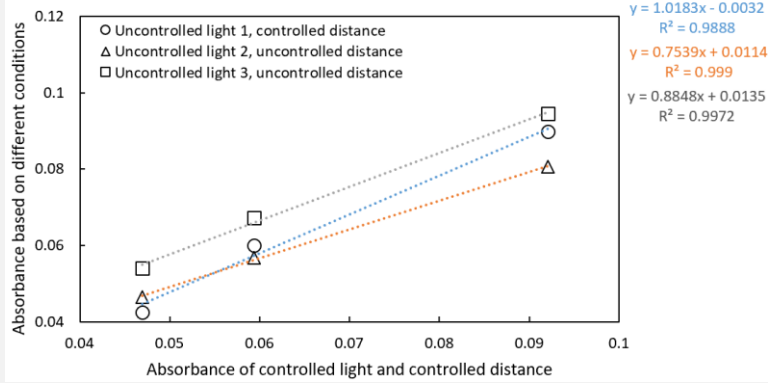
Correlation Plot for C = 100 ug/dL



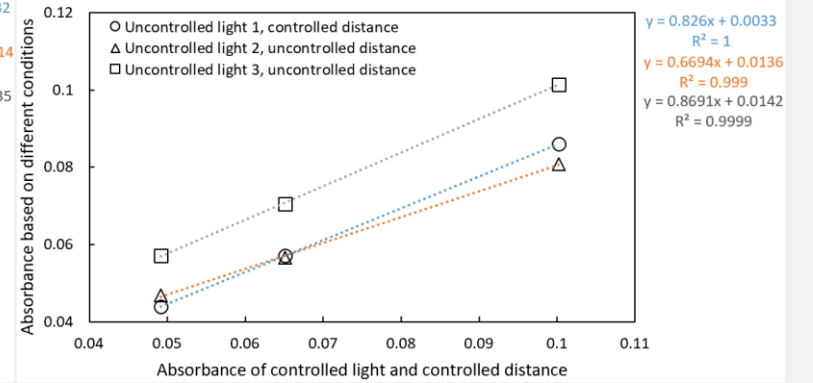
Correlation Plot for C = 150 ug/dL



Correlation Plot for C = 300 ug/dL

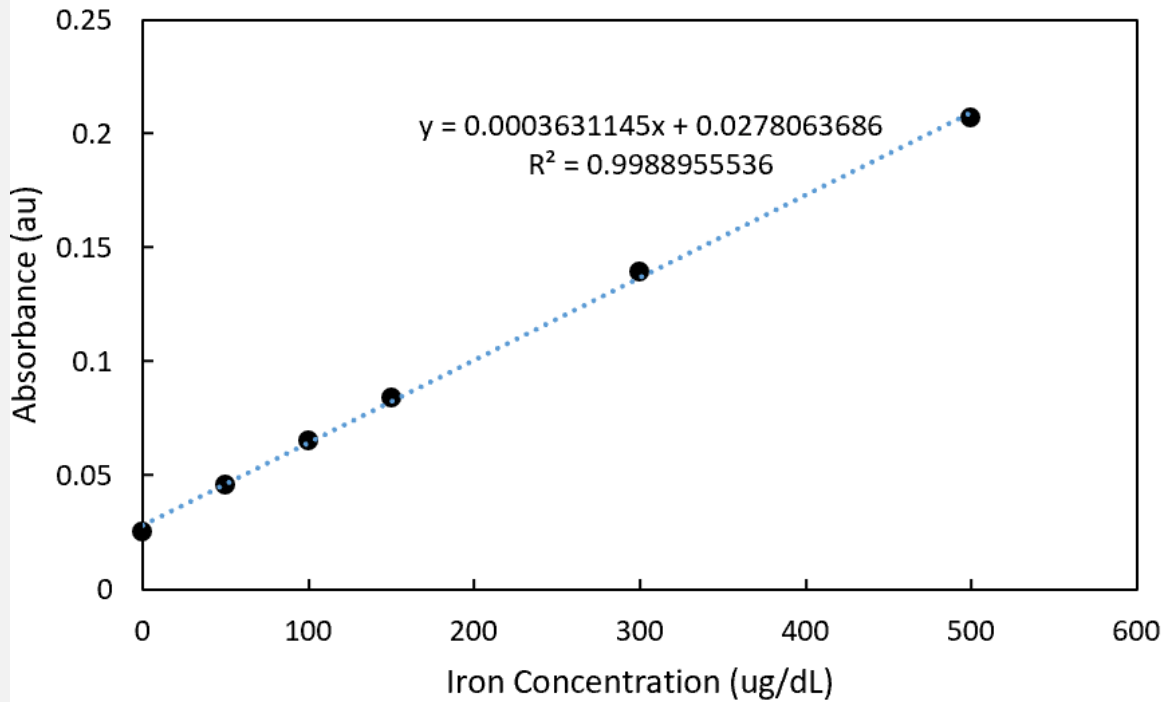


Correlation Plot for C = 500 ug/dL

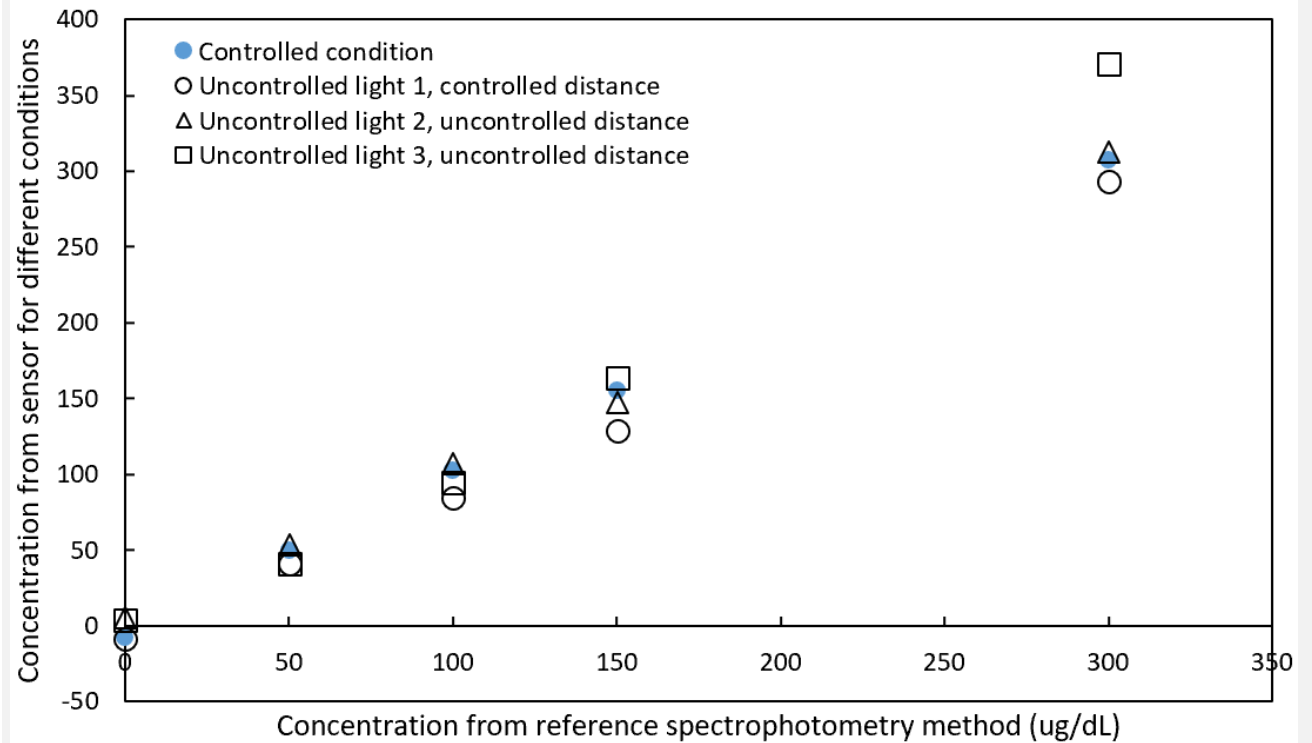




Sensor calibration curve (controlled light)

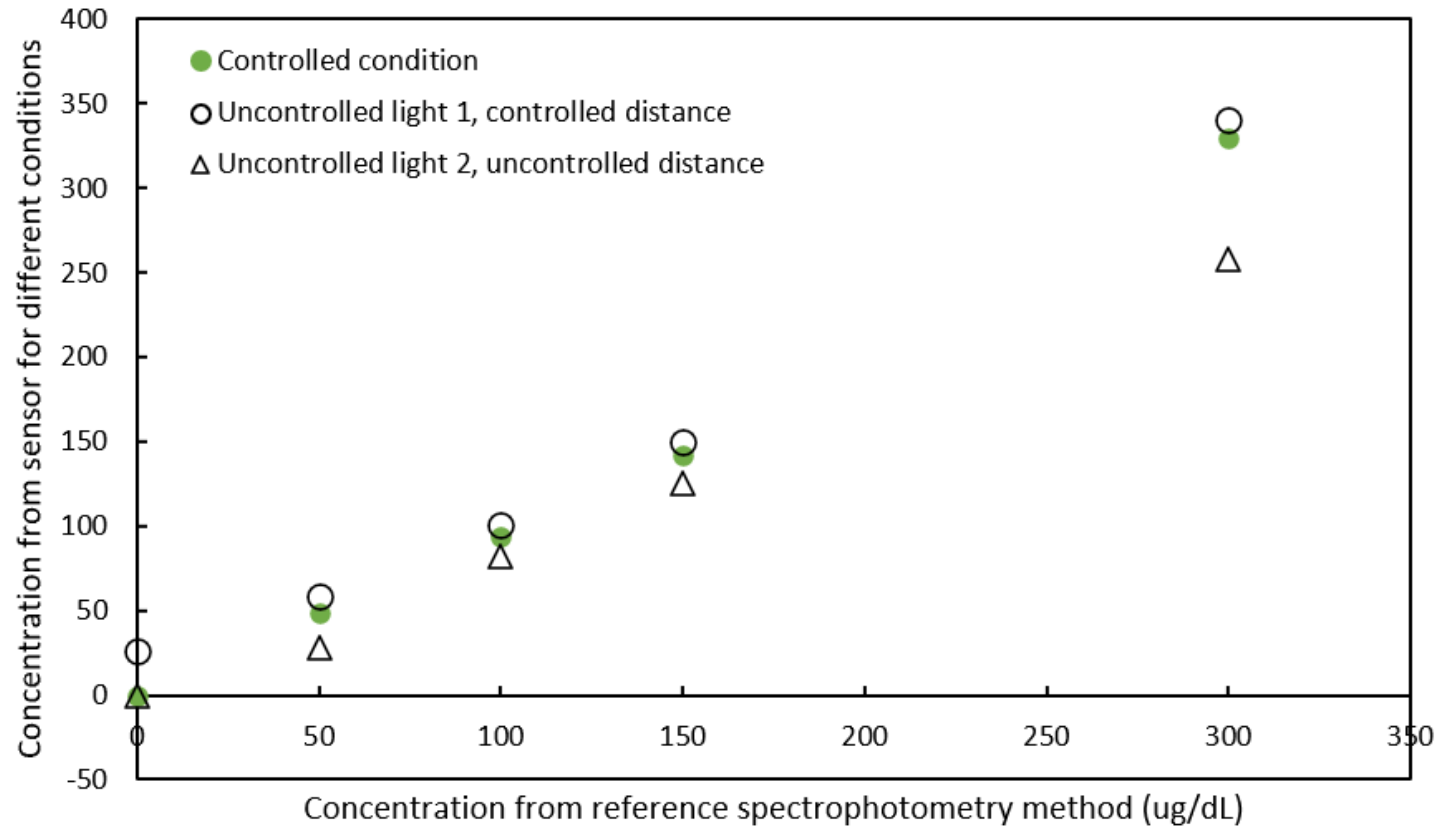


Correlation plot of sensor vs. spectrophotometer



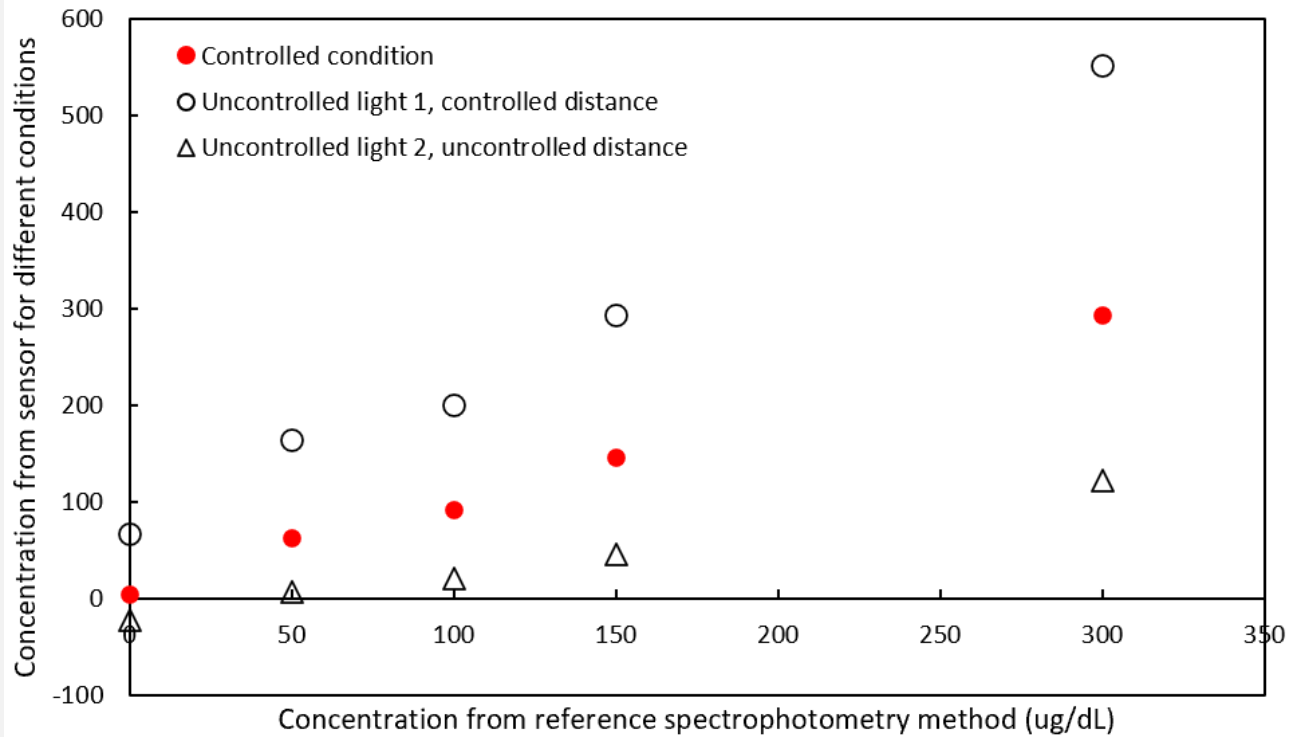


Correlation plot of sensor vs. spectrophotometer

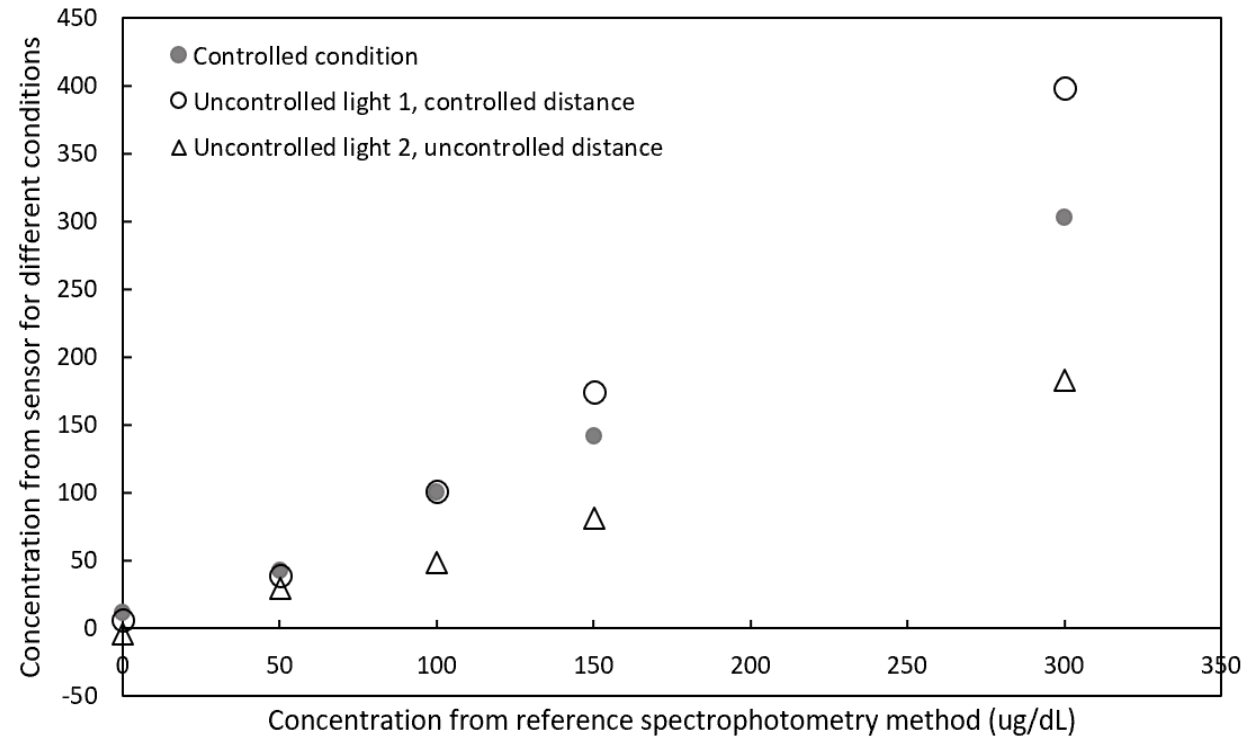




Correlation plot of sensor vs. spectrophotometer



Correlation plot of sensor vs. spectrophotometer



## NEXT STEPS

- Continue testing and formatting our developed codes to automate the process of retrieving RGB values
- Conduct work in Dr. Forzani's lab

# OVERALL EXPERIENCE

- Worked with new equipment and technology
- Collaborated with students and faculty of varying backgrounds
- Developed research skills
- Learned about the culture and history of Ireland
- Made many irreplaceable memories



## REFERENCES

[1] M. Serhan, D. Jackemeyer, M. Long, K. , M. Sprowls, I. Diez Perez, W. Maret, F. Chen, N. Tao, and E. Forzani, *Total Iron Measurement in Human Serum With a Novel Smartphone-Based Assay*, IEE Journal of Transitional Engineering in Health and Medicine, 2020.