

# Light Transmission in Turbid Water Environments for Marine Bycatch Technology

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## SenSIP Algorithms and Devices REU

### ABSTRACT

Light-based bycatch reduction technology relies on light transmission through turbid marine environments. The causes of turbidity vary across marine environments, therefore, different wavelengths may be better suited for a given environment[1]. This study seeks to find the relationships between turbidity, wavelength and transmittance to inform effective bycatch reduction technology.

### MOTIVATION

- Emerging bycatch reduction technology uses light to deter marine megafauna from getting caught in commercial fishing gear. [2]
- Turbidity is caused by suspended particles in a fluid. i.e. – silt, clay, algae. Therefore, an optimal wavelength may be different for each type of marine environment.[3]



Photo from National Geographic

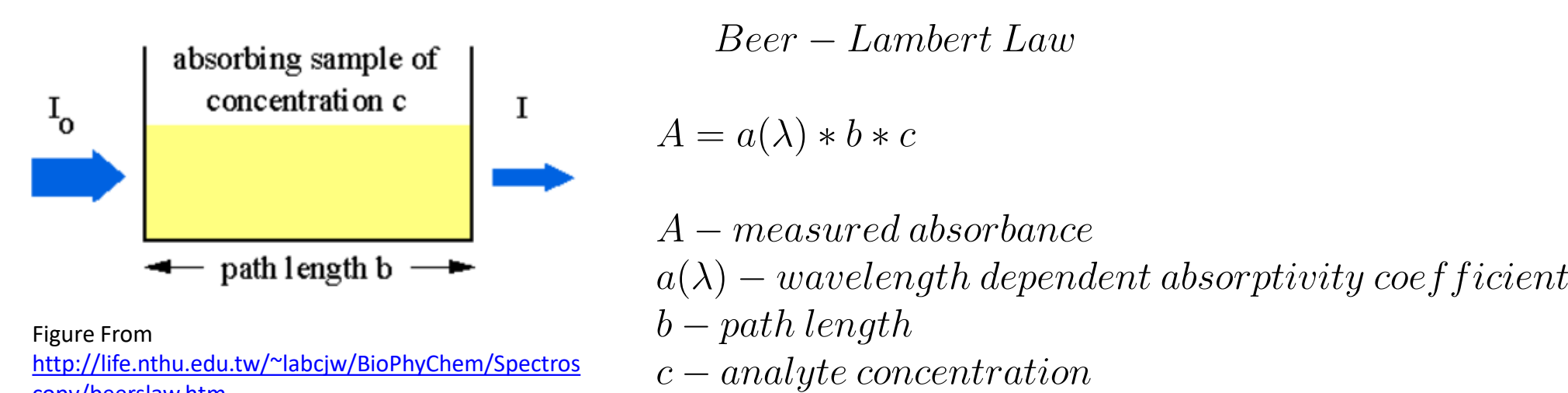
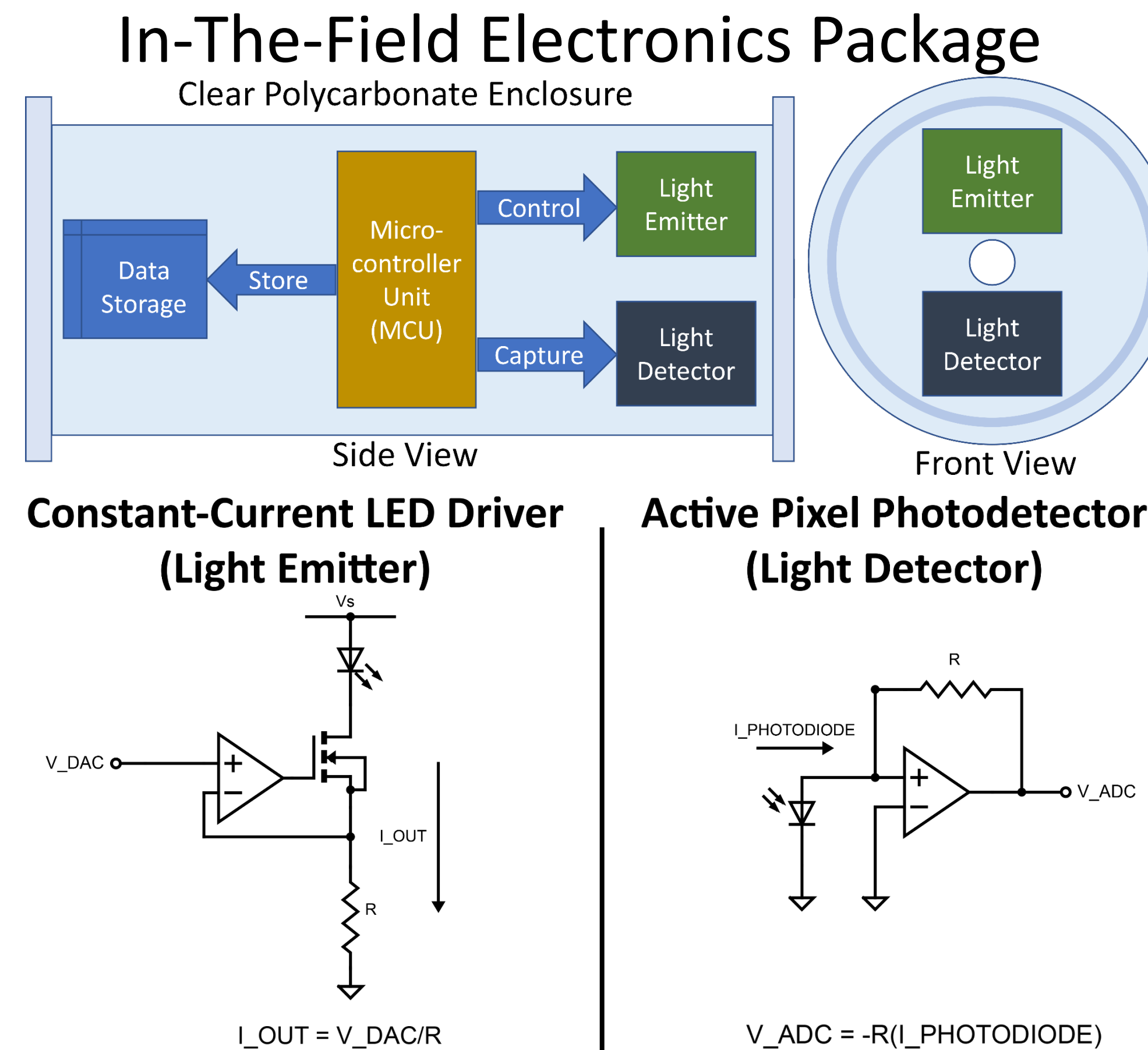
### PROBLEM STATEMENT

- What is the relationship between turbidity and transmittance for a given set of wavelengths?
- How does this relationship change across different marine environments?



Turbid water samples taken from various locations in Arizona.

### EXPERIMENTAL METHODS: DESIGN



Where  $A = \log\left(\frac{I_0}{I}\right)$  and Transmittance  $T = \frac{I}{I_0}$

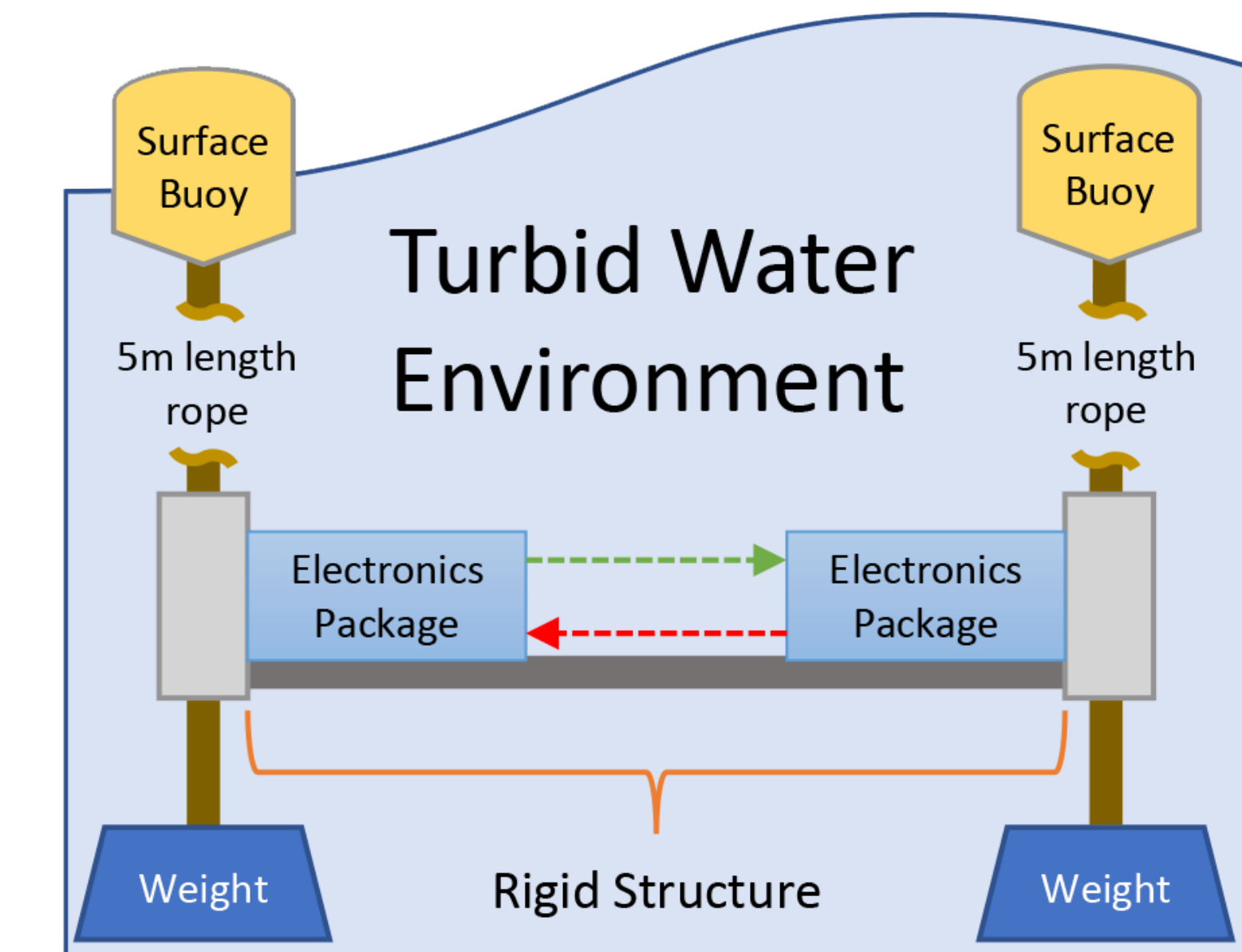
We can write intensity,  $I$ , as a function of wavelength absorbance,  $a(\lambda)$

$$I = I_0 e^{-a(\lambda)bc}$$

$I_0$  – initial light intensity

$$I_0 \propto V_{DAC} \quad I \propto V_{ADC}$$

### EXPERIMENTAL METHODS: DEPLOYMENT



### FUTURE WORK

- Construct benchtop in-the-lab experimental setup.
- Construct in-the-field electronics package and experimental setup
- Conduct field trials and gather experimental data.
- Characterize Transmissivity as a function of turbidity.

### REFERENCES

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### ACKNOWLEDGEMENT

This project was funded in part by the National Science Foundation:

- **CNS-1659871 REU SITE: Sensor, Signal and Information Processing Devices and Algorithms**
- **CNS 1837473 Machine Learning Enabled "Smart Nets" to Optimize Sustainable Fisheries Technologies**

