



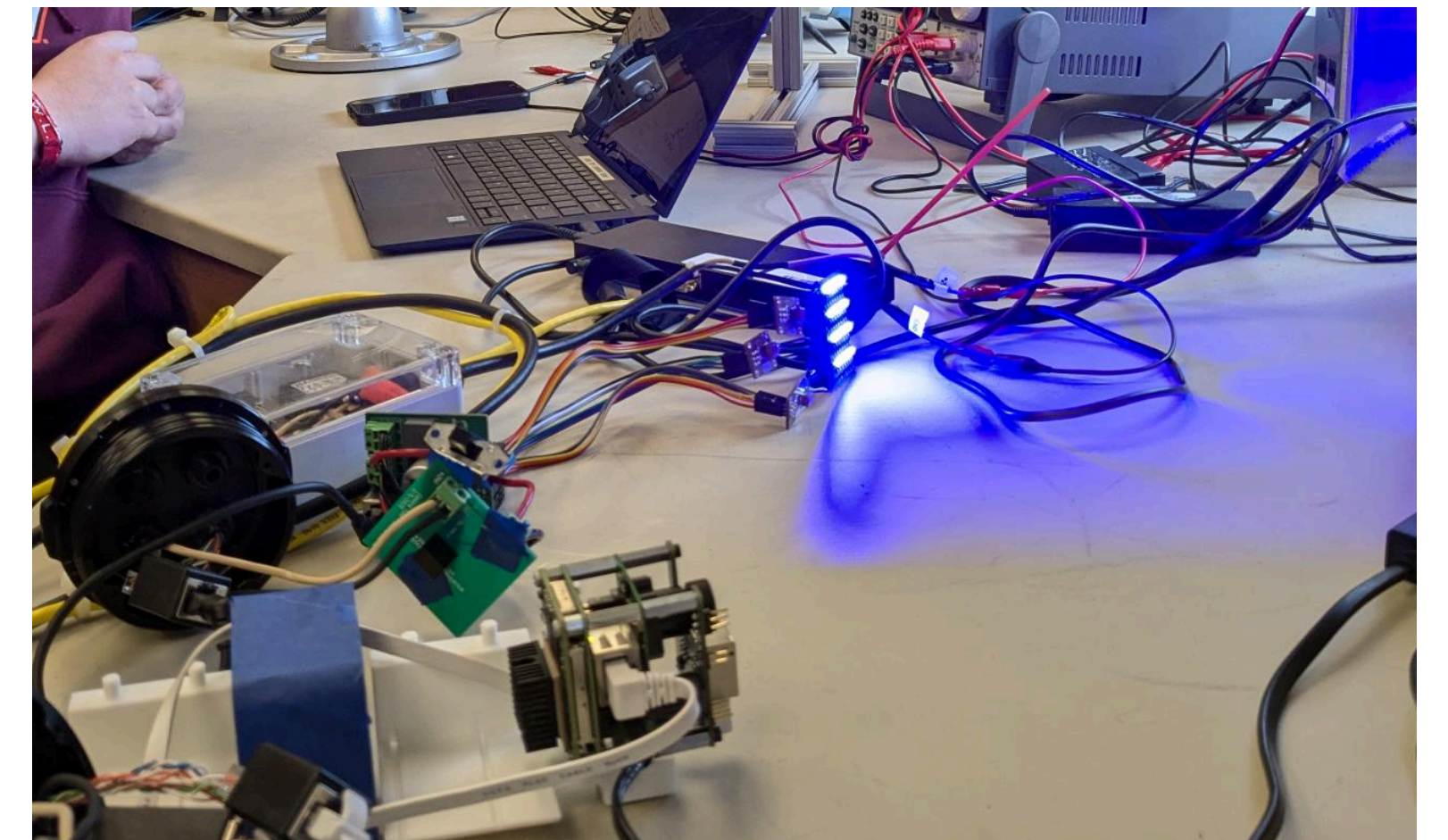
Underwater Time of Flight ROV Mounted RGB Camera



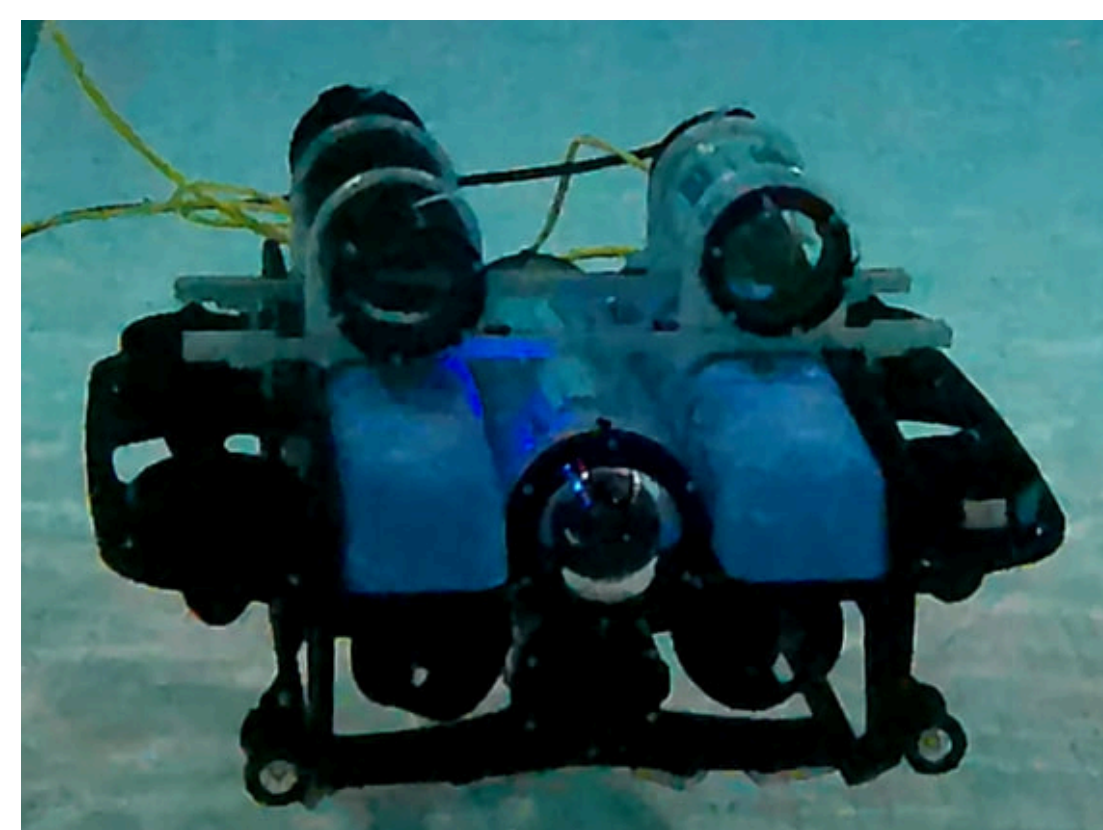
Background

The Underwater Time of Flight (ToF) team worked in partnership with BeamSea Associates to develop a first-of-its-kind 3D Multicolored Time of Flight Camera.

Most ToF cameras only work in one color, but ours works with red, green, and blue by adapting an existing ToF camera to work in all three colors. We designed ours for underwater use, packaging it for deployment on a remotely operated vehicle (ROV).



Camera Benchtop Setup



Camera/LEDs Mounted on the ROV

Underwater

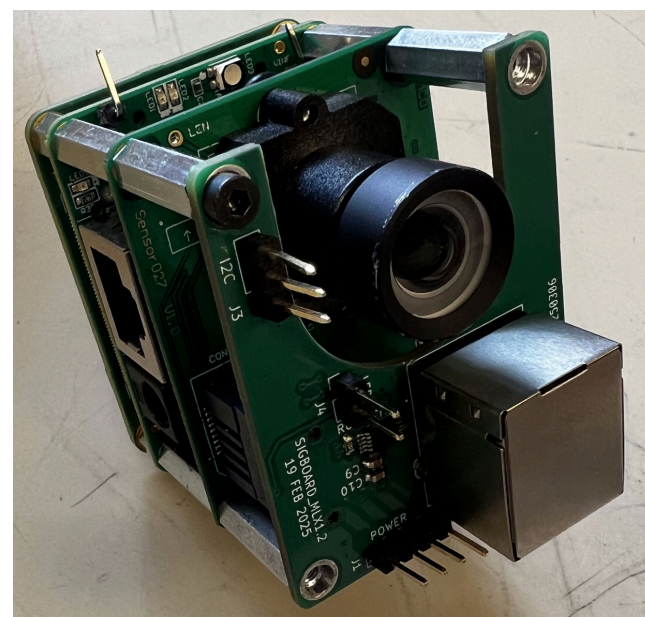
GOAL: Create a waterproof enclosure system that can be mounted onto a submersible ROV.

- Two tubes - one for our camera and the other for our LED system
- Custom made ring mounts, camera housing, and board inserts to help keep everything stable while ROV is in motion
- Tethered system with one power and one communications cable to above water control station

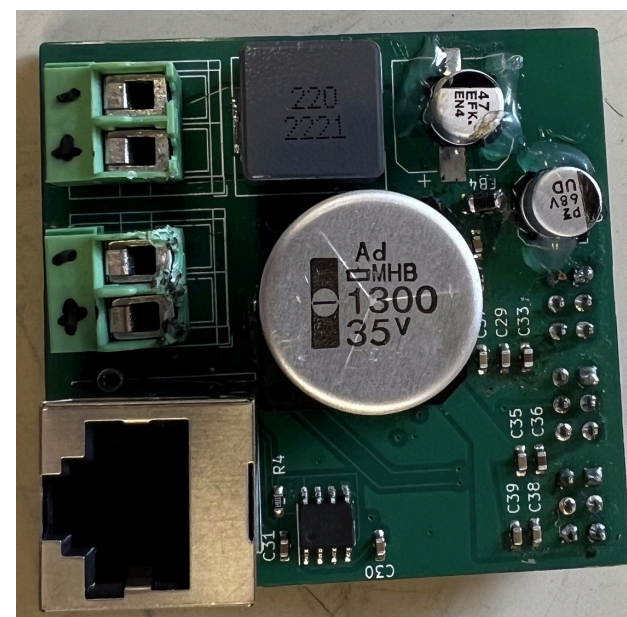
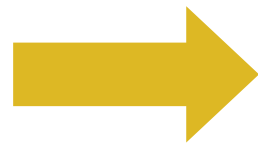
Camera

GOAL: Take a single output camera signal and use it to drive arrays of red green, and blue LEDs for imaging.

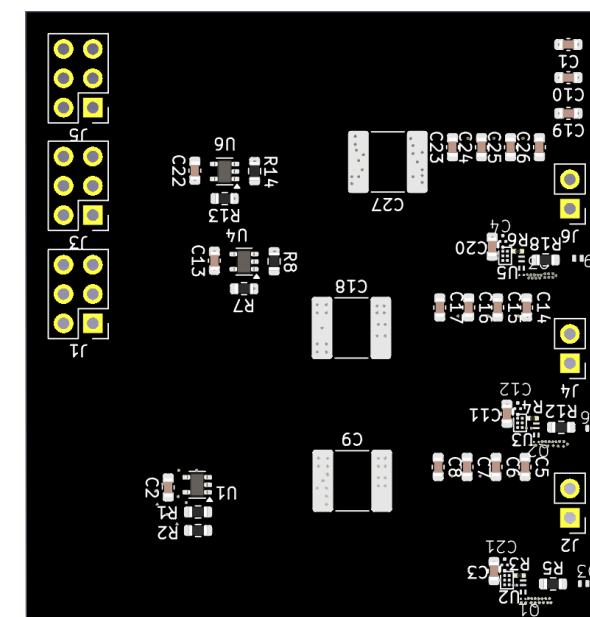
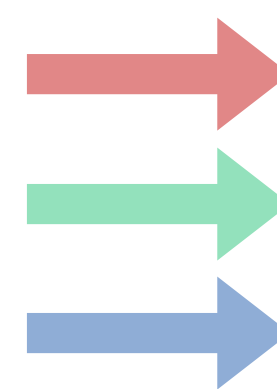
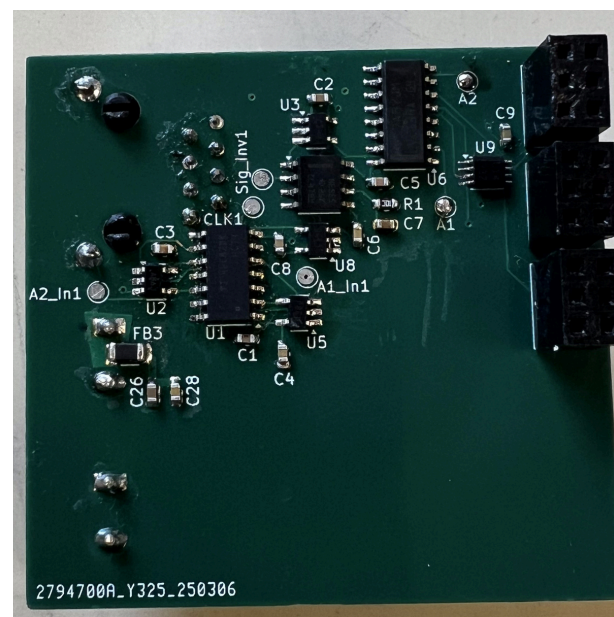
- Custom PCBs were made to break out the LED signal and use it to drive an 88-LED illuminator board.



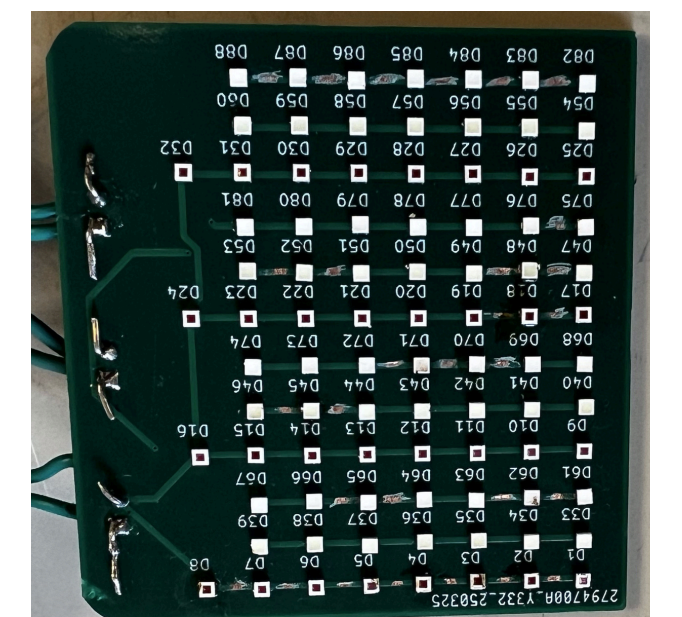
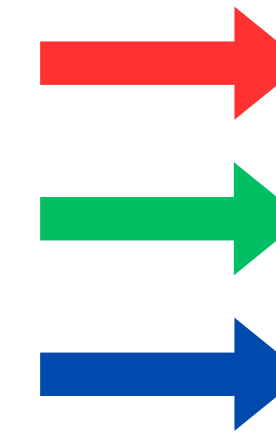
Melexis Camera



Switching Circuit Board



LED Driver Board

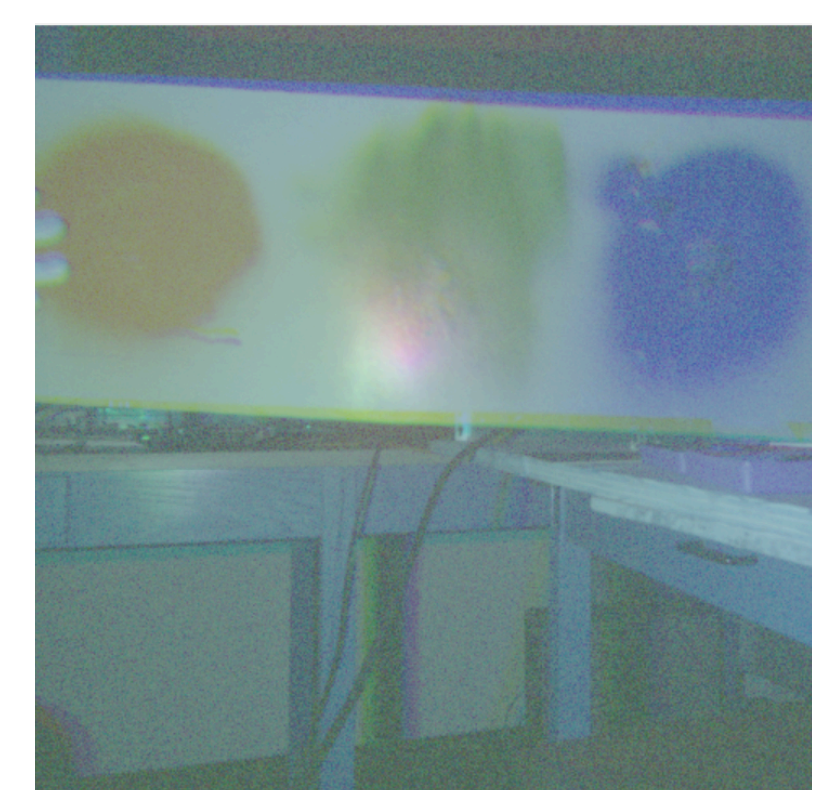


LED Illumination Board

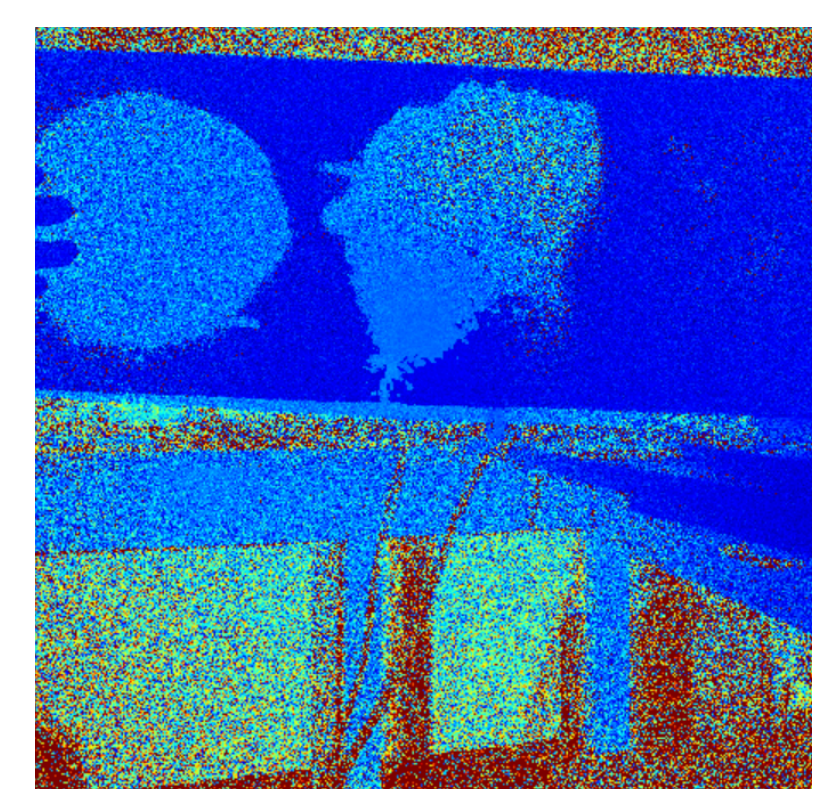
Imaging

GOAL: Combine RGB frames to display both color and distance images.

- Software sorts frames by color and assigns a color value to each pixel
- Calibrate distance readings for each color and display color and distance images at 25 frames per second



Combined Amplitude Image



Combined Distance Image



The Team

Faculty Advisor - Dr. Luke Rumbaugh
Adam Banford, Nate Duffy, Colin Gardner, Robert Lipnichan, Maggie Marino, Andy Sparks

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