

Background

Oceallus is a low-cost, open-source, underwater camera system designed for studying marine life such as clams and lobsters, rated for depths of up to 100 meters. It uses off-the-shelf and 3D-printed parts to reduce costs; this combined with a detailed assembly guide makes it easy and accessible for non-engineers to reproduce, while tackling challenges like adjustability, waterproofing, battery life, stability, corrosion resistance, and minimizing disturbance to wildlife. Powered by a Raspberry Pi Zero, it runs for up to four weeks, capturing 1080p images at customizable intervals, typically one photo every five minutes for time-lapse video creation.

<u>Overview</u>

The system comprises of three components: a camera module, a lighting module, and a water permeable frame that allows for customization and adjustability to meet a variety of research needs and constraints. Separate lighting and camera modules reduce the negative effects of particulate matter, which is a significant issue in local waters. Other key features include:

- IR Lighting
- Ballast support
- Adjustable FOV
 Small footprint (1m x 1m)

Electronics Block Diagram



Marine Science Institute



Underwater Spy Camera Denis Koush | Anna Gu | Matthew Santos | Emmanuel Chidiac Jorge Melgoza

Oceallus



- 3 ft vertical pipes
- 2 ft horizontal pipes
- D-rings to secure ballast
- Internal supports
- Easy to clean
- No adhesives

Key Components



Camera System

Uses custom, fully assembled PCB, removing the need for soldering by inexperienced research teams. Camera module compatible with multiple lenses, allowing multiple setups.

Lighting System

IR LEDs help illuminate the FOV from a separate module. Helps reduce glare internal lighting and enables from capture throughout night or at depths with reduced illumination.

Frame

PVC pipe pieces and ABS connections suited for marine applications. Custom mounts designed be placed to Eccentric anywhere on the frame. latches to secure connections easily underwater.

William Ray, Julia Cox, Ryan Chambers, Dr. Trevor Marks, Kirk Fields, Jared Jonas, Alen Iqbal, Josh Bowie



Optimization of boot time allows for longer deployments with current battery setup, or possible video captures for the desired deployment duration at the current battery capacity. Current boot times permit a deployment of up to 4 weeks, but could benefit from improvements to ensure battery life lasts until retrieval of the system.

Conclusion

- Oceallus offers an accessible, open-source solution for long-term underwater imaging.
- The system balances performance, ease of use, and affordability.
 - Costs ~\$799 to reproduce, while systems with less features cost thousands of dollars

Future Work:

- Refine electronics to improve functionality and reduce cost
- Improve the software user interface for easier configuration and smoother user experience
- Develop a step-by-step video guide to further assist users in assembly of the device













