UUV Major electronic design decisions

September:

Main design outlined:

- Flashlights
    - Lights
        - Deconstructed OTS flashlights
            - Already designed for this purpose
            - Usually run on 4.5v
            - Come with reflective cone
    - Batteries
        - 2x 18650
            - Already owned
            - Common standard
        - 5v converter
            - Microcontroller and LEDs can use a similar voltage
    - Microcontroller
        - Rpi pico W
            - Cheap, wireless microcontroller
            - Easy to work with
- RFID starting system
    - Outline goals
        - Use RFID tags to run different programs/commands without breaching the seal
    - RFID reader
        - Standard consumer kit
            - Easy to work with
            - Cheap
            - common
    - Microcontroller
        - Trinket m0
            - Small
            - Low power
            - Lots of pins
        - Will also control emergency systems
- Auxiliary power system
    - Batteries
        - 18650s
            - Already owned
            - Common standard
    - Voltage regulation

            - 5v and 3.3v converters
                - Microcontroller runs at 5v, rfid at 3.3v
- Ultrasonic sensors
    - Single sensor for bottom detection
        - Expensive
        - Not needed with webcam view
- Custom pcb
    - Outlined basic functions
        - Voltage regulation (3.3v,5v,12v)
            - Allows complete control over system power
            - Easy to fix any issues with power delivery
            - Easy upgradability
        - Connect GPIO/ data pins
            - Clear labeling
            - Easy upgradability
- Batteries
    - 4S Lipos
        - Easy to acquire
        - High capacity
        - Voltage only needs to be stepped down
    - Bus Bars
        - Can handle the current load of the vehicle
    - Diodes
        - Needed to prevent back charging
- Heat dissipation
    - Exterior heat sink + heat pipes
        - Seawater is excellent thermal mass
        - Simple design to extract heat from inside to outside the hull
- Leak detection
    - Thin metal strips
        - Simple
        - Cheap

October:

Created:

- BMS boards
    - Monitor battery voltage
        - Test pcb manufacturing capabilities

Updated:

- Battery charging
    - Swap to an off the shelf charger instead of trying to build our own
        - Cheaper
        - Safer

        - More reliable
- Heat dissipation
    - Dump heat into a copper plate pressed against the hull
        - Exterior fins will corrode
        - Cheap
        - No breaches to pressure vessel

April:

Updated:

- PCB Design
    - Rj45 jacks to go between PCB and endcap
        - Easy to source
        - POE spec can handle enough power over all 8 strands
        - Easy to remove from endcap

May:

Updated:

- PCB Design
    - Implemented schematics for Previous PCB design choices
    - Moved Voltage regulators to standalone units off of main PCB
        - Simplify design for time constraints
        - Standalone voltage regulators already owned for testing purposes
- Heat dissipation
    - Use water cooling
        - Concerns about plastic heat conductivity
        - Will allow for higher thermal headroom
        - Seawater loop is isolated, should not cause issues
- Auxiliary power
    - Lipoly pack
        - Easier to source than 18650s
        - Easier to charge
        - One cable