



OUR FLOAT PROFILING SYSTEM USES TWO ADAFRUIT FEATHER RP2040 RFM69 BOARDS COMMUNICATING OVER A 915 MHZ RADIO LINK. BOTH UNITS USE THE ADAFRUIT FEATHER RP2040 RFM69, INTEGRATING AN RP2040 DUAL-CORE ARM CORTEX-M0+ PROCESSOR (264 KB SRAM, 8 MB FLASH) WITH AN ONBOARD RFM69HCW 915 MHZ RADIO TRANSCEIVER. THE UNDERWATER UNIT INTERFACES WITH AN MS5837 PRESSURE AND DEPTH SENSOR OVER I2C VIA A STEMMA QT CABLE, PROVIDING THE PRESSURE (0-30 BAR, 0.2 MBAR RESOLUTION) AND DEPTH READINGS. FLUID DENSITY IS CONFIGURED TO 997 KG/M³ FOR FRESHWATER TESTING. THE UNDERWATER UNIT IS POWERED BY A SINGLE-CELL LIPO BATTERY VIA THE FEATHER'S JST CONNECTOR WITH AN ONBOARD 3.3 V REGULATOR SUPPLYING ALL PERIPHERALS. THE TOPSIDE UNIT IS POWERED OVER USB.

ON STARTUP, THE UNDERWATER FIRMWARE ALLOCATES A 1000-PACKET HEAP BUFFER (16 KB). EACH LOOP ITERATION READS PRESSURE AND DEPTH FROM THE MS5837 AND STORES A SENSOR PACKET (THAT HOLDS MILLISECOND TIMESTAMPS, PRESSURE, AND DEPTH DATA) INTO THE BUFFER. THE FLOAT DOES NOT TRANSMIT DATA WHILE THE DEPTH EXCEEDS 0.1 M. DURING THIS TIME, IT ONLY LOGS DATA AS 915 MHZ RADIO DOES NOT PROPAGATE THROUGH WATER. ON SURFACING, THE FULL BUFFER IS FLUSHED OVER RFM69 RADIO ONE PACKET AT A TIME, FOLLOWED BY LIVE STREAMING OF CURRENT READINGS. IF THE BUFFER FILLS, THE HEAP IS AUTOMATICALLY DOUBLED IN CAPACITY. AT ONE SAMPLE PER SECOND THE INITIAL 1000-PACKET BUFFER IS ABLE TO STORE APPROXIMATELY 16 MINUTES OF DATA.

THE TOPSIDE FIRMWARE RECEIVES EACH PACKET, VERIFIES ITS LENGTH, AND OUTPUTS STRUCTURED SERIAL DATA AT 115200 BAUD PREFIXED WITH LIVE OR BUFFERED BASED ON THE PACKET TIMESTAMP. THE SURFACE PYTHON APPLICATION PARSES THE SENSOR PACKETS AND CREATES LIVE PRESSURE AND DEPTH PLOTS, WITH BUFFERED DIVE HISTORY SHOWN AS DASHED LINES AND LIVE DATA AS SOLID LINES.

SAFETY REQUIREMENTS VERIFICATION

ELEC-NRD-001: THE UNDERWATER FLOAT IS POWERED BY A SINGLE-CELL LIPO BATTERY (3.7 V NOMINAL), REGULATED TO 3.3 V ONBOARD. ALL VOLTAGES REMAIN UNDER THE 12 VDC MAXIMUM RESTRICTION.

ELEC-NRD-002: THE FLOAT DOES NOT UTILIZE ANY THRUSTERS OR CAMERAS. ALL VERTICAL MOTION IS ACCOMPLISHED BY THE MECHANICAL BUOYANCY ENGINE.

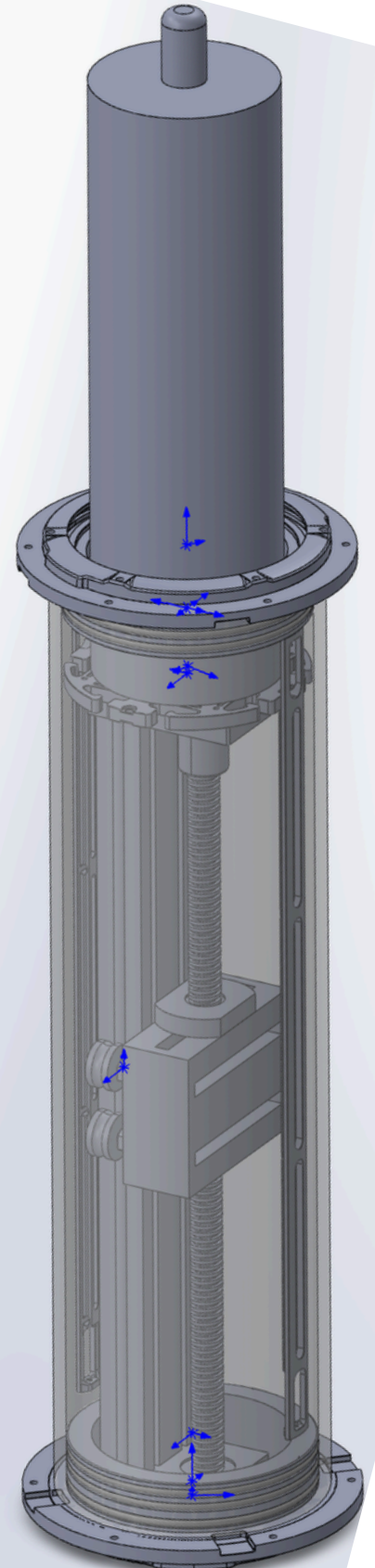
ELEC-NRD-003: WHERE THE BATTERY IS HOUSED

ELEC-NRD-004: A FUSE IS PLACED IN SERIES WITH THE BATTERY POSITIVE TERMINAL TO PREVENT EXCESS CURRENT DRAW, SIZED TO THE MEASURED FULL LOAD CURRENT OF THE SYSTEM.

ELEC-NRD-005:

MODE	FULL LOAD AMPS (MA)
LOGGING (RADIO OFF)	< 50
TRANSMITTING (RADIO ON)	~130

ELEC-NRD-006: ON MEMORY ALLOCATION AND REALLOCATION FAILURE, THE FIRMWARE STOPS IMMEDIATELY WITH A SERIAL ERROR MESSAGE. ON RADIO OR SENSOR INITIALIZATION FAILURE, THE FIRMWARE STOPS, PREVENTING OPERATION IN AN UNDEFINED STATE.

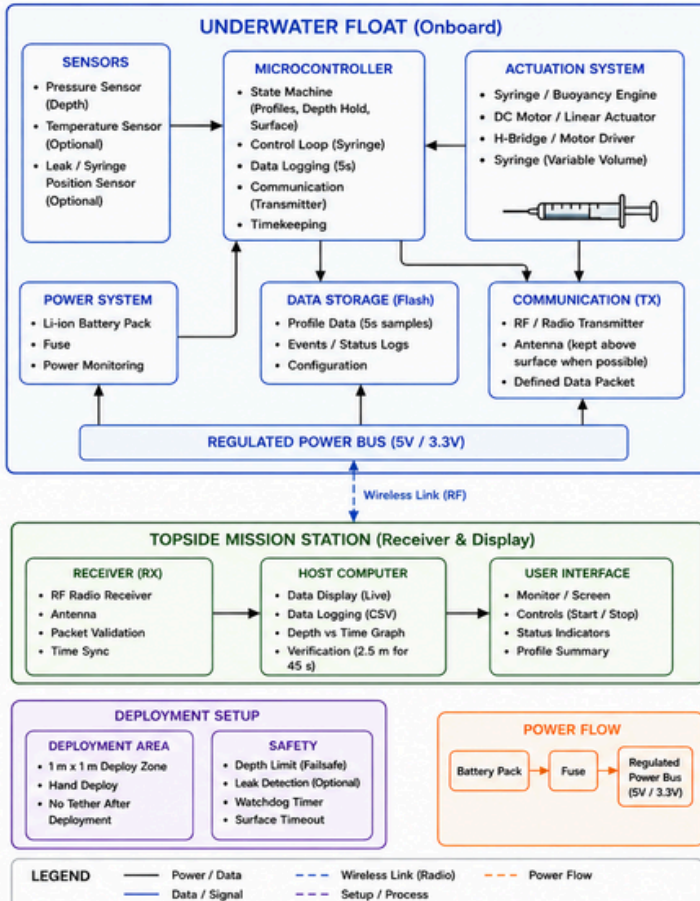


CAL POLY UROV

2026 NON-ROV DEVICE SPECS



TASK DIAGRAM (System/Component Overview)



FLOW DIAGRAM (Control & Data Flow Overview)

