Carrot 2.0

Non-ROV Device Documentation – DOC-004

Figure 1: Carrot 2.0

A. Mechanical Design

Our float Carrot 2.0 in Figure 1 operates using a 350mL bladder and a peristaltic pump to control buoyancy. As the internal bladder fills with water, the float's weight increases, thus changing its buoyancy and leading it to sink. By regulating the bladder, Carrot 2.0 implements depth control.

We utilize a Blue Robotics non-locking enclosure. The endcaps serve as pressure relief and will pop out in the case of positive pressure. Externally, there are feet that carry 800g of ballast. The feet can be removed and the ballast is adjustable. Internally, a custom printed circuit board and two battery packs are mounted. The antenna, a RGB LED indicator, and pressure sensor are secured on the endcaps with O-rings.

B. Electrical Design

The float utilizes a Feather 32u4 with a built-in radio frequency module. The feather controls 2 sensors: a PHT sensor to monitor internal conditions, and a pressure sensor to collect depth data. A normally closed reed switch allows for power to be switched on and off with an external magnet.

There are two battery packs wired in parallel (Figure 2). Each battery pack consists of 8 AA batteries to supply 12V. By wiring two packs in parallel, it helps supply double the current and sufficiently power the peristaltic pump. Off the battery packs, each positive wire is in line with a 0.75A fuse, and the common negative is wired to a 1.5A fuse (Figure 2). Furthermore, there is a 1.5A fuse mounted near the positive power input to the PCB (Figure 3).

Figure 2: Battery Packs and Fuses

Figure 3: PCB & Fuse

The RFM69 packet radio transmits time and pressure data to the surface station which has another Feather that receives the data. Then the station laptop reads the data through UART and automatically plots the data in Excel.

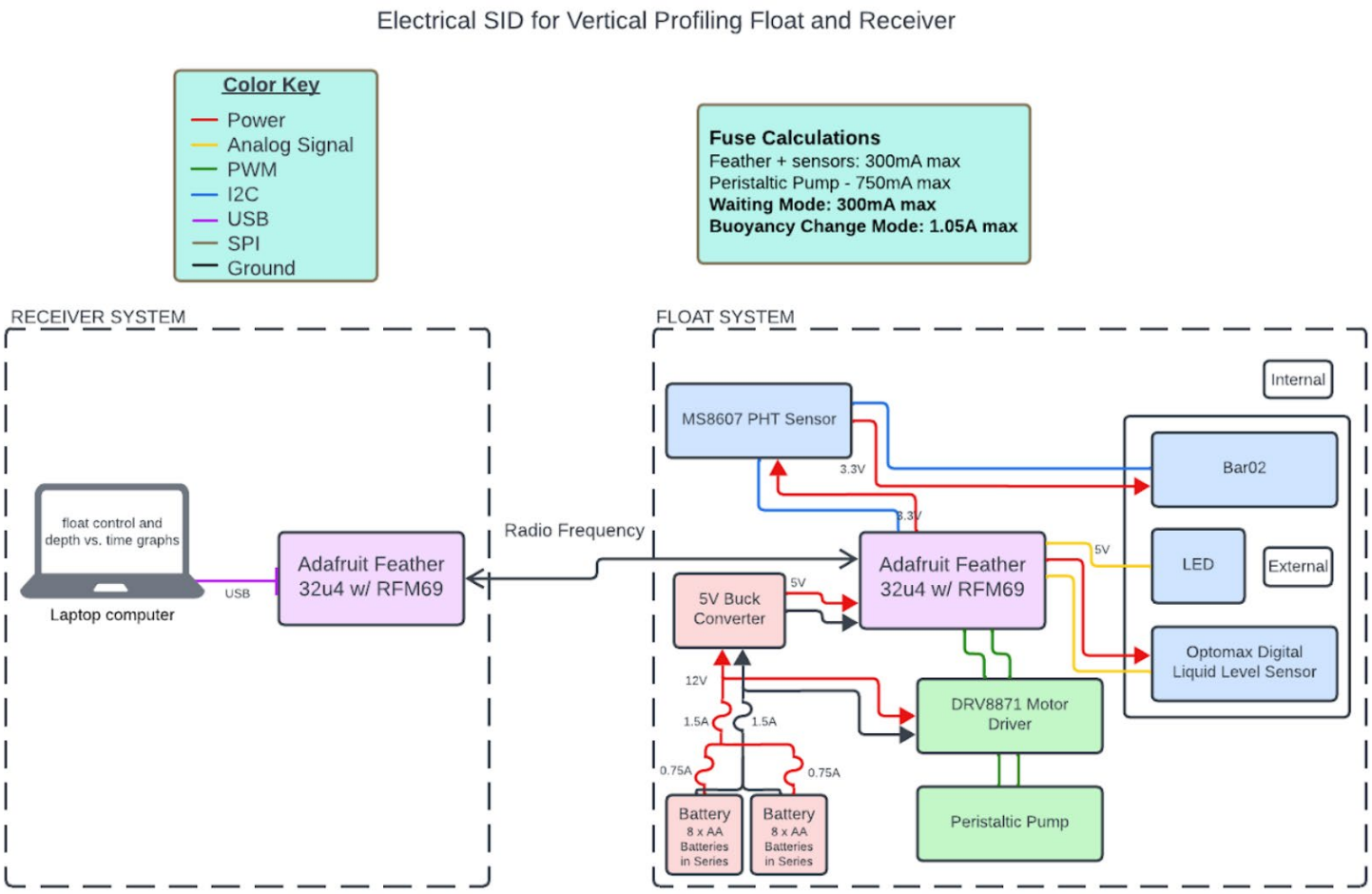

Figure 4: Carrot 2.0 Electronics Systems Integration Diagram (SID)