# Design

The Buccaneers have designed a vertical profiling float capable of completing multiple vertical profiles and wirelessly transmitting vital information to the control station on the surface. The frame of the float is a 4-inch inner diameter capsule with a syringe and the electronics housed inside. The electronics make sure that the float can complete the tasks by providing it with a means to navigate and communicate.
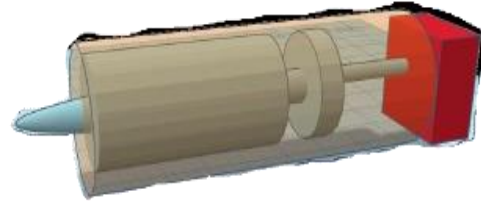
Electronics

The electronics on the vertical profiling float are controlled by a Raspberry Pi Pico microcontroller running Arduino code. The Pico is programmed to start when it receives the start command from the control station, which is received by the HC-05 Bluetooth module. After the signal is received, the float starts to keep mission time as the float descends. A servo is used to retract the syringe, making the float negatively buoyant. As this occurs, the float descends, reaching the desired depth while consistently taking pressure and depth data. When the float detects that it has reached the desired depth, it surfaces while still collecting data as it travels. As the float breaches the surface, it transmits the data gathered by a Blue Robotics Bar30 sensor via the Bluetooth module to the control station, where it can be graphed and displayed.

Power

The float is powered by two 9-volt batteries wired in parallel to provide the necessary current to the servo motor. An LM2596 DC-DC buck converter is used to power the Pico, as it requires 5 volts instead of 9. The utilized fuse is rated for 5 amps, as the components in the float can draw 3 amps. This provides overcurrent protection and makes sure that the float can safely operate. There is also a rubber pressure release that will trigger if pressure builds in the float, as well as water sensors inside that will stop all electrical signals if triggered. This is to minimize the time that electricity is flowing while being exposed to water, as it can be dangerous to itself and surrounding people.