

## Vertical Profiler Design Documentation

For the 2022 Request for Proposal, Eastern Edge Robotics has developed a vertical profiler using a buoyancy engine, as shown in Figure 1. The vertical profiler is designed to complete two profiles in the water and act separately from the main Remotely Operated Vehicle (ROV), Happy Adventure. The vertical profiler utilizes a magnetic switch control mechanism that activates when the profiler disconnects from Happy Adventure.

A 50 mm diameter Blue Robotics tube is used for the enclosure of the vertical profiler. This enclosure holds all of the components for the device. A syringe is used for water intake and outflow, modifying the overall density of the system. This allows for the profiler to sink and float as needed. The device attaches to Happy Adventure using electromagnets, and when the electromagnets are de-energized, the device will be detached from Happy Adventure and the first profile will begin.

The vertical profiler is powered using four AA Alkaline batteries in series, providing an operating voltage of 6 V. The profiler uses a P-channel MOSFET to control the power given to the microcontroller. A voltage regulator ensures that the microcontroller always receives the required 3.3 V. When a strong magnetic field is present, the MOSFET is switched off, and no power is given to the microcontroller. When the vertical profiler is no longer in a strong magnetic field, the MOSFET is switched on, and the microcontroller is supplied with power, allowing it to begin its two profiles. To allow for the profiler to move up and down, a syringe is connected to a geared DC motor. This motor is driven by an H-bridge motor driver, controlled by a microcontroller. The microcontroller is timer-based, with the motor being set to run for a predetermined time, and to delay for a predetermined time. This ensures that the profiler can reach the desired position in the water before completing a second profile.

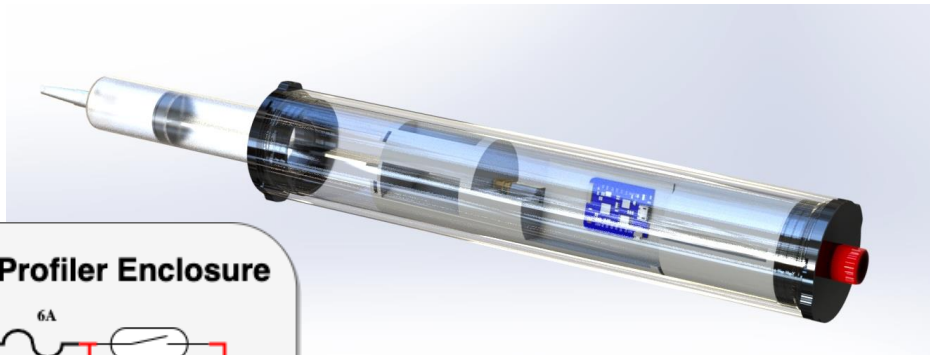
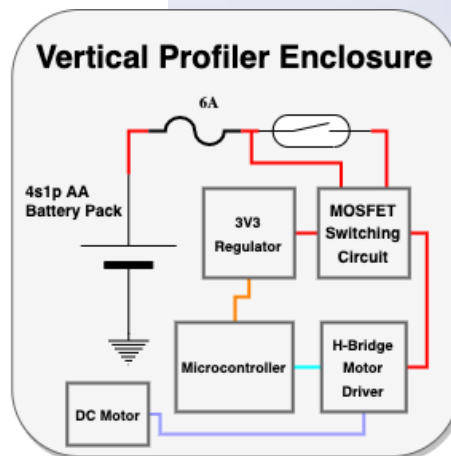
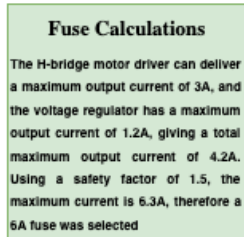
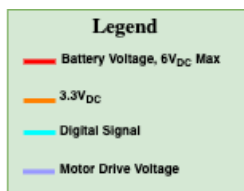


Figure 1: Vertical Profiler Render  
Photo Credits – Bedir Acar


	<p><b>Eastern Edge Robotics - Non ROV Device Vertical Profiler System Integration Diagram</b></p>	<p><b>Revision History</b> 2022-05-21 - Originally Drawn - ZB</p>
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Figure 2: Vertical Profiler – System Integration Diagram

Photo Credits – Zachary Bennett