LINN-BENTON ROV

NON-ROV DEVICE DESIGN | VERITCAL PROFILER

Our buoyancy engine (see Figure 1 and Figure 2) consists of a 4-inch diameter piece of sewage pipe, a linear actuator, a flexible external bladder, and a series of 3D printed pieces, which can be seen in Figure 3. During operation, air will be moved from a reservoir inside the pipe to an external bladder in order to change the buoyancy of profiler. This causes the vertical profiler to rise from the bottom of the pool to the top. The air will be moved between the bladders by a 3D printed attachment on the top of a linear actuator, which creates a piston sealed by an O-ring to make it airtight and redundant.

The external bladder is a pop-up, silicone bowl. The bowl is attached to a large, lightweight metal funnel to allow the air to enter. In order to waterproof the electronics and actuator, the bladder and funnel are made watertight with sealant, and the 3D printed pieces have O-rings running along the perimeter. The electronics are thus housed in a watertight compartment at the bottom of the sewage pipe, separated by a 3D printed piece from the actuator's chamber. The actuator's chamber is then separated from the air chamber by the piston.

The buoyancy engine control system uses an Arduino Uno, a motor controller, and a linear actuator. The electronics are powered by a 12 VDC AA battery pack; as such, the sewage pipe contains a pressure release valve as a safety measure, should excess pressure build inside the tube (**ELEC-NRD-004**). The electronics are controlled by a switch on the outside of the tube, which controls power. Once the power is on, a timer dictates when the linear actuator is activated to expand the external bladder.

Before the competition, we would like to incorporate a pressure/depth sensor, mirroring the depth sensor system integrated onto the main vehicle. This depth sensor would replace the timer in dictating the action of the actuator.

Figure 1: Vertical Profiler

Figure 2: Buoyancy engine electronics

Figure 3: a. Tech shield base; b. linear actuator base; c. linear actuator connector