Remotely Operated Sea Crawler (ROSCo V)
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**OBJECTIVE**

Continue the advancement of the multidisciplinary design of a durable sea crawler system that is able to undertake seafloor missions where divers are not capable of exploring. The remotely operated vehicle (ROV) allows for the use of variable attachments to aid in a wide variety of underwater practical applications. The ROV also features a buoyancy control system which allows vertical movement through the water column. A tank-like track system allows for easy translation along the seafloor.

**DESIGN CRITERIA**

The design requirements:
- Electrically operated
- Fully operable at 100 ft. deep
- Fixed fiberglass enclosed buoyancy system
- Track teeth modification
- Opportunities for expansion

**SYSTEM DESIGN: MECHANICAL**

In accordance with the design criteria, a fixed fiber glass buoyancy system was installed directly onto the top of the ROV main frame. Four main buoyancy tanks were constructed using a timber and fiberglass sandwich structure. The placement of each tank was determined through flotation experimentation.

![Image of ROV system](image1)

Additional flotation pieces were required to keep the ROV neutral in buoyancy. These pieces were installed forward of the ROV’s midpoint to accommodate for the mass of the manipulator arm.

**SYSTEM DESIGN: BUOYANCY CONTROL**

The Buoyancy system for the ROV consisted of four fixed fiberglass chambers. To precisely control the airflow into and out of the chambers, a two valve system was implemented for each chamber. The inflow and outflow of air is controlled using two solenoid valves for each chamber. The entire system has been placed inside a 4” acrylic tubing with custom starboard end-caps that are fitted with wet-made electrical connectors. They are intended to be independently controlled to allow for precise trim control when the ROV is moving through the water column. The pitch, trim and yaw of the ROV can be controlled using switches in the surface box.

![Image of buoyancy control system](image2)

**SYSTEM DESIGN: ELECTRICAL**

Each system on the ROV is controlled from the surface using a surface control panel that contains switches and joysticks that communicated through PIC microcontrollers. Commands and power are sent through a professional tethering system to the ROV’s two pressure chambers that contain the appropriate electrical components. The ROV traverses along the seafloor using tracks powered by a 220 V AC to 180 V DC power converter and 0.5 hp motors. A system of h-bridge motor drivers, using signals from a PIC, control the speed and direction of the motors.

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![Image of control panel](image3)