WHALETECH ROBOTICS

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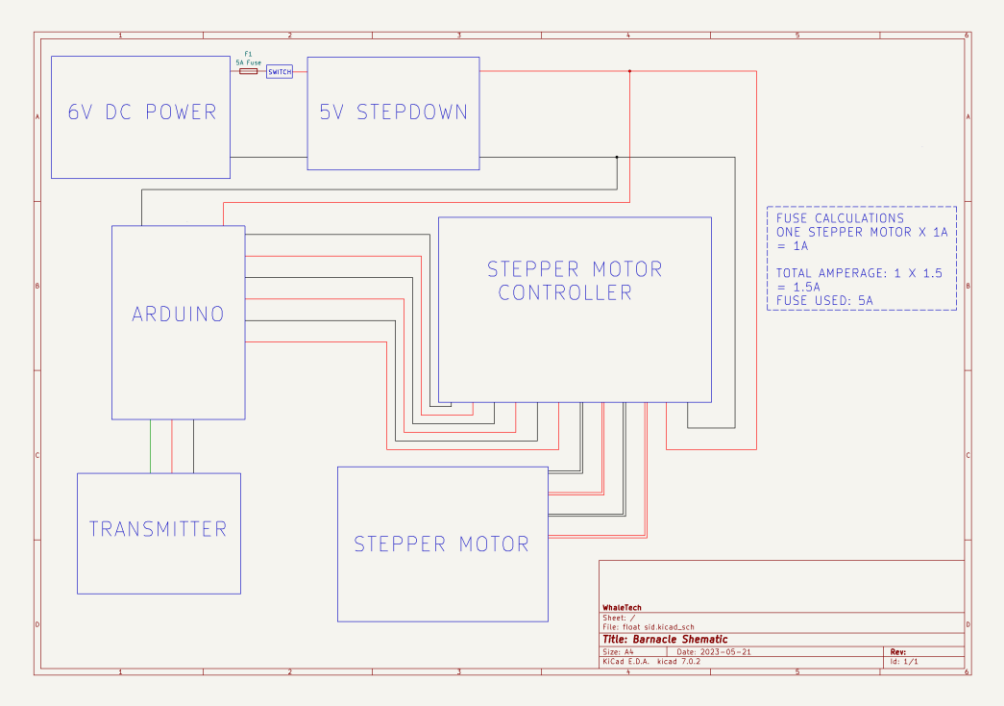
MATE WORLD COMPETITION 2023

Non-ROV Design Documentation "Barnacle"

WhaleTech's Barnacle is deployed to complete task 3, which calls for completing two vertical profiles along the water column and communicating with the mission station after each surface. The Barnacle is comprised of two systems, a control system, and a buoyancy engine. Both systems are housed within a PVC tube, 5" in diameter and 90cm in height. Two sets of four AA alkaline batteries are used to power all control system components; an Arduino Uno, a transmitter, and a stepper motor controller, which in turn powers the buoyancy engine.

The eight AA batteries are housed in two four-slot AA battery holders, mounted securely within a waterproof 3" Blue Robotics cylinder. The cylinder endcaps are free to open should pressure build-up occur, such as from potential overheating from batteries. The wires penetrating the ventral endcap are wired with abundant slack ensuring they do not impede the endcap from opening freely. The dorsal endcap is not attached to any wire, completely free to open. Five centimeters from both battery compartments is a 5A fuse, combining the positive wires from each holder. This creates a parallel circuit to increase battery life within the float.

The buoyancy engine is comprised of a hydraulic cylinder modified to utilize mechanical power provided by a NEMA 23 stepper motor. The Cylinder pumps in and out water altering the interior volume of the Barnacle, changing the density above and below that of the water it is in, causing it to sink or float respectively.



When at the surface, the Barnacle will communicate with the mission station using two paired transmitters, one within the Barnacle and the other within the surface control box. The transmitter is capable of interfacing with Arduino, which allows for the information communicated to be easily modified. When the information is communicated with the mission station, another Arduino Uno reads it and then displays it on an LCD screen.

All systems are housed in a piece of PVC to ensure the safety of marine life as well as all components inside. It serves as protection from collisions for all components in addition to serving as a waterproof housing. The endcaps also serve as additional pressure releases should the build-up of pressure occur.