SDSU | College of Engineering Mechanical Engineering

NIWC TIMED SPHERE DESTRUCTION SYSTEM

NIWC PACIFIC

**Team Members: Ryan Chen, Zuadi Farah, Emily Gornall, Juan Lomeli, and David Meyer**

Project Overview

NIWC has a data collection device deployed up to 2000 meters deep in the ocean that surfaces at a set time and transmits data. We were to design and integrate a system to remotely sink and destroy any electronics within the device, removing the need for manual retrieval. The design is to be able to survive ocean conditions, operate covertly, and have minimal environmental impact.
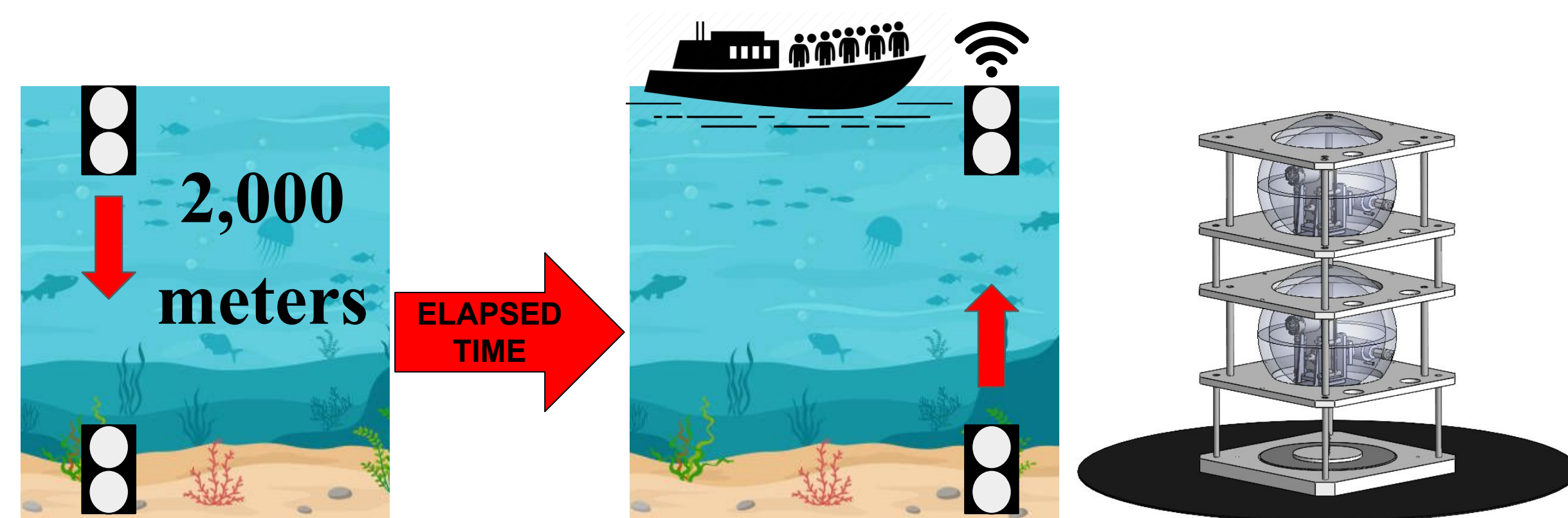

The Design

We have devised a self sinking system using a motor and ball valve. When activated, the system will initiate a valve opening sequence that will begin to flood the buoys. This completely destroys the electronics and sends the device to the sea floor
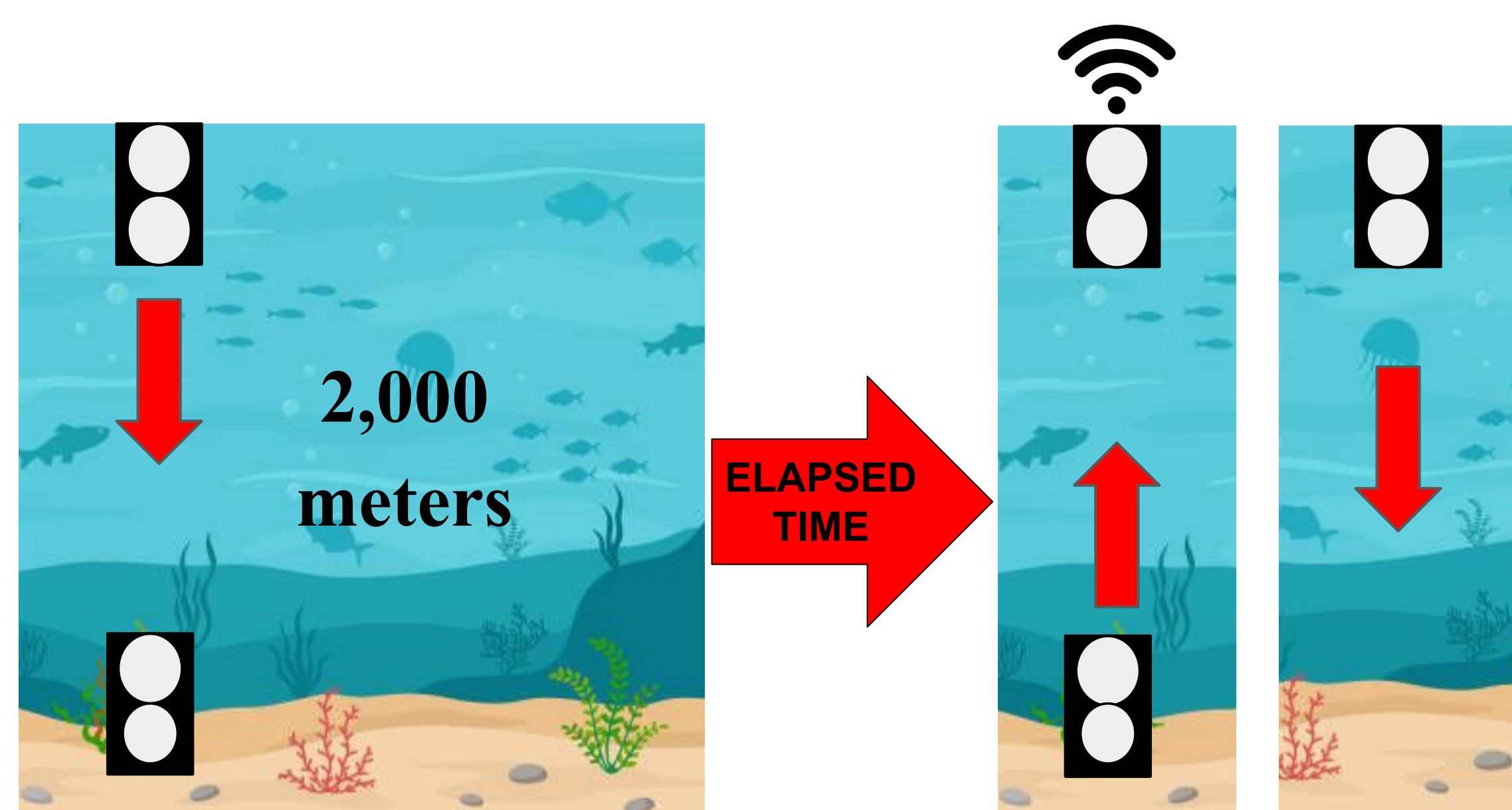
Mechanical System

The mechanical system is composed of a custom mounting bracket, compact DC gearmotor, a custom shaft adapter, ¼" ball valve, and ¼" pipe fitting. The valve and pipe fitting are 316 stainless steel and rated to 3000 psi. The motor outputs 1920 in-oz at 12 V (4 RPM). The custom bracket is printed with PLA and mounts flush to the interior of a buoy. The motor is secured using #10-32 2.5" screws and nylon insert locking nuts. The custom shaft adapter is also printed with PLA and transmits torque from the motor output shaft to the ball valve. Both the bracket and valve are held in place by MG Chemicals 8800 potting compound.
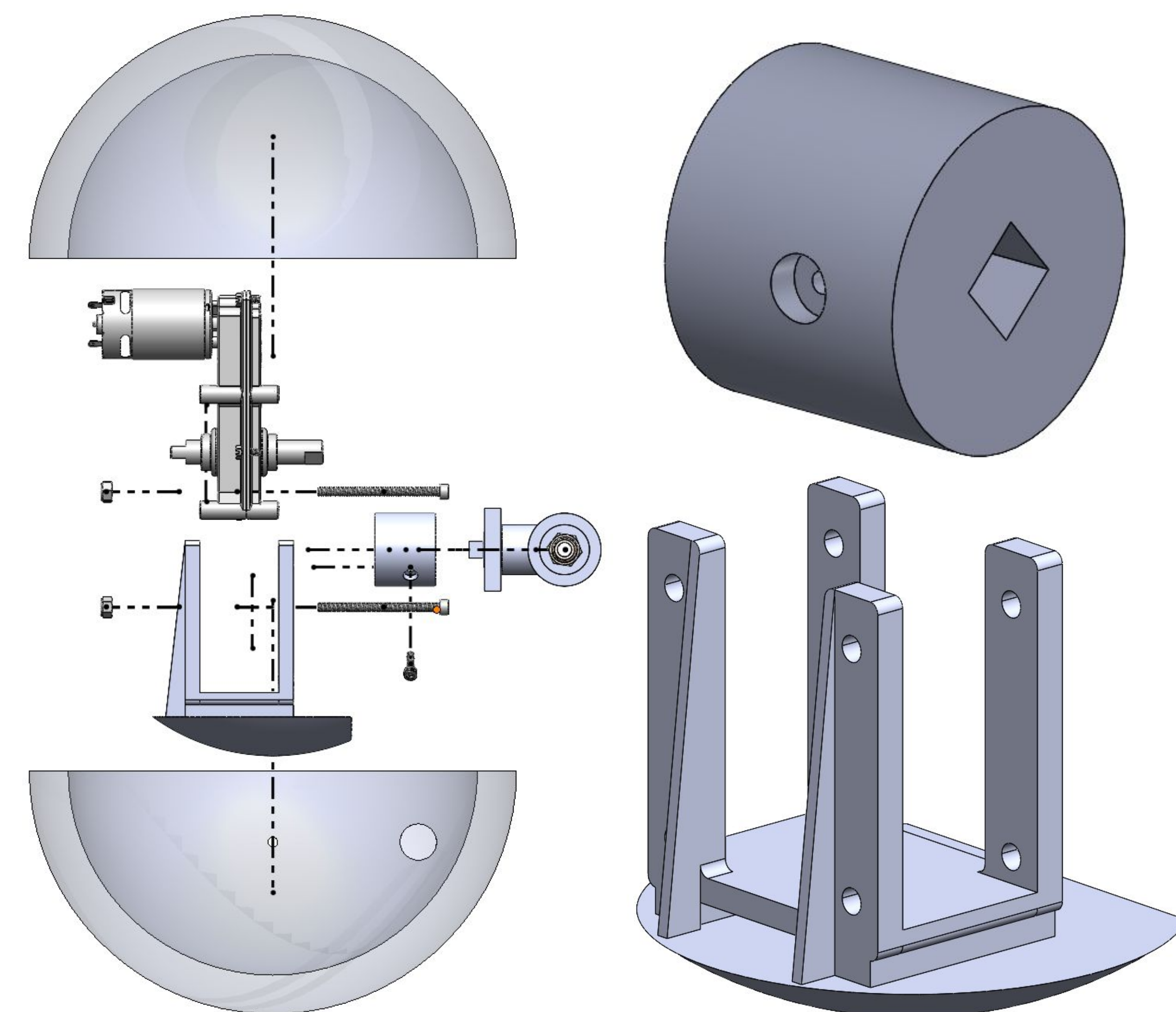
Electrical System

The electrical system powers the compact DC gearmotor and accomplishes the sequential order of actions needed to sink the device. Components include an Arduino Uno R3 microcontroller, a L298N motor driver, a subsea cable for intersphere communication, and a 9V battery.

Control System

Arduino code was written to provide a countdown timer before initiating the self-destruction sequence. The bottom sphere gearmotor is powered to open the valve, flooding the sphere. A delay occurs before sending signal to the top sphere gearmotor to open its ball valve. The sequence was necessary to prevent air bubbles trapping inside the sphere, which could create a positively buoyant device.

FALL 2025