Coastal Shallow Water Data Buoy

Objective:

The wave data can provide information that may be of use to coastal protection and beach nourishment efforts.

The driving force behind designing the buoy was a compact wave-energy conversion device, and so the buoy has been conveniently designed in a way to accommodate power generation from wave motion in the future if need be.

Features:

• The data buoy is aimed to provide the wave data in terms of heights, temperature and period at any given time in the coastal environment.

• The buoy could log its location and timestamp while logging.

• The design of the data buoy allows for an easily-configurable rack to be enclosed and sealed within a container, which can house as many electronics as required.

Results:

For a 20s heave motion, acceleration and GPS readings were recorded on the serial monitor. Graphs were plotted showing the variation of acceleration with time.

During the trials, the temperature recorded by the accelerometer was also recorded solely as a safety precaution to ensure the electronics were away from their maximum temperature ratings.
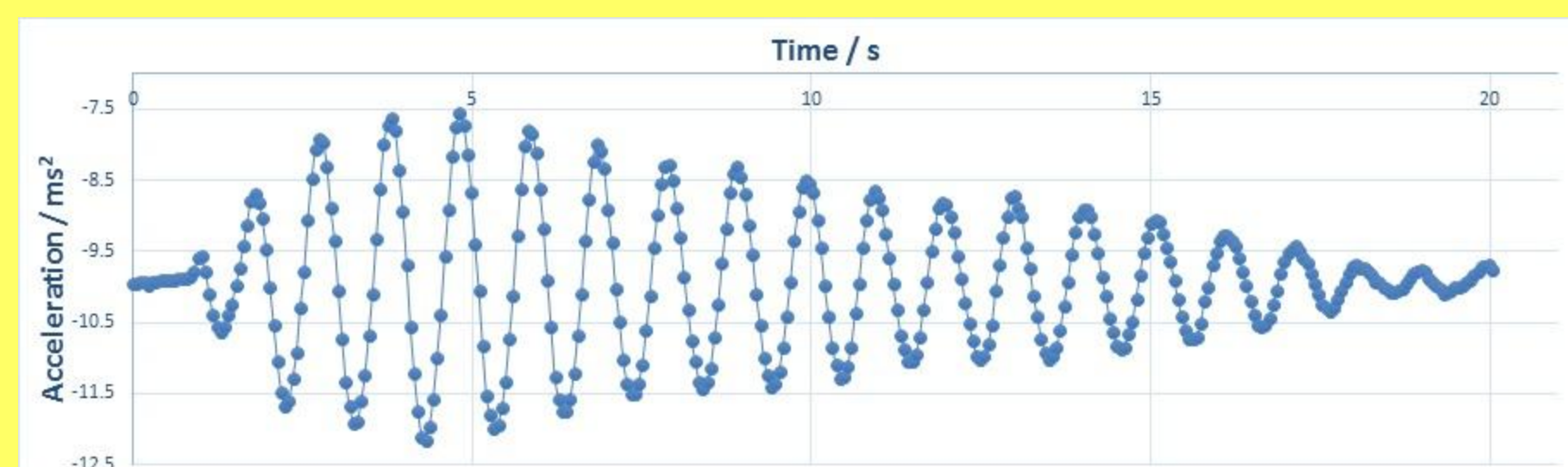

Conclusions:

One of the major goals in the design was to utilize a simple structure and mass-market electronics to keep the cost minimal.

In its current state, we have been able to log and transmit both acceleration and gyroscopic data.
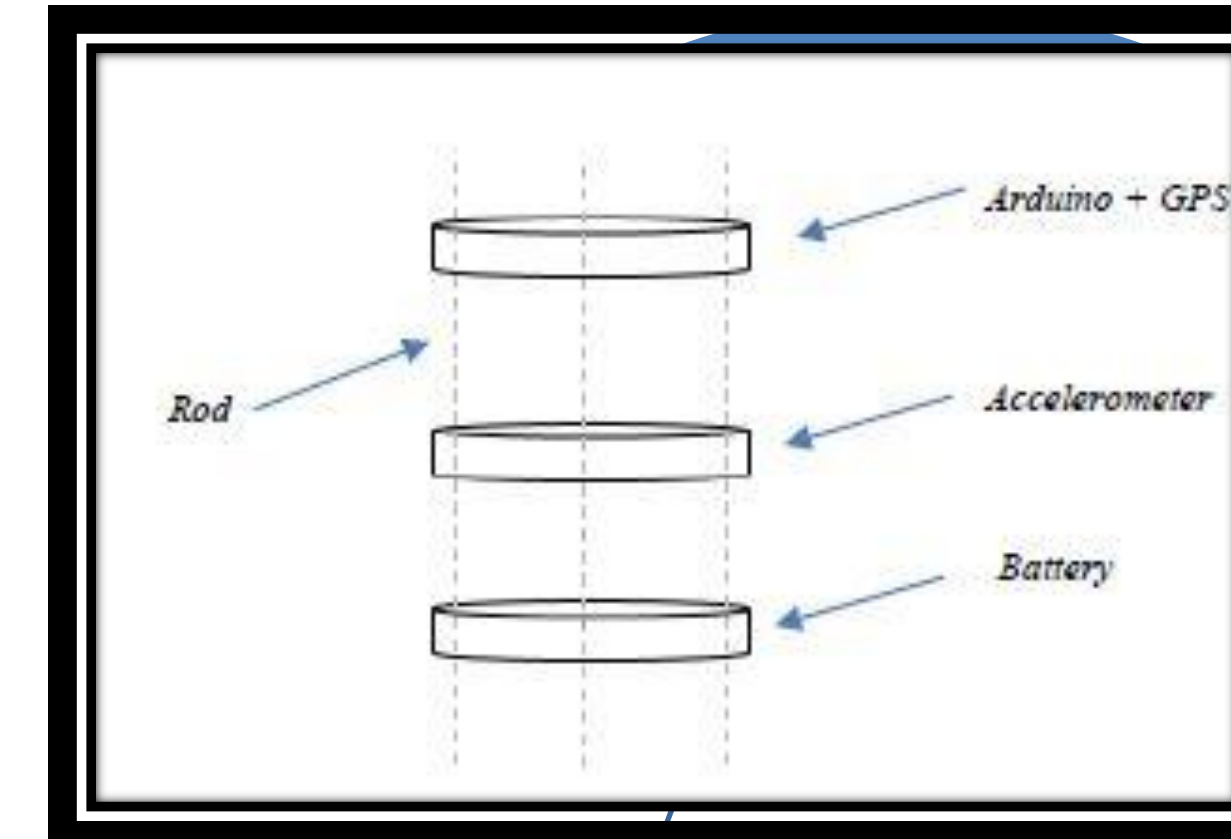
• Electronics

Three discs were chosen as an appropriate number of discs to hold all of the electronics. The bottom most one, bearing most of the weight, would hold the battery. The top most one holds the 'Arduino' and the 'center' disc houses the accelerometer, which is placed right on the center of the mass.
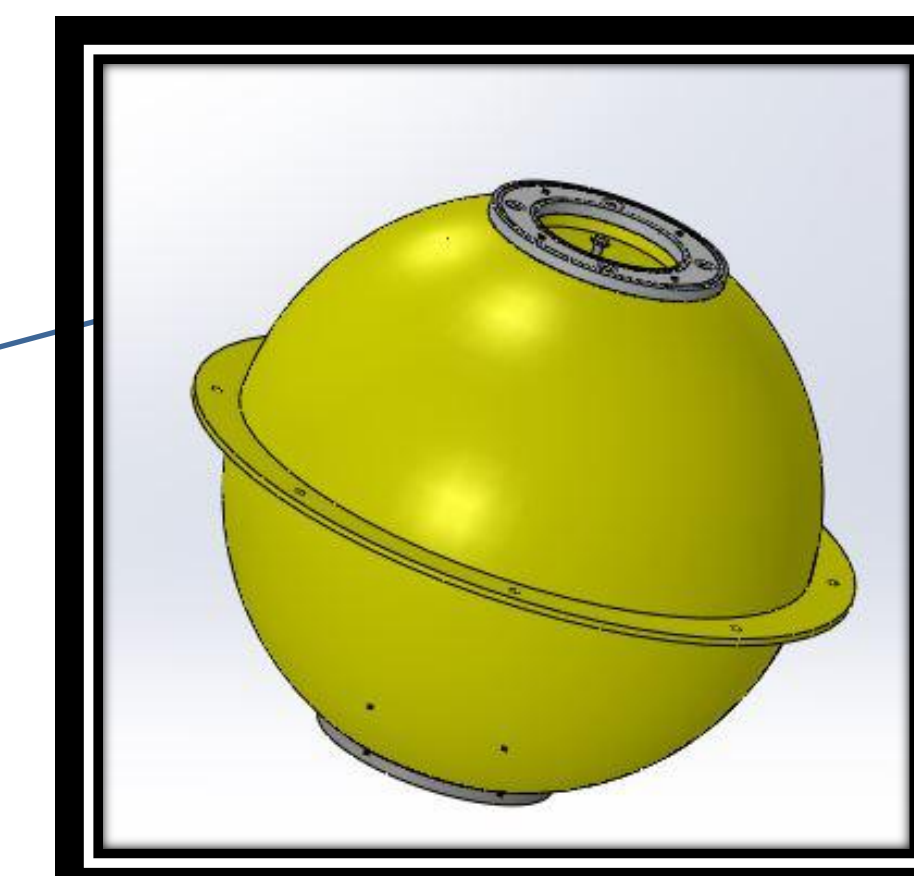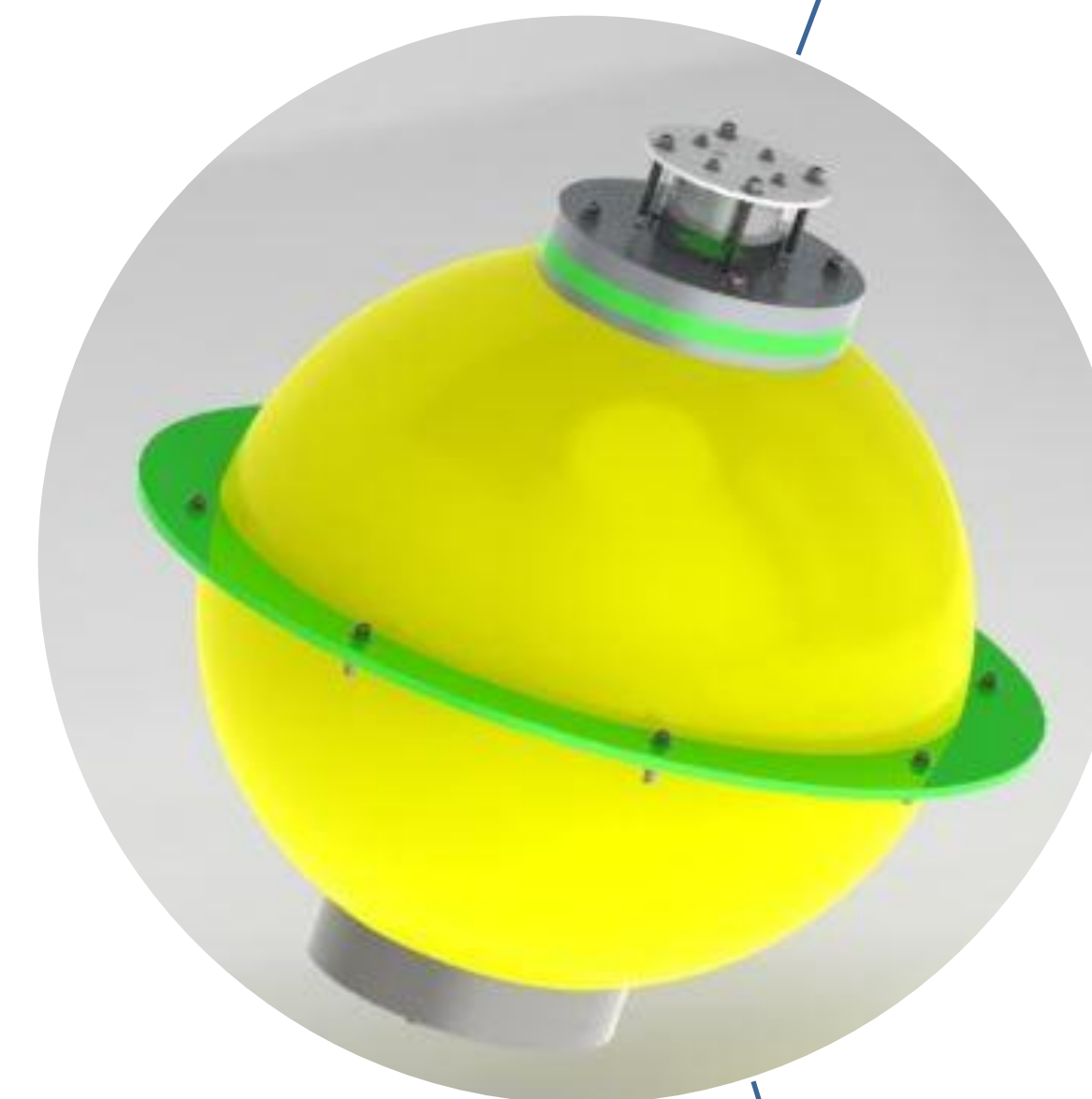
• Buoyancy

The diameter of the shell was kept 0.64m to provide the device sufficient buoyancy force to float. It was designed to sit half way above the waterline.
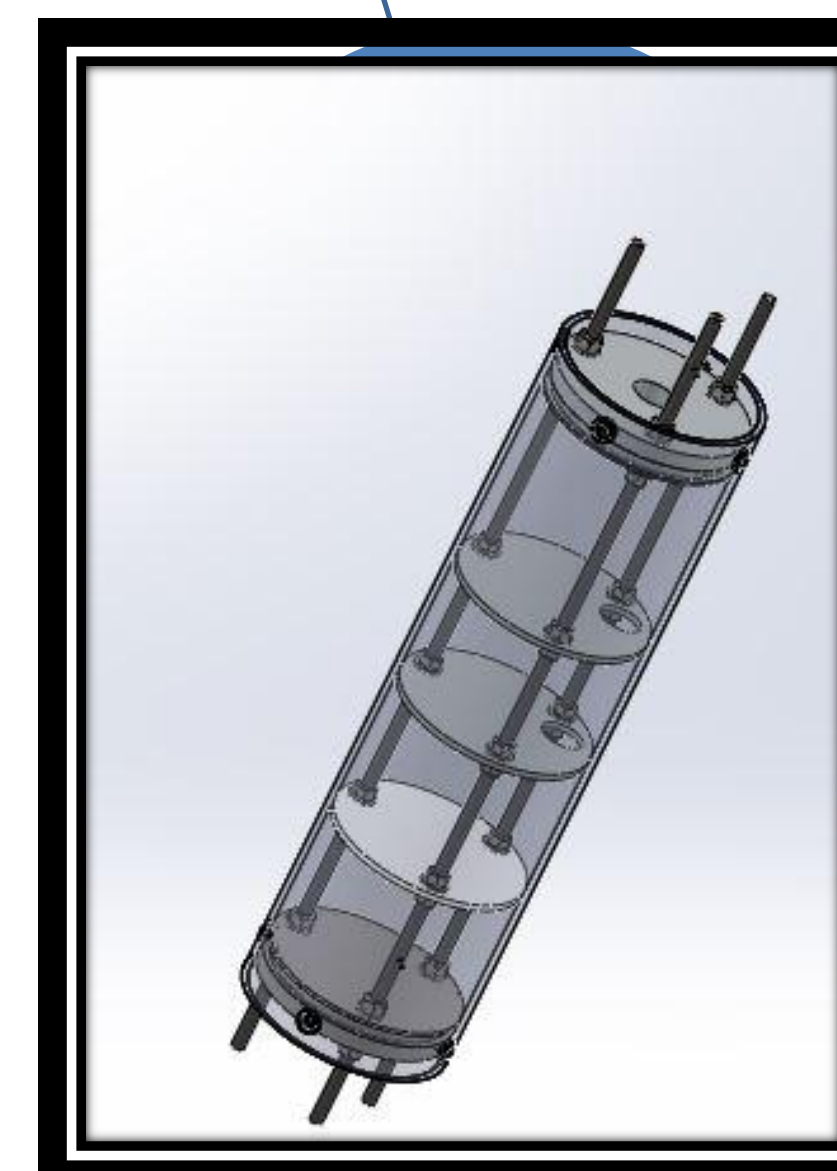
• Water-proofing

Sealing is essential to make the buoy water tight. O-rings were used to provide sealing. O-rings are placed at each level where ever there is a leak path. The canister is sealed using dynamic O-rings at its top and bottom. This provides additional protection to the components inside the canister i.e. if the shell gets damaged, the canister provides sealing.