

SWE WERC
Preliminary Report
20 NMT 2
Task 2

Purpose:

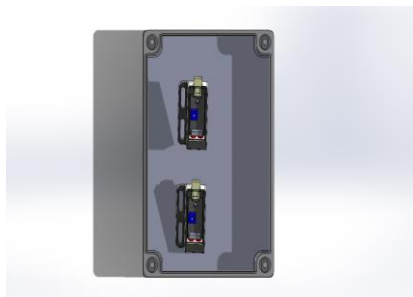
To design a long lasting monitoring system for the transpacific ocean that measures pH and salinity. The device needs to be an environmentally safe device, and the materials in the device, need to be easily replaceable/fixable. The device needs to be securely attached to the boat, and there also needs to be an easy removal system when working with the monitoring system.

Selected Sensors and Monitoring method:

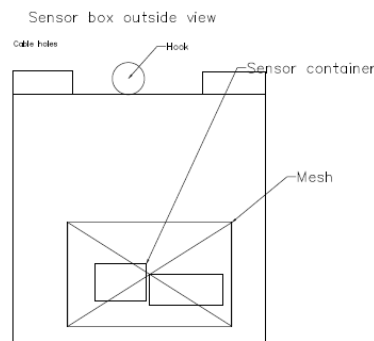
We will be using a D1 mini ESP32 ESP-32 WiFi+Bluetooth Internet of Things development board and two external Analog to Digital converters. The D1 mini will be using bluetooth to transfer data to the satellite communication device. In order to measure pH we will be using an Oxidation Reduction Potentiometer, ORP (commonly used in aquariums) and an Electrical Conductivity probe to measure the salinity.

Drawing of the Device:

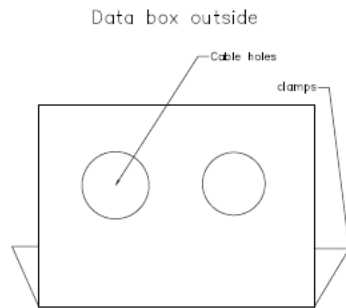
There are three main parts of this device. There is the Data box (Figure's 3 and 4) which is where our development board and Analog to digital converters will be. These will be on the boat which is advantageous because it makes it easy to fix issues with these electronics and so that it won't be damaged by water. The second main part of this device will be the Sensor box (Figure 1 and 2) which exists to protect the sensors from potentially harsh conditions, and to make it easier to bring the sensors back onto the boat. This sensor box is going into the ocean and for the most part will stay in the ocean, unless the sensors need to be repaired, checked, recalibrated, or replaced. The cables are the third main part of this device and they will be connecting the microcontroller to the sensors. These cables will be coated, covered or protected by a waterproof substance in order to protect the cables from water damage in the ocean.



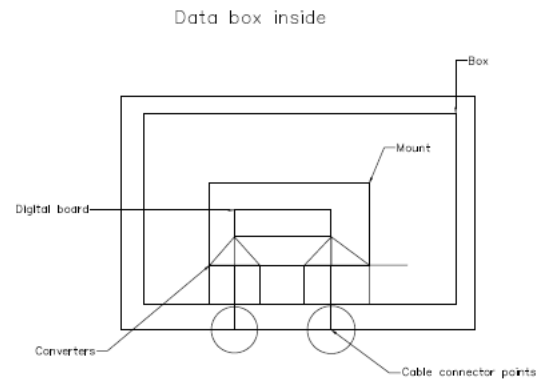
(Figure 1: Inside of the sensor box)



(Figure 2: Outside of the sensor box)



(Figure 3: Outside of the data box)



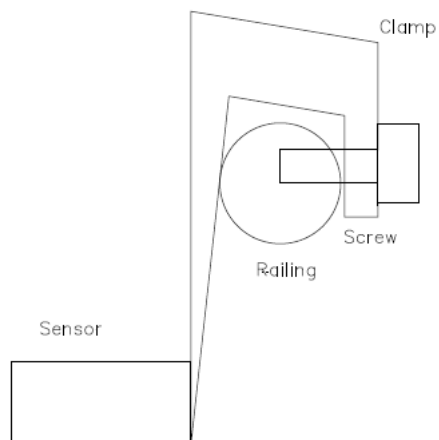
(Figure 4: Inside of data box)



Overall monitoring system

Device attachment:

To attach the data box we will be clamping the box on the bottom railing. This should effectively keep the data box on the boat. The sensor box will be connected to the data box using a metal chain; the metal chain is so that the sensor box is easier to pull up, and less likely to break off in the ocean. A diagram of how the clamp mechanism will work is attached below.



Replacement of Device:

It will depend on how the device is broken in transit. If the microcontroller needs to be replaced then the top box will be unscrewed from the mount and a new microcontroller will be attached to the connector and the cables. The same applies to if the DSC connector needs to be replaced. If the cables become damaged then the sensor box will need to be pulled up onto the boat using an iron chain, once the sensor box is on the boat the damaged cable can be detached from the midpoint of the cables, the data box or the sensor box, and replaced with new cables, and or fixed. If the sensors break in transit then the sensor box will have to be pulled onto the boat opened with a screwdriver and then the sensor compartment of the damaged sensor can be opened with a screwdriver and the damaged sensor can be replaced.