

Grand Lake St. Mary's Water Quality Monitoring Platform

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Abstract

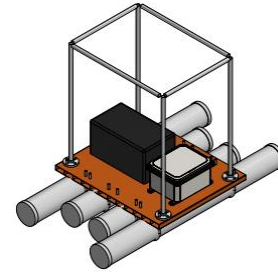
Grand Lake Saint Mary's is a local freshwater lake that is currently suffering from ongoing algae blooms. We have been tasked with creating a floating monitoring station to measure the water quality in the lake in order to monitor the algae blooms. The monitoring station is composed of a raft containing a battery, water quality sensors, a radio transmitter, and a computer microcontroller.

Power

First, the total maximum current used by the system was calculated. With this information, a battery could be sized. A deep cycle marine battery was chosen because it is relatively cheap, and they can handle conditions expected for the raft. By dividing the battery's amp-hour rating by the daily current usage, the battery life can be calculated. With a daily usage of .83 amp-hours, a 100 amp-hour battery could last 4 months before needing replaced or recharged.

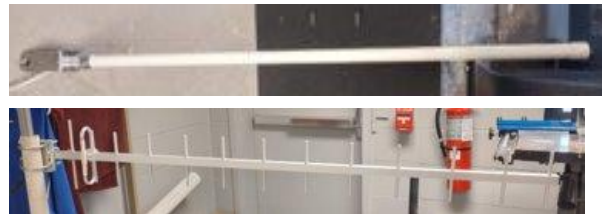
Raft Design

The raft uses a pontoon design to keep cost down, construction simple, and the station stable. To keep weight down, the pontoons, deck, boxes, and frame are plastic, mostly PVC. The fasteners are galvanized or stainless for corrosion resistance. For expansion space, such as more sensors, there is a battery box and an electric box. The frame is currently for reflectors, but it could hold a future solar panel.



Data Transmission

The sensor data is transmitted from the raft using an onboard omnidirectional transmitter. The data is then received by a receiver that is located on campus. Next the data is stored and analyzed by a computer on campus. A copy of all the sensor data is stored on the raft in a SD card, in case of transmission errors.



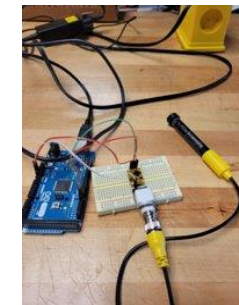
Transmitting and Receiving Antennas

Raft Construction

The raft is constructed out of PVC. U-bolts hold the pontoons to the deck, and bolts hold the boxes and frame to the deck. The boxes are sealed with glands and outdoor caulk. The sensors run through the bottom.



Sensors and Data Collection



Dissolved O₂ Sensor

The water monitoring platform contains sensors to measure water depth, water temperature and the dissolved oxygen in the water. The platform is capable of supporting additional sensors that may be added by a future group. Additional sensors include a turbidity sensor and a PH sensor.