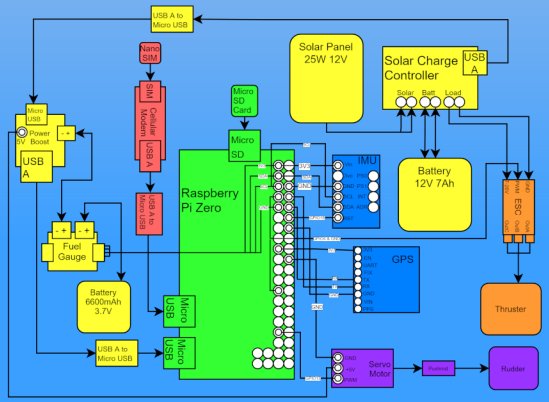
Low-Power Buoy Directed to Desired Location

Ryan Levy | Benigno Ortega | Corey Zhou | Winston Lee | Tahereh Mehjerdy

Overview

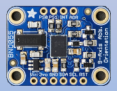
Our goal is to design a system to autonomously keep a buoy near the desired location while consuming the minimum power without an anchor attached to the seafloor. If the system drifts outside a set radius from the desired location, the system will autonomously drive it back to the location. We control the vessel by sending the target location from Web-app, using a GPS and IMU for detecting location and direction, and then using this information to calculate the desired thrust and direction. The system is self sustained through solar power and extra batteries are connected when sunlight is obstructed.

Hardware Schematic



Key Components

GPS: MTK3339
- 66 channels with 10Hz updates
- 165dBm sensitivity
- 20mA low power consumption during navigation

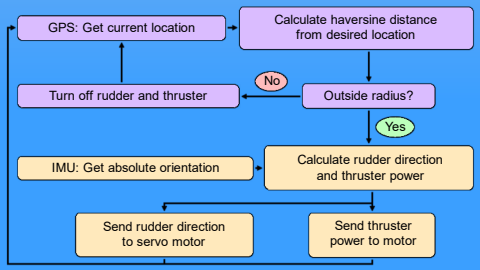


IMU: BNO055
- Accelerometer, gyroscope, and magnetometer combined to solve for 3D space orientation.
- High speed ARM cortex M0 processor that outputs quaternions, Euler angles, or vectors

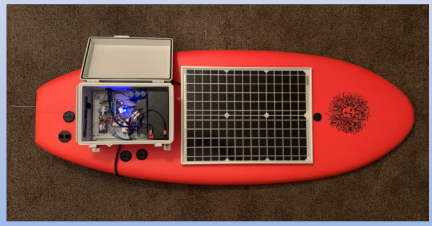
Cellular Modem: Nova-R410
- 9 mA when active
- USB 2.0 carries at 480Mb/s

Blue Robotics Thruster: T200
- Three phase brushless outrunner motor
- Runs on 10-20 V

Functional Flow Diagram

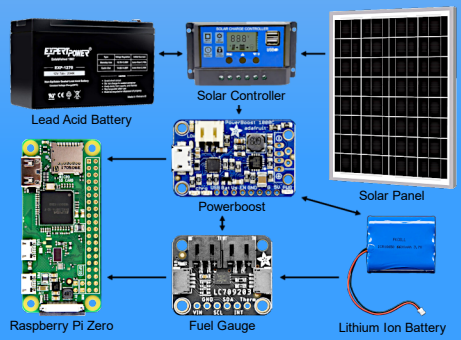


Final Product



Solar Power System

- 12V 7000mAh Lead Acid Battery
- 3.3V 6600mHa Lithium Ion Battery
- 25W Solar Panel charges system in 12 hours
- Batteries last 72 hours without sunlight



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