Self Stationing Autonomous Buoy

Sponsor: Lockheed Martin

Sponsor's General Mission or Business Statement: Lockheed Martin, defense contractor, $37B yearly sales, 130,000 employees, is one of the top employers of choice for engineering students.

Sponsor's Advisor, Title, and Phone Number: Dr. Robert J. Monson, Senior Manager, Maritime Systems (651) 456-2673

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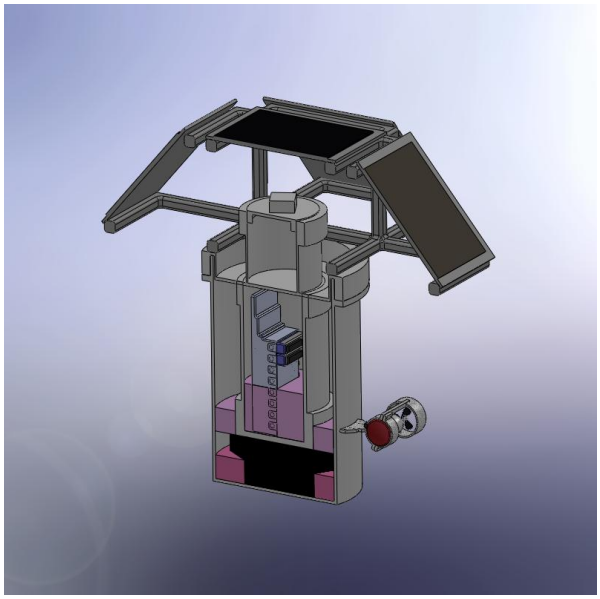
Team Member Names: Rollie J. Casillas (EE), Nicole M. Jackson (ME), Bryan J. Okerlund (ME), Paul M. Roczniak (ME)

Senior Design Clinic I-II (ENGR 480-1) 2005-6 Project Mission Statement: Provide a self-stationing system that can be used by untrained personnel to mark a location in a lake. Specific deliverables include an operable and demonstrated prototype, schedule and plan for the project, and a report on the project models and performance testing.

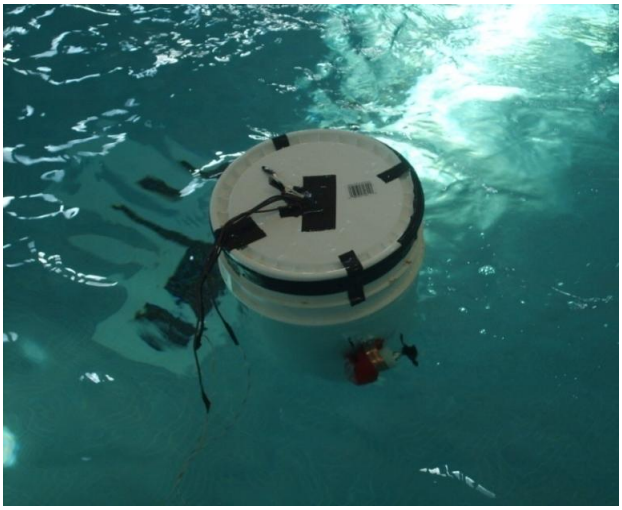
Major Design Requirements:

1. System to fit into a typical river buoy chassis
2. System to provide all own power, propulsion, communications, etc.
3. System to operate indefinitely
4. System to be able to receive geo-reference position to move to that position
5. System to be self-contained
6. System to be tamper proof

Senior Design Project Summary: This project required the design of a buoy that can be deployed from a maritime vessel and remain in a specified location indefinitely. The system will be useful in areas where an anchor chain is not practical. The conceptual process approached the problem through physical design and buoy operation control. The mechanical design of the buoy involved sizing the housing, propulsion system and solar power panels. A power-consumption study was performed to calculate the necessary generated energy and resulting solar panel area to sustain the buoy. Two batteries on board allow for reliable power management. LabVIEW programming is used to control the buoy's movements. The program integrates latitude and longitude measurements gathered from a GPS unit and heading and bearing readings determined from an electronic compass. An on-board National Instruments CompactRIO robotic controller provides processing and connectivity for the buoy's stand-alone platform. This device includes an embedded real-time processer for fast communication between I/O modules that control the electrical components. The controls logic allows the buoy to maintain its position despite any drifting due to waves.



SolidWorks model of completed buoy



Early testing in pool