

## University of Rhode Island 'RamBoat' Robotics Team

For the past five years, a team of URI students has competed in the International RoboBoat Competition, held each July in Virginia Beach, VA. During the competition, student teams race autonomous surface vehicles (ASVs) of their own design through an aquatic obstacle course. This includes littoral area navigation, channel following, and autonomous docking. The competition provides an opportunity for students to develop skills in system engineering by accomplishing realistic missions with autonomous vehicles in the maritime environment.

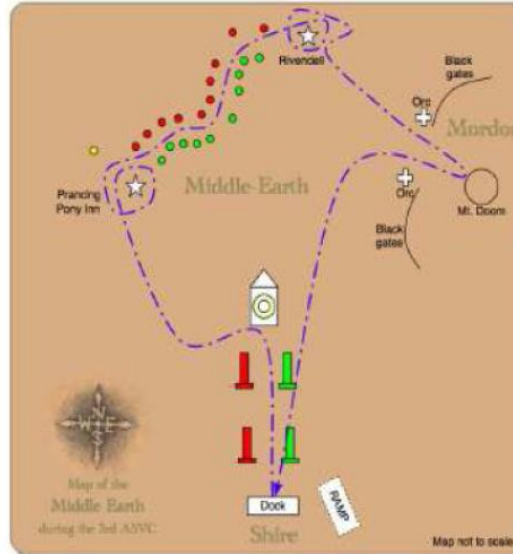
This year, the RamBoat team is embarking on an ambitious project to rebuild the entire boat, from the hulls up, in time for the competition. We are looking for 3 dedicated engineers to work alongside the current team of OCE, MCE, and ELE undergraduate and graduate students on mission critical software and electrical engineering projects.

The responsibilities of the team members are expected to be:

- Electrical Engineer A: Power Electronics
  - Complete a board level design of a combined sensor/motor/actuator power regulation circuit -- this is a direct follow on from work by last years ELE Capstone Team member Matt Power.
  - Fabricate the power regulation board.
  - Design and implement a stress testing program for the board, testing the ability to sustain exposure to variations in environmental conditions (vibration, humidity, and temperature fluctuations.)
  
- Electrical Engineer B: Embedded System Health Monitor and Display
  - Design a standalone monitoring unit, including an embedded display, which will allow the team to monitor system health and environmental conditions while in the field under adverse conditions.
  - Build and test the health monitoring unit.
  - Validate under field conditions -- i.e. test it on the water!
  
- Computer Engineer A: Vehicle Dynamic Simulation and Control
  - Create an interface between the existing robot code base and a Simulink dynamic model of the boat.
  - Perform 'hardware-in-the-loop' simulations of the robot to test the interactions between mission autonomy, navigation, computer vision, and dynamic control of the vehicle.

- Create and test control algorithms for the competition challenges, in simulation and in the field with real hardware.

The project will build on the efforts two previous ELE Capstone teams which focused on mission autonomy, computer vision, and power systems design . In each of the last two years, two of the three ELE/ECE students have taken the opportunity to attend the competition in July (although this is entirely optional). Two former ELE Capstone students (Tom DeRensis and Stephen Norris) are currently active members of the team.



The 2012 RamBoat navigating autonomously through buoys (left). The 2012 course 'map' (right).



The Univ. of Rhode Island "RamBoat" team prepares to depart for the July 2013 RoboBoat competition. *Photo: Stephen Licht*