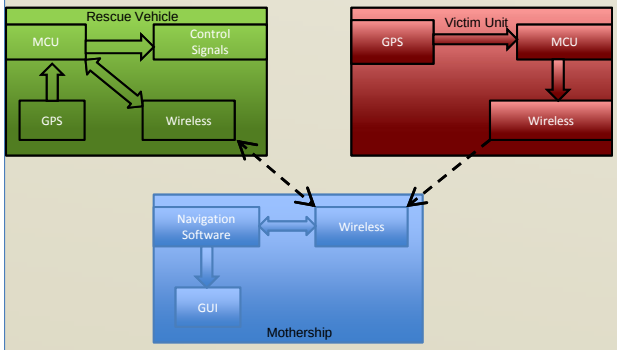
Autonomous GPS-Based Marine Search & Rescue Vehicle

By Alex Kindle and Justin Stocker
Advised by R. James Duckworth and David Cyganski

Project Motivation

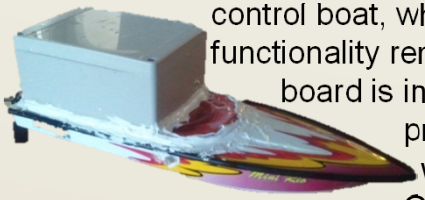
When a person falls off of a large ship, it takes several minutes to assemble a rescue team, during which the person may be lost forever. To maximize the likelihood of rescue, a GPS-based rescue system was designed that could be automatically deployed. This system includes a victim locating unit, designed to be installed on lifejackets; a rescue vehicle, which autonomously navigates to the victim using GPS; and a mothership host system, which provides navigation vectors to steer the rescue vehicle to the victim and back.



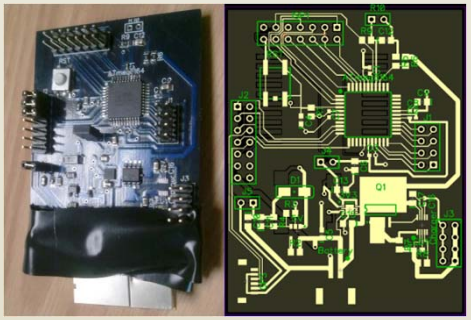
This is a simplified view of a rescue scenario. The victim has fallen off of the mothership and drifted away; the rescue vehicle has been deployed to rescue them and bring them back.

System Design

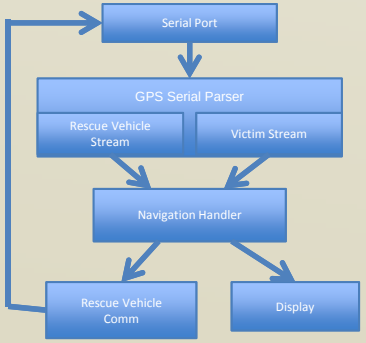
The rescue vehicle was built around a remote control boat, which has had its RC functionality removed. A development board is interfaced with the boat's propeller and rudder, a wireless radio, and a GPS unit.



The victim unit is a custom-designed PCB designed to efficiently run off of a single battery, featuring an ATMega164 microcontroller, which broadcasts its GPS location over the wireless network.



The mothership runs the navigation software for the system, which takes in GPS data from the victim unit and rescue vehicle, and broadcasts control signals to the rescue vehicle.



Results

The original target for the project was to place a rescue vehicle within about 15 feet of a victim in the water. Ultimately, we did even better – in repeated water tests, we successfully got the rescue vehicle within six feet of the victim using just GPS-based navigation. Below is a map of one of these water trials, performed in Elm Park, and a link to a Youtube video of the trial.

http://www.youtube.com/watch?v=koDYwOnNKTA

Worcester Polytechnic Institute