



Underwater Sea Glider Audio Controller

Description:

The Portland State University Northwest Electromagnetics and Acoustics Lab (NEAR Lab) owns an underwater unmanned vehicle (UUV) called a [Slocum Sea Glider](#). Unmanned Aerial Vehicles (sometimes referred to as UAV's or drones) have seen widespread applications in recent years and are even being considered for package deliveries by Amazon. Underwater drones are also becoming increasingly important for applications in the ocean (e.g., recall the search for the Malaysian Airplane). Underwater sea gliders are a specific type of underwater drone that uses a very low power buoyancy engine and can therefore remain at sea for months at a time. The NEAR-Lab sea glider is outfitted with a prototype acoustic package that has two hydrophones and is used to gather acoustic data for oceanographic research (e.g., marine mammal detection and tracking). Right now the signal from the hydrophones is being recorded with an [off-the-shelf recorder](#). The audio performance of the recorder is more than adequate, but it lacks some of the features we desire for successful acoustic data collections. The goal of this project is to design a hardware controller and software interface that works along side the data recorder to improve the feature-set and usability.

Why should you pick this Capstone?

If you are selected for this Capstone you will be involved in the entire project from the initial product requirements to a finished design. It will be a very hands-on project with various hand-built prototypes and field tests. This is a unique opportunity to work on an unmanned vehicle and contribute to oceanographic research.

Goals:

- **Scheduling:** The ability to turn the data recorder on and off according to a pre-programmed schedule. This will require an accurate real time clock on the controller.
- **Increased storage:** Many ocean deployments will last days or even weeks at a time. Right now the device is limited to the storage capacity of a single SD card. We want to be able to use multiple SD cards throughout the duration of a deployment.
- **Low power:** Batteries take up valuable space inside of the glider. This controller will need rely on interrupts and go into a deep sleep whenever possible to conserve battery life.
- **Clean user interface:** This controller will be used by a variety of people and needs to be well documented and easy to use. A PC-based software interface for setting the recording schedule is desired.

Recommended Skills:

- Some embedded firmware development experience (ECE 371, 372, etc)
- Experience designing and assembling PCB prototypes
- Some experience with PC-based programming – (e.g., C, C++, C#)

Industry Sponsor:

Metron Inc. is a scientific and engineering consulting company dedicated to solving challenging problems in national security. The headquarters for Metron are in Reston, VA and the Advanced Mathematics Applications Division recently opened an office in Portland and established a teaming agreement with Portland State. The Portland office of Metron is currently working on projects for the Office of Naval Research (ONR), the Naval Oceanographic Office (NAVO) and the Defense Advanced Research Projects Agency (DARPA). Point of contact at Metron: Dr. John Gebbie, gebbie@metsci.com.