Autonomous Underwater Vehicle Control Through Underwater Acoustics

Team 171
Connor Burns (Electrical Engineering)
Joseph Folz (Electrical Engineering)
Michael Daukas (Electrical Engineering)

Advisors:
Shengli Zhou
Shalabh Gupta
Introduction

Autonomous underwater vehicles (AUVs) can accomplish many tasks including data collection, exploration, and recovery missions. The completion of these tasks can all be aided by the use of multiple AUVs working cooperatively. However, there are many challenges associated with designing a swarm of synergetic AUVs. Two of the largest complications that need to be considered are the limitations of underwater communications and localization. Even after these obstacles are overcome, coordination of multiple AUVs is not trivial. The focus of our project will be the control systems that facilitate this collaborative behavior, as well as the physical design of each AUV.

Overview

Each AUV will be a fully mobile unit, with the capability to control its depth, as well as move and turn in the horizontal plane. Each AUV will have the ability of communicate with a central computer with a user interface, and communicate amongst each other. The communication will be achieved using acoustic modems. The AUVs will be able to receive a command to get into a certain formation, and be able to collectively determine how to make that formation. After getting into formation the AUVs will need to be able to move as a group and maintain their formation.

Specifications:

- Number of AUVs: 6
- Function with less AUVs: Yes
- Number of possible formations: 2
- Time needed to make formation: Shortest necessary time will be calculated
- User interface: Allow user to select a formation, a starting location and destination or direction for the AUVs to travel
- Depth Control: Using sensor data the AUVs will be able to control their depth
- Sensors: Each AUV will have Depth, Temperature, and Proximity Sensors