Project Plan

Team:
Taylor McRae tmcrae2012@my.fit.edu
Sean Small ssmall2013@my.fit.edu
Robert Booth rbooth2013@my.fit.edu
Clayton Esposito cesposito2014@my.fit.edu

Sponsor:
Dr. Phil Bernhard pbernhard@fit.edu

Client:
Dr. Stephen Wood swood@fit.edu

Goals & Motivations

Produce software as a controller for an Autonomous Underwater Vehicle. This vehicle will be able to survive without human interference and collect sensitive data while maintaining anonymity. This AUV will collect and synchronize data based on our pre-programmed survey and sampling schedule. The AUV will remain underwater, navigate coastal regions, collect data using neural networks in conjunction with embedded sensor systems. We will work on the navigation and some sensory input of the vehicle.

Approach

1) The AUV successfully takes a course to avoid obstacles and return back to it's original course. The AUV will be dropped at a predetermined point with the mission to reach a specified GPS coordinate. The AUV will drift for as long as possible to preserve battery life and extend operation time. The AUV will detect debris and terrain obstacles via sonar determine if a detour is needed and execute. The AUV will be contained to an Area or Operations and will take action to return should the device move beyond the specified area due to an exterior force.

2) The AUV will have an emergency system with two basic response patterns based on the type of mission. In the event that the mission is covert the emergency system will scuttle the AUV in the event of compromise. The system will flood the AUV and wipe the memory from all disks. In the other case the system will send a message back along with log data on the AUVs systems for retrieval and repair.

3) Automated Mission Planner will produce MOOS mission scripts for users without MOOS or programming knowledge. The mission planner will allow users to select from the possible MOOS behaviors and input data needed such as GPS coordinates and

acceptable margin of error on waypoints. The users will be able to select the configuration blocks for which MOOS plugins will be used and customize setting if needed. The planner will write the scripts and provide the user with a mission folder that only needs to be copied to the AUV.

Novel Features

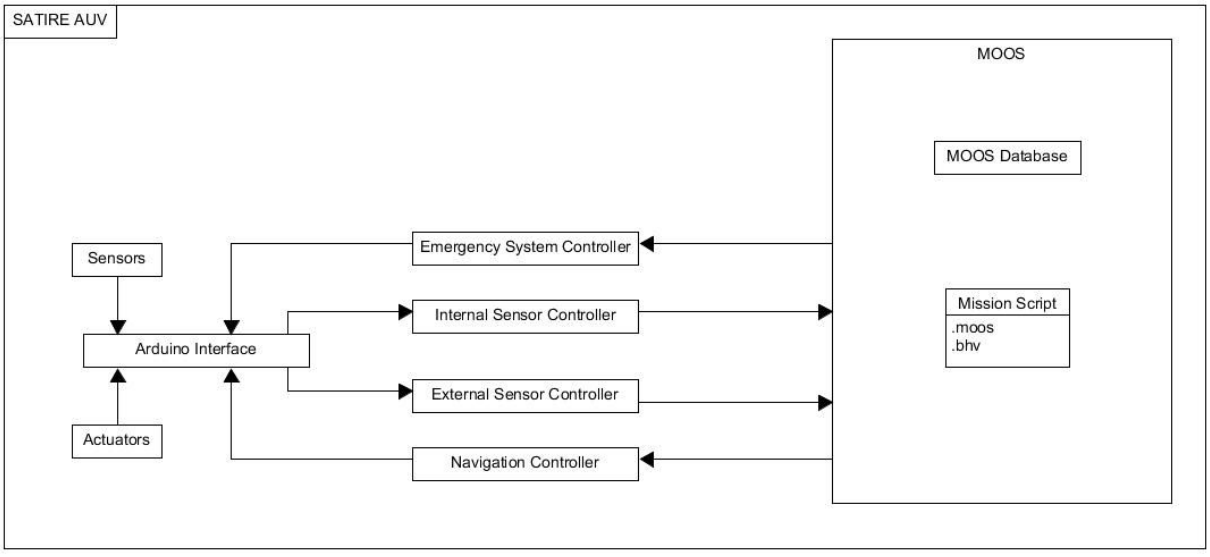
An autonomous underwater vehicle that can survive, navigate, and monitor harbors without being detected. This vehicle will collect data from multiple sensors and transmit to a satellite uplink.

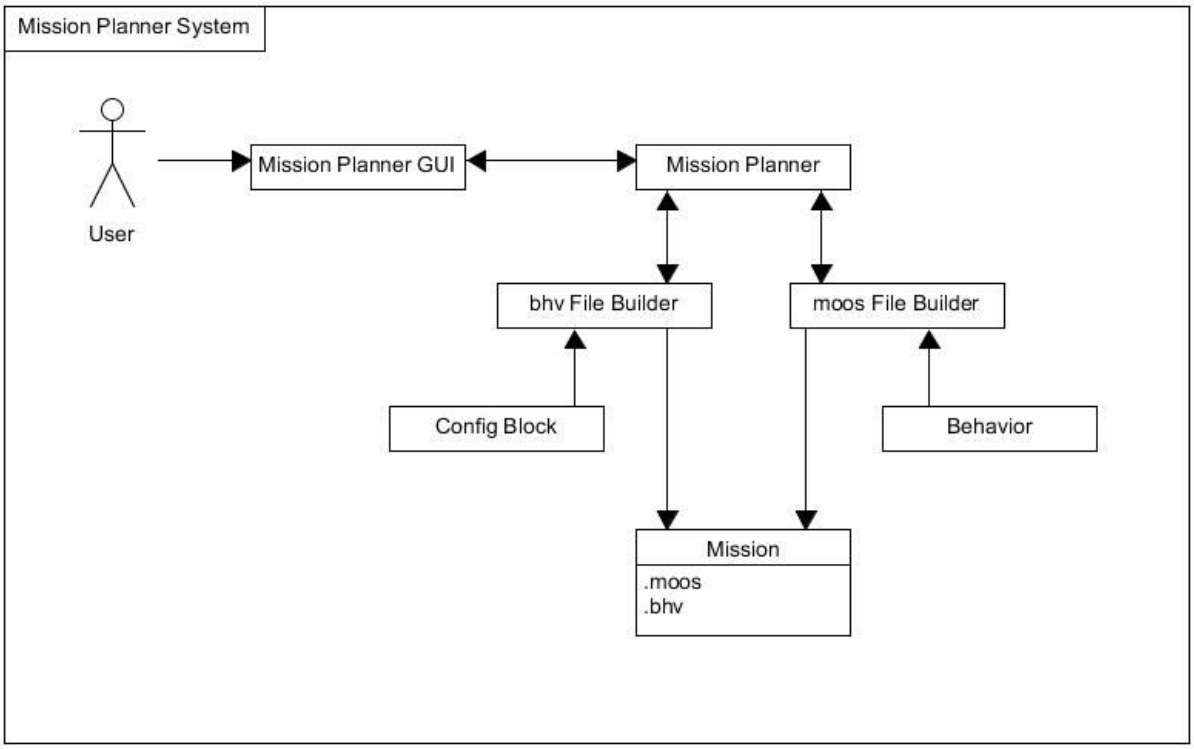
Technical Challenges

1) Learning how to get the hardware to interact with MOOS code
2) Building simple artificial intelligence for the vehicle to survive without user dependency
3) Understanding and programming the hardware, including data gathering and sensor synchronization.

Design

System Architecture Diagrams





Progress Summary

Module / Feature	Completion	To Do
Obstacle avoidance	75%	Implement Sonar to create obstacles for AUV
Emergency Systems	40%	Get sensor data, decide action system takes
Navigation	100%	

Milestone 4

- Design and implement connection to existing arduino code
- Install MOOS onto the Arduino hardware
- Demo and test prototype Mission planner

Milestone 5

- Create poster for Showcase
- Implement and test emergency system with placeholder methods

- Implement and test sonar obstacle detection.

Milestone 6

- Create user manual and progress report for future CS teams
- Create demo video
- Test and debug the current system in entirety

Milestone 4 Task Matrix

Task	Taylor	Robert	Clayton	Sean
Arduino connection	30%	30%	20%	20%
Hardware Install	25%	25%	10%	40%
Mission Planner	10%	10%	70%	10%

- Task 1: Implement a means to connect the MOOS system to the pre-existing Arduino code for receiving sensor input and sending motor control output. The team needs to interface the pre-existing Arduino code that currently controls the AUV with the MOOS systems. The existing manual control of the Arduino code will remain with MOOS acting as a back seat driver for automation.

- Task 2: Successfully install MOOS and the external plugins onto the currently available Arduino board. The team needs to install MOOS onto the current hardware along with the custom plugins made for the SATIRE AUV.

- Task 3: Demo and test the mission planner with a limited selection of config blocks and behaviors. The mission planner needs to be functional with the gui and file builders to be demoed and tested. This initial build will contain a selection of the core behaviors and config block with more to be added after a round of testing.

“I have discussed with the team and approved this project plan. I will evaluate the progress and assign a grade for each of the three milestones.”

Signature: _____ Date: _____