SATIRE Milestone Progress Evaluation 3

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

Updated Progress of Last Milestone (2) (Progress Matrix)

Task	Complete %	Taylor	Sean	Robert	Clayton	To do
1. Implement, test, and demo GPS navigation controller	80%	10%	10%	10%	50%	Implement drift capability into moos
2. Implement, test, and demo AUV dead reckoning	90%	25%	20%	20%	25%	Moos dead reckoning is functional. Will need occasional input from gps to verify.
3. Implement, test, and demo motor control	30%	5%	15%	5%	5%	Interface Moos app with the arduino control code

Tasks Discussion Milestone 2

Task 1 - MOOS GPS navigation is functioning but not yet automated. The generation of behavioral and mission files is still manual, this will need to be automated. The next step will be to implement an automated generator for moos mission and behavioral files.

Task 2 - The cartesian coordinate system of moos provides dead reckoning functionality and is functional with our mission. The dead reckoning function has been determined as sufficient for our vessel. The dead reckoning will collect data from the sonar devices we have on the vessel and the cartesian grid that is already fully functional on MOOS to help navigate throughout foreign waters without an individual controlling its movements.

Task 3 - The MOOS app for motor control is implemented but as of yet only has the functionality to connect to the MOOSDB for communication. We need to implement the interface from MOOS communications to the hardware still.

Progress of Current Milestone (3) (Progress Matrix)

Task	Complete %	Taylor	Sean	Robert	Clayton	To do
1. Implement, test, and demo sensory input	50%	5%	30%	5%	10%	Demo pressure sensor and AHRS Sparton
2. Implement, test, and demo collision avoidance system	25%	10%	5%	5%	5%	Moos App created and capable of fetching messages from MOOSDB implemented
3. Implement, test, and demo Emergency System	40%	5%	5%	20%	10%	Moos App created and capable of fetching messages from MOOSDB implemented
4. Implement Mission Planner	55%	5%	5%	5%	40%	Finish adding the .moos config blocks and .bhv behaviors, implement GUI

Tasks Discussion Milestone 3

Task 1 - The team has access to the current arduino code that the hardware is running on. The hardware is not currently operational after the hardware was removed from the design center. We do however have access to the hardware teams demonstration of the Blue Robotics T100 Thrusters and we have an online simulation of the gas sensor. Only some of the sensors are currently implemented on the live arduino. This task is very important because almost all of the functions of the vessel come from sensor input collected by the vessel because of the autonomous nature of the vehicle.

Task 2 - This task is dependant on the first task, which is involves input coming in from the sensors of the UAV. We want our vehicle to be able to navigate through foreign waters with the

ability to change its immediate path if there is something in the way that could put of UAV in danger. We will put in specifications for how close our vehicle can be to the sea floor when navigating, how drastically the UAV will move if there is something in its path, and other information that would help our vehicle avoid collision. The main hardware that will be used for this task are the two sonar devices that are planted on the vehicle to measure how close the vehicle is to the surface and the sea floor, and how close an object or projectile may be to the vessel.

Task 3 - This task is also heavily depended on the data that is received from the sensors that are being worked on in task 1. We will be measuring multiple things within the inside and outside of the vessel, and use this system to notify the customer when the vessel is in trouble. For the task, we went through the files within the MOOS source code involving specifications about the integrity of the vessel. For this task, we worked on changing some of the generic specifications for an underwater vessel so as to meet the specifications of our vehicle. We also are working on adding the uHelmScope application that is available for MOOS, which will help us test the system by showing the output of the emergency system.

Task 4 - Mission planner still needs some of the config blocks and behaviors implemented and a GUI. File builders for both the .moos and .bhv files are in progress with focus on implementing the config block for the .moos and the MOOS behaviors that are a part of IvP Helm, The mission planner needs to allow users to select the behaviors they want to be a part of the mission and input information needed such as gps coordinates. GUI is not yet implemented and will need to be addressed after all of the behaviors and configs are in.

Personal Discussion Milestone 3

Taylor - Worked on collision avoidance for the software. Had to hardcode obstacles for the demo but it is not guaranteed to work under water yet. Only about 25% complete which is behind schedule.

Sean - Conducted a demonstration of how the gas sensor will be implemented in the AUV using an online simulator. When the sensor reads a set threshold it will call the emergency system which will determine what action the AUV will take next.
Also have researched about the Arduino system as well as more in-depth reading about the MOOS system. Have also researched about the hardware that's planned to go in the AUV, including the Bar 30 sensor, Blue Robotics T100 thrusters and the MQ2 gas sensors.

Robert - Working on developing a simulation to demonstrate the emergency system of the AUV. Added the uHelmScope application that is available on MOOS. The uHelmScope application is a

console based tool for monitoring output of the AUV. Still need to change the specifications of the emergency system to fit the exact needs of our specific underwater vehicle, rather than using the generic attributes already put in the application.

Clayton - Development of an automated mission planner in progress. The mission planner is a pc application for the users of the SATIRE device to create moos missions for use by the device. The application is still in progress, the basic functionality is incomplete and a gui still needs to be implemented. Currently implementing the .moos file config blocks and the .bhv behaviors possible to moos missions. Both file writers and the system main are in progress.

Plan for next milestone (4) (Task Matrix)

Task	Taylor	Sean	Robert	Clayton
1. Implement, test, and demo more sensors	20%	40%	20%	20%
2. Implement, test, and demo collision avoidance system	40%	25%	25%	10%
3. Implement, test, and demo Emergency System	20%	20%	40%	20%
4. Finish implementation of the Mission Planner and implement the GUI	10%	10%	10%	70%

Discussion Milestone 4 Planned Tasks

Task 1 - We need to additional sensor interfaces ass the hardware team adds them. Testing the current interfaces both in simulation and on the hardware. We will also work on formatting the sensor data so it can be understood by UAV to be used for the collision avoidance system and the emergency system.

Task 2 - Develop the collision avoidance system from the AUV sonar. Need to implement obstacle detection, orientation, and motion vectors. Develop decision process for determining if avoidance is needed, and develop pathfinding around obstacle if needed. We also need to determine the angle of course adjustment of the vessel if a collision is imminent. We want out vessel to be as fuel efficient as possible because it only has a finite amount of power to complete its mission.

Task 3 - Continue development of the emergency system. Implement flag and responses for both secret and open missions (scuttle or message for help). Find a way to test each of the individual areas that are in need of an emergency system (Ex. hydrogen monitor, temperature monitor… etc). We also want to specify what each alarm from the emergency system will cause the alarm to do (Should the vessel send a message for help or move to another area). We plan on also continuing to individualize our emergency system so all of its specifications fit our UAVs attributes perfectly.

Task 4 - Continue adding the .moos config blocks and MOOS behaviors to the mission planner. Implement the GUI. The mission planner needs to allow users to select the behaviors they want to be a part of the mission and input information needed such as gps coordinates. GUI is not yet implemented and will need to be addressed after all of the behaviors and configs are in.

Sponsor Feedback Milestone 3

Task 1

Task 2

Task 3

Sponsor Signature: _____ Date: _____

Sponsor Evaluation

- Sponsor: detach and return this page to Dr. Chan (HC 322)
- Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Taylor	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Sean	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Robert	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Clayton	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

- Sponsor Signature: _____ Date: _____