Robotic Mining Competition – Milestone 1

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Faculty Advisor: Dr. Marius Silaghi (msilaghi@fit.edu)
Client: Robotic Mining Competition team, NASA
Meeting Times: Wednesdays, 4:00pm - 5:00pm; Fridays, 3:00pm - 3:30pm

Supporting Member from Aero/Mech Eng. Design:
Shelsy Toppenberg (stoppenberg2020@my.fit.edu)

Milestone 1 Progress:

Due to project leads within RMC being required to have a supporting member, I will be including the contribution of my supporting member in the progress matrix.

Task	Completion %	Liam	Shelsy	To Do
1. Code level review/language selection	100%	90%	10%	none
2. Small demos	100%	90%	10%	none
3. Requirement Document	90%	90%	---	Confirm specifications of the navigation software.
4. Design Document	80%	80%	---	Finalize design of navigation interface, as well as the computer to be used.
5. Testing Document	100%	100%	---	

Task 1:

This was likely the easiest task to get done. Python was chosen as the language to use because of its ease-of-use and versatility, and a language most of the other members on the RMC team are familiar with. It can be used with various navigation encoders and simulation software, which gave us a wide range of choices.

Task 2:

Small python demos were made via simulation software that showcase both manual and autonomous movement of a small robot. The simulation software used is Webots by Cyberbotics. While Shelsy did not contribute to the code for movement, she has been working on building the virtual terrain environment simulating the arena that will be used in the actual robotic mining competition.

Task 3:

The documents that were made in tasks 3-5 were all organized out of information that was confirmed for the RMC team's System Requirements Review (SRR), which we had to make ourselves. The SRR needed requirements specified for the software systems, so what was submitted through the SRR was used for the Requirements document, although the tables in the SRR were formatted slightly different from the tables expected in this class's documents. But it made organizing the requirements a little easier, as the Requirements had to be settled much earlier than expected. In the end, this gave me more time to put together the details for the design and testing aspects.

Task 4:

The Design document also took from what we had submitted in the SRR document. Within the Design document, graphs depicting the interactions and the needed classes/functions along with the necessary explanations for the classes.

Task 5:

The Testing Document was a bit tricky. The easiest part was putting together the testing cases for the functional requirements. The testing cases for the interface that the team wants for navigation was not difficult either, but is subject to change as the team confirms what they want in that interface this week. The hardest test cases to figure out were for the performance requirements. I tried my best with the knowledge I had, but computer networking is not my strongest area. I will be working to improve my knowledge on this over the course of the semester.

Milestone 2 Plan:

Task
1. Implement a simulator
2. Design test vectors for main requirements to be verified by simulator
3. Look up documentation of involved hardware
4. Research relevant algorithms for autonomous tasks

Task 1: This was completed early. While just giving them a demo on python to show that I know how to work the language, I decided to give the RMC team a little more since we needed to figure out the simulation software early. Refer to the Task 2 section from the Milestone 1 progress.

Task 2: We will have to come up with certain criteria for the software to pass. One could be the time it takes for the software to run, how fast the robot is able to complete tasks with the software, what kind of information will be accepted and passed to other parts of the robot's system, etc. Finishing up the simulated arena environment will help us a lot with this.

Task 3: Some of the hardware is not yet known, as the team figures out which computer to use. While Raspberry Pi would make things easier for me, it will give difficulty to the electrical subsystems. If we go with an Arduino, the situation would be reversed. The team wants to work around my preferences. Outside of that, looking up the documentation and examples of code involved with it should not be super difficult.

Task 4: This research will be continuing through to Task 3 and into winter break while the manual controller systems are developed. We will have to decide what would be more efficient for the robot depending on the parts that are used in its physical design.

Meetings with Client:

- 09/06/2023
- 09/08/2023
- 09/13/2023
- 09/15/2023
- 09/20/2023
- 09/22/2023

- 09/29/2023

Feedback – Milestone 1

The client is satisfied with the work done so far. There has been good communication, and the demos provided look adequate. One thing that needs doing is to confirm with navigation about the design of navigation interface, but everything else has been moving along smoothly.

Meetings with Faculty Advisor:

- 09/26/2023 –

Feedback – Milestone 1

Task 1: Sounds good.
Task 2: Looks good.
Task 3: Be a little more specific with requirements?
Task 4: Think more about how components interact with each other.
Task 5:

- Faculty Advisor Signature: _____ Date: _____

Faculty Advisor Evaluation

Liam	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

- Faculty Advisor Signature: _____ Date: _____