Debris in Space Autonomous Removal Mechanism (DISARM)

Milestone One

Team Members

Project Manager: Kyle Watkins

Project Systems Engineer: Luca Rizza

Electronics System Lead: Michael Leard

Electronics System Supporting Engineers: Nouraldean El-Chariti, Ali Lebbar

Grappling System Lead: Daniel Soto

Grappling System Supporting Engineers: Laura Guziczek, Ali Lebbar, Davey Renoid

Control System Lead: Nouraldean El-Chariti

Control System Supporting Engineers: Laura Guziczek, Matthew Intriago, Michael Leard

Structure System Lead: Vincent Panichelli

Structure System Supporting Engineers: Davey Renoid, Ali Lebbar, Daniel Soto

Client: Dr. Markus Wilde

Faculty Advisor: Dr. Silaghi

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Current Milestone Progress

Task	Completion %	To do
1. Investigate tools	100%	none
2. Hello World demos for Arduino and Raspberry Pi, and ROS	100%	none
3. Requirement Document	100%	none
4. Design Document	100%	none
5. Test Plan	100%	none
6. Outline of autonomous algorithm	50%	Write and implement pseudocode
7. Decide in language for User Interface	100%	none

Discussion

Task 1: The first step was to research tools that I would need to design the system as well as tools that could be used for simulating the algorithm. After researching and getting help from my advisor I found and tested the ROS software to see if it could be used to implement an autonomous algorithm and to create a demo of the design.

Task 2: In order to decide on which microcontroller will best work with the system, I developed hello world demos of the software. It's been decided that different microcontrollers will be used, one for low power to electronics, and another for high power for the welding system.

Task 3: Added requirements for the autonomous algorithm, manual system, as well as requirements for the simulation in the case of not being able to develop a prototype device in time.

Task 4: Developed a trade study on the welding that will be used on the system with the help of the controls subsystem of the team. Following the trade study, designed a potential control flow of the

welding algorithm to be implemented alongside the mock user interface. Need to design a pseudocode for the algorithm so that I can start coding the actual algorithm.

Task 5: Created test cases for each requirement of the system. Several of the test cases are similar since the way of testing that each requirement works is by checking that the system is able to handle the max debris size as well as medium to small debris sizes.

Task 6: The outline of the autonomous system was placed in the design document, however the completion is at 50% since a pseudo code needs to be developed.

Task 7: After creating the mock GUI, it's been decided that the user interface will be coded using both Visual Basic and HTML tools through the use of Visual Studio which is also compatible with ROS.

Plan for next Milestone

Task	Matthew
Design algorithm pseudocode	Using designed control flow, design pseudocode to demonstrate how the algorithm will work.
Produce an algorithm draft to be tested	Design an algorithm to be tested on ROS
Decide if we will be developing a graphical simulation	Need to meet with the client to see if a numerical simulation is enough or if a graphical simulation of the algorithm is necessary/possible.

Discussion

Task 1: It will be easier to visualize what sort of data structures will be needed in the algorithm as well as how the control flow will look in code by developing pseudocode.

Task 2: Once a pseudocode has been developed, start coding a draft of the algorithm with functions and variables to be used.

Task 3: With ROS, a numerical simulation can be designed in which we can observe if the welding has been a success through observing the calculations that will be used in the algorithm. However, a graphical simulation might be necessary so that the team has a visual deliverable. There might be limits to these since this requires graphic design to be implemented with the algorithm which will be challenging.

Date(s) of meeting(s) with Client during the current milestone

Client Meeting Log	
August 26, 2020	Meeting to discuss requirement document
September 02, 2020	SRR Meeting
September 09, 2020	Peer Review Assignment
September 16,2020	PDR Meeting

Client feedback on the current milestone

- We should deliver a working prototype, user manual, and integration manual
- Specify how we are going to make the deliverables happen and add further details
- Do research into a dampening system to absorb the impact between the space debris and the device. Other option is an extending/contracting system
- Electronics should look into stud welding, cold welding, and capacitor discharge welding (We have decided to use stud welding)
- Develop budgets for each subsystem (Electronics, Controls, Structure, Grappling System)

Date(s) of meeting(s) with Faculty Advisor during the current milestone

Faculty Advisor Meeting Log	
September 15, 2020	Meeting to discuss requirement document and design

Faculty Advisor feedback on each task for the current Milestone

Discussed current requirements and emphasized the importance of having requirements for a simulation. In the case that the team is not able to develop a prototype in time, or in the case that I have to wait for an extended period to be able to work on the prototype code, a simulation is needed to have a deliverable for the project. Otherwise I might end up with no completed requirements since I was not able to test the coded algorithm with the prototype.

Faculty Advisor Signature: _____ Date: _____

Matthew Intriago	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: _____