Debris in Space Autonomous Removal Mechanism (DISARM)

Milestone Five

Team Members

Controls System Supporting Engineer: Matthew Intriago (mintriago2017@my.fit.edu)

Project Manager: Kyle Watkins

Project Systems Engineer: Luca Rizza

Electronics System Lead: Michael Leard

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

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Grappling System Lead: Daniel Soto

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

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Control System Lead: Nouraldean El-Chariti

Control System Supporting Engineers: Laura Guziczek, Michael Leard

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Structure System Lead: Vincent Panichelli

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

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Client: Dr. Markus Wilde (mwilde@fit.edu)

Faculty Advisor: Dr. Silaghi (msilaghi@fit.edu)

Current Milestone Progress

Task	Completion %	To do
1) Develop DISARM plugin	85%	Fix bugs in simulation
2) Develop demo videos	33%	Develop demo video for the rest of the test cases
3)Create poster for showcase	25%	Poster design is in progress.

Discussion

Task 1: Fixed the error where ROS was not letting me add joints to the DISARM model. Re-coded the links and joints of the model in order to have the guiding rods retract and the spring dampen upon collision against a debris. The spring and the guiding rods were turned into prismatic joints which essentially are joints that provide a linear sliding movement with a lower and upper limit. By combining the prismatic joint with a transmission, the dampening system started working properly in the simulation. Added controls to the chaser to have it move DISARM towards the target debris. When the LiDAR-Lite sensor detects an object in its line of sight, the chaser will guide DISARM towards the target object. The simulation has yet to be tested with several debris in the line of sight of the sensor, which is an event that needs to be considered. Currently, the actual "welding" of the debris on the prongs is missing, the CubeSat simply stays on the prongs due to the extrusions on the model being held by the welding prongs.

Task 2: Demo video for the capture of a one-unit CubeSat has been recorded, demonstrating how DISARM approaches the debris, and then dampens the impact upon collision on the prongs. Need to record demo videos testing other test debris cases, and possibly multiple debris at a time.

Task 3: The designing of the poster is currently underway and will be completed by the due date.

Plan for next Milestone

Task	Matthew
Finish recording demo videos	Record videos for the rest of the test cases and add final touches to the simulation
Test Arduino code with motor	Continue working with control systems lead
Create poster for showcase	Design with the help of my team

Discussion

Task 1: The current simulation demo video is a bit choppy. While recording the simulation, the frames dropped in Gazebo that caused the video to cut in some places. Need to figure out why the frames are dropping before being able to record videos for the two other test cases. This issue could be due to high CPU usage of my laptop or the hardisk being almost at full capacity. Clearing up space on the computer and only have Gazebo upon while recording could solve the issue.

Task 2: The controls system lead and team has completed the motor and sensor code to be used alongside the Arduino. Unfortunately, the code has yet to be tested since the motor never arrived. Once replacement motor arrives, the code will be tested.

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

Client Meeting Log	
February 17, 2021	Weekly Progress Report Meeting
February 24, 2021	Weekly Progress Report Meeting
March 10, 2021	Weekly Progress Report Meeting

Client feedback on the current milestone

- Sensor should activate the welding circuit once it detects that the debris is in contact with the stud but before the debris touches the stabilizer.

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

Faculty Advisor Meeting Log

March 15, 2021   Meeting to discuss milestone 5
                                                                                    progress

Faculty Advisor feedback on each task for the current Milestone

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: _____