Debris in Space Autonomous Removal Mechanism (DISARM)

Requirement Document

Team Members

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Client: Dr. Markus Wilde

Faculty Advisor: Dr. Silaghi

Grappling Device Autonomy

Requirement	Description	Input	Output	Verification Method
CNSY-01	System shall track and locate debris up to a max debris size of 27 cubesat unit	Height, width, and depth of debris.	N/A	Testing that the algorithm measures a cubesat
CNSY-02	System shall autonomously perform the welding process	Proximity of the space debris	Complete the weld	Demo displaying the algorithm authomosly performing.
CNSY-03	System shall transfer collision data	Proximity and momentum of the space debris	Velocity, momentum and energy data collected and transferred	Testing the interface of the system
CNSY-04	System shall be able to work in a vacuum and no gravity	N/A	N/A	Testing prototype in a vacuum environment
CNSY-05	System shall turn off in the existence of problems with the weld	Verification of weld completion	N/A	Testing prototype

Grappling Device Manual Function

Requirement	Description	Input	Output	Verification Method
CNSY-06	The device shall display an accessible interface for power and data transfer	Velocity and momentum of debris	Numerical data displayed on interface	Testing of interface

CNSY-07	Users can check status of welding	Transferred data	Status of Welding	Displayed on interface
CNSY-08	Users can manually cancel or shut off the welding process	N/A	N/A	Option displayed on interface

Grappling Device Simulation Requirements

Requirement	Description	Input	Output	Verification Method
CNSY-09	The simulation shall demonstrate all the forces and stresses acting on the welding system.	Velocity and momentum of debris	Graphical simulation	Demonstration on ROS
CNSY-10	The simulation shall display the algorithm's ability to adapt to different debris.	Height, width, and depth of debris.	Attachment moving to adapt to debris	Demonstration on ROS
CNSY-11	The simulation shall demonstrate the weld in action and the thermal changes on the system.	Total calculations including debris measurements, velocity, heat transfer, and momentum.	Weld in action demonstrated on simulation	Demonstration on ROS