EE/CprE/SE 491 WEEKLY REPORT

10/02/2024 – 10/09/24

Group number: 9

Project title: Space Cyclones - COSMIC CAPSTONE CHALLENGE 2024-2025

Client &/Advisor: Bo Varga, Benjamin Rupp, Rachel Shannon

Team Members/Role: John Beuter (Team Lead), Daniel Sprout, Maheeka Davarakonda, Tanvi Mehetre, Riley Heeren, Ben Swegle

- **Weekly Summary/Objectives**

After meeting with Bo on the October 6th, we identified six issues and six services (listed below) to research further. This week's goal is to complete research on all issues and services to share findings during the next meeting on October 12th.

Issues to address:

1. Tumbling
2. Grabbing (net?)
3. Tethering
4. Radiation (bit flip problem)
5. Thrust problems (ionic propulsion?)
6. Microparticle impact on satellite

Services required in space:

1. Fix solar panels
2. Refueling (RAFTI)
3. Maintain/change orbit of target sats (what are most feasible target satellites?)
4. Data transfer
5. Antenna Replacement on target sat
6. What type of camera do we offer? (LiDAR/ radar other options?/ resolution)

- **Past week accomplishments**

  • John Beuter:
  Researched in space manufacturing and refueling. One company, Varda Space Industries, manufactures pharmaceuticals in space. The work that Varda is doing seems like an interesting avenue (manufacturing) that our group could start to look into.

  Outside of manufacturing, I researched Orbit Fab's Tanker-001 Tenzing which is an in space fuel tanker. The concepts present in the Tanker-001 Tenzing match some of our early design concepts.

  • Daniel Sprout:
  Researched into how radiation impacts design decisions in space, in addition to methods potentially able to be used to facilitate data transfer between space services.

  • Maheeka Devarakonda:

  - Attended office hours last thursday to clarify pending questions.
  - Continued research on on past tethering successes. Looking into various different types of tethering especially yo-yo despin.
  - Understanding constraints regarding pulling an object in space versus reaching an object.
  - Continued reading space robotics book.

  • Tanvi Mehetre:

  Researched the issue surrounding tumbling. Met with Professor Simone Servadio to gain more insight into our ideas and inputs on how to enhance them. Discussed the solutions that our team can go forward with and what issues we should address.

  Looked into servicing solar panels and jotted down ideas on what type of servicing a solar panel requires.

  Attended the C3 office hours where the last year's teams presented their projects.

  • Riley Heeren:

  Look into microparticle impact on satellites and maintain/change orbit of target satellites and prepare a doc to show the group to help us understand the possible needs and challenges in that area.

  • Ben Swegle:

  Began researching issue number 2, grabbing using nets, and service number 6, camera options. While researching those topics I prepared a document summarizing my findings to share with the team during our next meeting.

- **Pending issues**

  • John Beuter: N/A

  • Daniel Sprout: N/A

  • Maheeka Devarakonda: N/A

  • Tanvi Mehetre: N/A

  • Riley Heeren: N/A

- Ben Swegle: N/A

- **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
John Beuter	Discovered ISAM standards organization called CONFERS. Linked resources for the team to use from CONFERS to help frame our design in line with industry standards and best practices. Discovered alternative options for manufacturing in space.		3.5
Daniel Sprout	Looked into Radiation impacts and data transfer methods in space.	3	9
Maheeka Devarakonda	Attended office hours last thursday to clarify pending questions. Continued research on on past tethering successes. Looking into various different types of tethering especially yo-yo despin.	4	14.5
Tanvi Mehetre	Met with Professor Simone Servadio to discuss the project and explore ideas for improvement. Reviewed potential solutions for the team and identified key issues to address. Also researched solar panel servicing and noted essential maintenance requirements. Attended C3 office hours.	4	9
Riley Heeren	Look into microparticle impact on satellites and maintain/change orbit of target satellites and prepare a doc to show the group to help us understand the possible needs and challenges in that area.	2	6
Ben Swegle	Researched grabbing options using nets and camera options to then summarize findings in a document for presenting to the rest of the team.	3	7

- **Plans for the upcoming week:**

The plan for this week are to conclude researching the issues and services listed in the summary above. Each team member is to summarize their findings and present them during the next team meeting on October 12th.

- **Summary of weekly advisor meeting**

After meeting with Bo on October 6th, we gained feedback on our current design ideas and identified the six issues and six services listed in the summary above. Bo also provided advice to focus on one difficult problem as we only need to show a minimum of three operations.