

# OBJECT ORIENTED ANALYSIS AND DESIGN

## DE-ORBITING ACTIVE DEBRIS BY DUAL-ARM SPACE ROBOT

### PROBLEM STATEMENT:

Active debris removal (ADR) technology is an effective approach to remediate the proliferation of space debris, which seriously threatens the operational safety of orbital spacecrafts. By using the Dual-Arm Space robot in the Artificial intelligence the Robot will capture the debris data then analysing the debris orbit will help to de-orbit the active debris.



PRIMARY ACTORS	USE CASES
Debris Removal Robotic Satellite	<ol style="list-style-type: none"> <li>1. Detect &amp; track debris</li> <li>2. Execute debris Removal</li> <li>3. Send debris data to Station</li> <li>4. Change the threshold</li> </ol>
Ground Control Station operator	<ol style="list-style-type: none"> <li>5. Satellite command</li> <li>6. Satellite control</li> <li>7. monitor Satellite health</li> <li>8. analysing the debris data.</li> </ol>
Space debris monitoring system	<ol style="list-style-type: none"> <li>9. provide debris information</li> <li>10. collision prediction.</li> </ol>
Satellite maintenance Technicians	<ol style="list-style-type: none"> <li>11. Perform Routine maintenance</li> <li>12. Address technical issues.</li> </ol>
Space Agencies	<ol style="list-style-type: none"> <li>13. Fund Satellite program</li> <li>14. Set policies and guidelines</li> </ol>
Regulatory Authorities	<ol style="list-style-type: none"> <li>15. Enforce compliance</li> <li>16. mission approval</li> </ol>



## PRIMARY ACTOR

## USE CASES

Research  
Institutions

17. Utilize Satellite Data
18. Collaborate on Studies

International  
Collaborators

19. Data Sharing
20. Coordinate removal

Communication  
Service Providers

21. Ensure data Transmission

Public media

22. Report updates



ID & NAME:	UC-1 / Detect & track debris		
Created By:	SRINIVASAN. J.P	Date Created	22/01/24
Primary Actor	DRR Satellite	Secondary Actor	Debris detection system
Description	DRR Satellite capture the lights send to the detection system. the detection system will command the satellite to de-orbit the debris		
Trigger:	The debris detected in the system		
Precondition	RE-Satellite Should be Idle, PRE-2: System		
Postcondition	Post-1: Damage check		
Normal Flow	<ol style="list-style-type: none"> <li>1. Capture lights</li> <li>2. detect debris</li> <li>3. move towards debris</li> <li>4. wait for an command</li> <li>5. de-orbiting debris</li> <li>6. Damage check</li> </ol>		
Alternate flow	<ol style="list-style-type: none"> <li>1. no lights change infrared mode continue step 2</li> <li>2. Command not received discard mission</li> <li>3. Satellite damage recovery mode</li> </ol>		
Exceptions	4a. command is discard the check for new debris		
Priority	High		
Frequency of use	average of 2 debris per day		
Business Rules	BR-1		
Other Information	1. Satellite can discard the mission anytime the satellite detect any damage		
Assumptions	Assume that average of 10 degree can be detected		



use case diagram





