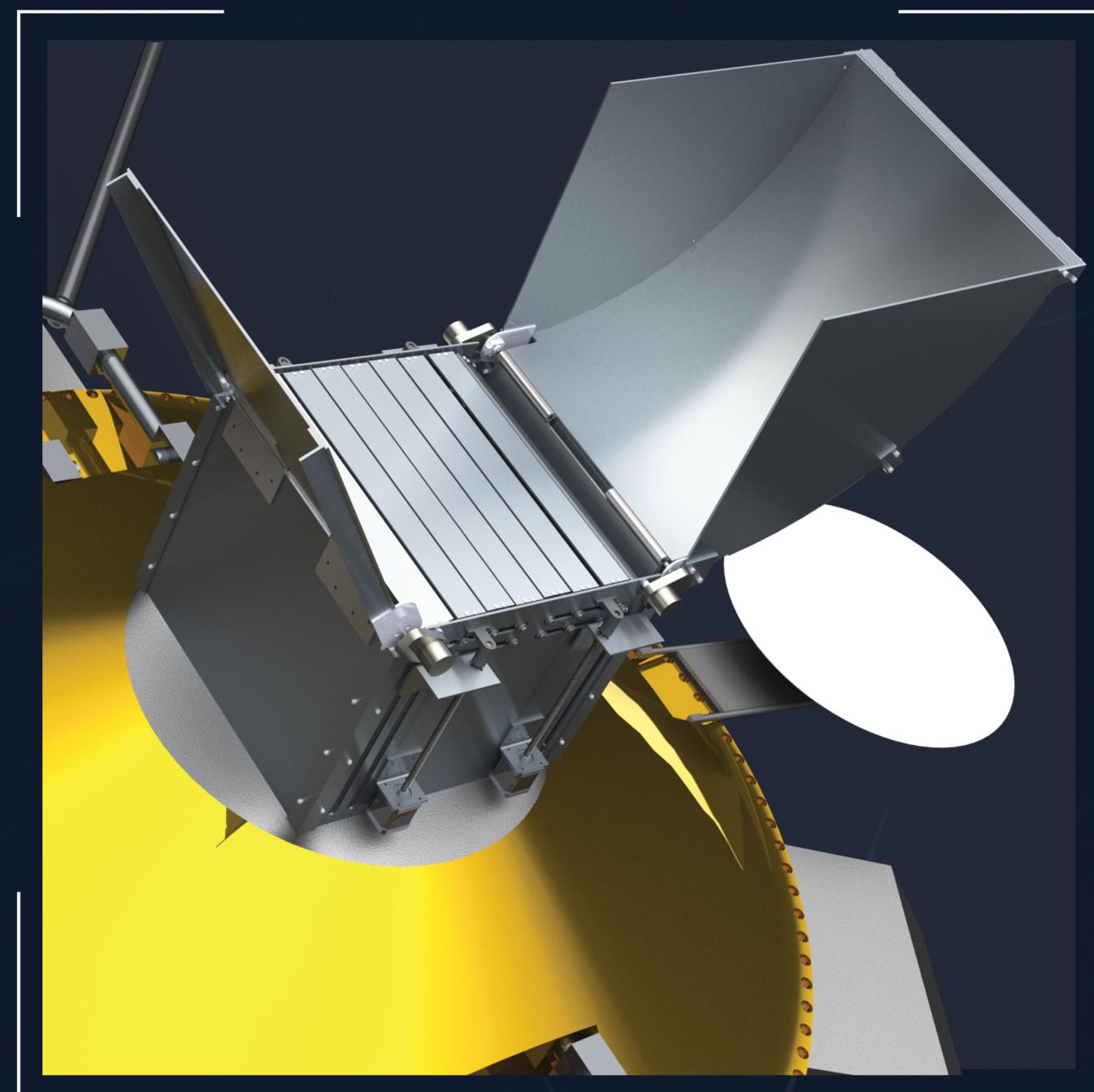




DEBRIS ELIMINATION & MANAGEMENT INSTRUMENT

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DEMISCOPE

DEMI (Debris Elimination and Management Instrument): A Novel Solution for Space Debris Removal. Space debris poses a serious threat to the safety and sustainability of orbital activities. To address this challenge, we designed DEMI, a collection mechanism that can capture and store multiple pieces of small debris in low Earth orbit (LEO).

DEMI works with a two stage capture system: an **outer aperture** that encloses the debris, and an **inner door** that seals it inside a storage chamber. DEMI can be easily attached to the **ESPA Star** satellite bus, which provides the necessary power, propulsion, and communication systems.

DEMI is made of space grade materials with the ability to add space-grade shielding to withstand the harsh environment of space.



THE PROBLEM

Space debris is a growing hazard that threatens the safety and sustainability of orbital activities that we depend on for our daily lives. Thousands of trackable objects larger than 10 cm can collide with satellites and spacecraft, creating a cascade effect known as **Kessler Syndrome**. This could disrupt or destroy services such as GPS, internet, television, weather monitoring, and emergency response.

Currently, there is no cost-effective method to collect or destroy space debris and prevent further damage to the space environment.



KESSLER SYNDROME

USER EXPERIENCE



1 ESPAStar with DEMI maneuvers into close range of debris

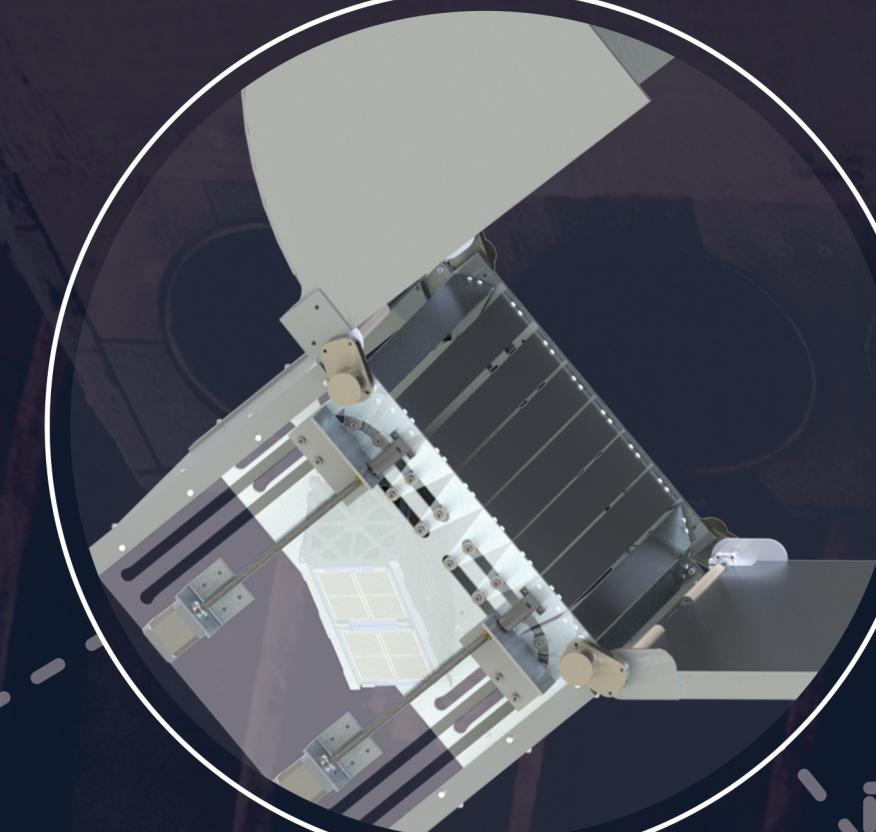


2 Outer aperture closes around the object

3 Inner door rolls open



4 Outer flat door pushes debris inward into the storage area & inner doors close again



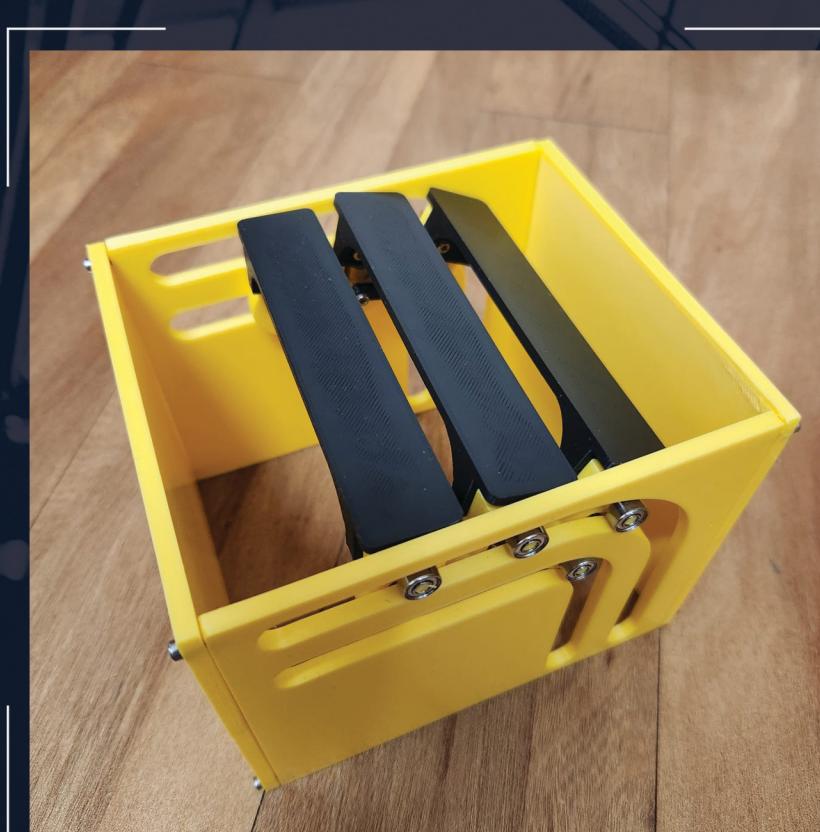
5 Outer aperture reopens

DEMI is ready to collect a new piece of debris!

PROTOTYPING



INITIAL DESIGN



REVISED DESIGN

The DEMI team focused on reusability, simplicity, and reliability. They ruled out nets and gecko grippers, which would have been cumbersome and single-use. Over time, they settled on a clamshell design that could capture debris of any **size, orientation, or composition**.

Through 3D printed and cardboard mockups, they arrived at a mailbox and flap configuration with a slim, nonintrusive garage-style door.