

Team Intro

Sami Mian: Hardware Design (Electrical, Sensors), Control Logic Design

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Josh Chang: Industrial Design

Lauren McBurnett: Moral support

Abhik Chowdhury: Software Conceptualization, IoT Integration

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Problem statement:

The issue that we decided to address is that astronauts have to carry a computer around with them while navigating the ISS. Specialty computers are mounted around the station, but personal computers and devices require constant holding or stabilization, to prevent them from floating away. Free floating computers and tablets are inconvenient, and waste time and cause frustration throughout the work day.

Initial thoughts/Concepts:

There were several different ways we considered approaching this. Below is a list of concepts that were eventually scrapped due to either feasibility restrictions or design issues.

- Floating propeller with screen shroud
- Gas propellant (CO₂, NO₂), O₂
- Propeller on arms (VTOL look?)
- Open propeller

The major roadblock we were facing was the following:

How do we get the device to move along the Z axis using a propeller?

Temporary solution: Build air vents to capture backdraft from fan and funnel around the edge of the gimbal frame.

Solution:

Our solution to this problem is to create a gimbal stabilization device that would attach to the computers or personal devices of the astronauts. This device would utilize a single fan for propulsion, and would rotate along two axis. The device uses a gyroscope sensor to determine stability, and uses gesture control to interact with the astronauts. The mounting platform will include adjustable clamps which would allow for a wide variety of devices to be used with it.

Here is a list of necessary hardware components:

Gyroscopes: 5

Embedded computer: 1

Batteries (Rechargeable): 2

Intel RealSense Camera: 1

Process/Group Brainstorming

In order to figure out what we wanted to design, first we needed to learn more about the lives of the astronauts on the ISS. In order to do this, the team looked through online video tours of the ISS, and watched interviews with past ISS astronauts who talked about life on the station. From there we made a list of the most pressing issues/annoyances faces, and placed them into categories (exercise, relaxation, work, meals, etc).

After creating our lists of problems, we started to think of innovative ways to improve each of these issues, slowly narrowing down our focus until we had 2 or 3 prime ideas. From there we started sketching and designing devices to create these solutions, and used our design concepts and feasibility analysis to determine our final product. We used rapid ideation and analysis to modify these designs, and incorporated several previously discarded ideas in our final concept design.