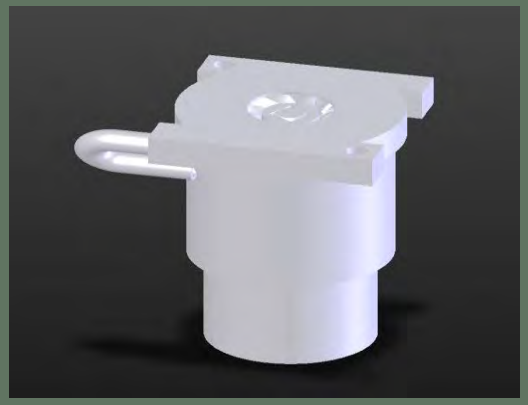
THE DUST EATER

Our Team

Haylee Monroy, Sean Amaya, and Jayden Tung

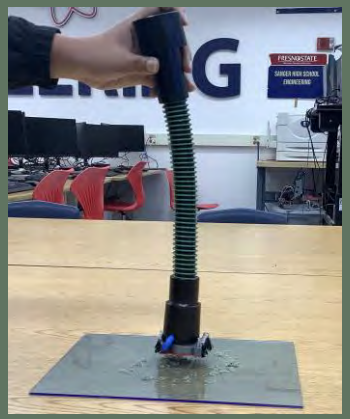
Sanger High School

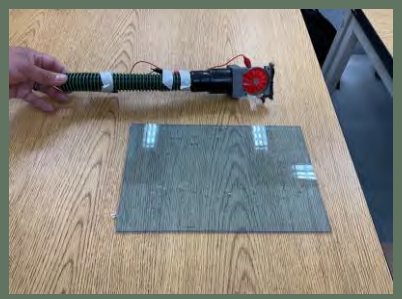
Teacher: Mr. Cuaron



Initial CAD Design

The Dust Eater is essential due to the ongoing issue of dust infecting all space shuttle surfaces. The Dust Eater will easily contain and maintain all space shuttle surfaces.





IMAGES OF PROTOTYPE

MAIN FEATURES OF DESIGN:

SUCTION:

- SUCTION ALLOWS FOR MECHANISM TO STICK ON THE ISS SURFACES

BRISTLES:

- PHYSICALLY CLEAN SURFACE SINCE SUCTION ITSELF ISN'T ALWAYS 100% EFFECTIVE

MOVEMENT:

- INCLUDES A FAN TO STEER FOR X/Y AND R/Y
- WITH SANGER'S PROPULSION TEAM, THEY FOCUS ON MOTION AND WE POSITIONING USING A DUST SENSOR

EFFICIENCY:

- SIZE OF HALF A CELL PHONE, EASILY MOBILE
- DUST SENSOR, LOCATES DUST AND WHEN TO MOVE ONTO NEXT SURFACE

Our creation is an attachment to the core of the kaudropus.

The box that surrounds our extendable microfiber duster arm is used to collect the dust after it's 10 minute cleaning cycle. In the future, when the arm retracts back into the box and the door closes, a vacuum will pull the dust off the bottom of the duster.

Frontier High School
Hamburg NY 14075

Teacher: George Ouimet

Will Harlach
Grade: 10

Camden Kaufman
Grade: 10

Maddie Osborne
Grade: 11

Andrew Pavlovich
Grade: 10

Max Sheman
Grade: 11

Duster Arm

The kaudropus is a robot, that will clean the space station. This project is split into 5 parts, one being the duster arm.

The goal of the duster arm is to pick up any dust in the space station to help decrease the need to clean the space station.

Project by:
Will Harlach,
Camden Kaufman,
Maddie Osborne,
Andrew Pavlovich,
Max Sherman

The box that the duster arm is contained in is made with a laser cutter.

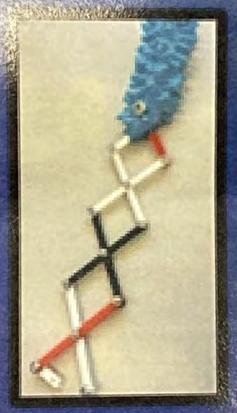
The material is MDF and the dimensions of the box is
5.5 x 5.5 x 7.5 in

The inside of the box is textured and dust will stick to the inside and can be cleaned out using a vacuum

The duster on the end of the arm is a microfiber duster because it holds the dust the best.

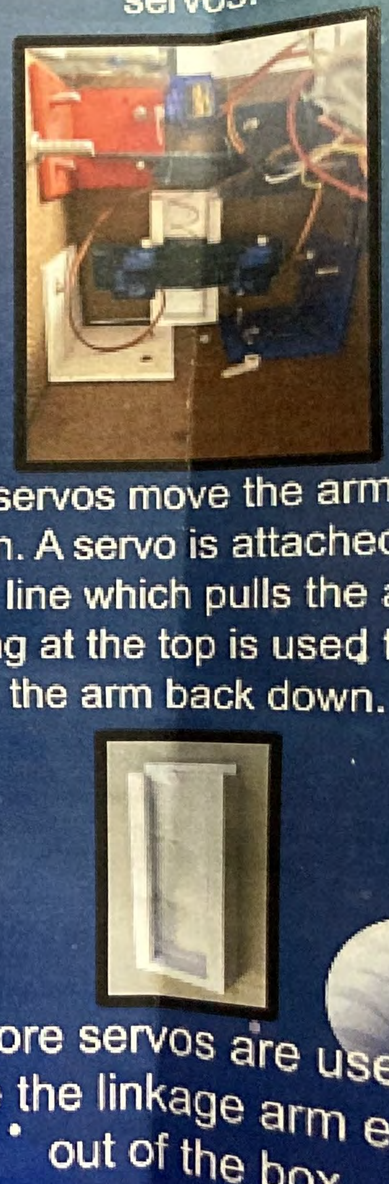
The linkage arm is 3d printed and is used to extend the arm out of the box.

When the duster is out of the box if can be lowered to reach the walls and other surfaces that need to be dusted.



The duster is lowered using a track that is also 3d printed. The track has 2 parts and can easily move the arm up and down

All of the moving parts move using servos.



These servos move the arm up and down. A servo is attached to a fishing line which pulls the arm up. A spring at the top is used to push the arm back down.

2 more servos are used to make the linkage arm extend out of the box

Assembling And Testing

1

Parts fully together

2

Microfiber glove on prototype for dusting ability

3

High capacity of dust build up on glove

Thank You

Important reminders in case you forget:

- The microfiber gloves provides higher absorption, simple cleaning by water, and long lasting usage
- Our design makes it easier to dust in places whether its in small crevices, angled structures, or large surfaces
- The prototype will mimic the flexibility of a hand increasing the dusting adaptability

Don't forget to check out more of our product, videos included!

NASA

The Handy Duster

Bridgeland High School

Instructor: Mr. Laughlin
Students: Hunter Brooks, Joseph Chavez, Tierra Cullivan, Cooper Moreland

Scan Here For More

Background

Our prototype was designed for the purpose of collecting dust in a space station in an efficient mobile manner.

The Kwadropus Idea

The “Kwadropus” is a robot project composed of 4 seperate arm structures, a center control system, and is inspired from an octopus’ way of motion.

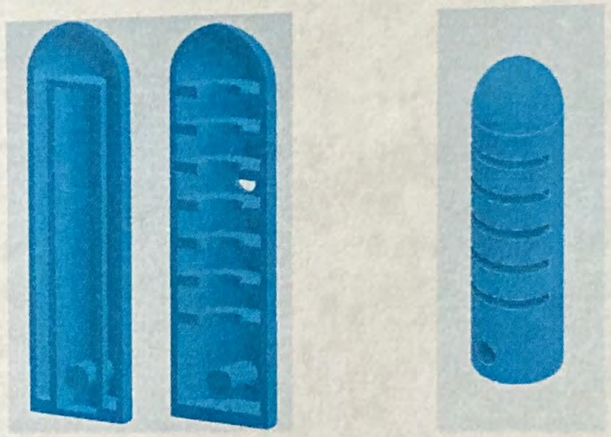
The Dusting Arm

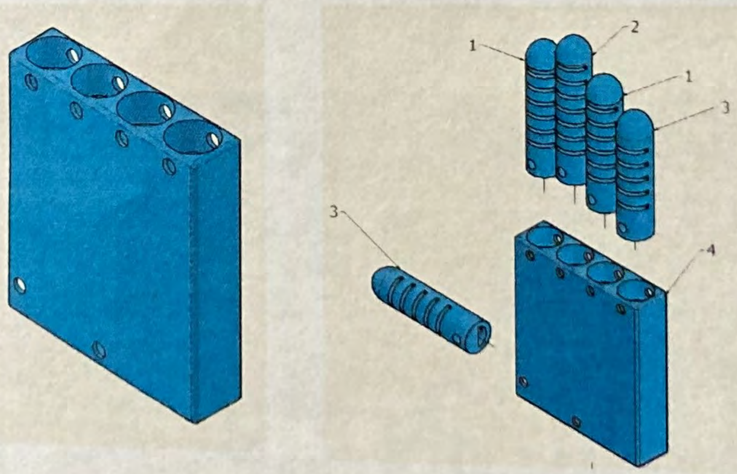
We have developed a prototype with the resemblance to a human hand. The quickest form of dusting that comes to mind is to use your palm and fingers.The swift side-to-side motions of our design increases the ability of particle collection in any given area.

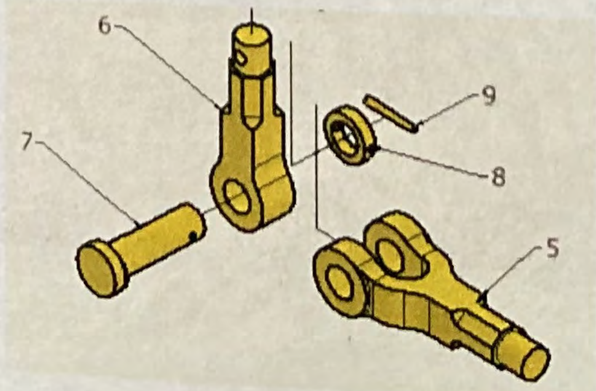
NASA

The Design Process

What we produced using Autodesk Inventor



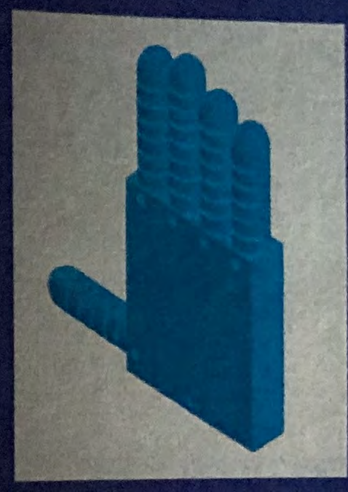




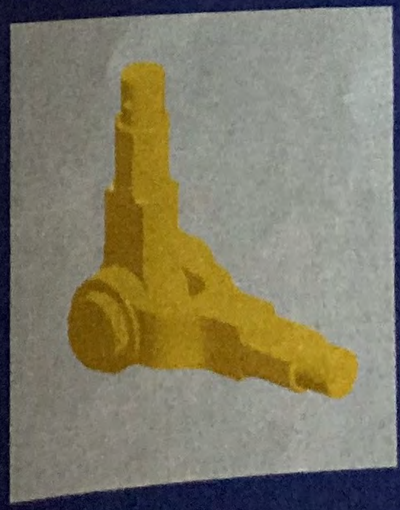
The Components

These key structures were designed to capture the flexibility aspects to the human hand, while increasing the robots overall mobility to dust.

The fingers are made of silicone rubber to inhabit mobility to surfaces. We designed the molds on the left to give a distinctive structure to properly bend the limbs.



The wrist structure below serves as a joint giving the side-to-side motion to the above contracting fingers.



Duster Arm

Southwest Christian High School

1981 Bavaria Rd, Chaska,
MN 55318
(952) 556-0040

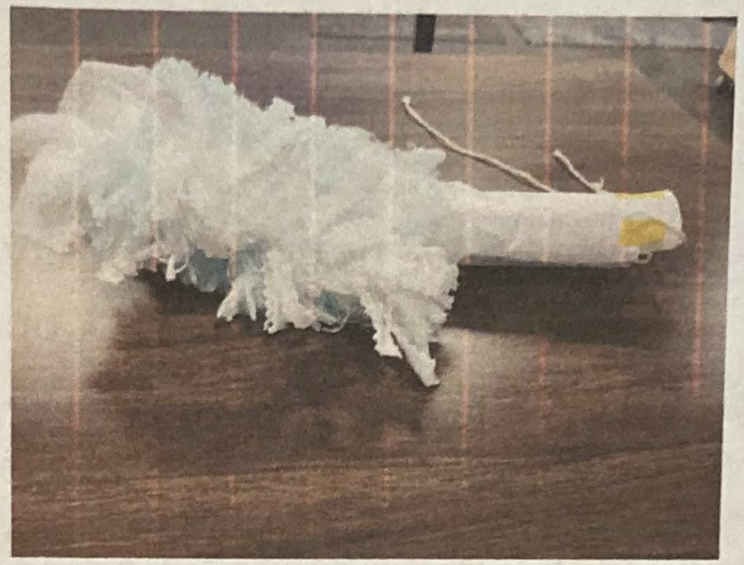
Instructor: Gary Shelton

Team: Peter Bosch, Jonah Garneau

The Team ↴

Peter **Jonah**

Previous Design



New Design

Our Problem

Develop a flexible and moving dusting arm that will be able to remove and absorb dust as the robot moves around the module walls without liberating dust into the surrounding volume.

Product Overview

To keep the design simple itself, we decided on the classic format of keeping the arm parallel to the qwadropus for most of the time. This makes sure that there is no excess dust would fall off the arm due to microgravity.

Dusting

Our previous design aimed towards the simplicity of just using the average swiffer duster. However, the problems that were faced with that design was that it was not the most effective when it came to static electricity and the durability of one swiffer was very short. With our new design, we will be using rabbit fur. With this rabbit fur, it fixes the problem with both of our previous problems by containing more of a static charge and becoming more sustainable.

Movement

Because it gave us useful mobility and enough stiffness that pick up dust. This idea started with a paper spring that was floppy but with springs attached to the corners, it could be maneuvered in all directions. That is a useful thing because the duster can move independently from the robot. This arm can also hold the duster and still move. The negative of this design would be that it does not have as much mobility as desired. This combined the positive elements of the other two options and did not have many downsides.

Cleaning

The capsule to clean off the duster has been redesigned from our previous prototype to focus on how to discharge the static electricity from the duster. We are able to have the dust fall off by using a grounded wire to get rid of any charge. The next step would be to activate the vacuum and catch the debris that had fallen off from the duster. Then we would be able to create a static charge in the same tube, therefore limit any human interaction with the duster arm and utilizing three different steps into one area.

Initial Ideas

While in our early stages, our ideas to make this arm changed in various ways. We did not have a plan for a tension-based string system as we do now, instead, we had the idea of a series of ball joints with motors attached that would spin around slowly and or be controlled. This idea evolved into a more malleable joint which was the universal joint. In the end, we found a way to use no joints and no motors inside the arm itself by just controlling it by the base, which was the string system we have currently.

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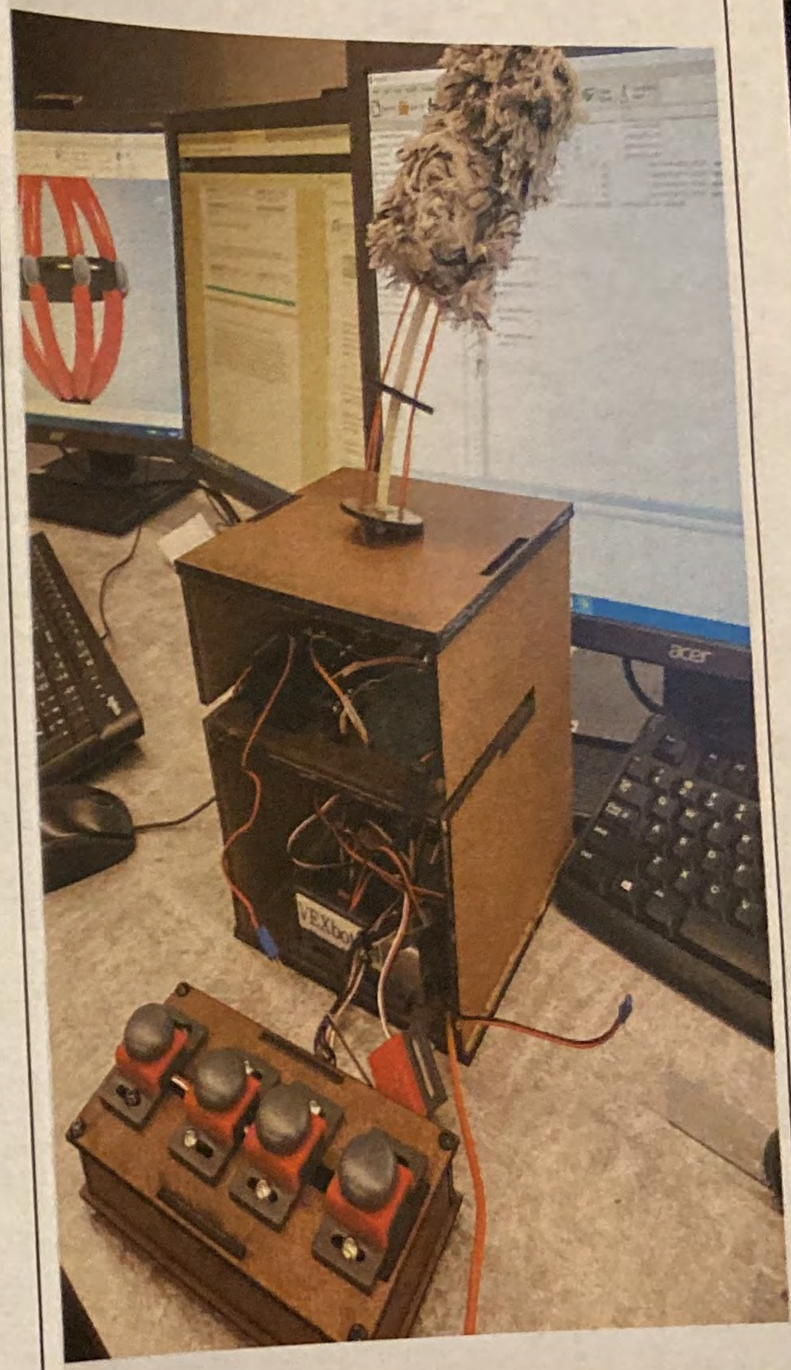
Automation

Our arm is fully automated with four buttons on the box, each connected to two motors that give different inputs. An example is this, button one moves motors one and two in opposite directions, this is so the arm tightens and loosens on one end to give a freedom of movement with more fluidity. Button two moves the same motors as motor one however the difference is the motion direction, which tightens/loosens the opposite as button one. Pressing different buttons at the same time can also give diagonal movement so it's not as linear and robotic. We also created a backup system that allows us to do the same thing with a controller.

Kwadropus Duster Arm Brochure



KHP

Our project is the duster arm part for the "Kwadropus Hunch Project". The duster arm is meant to collect dust and other types of dirty particles that get in a space station whilst being in zero gravity.
The materials we have used for our prototype design currently are wood, string, and VEX motors. The arm is mainly dependent upon a tension-based string system and allows the movement we wanted to achieve.

This is the overall design (The bigger version). This shows the actual arm in a more obvious representation of how it works.

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Website/Contacts

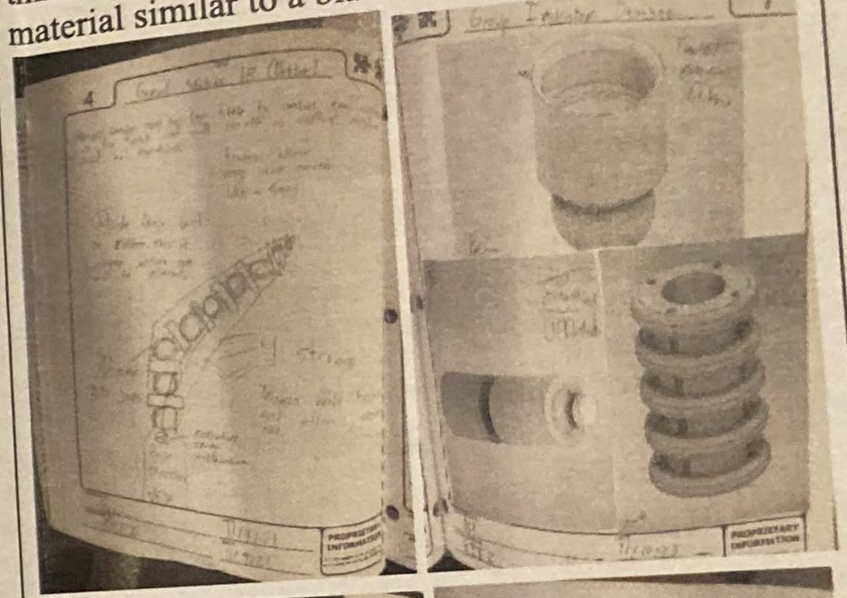
Mr Ciprian - Pre-Engineering Miami Valley Career Technology
Epic D. Zack M. Eithan C.

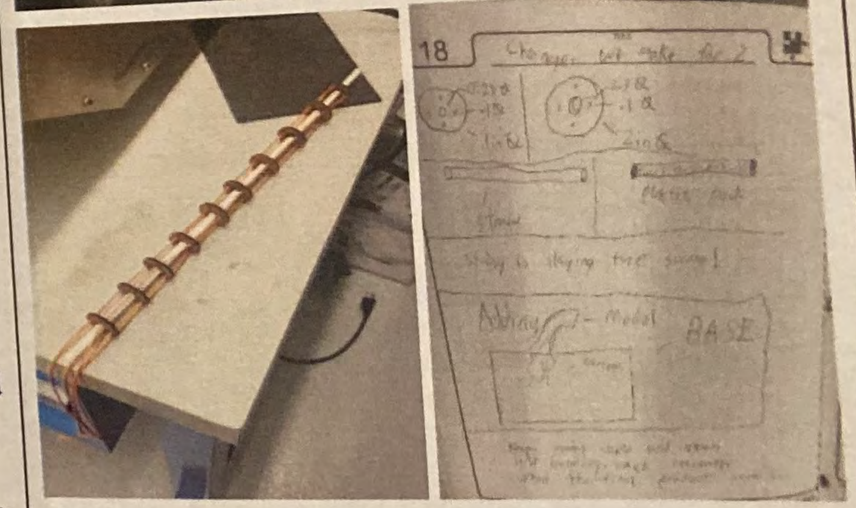
Final Ideas

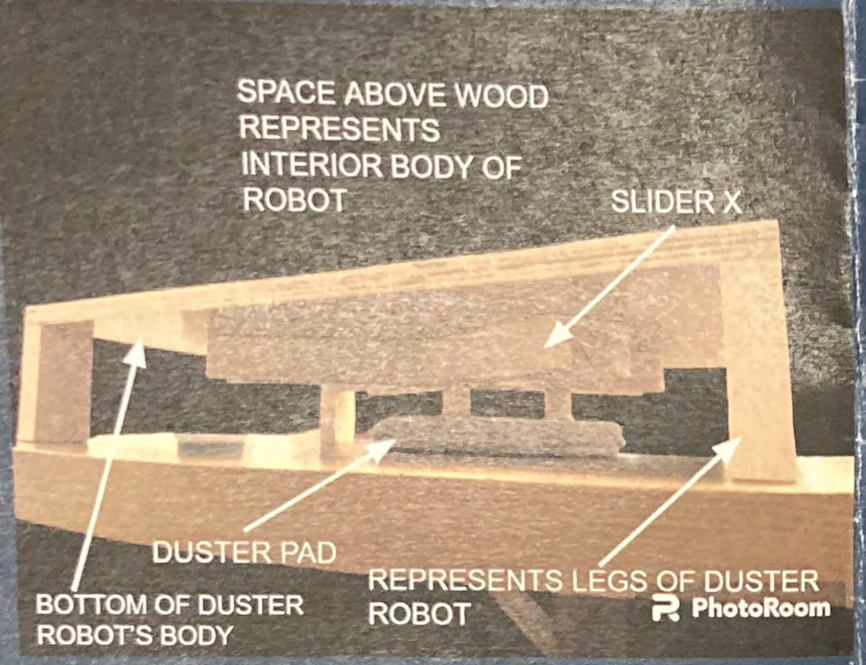
For our final prototype, we will have everything made and attached correctly however the main factor we go for when making this design is the other groups that are included, we have had to optimize and make sure our arm can be controlled with little to no effort and make sure there are gaps for the suction cups to be placed upon the arm with the other group. We hope we have made the arm as optimized for other groups as possible while having a unique image that differs from most people's status quo of a duster arm.

Sketches/Prototypes

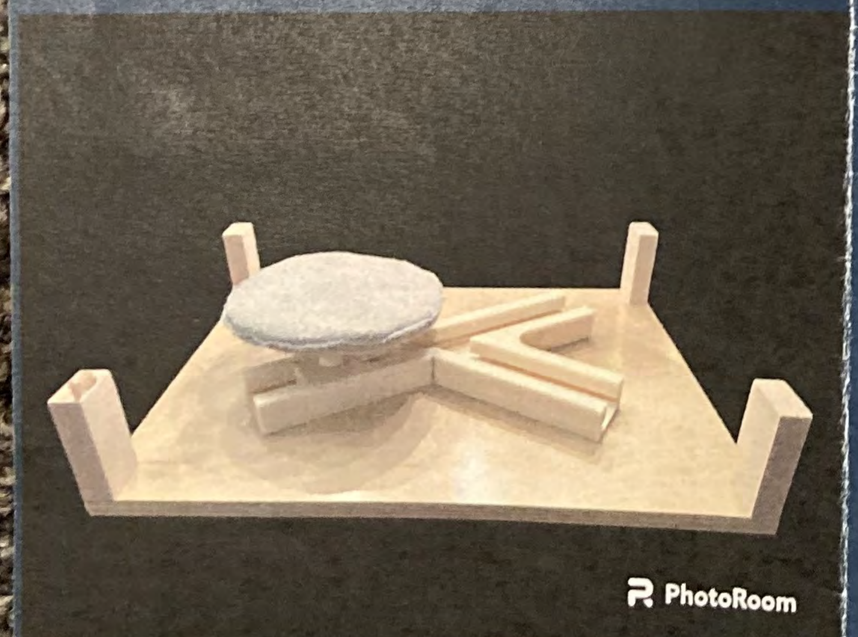
We have more ideas coming, mainly about the material used around the arm itself but we are thinking of a material similar to a mop, maybe a material similar to a blanket.







The duster arm will be attached directly to the bottom of the robot, slowly rotating in a circular / elliptical motion.



Link to Presentation

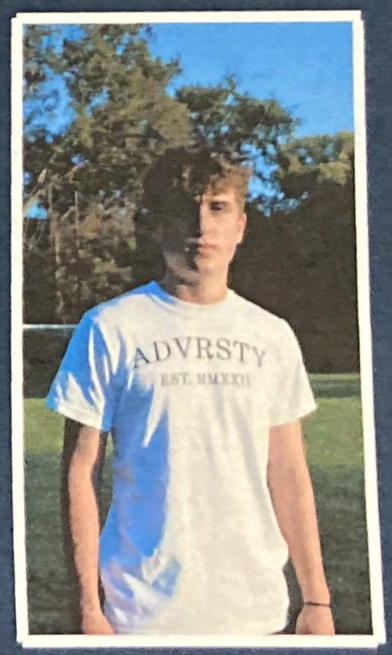
Duster Arm

Robotic Duster for Space Stations

Team : Ryan Dahl

Teacher: Jarrall Ford

Cypress Woods Highschool



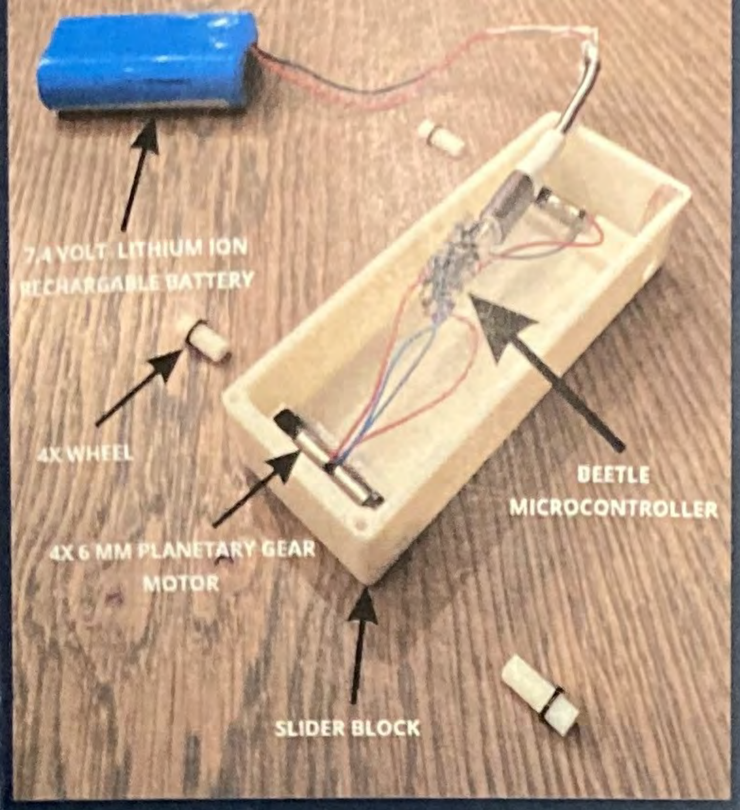
Main Features:

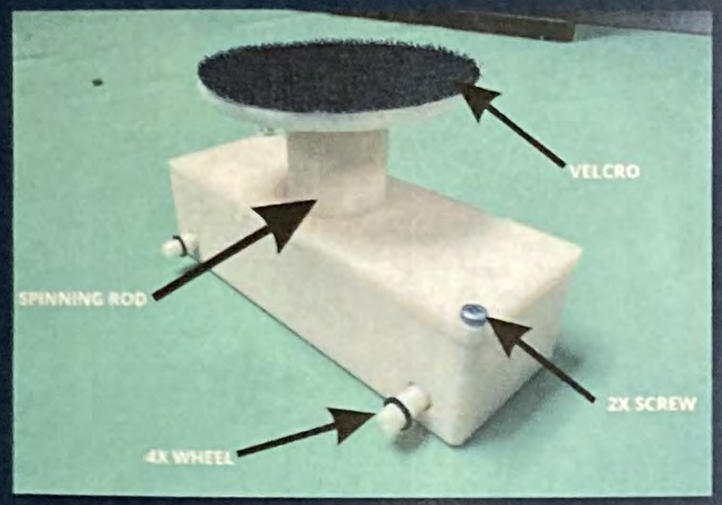
-X-shaped Track system, with slots for wheels to roll

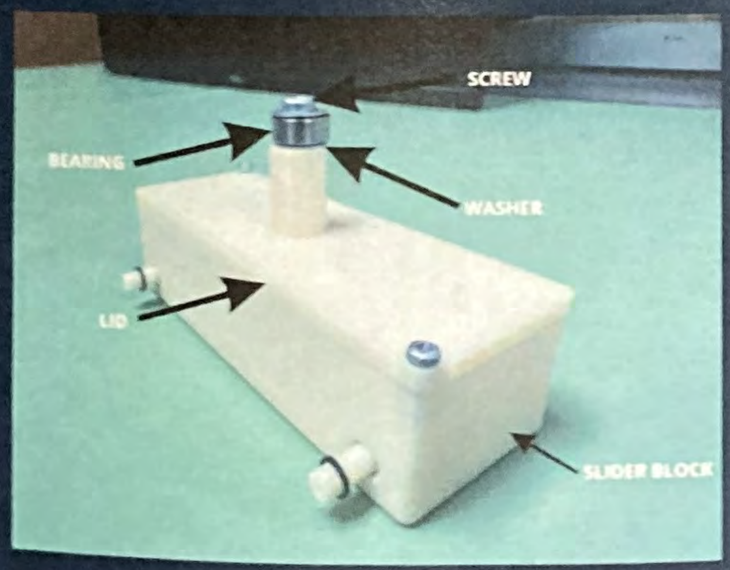
-2 sliding blocks, each equipped with 3 wheels, containing electronics to power mechanism

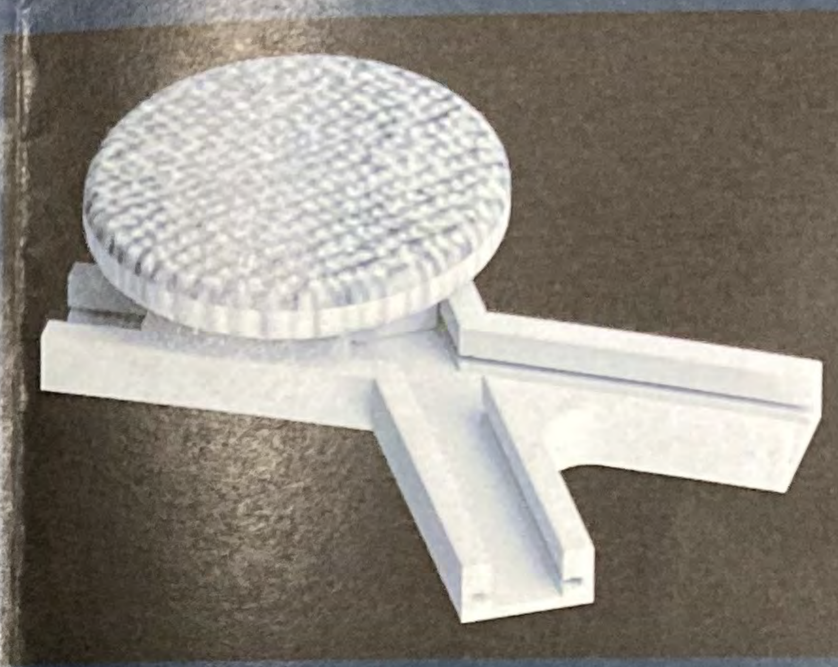
-Micro fiber duster pad, able to effectively remove and hold dust, and flexible to allow for movement over uneven surfaces.

-Velcro used to attach duster pad to slider blocks for easy replacement / cleaning









The mechanism will be powered by 2 IOT cars, each having a lid with Velcro embedded to attach the duster pad, containing 3 planetary gear motors, a battery, and a beetle microcontroller