

2022 Design and Prototype Finalists

Hand Powered Zero-g Bulk Transfer System

Students: Daniel Kogan, Yusuf Siddiqui, Shaheer Khan, Arish Ahmed
Teacher: Chris Regini
School: Half Hollow Hills, New York

Students: Jaedon Hight
Teacher: Rebecca Allen
School: Palm Bay Magnet, Florida

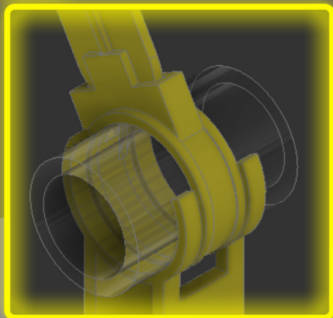
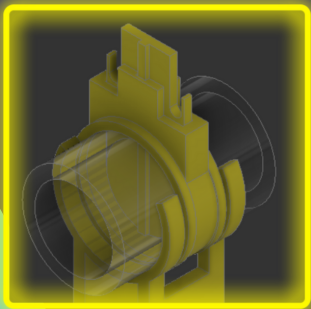
Students: Ben, Nicolas, Katelyn, Christian
Teacher: Robert Burke
School: iSchool of Lewisville, Texas

Students: Brock Larson, Adam Brandland, Nate Gangelhoff, Stuart Buecher
Teacher: Joel Bertelson
School: Chatfield, Colorado

Students: Joel Simons, Ronin Mannina
Teacher: Ashley Pederson
School: Lakewood, Colorado

How to use the pipe

The feature of the pipe that allows for a controllable amount of particles to get through is the valve, which opens by pulling it upwards and twisting it to the side, which allows it to be locked. To get particles to move through, you must nudge the particles in the input bag. The PVC pipe used is transparent, so that allows you to count the specific amount of particles that went through before you shut the valve.



Transfer containers



Thanks to the modularity of the device, transfer between virtually any two containers is possible. In fact, you do not have to transfer into a container, you can transfer directly to your hand for immediate use/consumption.

OCCAM'S PIPE

Overview

Problem

In order to get a large amount of small parts aboard the ISS, many plastic packages are sent, which contribute to the overall abundance of trash. It could potentially be more efficient to send everything within one large bag, but that presents a new problem. When you open it, all the small parts within it will start floating around the ISS and could get stuck in machinery and cause other problems. How can a device that solves both of these issues be created?

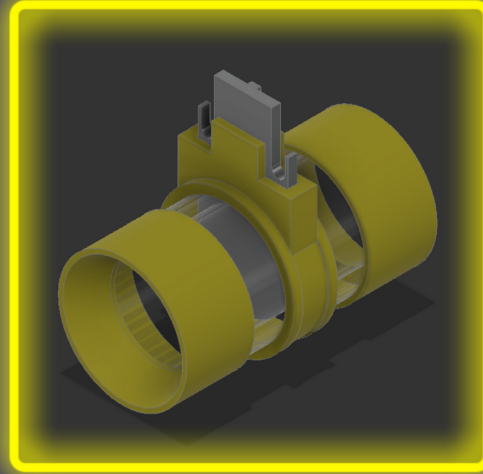
Objective

Design an efficient way to transfer items between two containers without any spillage.

Criteria

- Be able to control the amount of particles being transferred
- Has to be easily cleanable
- Could be hand/battery powered
- As easy to operate as possible (**Occam's Razor**)

Our Design



Modularity

Our design was created in such a way that all of the components used are easily interchangeable. This means that if a part breaks, it can be easily replaced. This also means that modifying the components to allow for the attachment of two specific containers is greatly simplified.

Ease of manufacture

Most of the parts used can be 3D printed. The other necessary parts are part of a PVC pipe and a rubber band. The parts can be joined together using friction fits, but some hot glue or other adhesive is necessary for reassurance.

Our Team:

Daniel Kogan
Yusuf Siddiqui
Shaheer Khan
Arish Ahmed

Half Hollow Hills
High School East
Mr. Regini





ГИДЗЕНКО КРИКАЛЕВ
SHEPHERD

CRAFTSMAN

TSA
Explore Your
Future STEM

Magnetic Bo...

Processes:

Zero Gravity Item Transfer System

Jaedon Hight

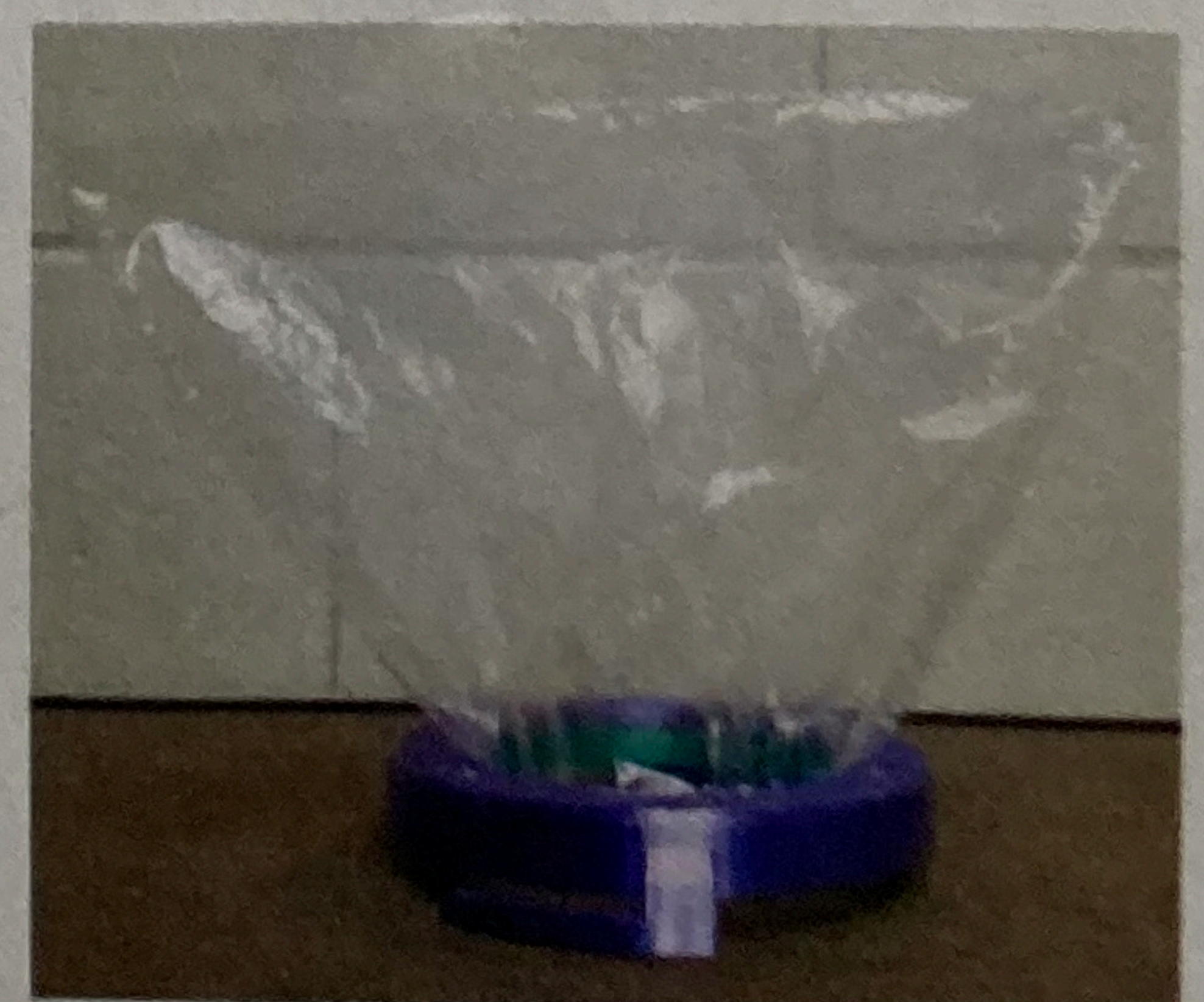
Palm Bay High School

This prototype allows for safe and easy transfer of objects in space from one container to another. The design ensures that no loose particles can escape during use, and that you can fairly simply control the amount of items moved to your liking. This prototype is designed for small hardware like screws and nuts, or small snack items like nuts or M&Ms if it's made with the right food-safe materials.



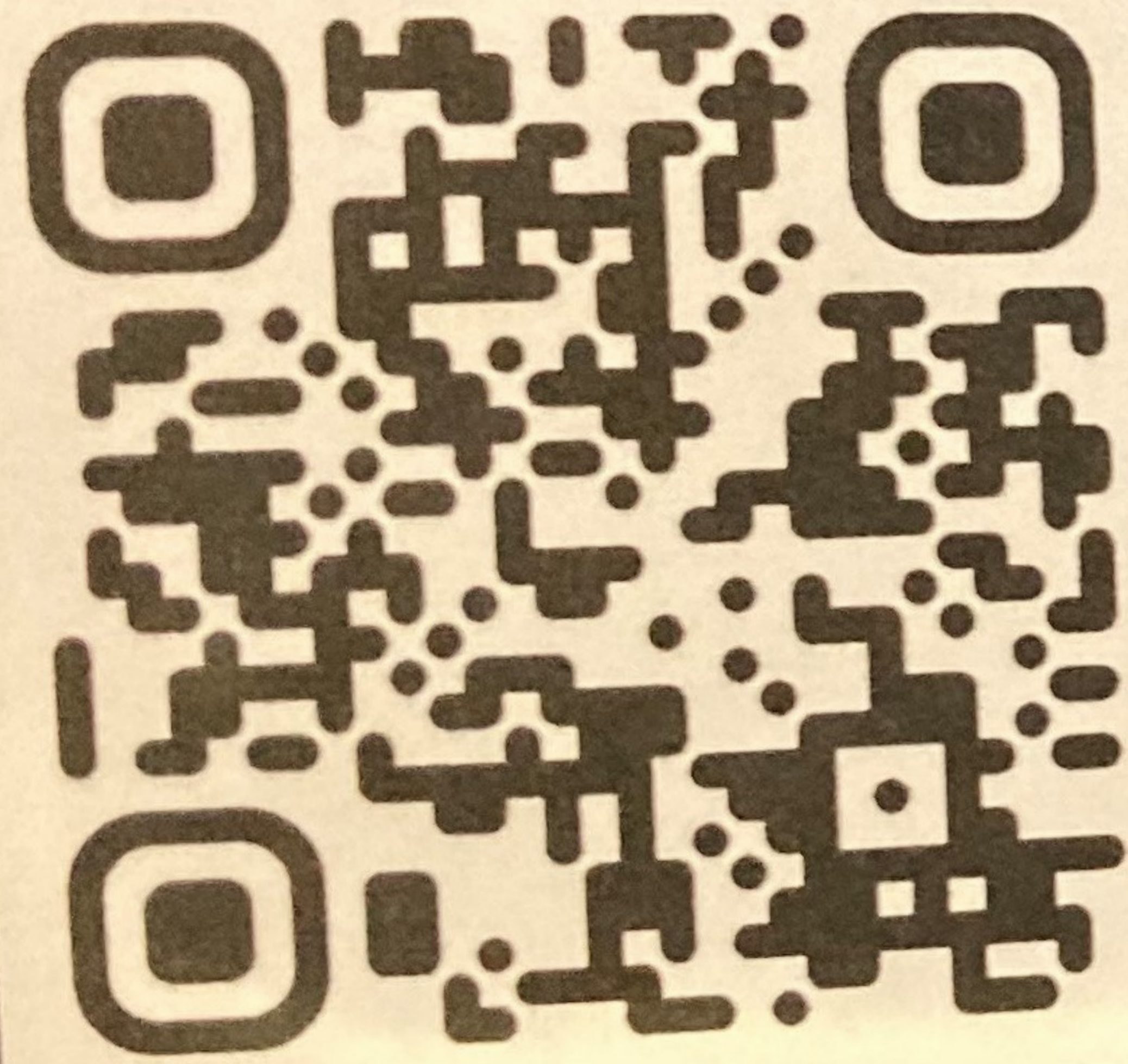
The Parts:

- **The Container** can be any size or shape as long as it fits the adapter. The container used is designed to be a medium sized container, comfortable for most hand sizes and has plenty of space for items.
- **The Container Adapter**, and the object seal, acts as a sort of cap. It also allows the container to easily lock together with the bag so that items can be transferred between them. The rubber seal acts as a filter so that the user can still reach inside the container without having to worry about particles or items escaping and floating away.
- **The Bag** is where all the items can be stored in bulk. It can also be any size or shape, so long as it's adapter piece can be mounted onto it properly.





Testing Video



Features

- Dilating Door
- Magnetic Connections
- Clear Portion & Bulk Bags
- Interchangeable
Adaptors
- Hand-powered



About Us

Ben: Implementer- Turn the team's ideas into actual plans

Nicolas: Planter- Come up with original approaches to help the team solve the problems

Katelyn: Completer/Finisher- Detect mistakes and work to keep the team on track

Christian: Leader/Facilitator- Guide the activities of the team and identify the team's obligations

The Reason Behind the Project

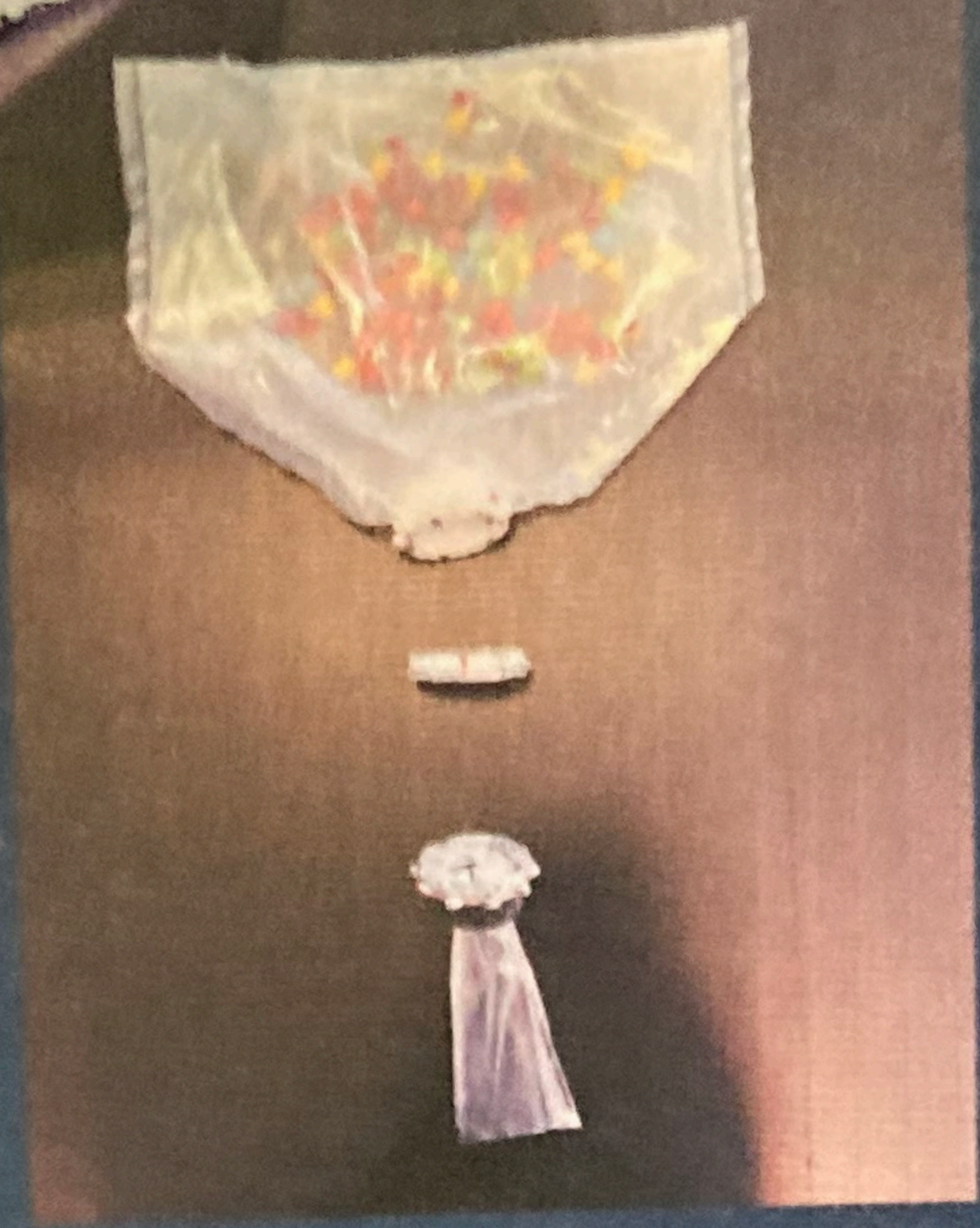
Large bags of items can cause loose particles to float in the ISS, so astronauts take many serving sized bags for their food. These serving sized bags produce excess trash, however our hand-powered device efficiently portions items from bulk into single serving bags reducing waste and spillage.

Name of NASA HUNCH Member: _____
Must be the same on the presentation): 20

Prototype:

Our prototype has adjustable portioning with dilating doors. It successfully portions multiple items and foods. It uses a system of magnets making it interchangeable with different bulk bags.

Website:



Zero Gravity:

We have considered zero gravity in every aspect of our device. We understand that small forces in zero gravity can affect objects more than on Earth. That's why we centered the device around the use of magnets.

Bulk Item Portioner

Bulk Item Portioning Made Simple



HIST

Planning

PALS in Space

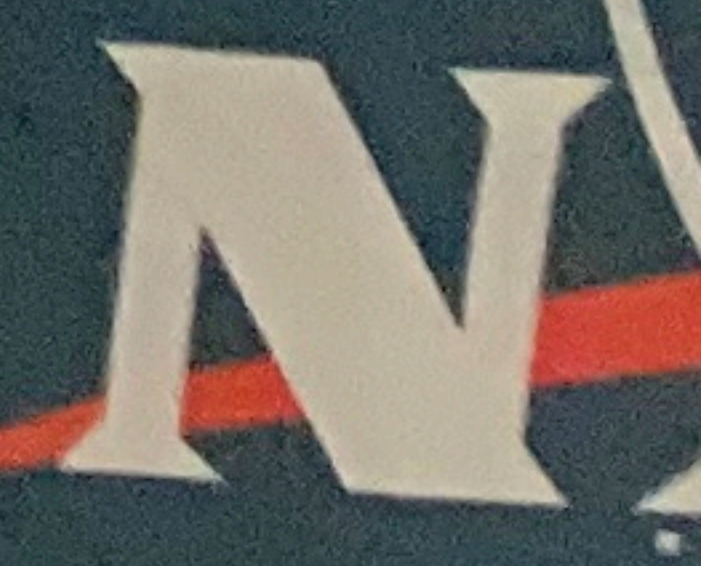
Precise Allocation of Loose Solids in Space

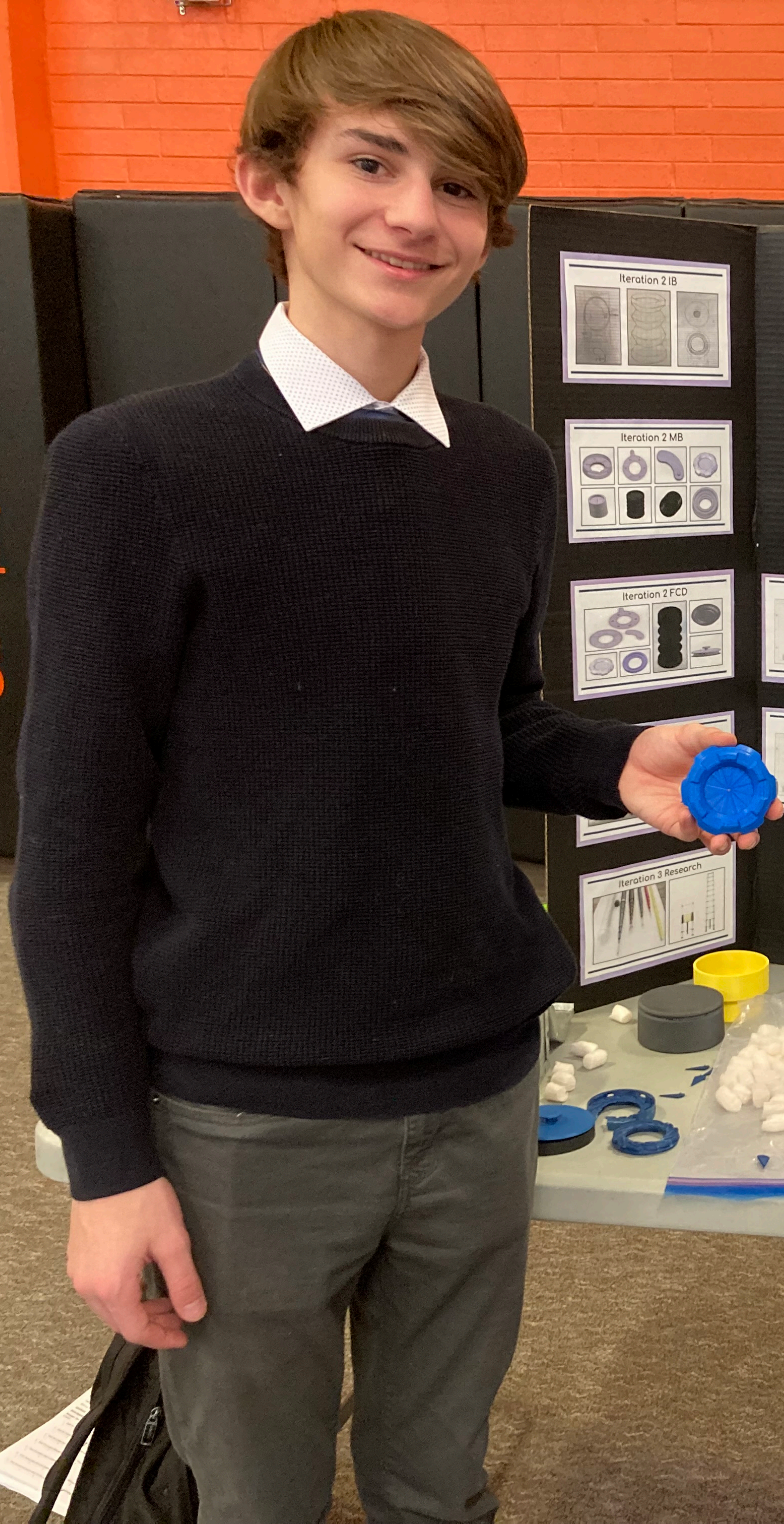
Solution

The PALS in Space assembly will decrease the amount of trash in the ISS by allowing the astronauts to transfer loose solids from a bulk bag to a reusable storage bag in a closed system. This will allow the astronauts to send up less individually packaged items, reducing the amount of trash on the ISS.

These pre-fab we are design

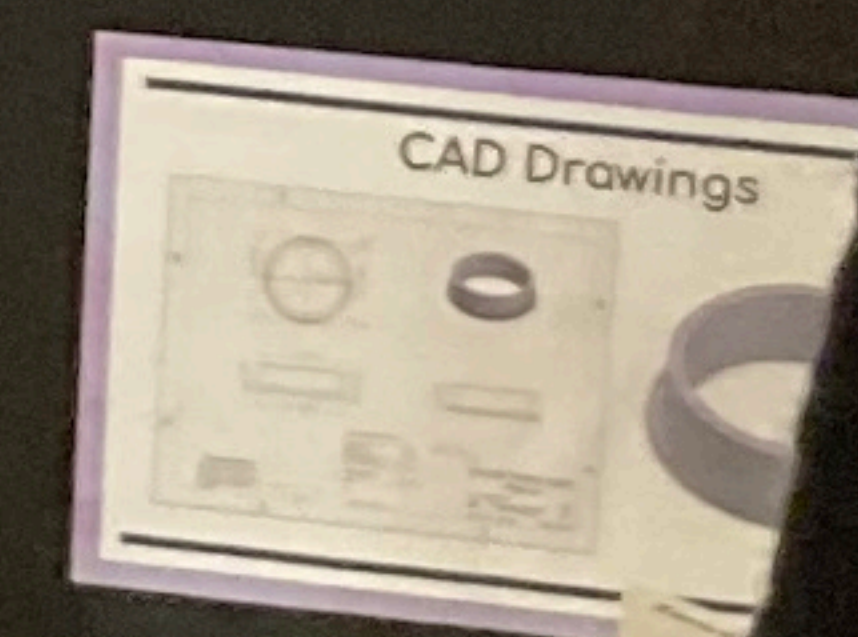
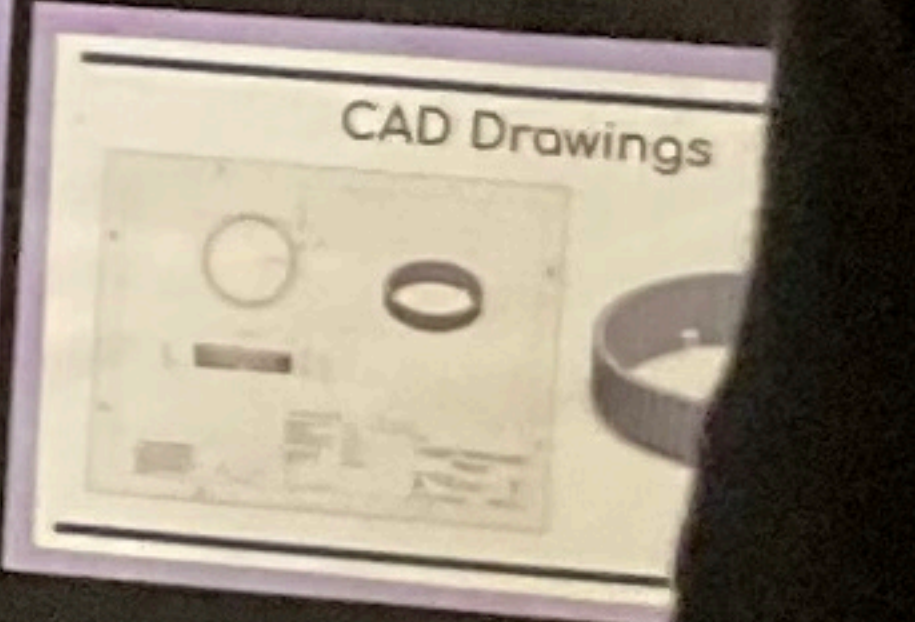
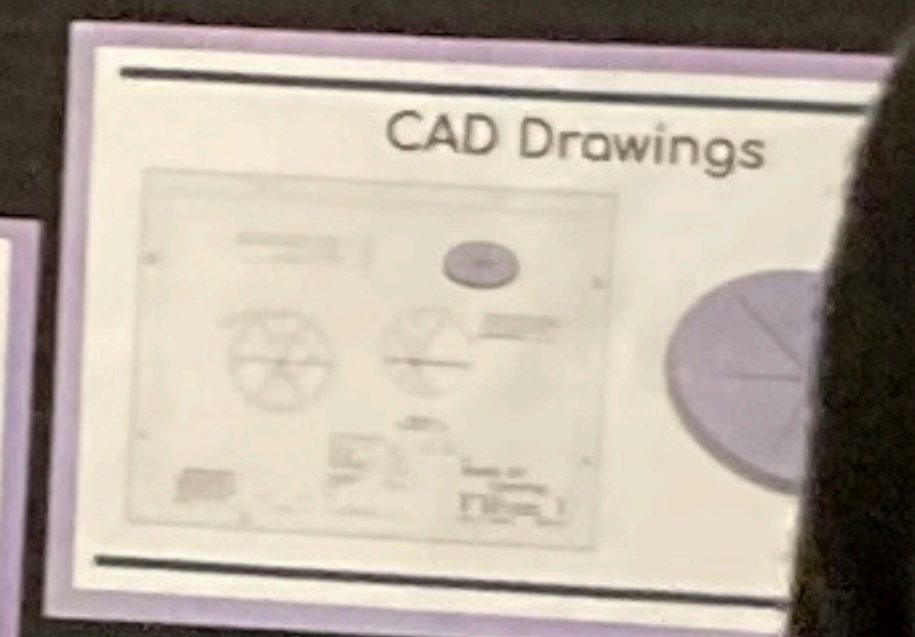
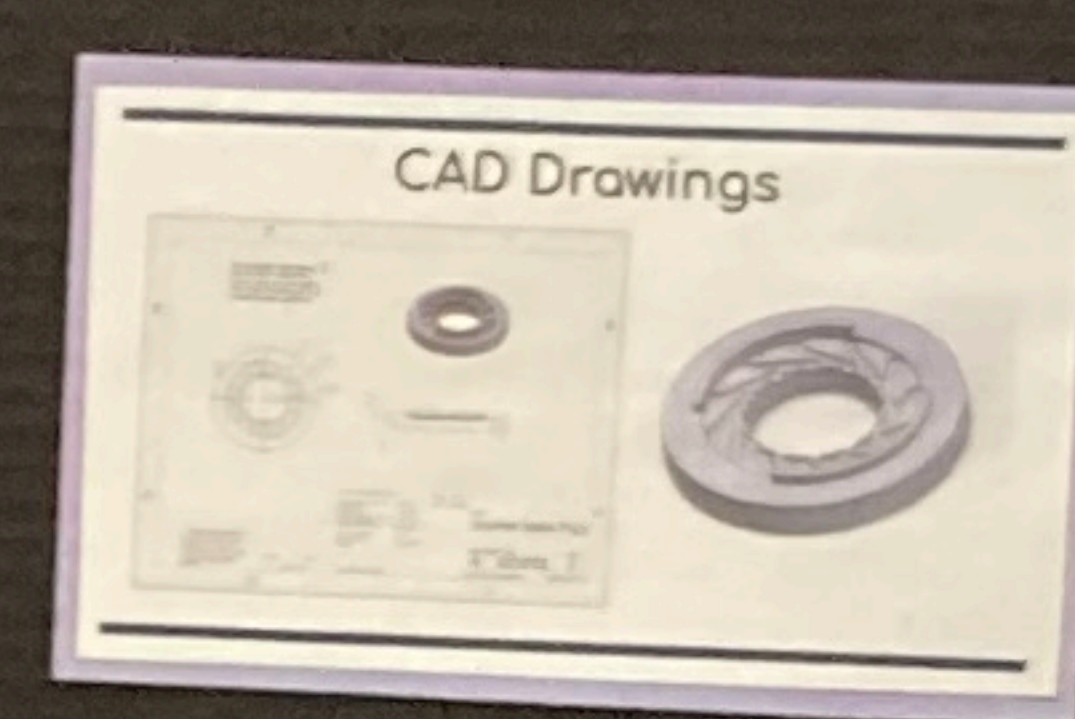
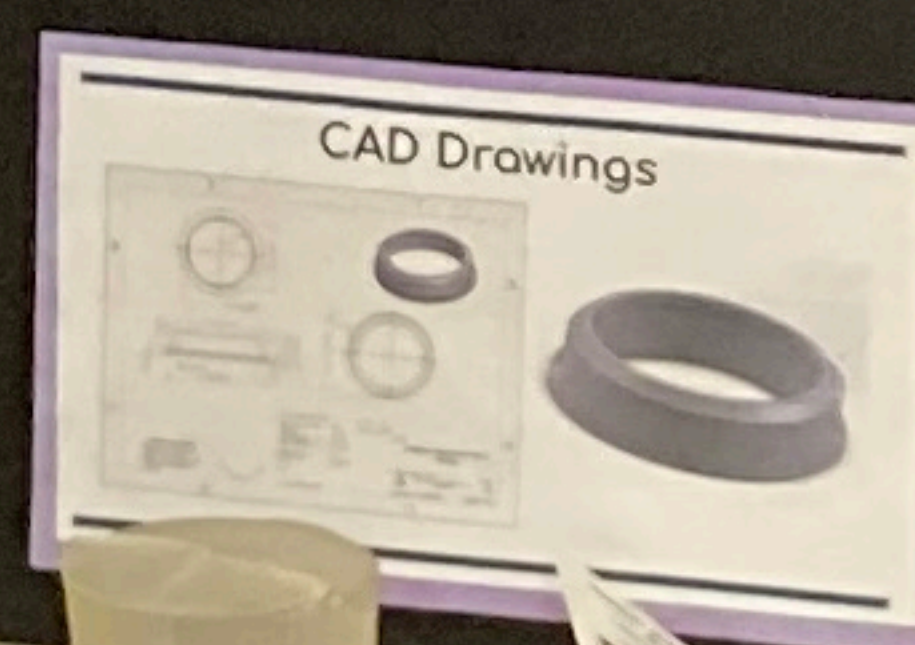
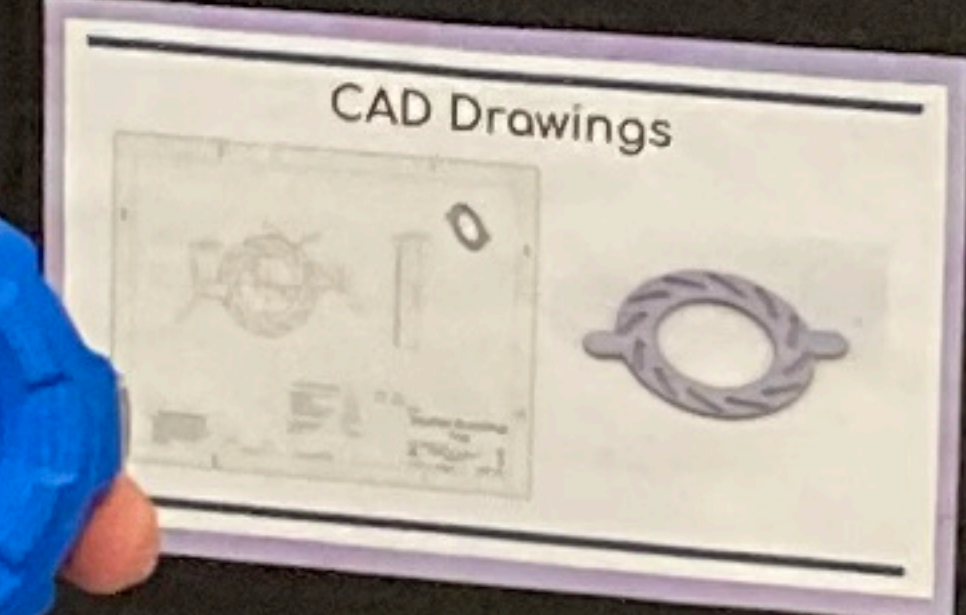
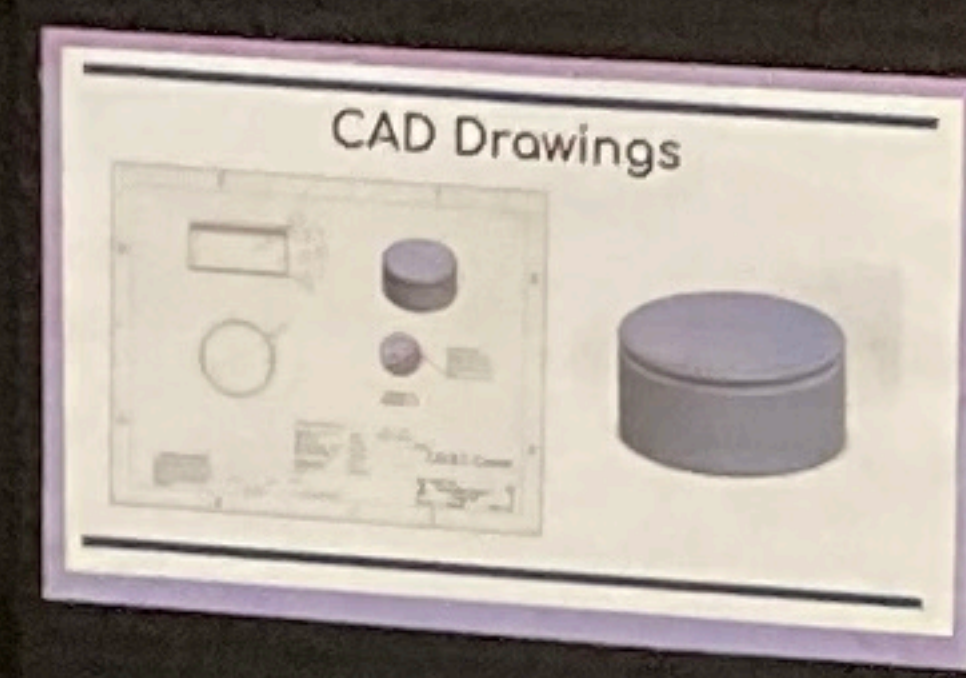
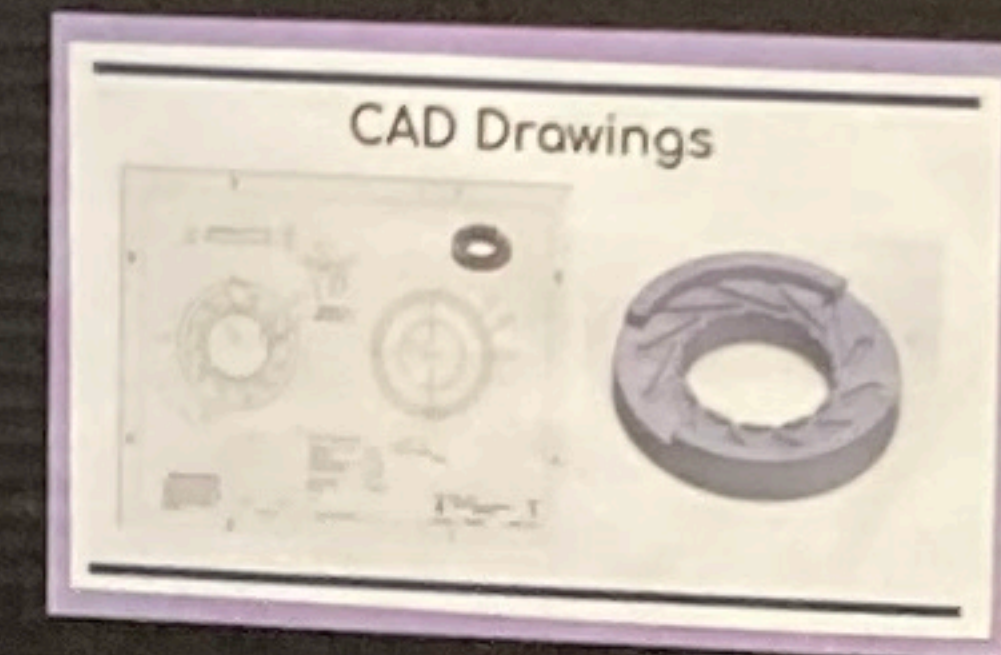
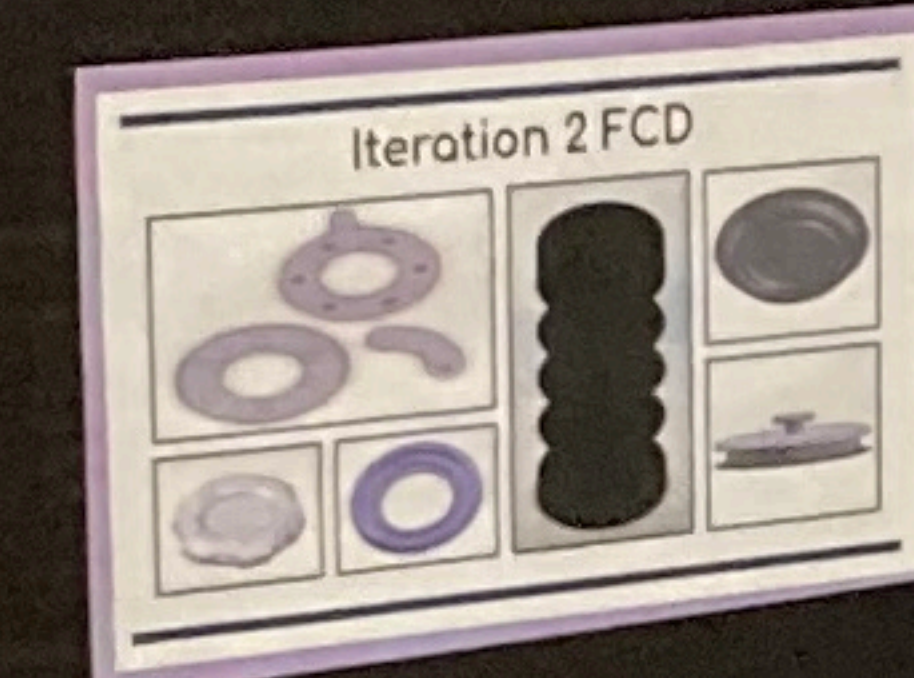
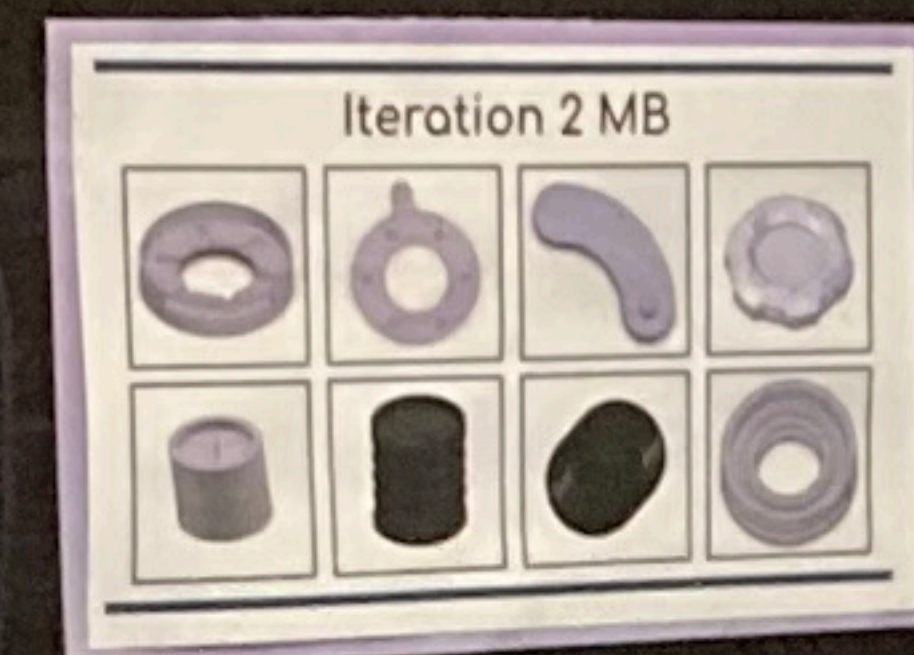
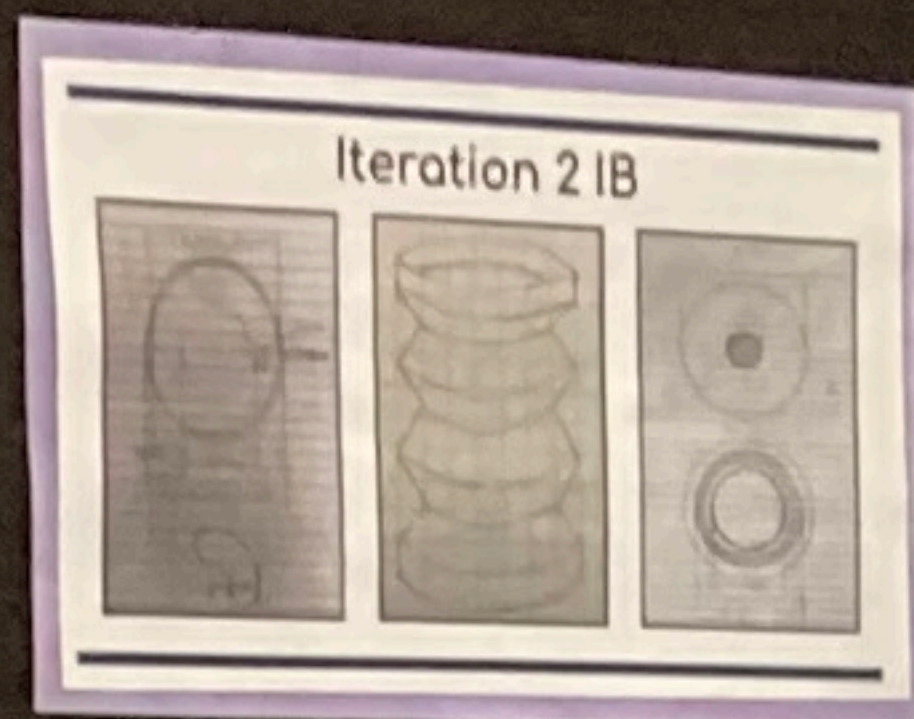
Hardware





Zero - G Bulk Transfer System

— Joel Simons and Ronin Mannina —



Zero-G Bulk Transfer System

Lakewood High School

Ms. Pederson

Joel Simons and Ronin Mannina

The design works as a closed and completely manual system. There is a sealed base that opens with a camera shutter. This keeps the bag closed. The telescoping piece has a shutter on the bottom which mounts to the base pad and serves as a makeshift airlock. The "Thoomper" extends to create a closed area for the bags contents to be pushed into as a transportable container. There is an elastic opening that keeps it sealed until the user reaches in to remove items.

