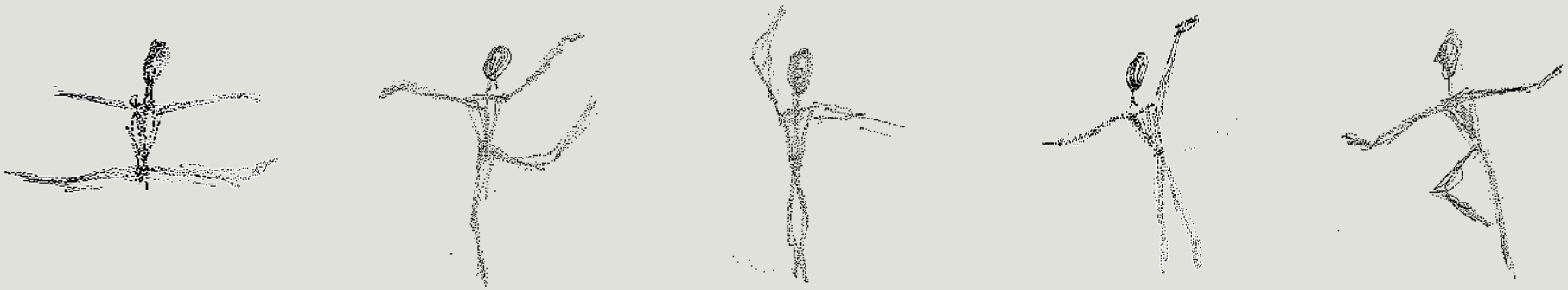
RIKA KO

Portfolio



ABOUT ME

I'm a sophomore at Northwestern University studying Manufacturing and Design Engineering. I fell in love with design when I realized that my natural inclination to tinker with anything and everything created some pretty cool stuff. I also love science fiction thriller novels, exploring new places, and anything animal related, but especially my dog, Sunshine.

WHAT DO I BRING TO THE TABLE?

Perspective. My past experiences have given me a powerfully unique viewpoint. From learning the human-centered design process through my interdisciplinary major to creating great designs that optimize function and user satisfaction through working at Tesla, I offer new insight.

Ability to create. I am proficient in a plethora of visualization tools – from machine shop skills to computer-based applications like Photoshop and SolidWorks. I believe the ability to prototype is a large part of the success of my projects.

Collaboration. Being able to discuss ideas with others is an integral feature of any project. Being cognizant of my strengths and weaknesses and combining them with the skills of others creates a result that cannot be achieved with just one person.

A passion for making a change. I am willing to go above and beyond for a project or cause I am passionate about. When I am excited about something, it is loud and clear in the work I do, because the end result inspires me as much as it helps others.

Tesla Motors, Inc.

This summer (2016), I was a Product Excellence intern for Tesla Motors in Fremont, California.

What I did in my 10 weeks at Tesla:

- ❑ Identified reoccurring problems in vehicles and investigated the issues directly on the production floor
- ❑ Independently did quick analyses of various issues and made direct changes that are implemented on the assembly line today
- ❑ Communicated with every step of the supply chain: manufacturers and suppliers, design engineers, assembly line workers, managers and employees of various departments
- ❑ Designed changes to these issues in "Tesla time" – a term the employees used to mean "as fast as possible"

Tesla: Project Example

Problem: The Model X air vents on the instrument panel were jamming and noisy during final inspections.

- I analyzed the installation process of the vents, discovering that the problem stemmed from poor manufacturing from our suppliers and improper installation

Two things needed to be taken care of:

Suppliers

- I complied data in 30 random cars on gap tolerances, force efforts, and percentage of defective parts
- Set up a meeting with the suppliers to discuss quality of parts and manufacturing
- Because Tesla moves quickly, I created a temporary countermeasure to this issue that was implemented on the production floor while the parts were being improved

Installation

- Rewrote the work instructions and taught the new procedure to the assembly workers
- Modified and specified work instructions to lessen chance of error

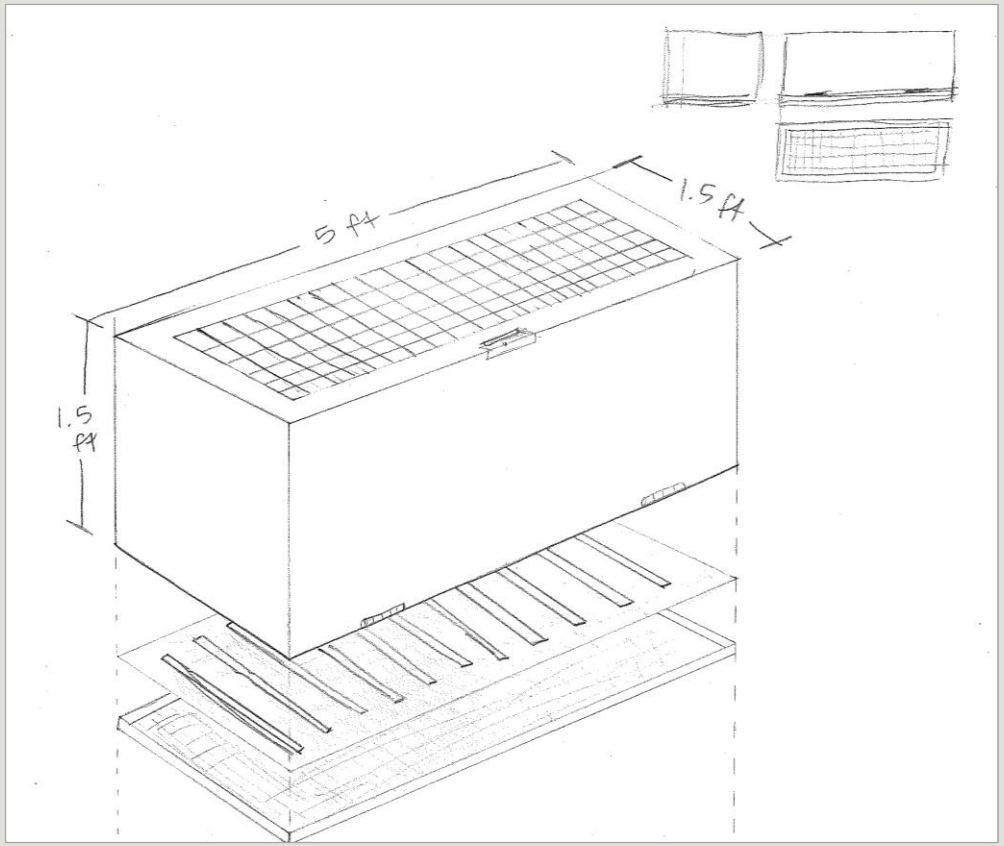
Within 3 days of re-teaching workers and instating countermeasures, the error decreased over 50%. When the reworked parts were introduced, the error was 0-1%.

Current Project: Slow Feeder Box

Background: In the wild, grazing animals (zebras, camels, horses, etc.) eat from bushes and small trees, and typically spend lots of time looking for their food.

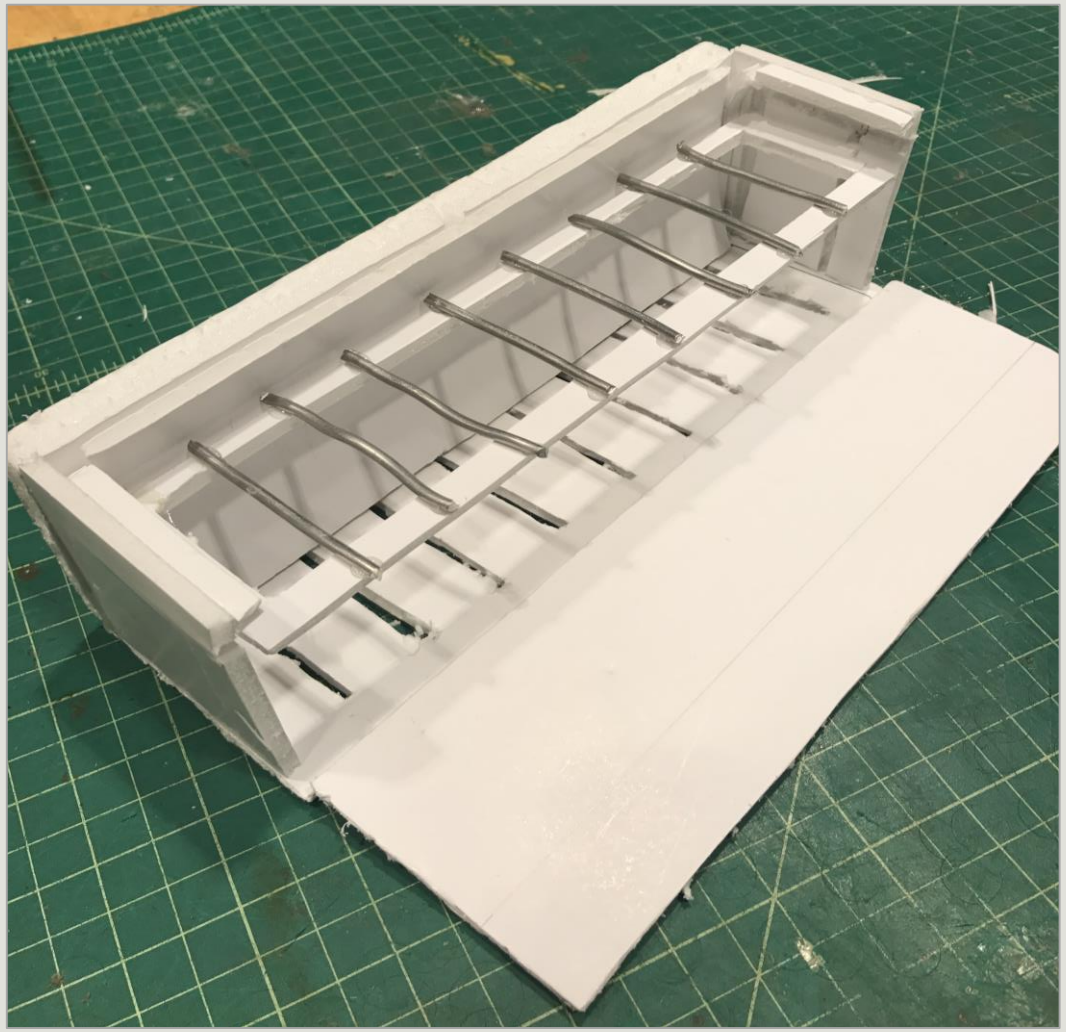
Problem: The grazing animals at the Lincoln Park Zoo (LPZ) eat from the ground, and usually in the same place every day.

- ❑ With another Northwestern student, we met with the Behavioral Husbandry and Enrichment Manager to see what efforts have been made to solve this issue
- ❑ Currently, we are collaborating with the zoo's main mechanical engineers to build and test our prototype, the drawing of which is to the right



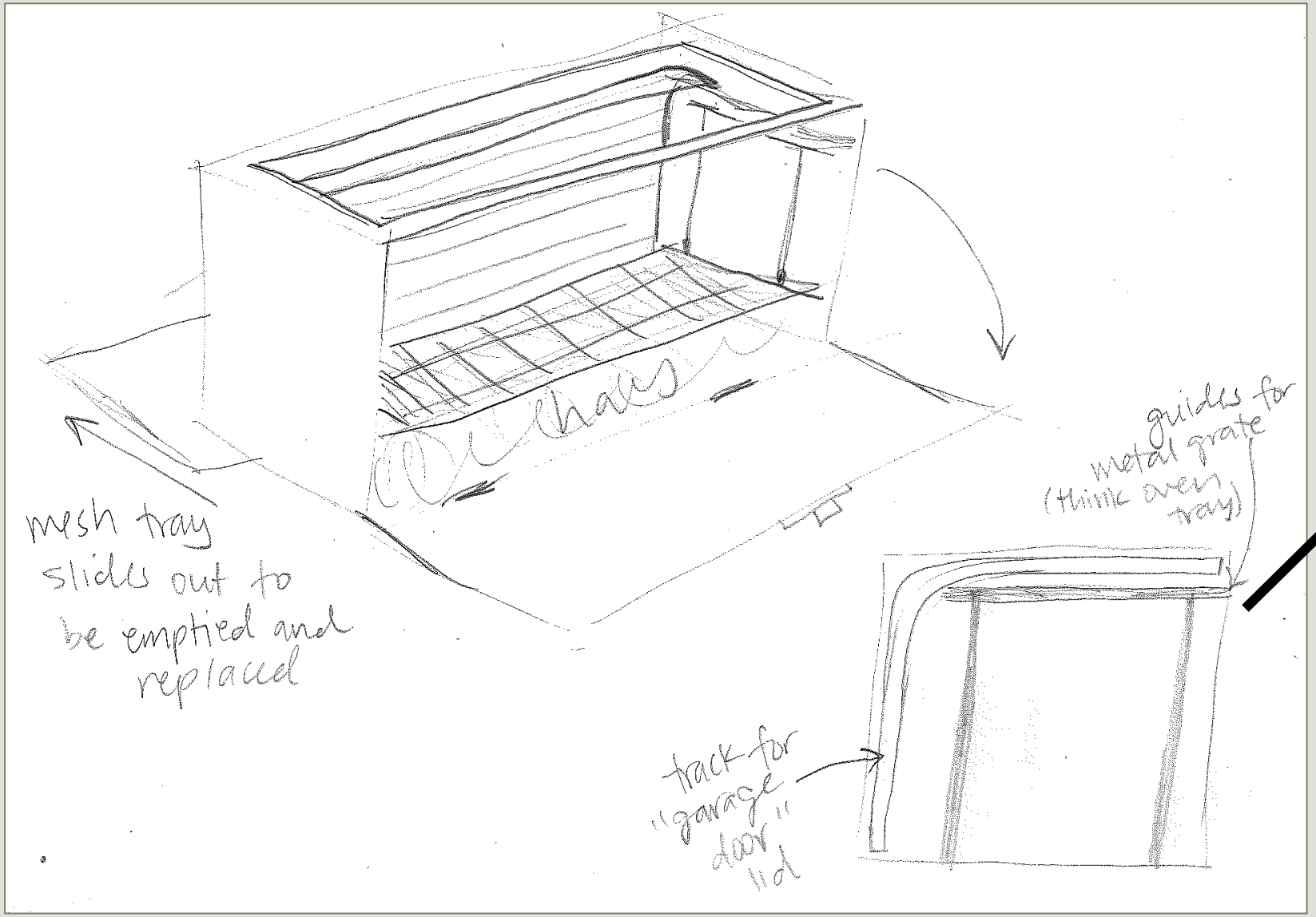
A key feature of our design is an Arduino that will trigger a timed motor connected to a “garage door” which will close the box at random intervals, forcing the animal to find another open feeder box.

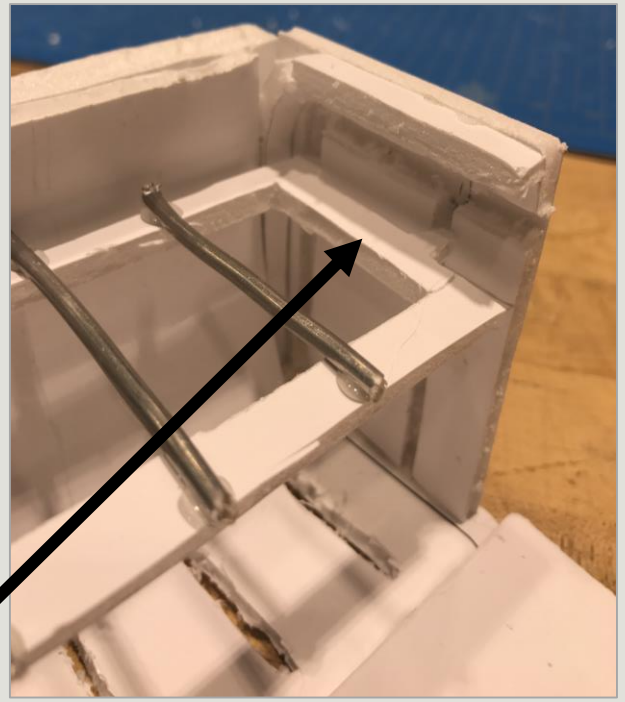
Other concerns, such as drainage, accessibility of the food, durability to extremely powerful animals, have been considered while creating our current design.



Currently, we are finding more energy efficient ways to close the box, as the current garage door idea would require a significant energy source.

Stay tuned for more developments on this project!



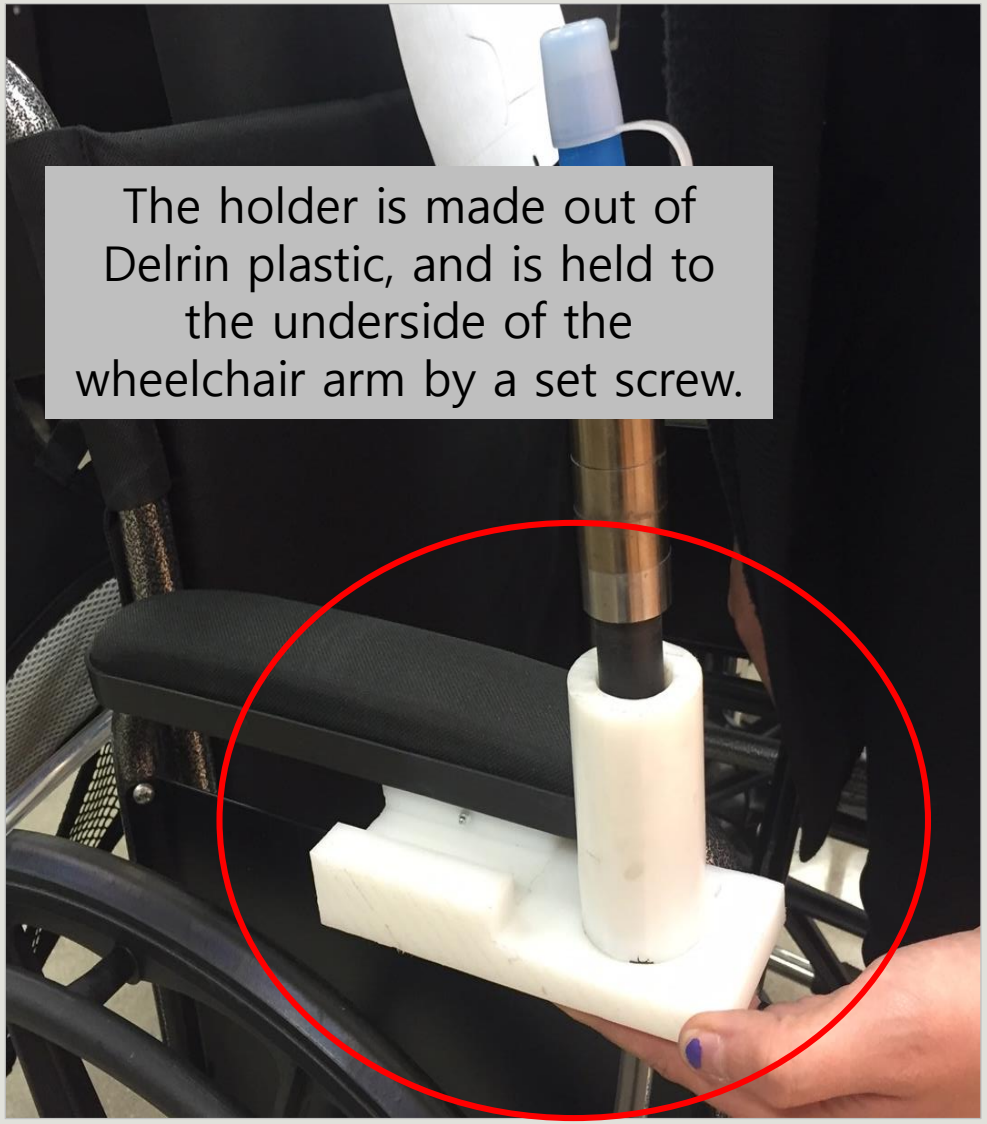


Box with garage door closed

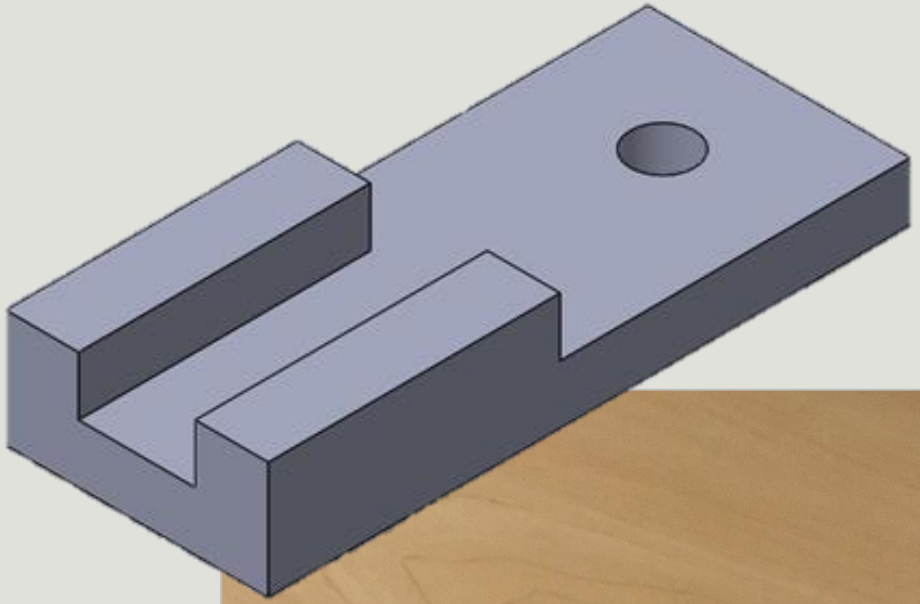
MagnetiGrip

Problem: Our user, a man at the Rehabilitation Institute of Chicago (RIC) with a spinal cord injury, has very limited upper body mobility and grip strength. Among the tasks that he cannot do independently, the most inconvenient is the inability to drink water by himself.

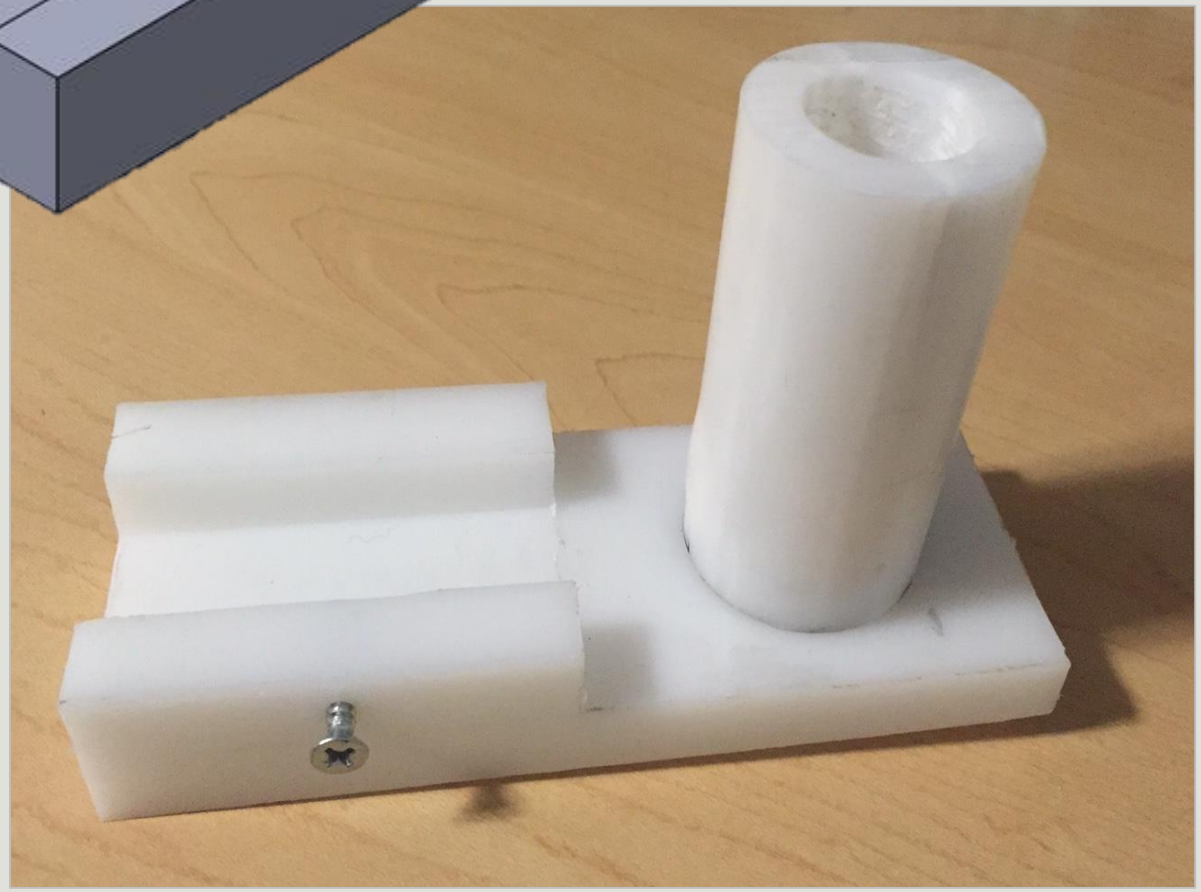
- My partner and I focused heavily on observing and interviewing the user to understand his problem and hear his input
- After brainstorming, we produced multiple mockups to visualize and test each idea for plausibility
- A design review found that a system with a magnetic grip and a bite valve was the best solution to our user's immediate problems
- As for materials selection, we mainly considered durability and cost. It led us to Delrin plastic for the white holder, polypropylene for the handle, etc.



The holder is made out of Delrin plastic, and is held to the underside of the wheelchair arm by a set screw.



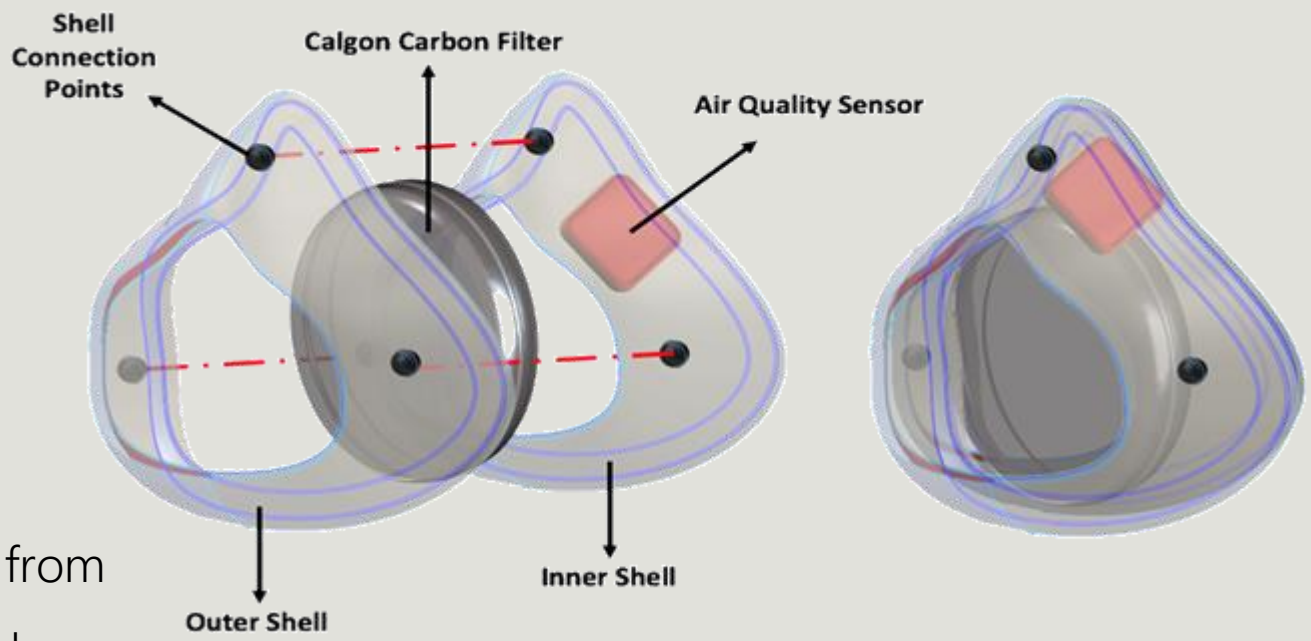
The base of the holder, without the cylindrical portion (left), and with the cylindrical portion (below)



The magnetic bar sewn into the hand strap allowed the magnetic handle to be easily lifted by the user with no need for grip strength at all.

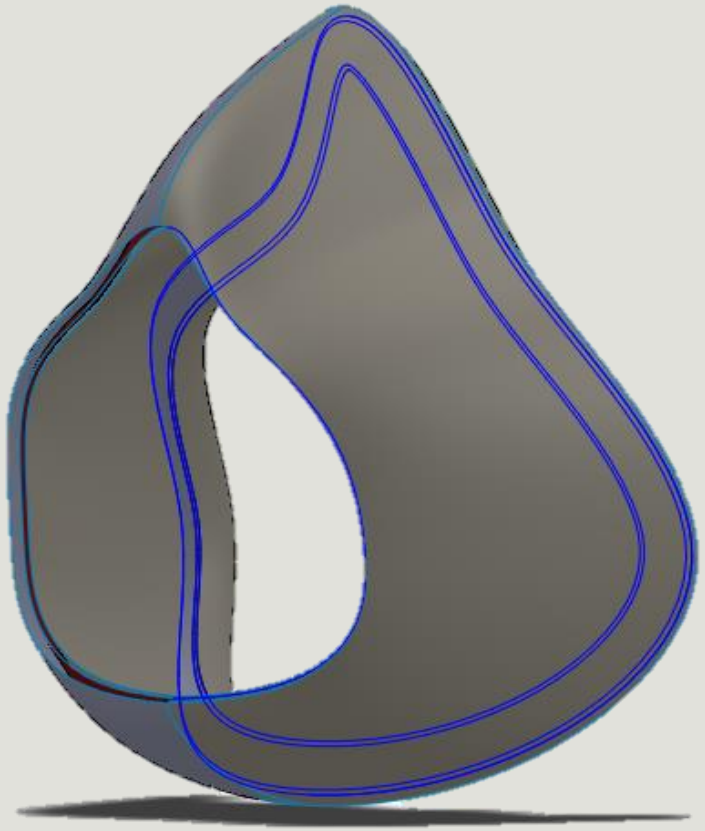
This water pack hangs on the back of the user's wheelchair with a convenient backpack.

Take it Breezy



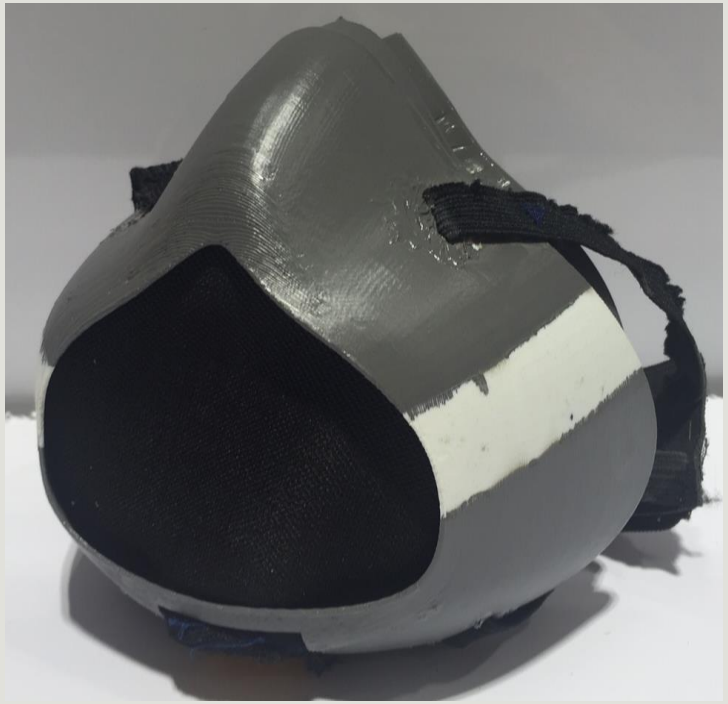
Problem: The pollution in Beijing, China is at an all-time high, yet the citizens choose not to wear breathing masks.

- My team was given a massive user survey, taken from samples of Chinese adults aged 18-40. I evaluated and categorized the results into four main categories: comfort, ease of use, cost, and customizability/fashion
- From this, we determined our areas of focus:
  - Comfort: the contours of the mask were designed to mold to the face, and we added a silicone tubing which acts as a cushion between the mask and the face
  - Ease of use: we implemented a two-shell mask that makes cleaning and filter replacement simple
  - Cost: all the manufacturing materials are affordable and easily obtained, allowing low commercial cost
  - Customizability: The material of the mask allowed for color and design customization of the outer shell



Features

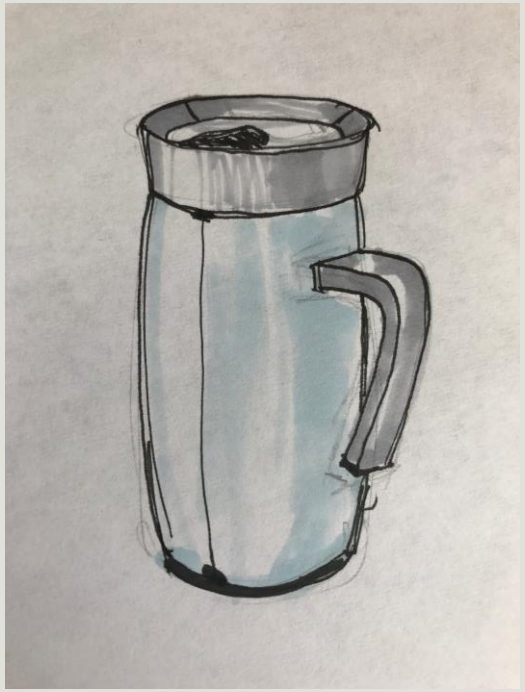
- Two 3D printed mask shells, made of ABSplus thermoplastic for its low density and affordability
- The pollution filter, held between the two shells for easy replacement
- Four fabric elastic straps, attached in the back with a Velcro pad.
- Silicone tubing outlining the inside of the mask, for maximum user comfort
- An exhalation valve, allows easy breathing

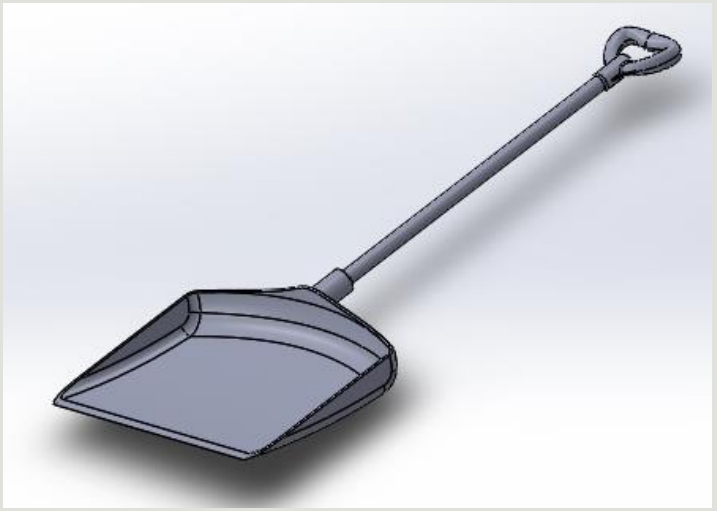


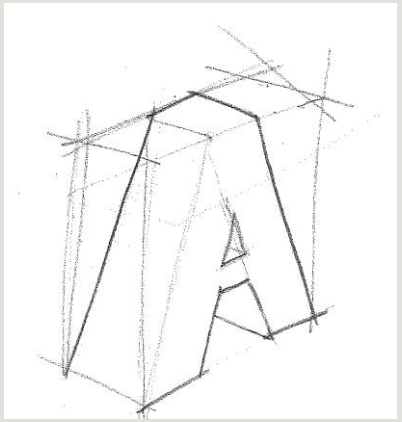
The mask was designed with the curvature of the face in mind for maximum comfort. This was measured against our target demographic, young Chinese adults.

Prototyping Skills

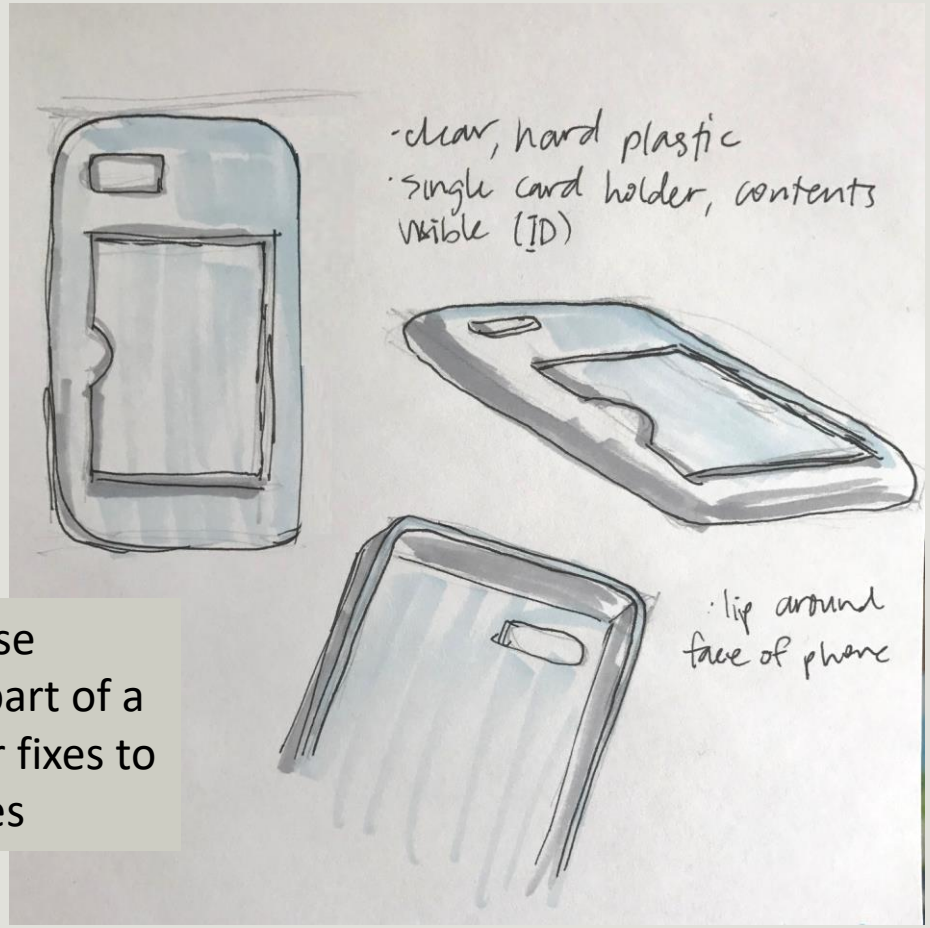
I have taken an industrial sketching and design class, and I am proficient in SolidWorks and CATIA.







This phone case drawing was part of a brainstorm for fixes to common issues



Feel free to reach out with any questions:

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