

Portfolio



Patricia Chan

Energy Research Engineer

A Little about Me

I am a current junior at MIT majoring in Mechanical Engineering with a concentration in Energy. I chose to study engineering because engineering allows me to use my knowledge to solve real-world problems and make a positive impact in the world.

The Terrascope Learning Community and NEET Renewable Energy Machines Thread have taught me to work collaboratively on open-ended, multifaceted problems, to iterate through the design process, and to consider the socioeconomic implications of my work. Through those experiences, I have developed skills in SolidWorks, Fusion 360, MATLAB, and basic machining tools, such as 3D printing and laser cutting.

I hope to pursue a career in the field of energy and contribute toward solving the global climate change issue through innovations in clean energy. Please contact me at pctrishy@gmail.com to discuss any opportunities relating to energy, sustainability or design.

Rooftop Rainwater Collection System



2.00C Design for Complex Environmental Issues
Spring 2019
Group Project — Alleviating water insecurity in the Navajo Nation

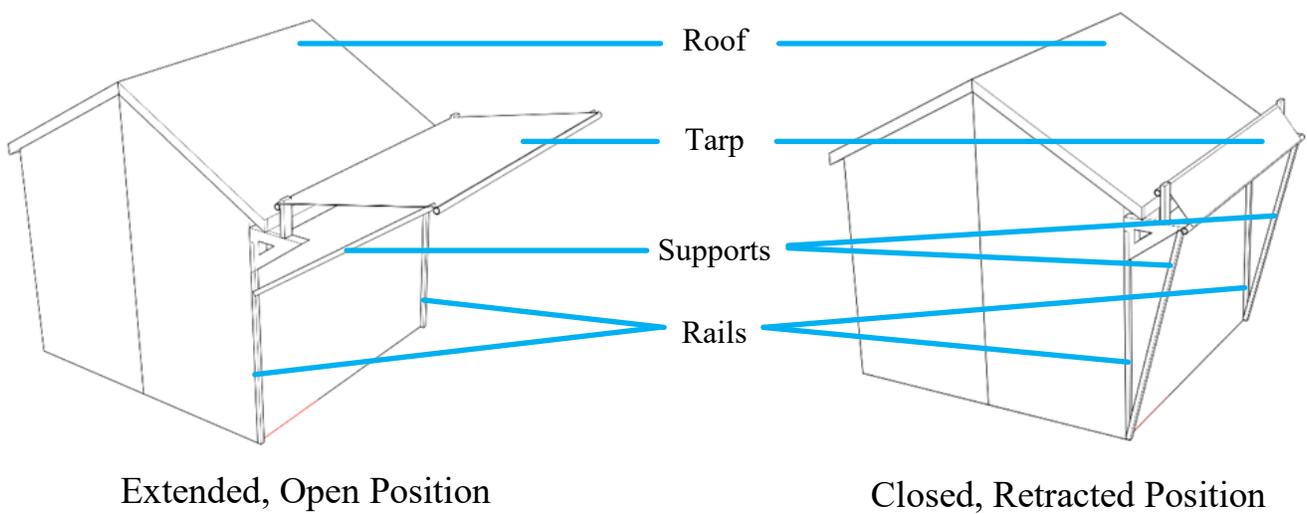
- Skills Used:
- Design Process
 - Sprint Style Workflow
 - Prototyping
 - Sketch Modeling

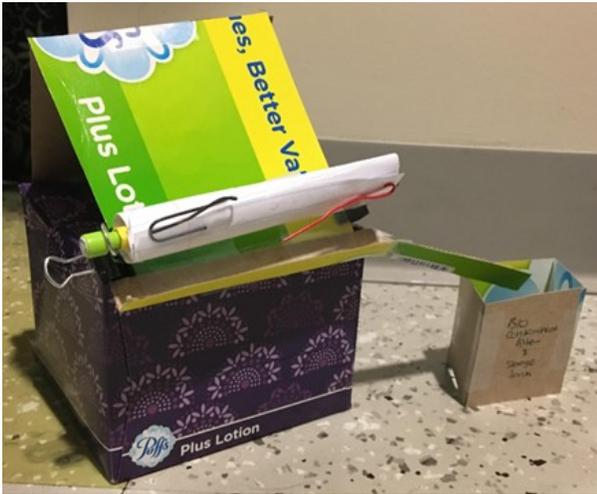
The rainwater collection system has a retractable tarp that creates additional roof area for rainwater to run off into the existing gutter system. The supports for the tarp slide along rails on the wall for easy storage. Ideally, this system will be able to increase the supply of water for a family in the Navajo Nation without running water or community sources of water.

We designed this system to be inexpensive, easy to assemble and maintain, and made of materials easily found in a hardware store.

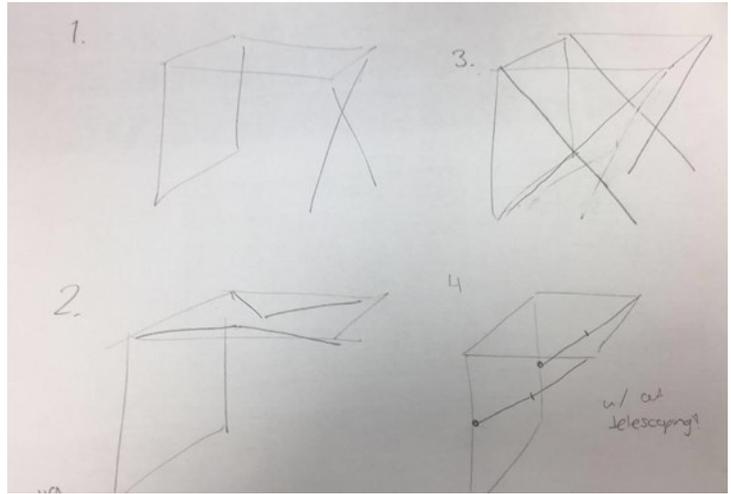
My two teammates and I made all design decisions as a group. I specifically contributed most in building the house structure and both the initial and final prototype.

Final Prototype Rhino Drawings



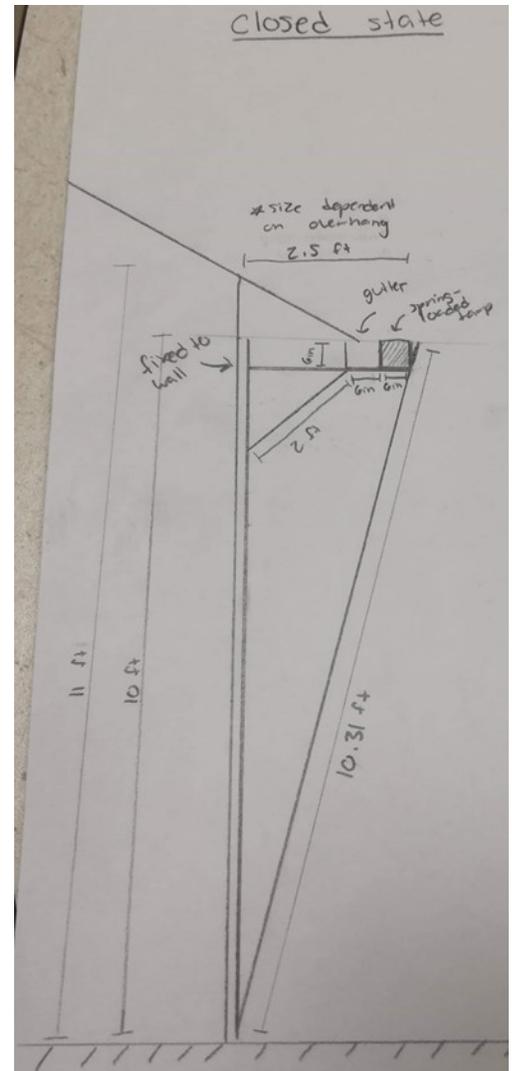
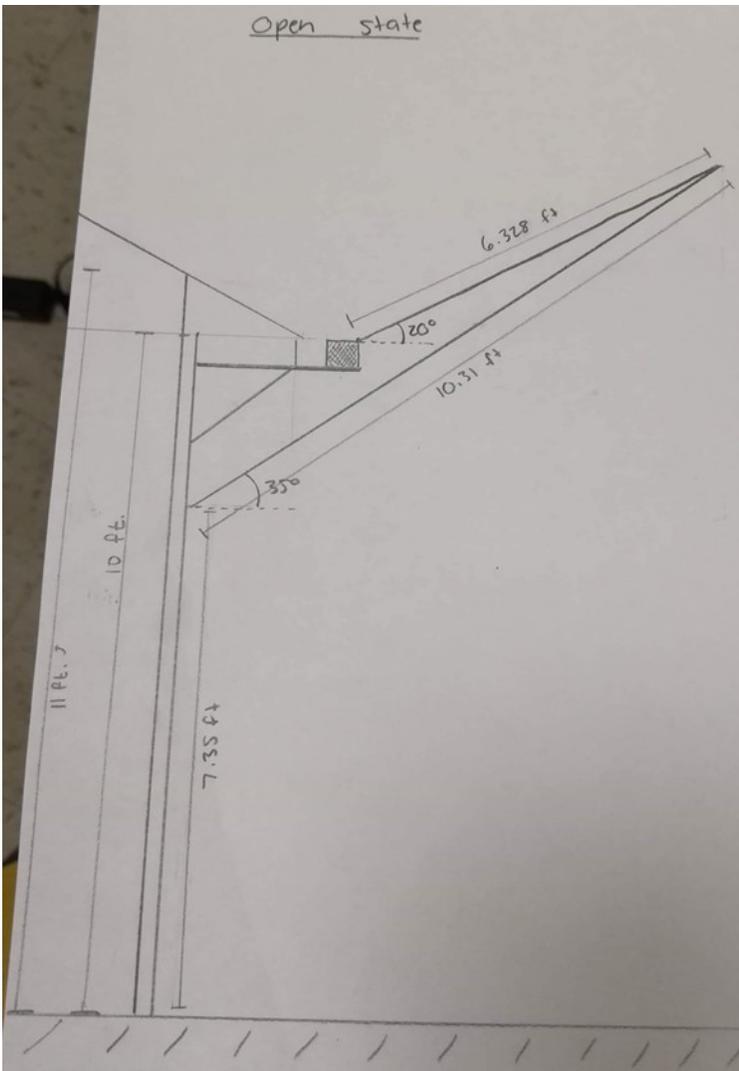


Sketch Model



Brainstorming Different Supports

Final Prototype Design Drawings



Prototype Close-up



Roof

Roller

Tarp

Where the tarp retracts into and is stored when not in use

Gutter

Rails

Supports

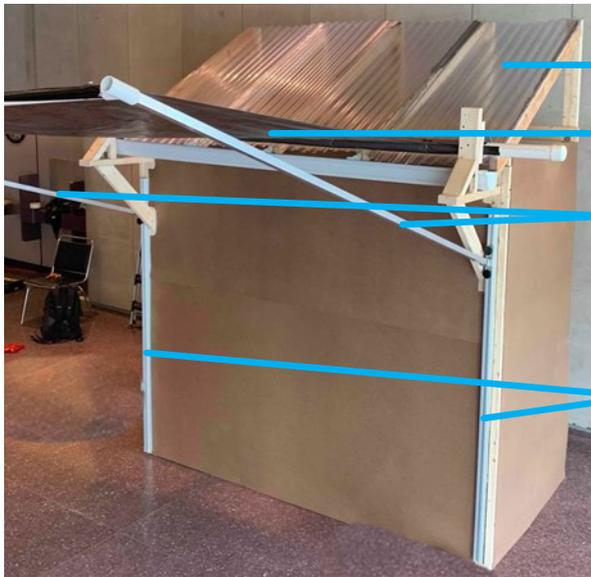
Fastener Knobs

Rotating Hinge

Tightens to hold the supports in place along the rail

Given the small size of homes in the Navajo Nation (around 500-1000 sq. ft.), the tarp adds roughly 40-60% additional area. Between the wettest and driest months, the system is estimated to be able to collect between 3 and 30 gallons per day. For context, the average Navajo Nation resident without running water uses 7 gallons of water a day.

Final Prototype



Extended, Open Position



Closed, Retracted Position

Roof

Tarp

Supports

Rails

Lasercut Cabinet



3.007/22.03 Introduction to Materials and Mechanical Design

Fall 2019

Individual Project — Create a three-dimensional structure using lasercut parts

Skills Used:

- Lasercutting

The cabinet is a small double-doored box, with the design inspired by ancient Chinese furniture. Created using a simple kerf bending pattern, the bendable doors are held closed with a simple latch. I chose to use kerf bending on the wood to create flexible doors that can bend closed and spring open.



Inside of First Assembly

Testing Different Kerf Bending Pattern Thicknesses

