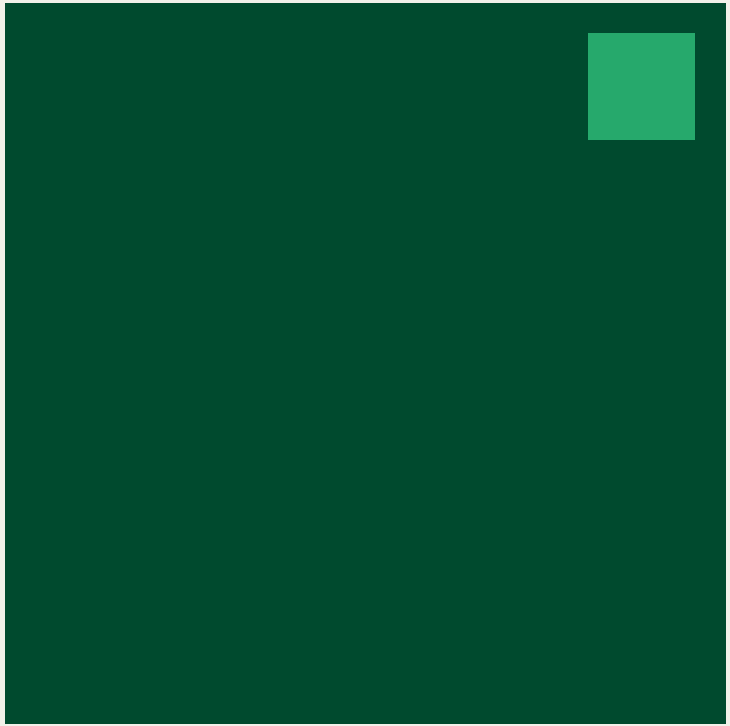
22.03 Final Review



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- Intro to Design Thinking and Rapid Prototyping
- Open to NEET Sophomores and others
- Skills covered: CAD, 3D printing, laser cutting, electronics, Arduino programming
- Ambitious design goals
- Completion over IAP

Contents

01 Scope of Work

02 Early Ideation

03 CAD + Design

04 Structure + Composites

05 Electronics

06 Assembly

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Scope

This charging station serves to **encourage MIT students to spend time outdoors** without being limited by the battery life of their electronics. The charging station fosters community by offering **convenient, eco-friendly charging** options that prioritize **accessibility, reliability, and sustainability**.

Ideation Process

PARTI REFERENCES

INDIVIDUAL IDEATIONS

MID REVIEW DESIGNS

FINAL CONCEPT

Parti Inspirations

TREE CANOPIES

We were inspired by the way that tree canopies provide a sense of security and shade while also creating a beautiful lighting effect with their networks of branches and leaves.

MUSHROOMS

We found the shapes and textures of oyster mushrooms that cluster on tree trunks visually interesting. While organic, they resemble the work surfaces we wished to create.

FOREST CONNECTIVITY

We sought to capture the interconnectedness of the mushroom and tree in a subtle reflection of the mutual interconnection between individuals at MIT across departments.

Mid Review Group Designs

BONSAI TREE MODEL

This model aimed to create a peaceful and intriguing system reminiscent of the harmonic bonsai tree, complete with a mechanized, moving tree canopy and an extended tree stump to sit on.

TREE STUMP MODEL

This design aimed for a semi-enclosed environment offering some privacy and shelter.

GROVE MODEL

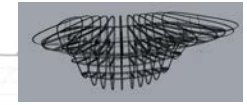
Aimed to create an inviting and comfortable atmosphere; the canopy illustrates a sense of connection.

CAD + Design

Combined favorite aspects of 3 early models:

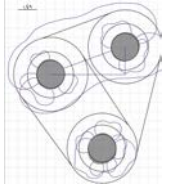
- **Organic trunk and canopy** from bonsai tree model
  - Has a natural quality
- **Inside-outside components** from tree stump model
  - Gives the feeling of more space and privacy
- **Cluster arrangement** from grove model
  - Calm, serene environment

Living
Canopy/Roof

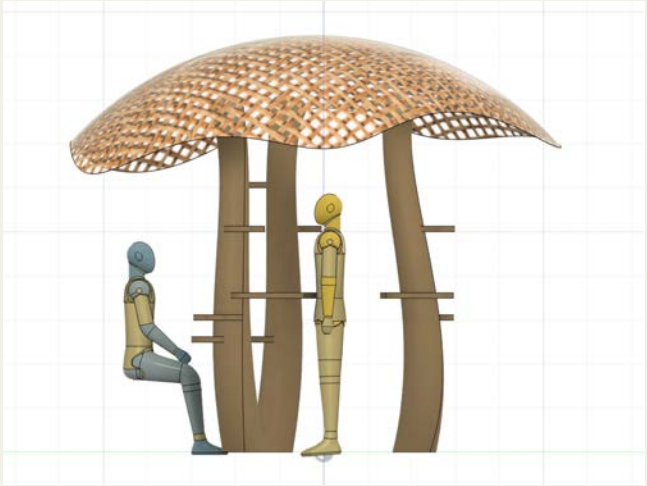


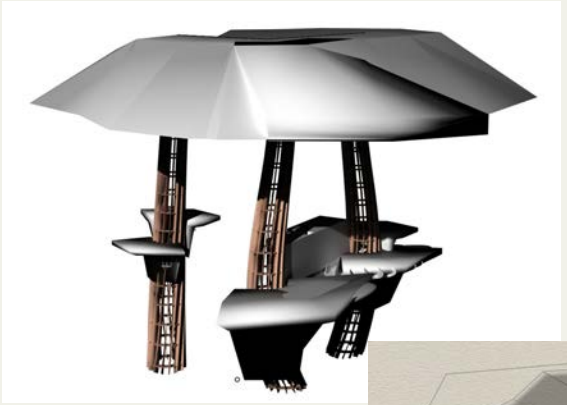
Shelf design

Partition

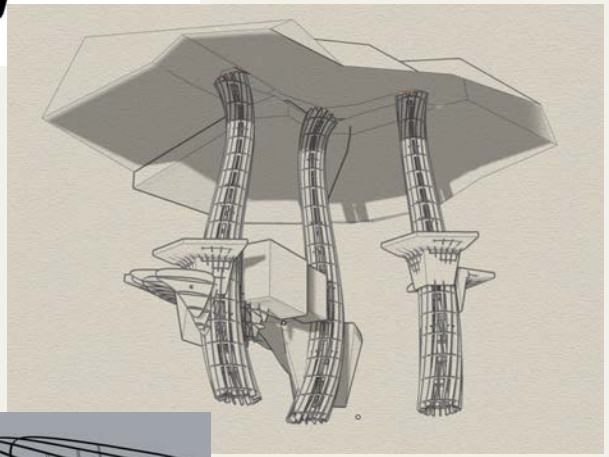


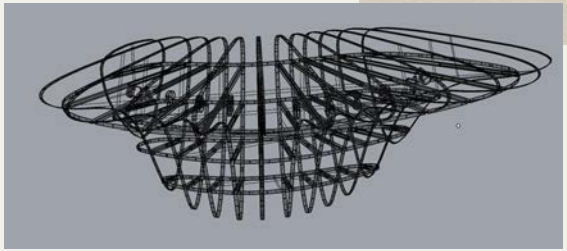
“Trunk” layout





Transition from Fusion to Rhino CAD Model





Structure + Composites

Tested Variety of Composites

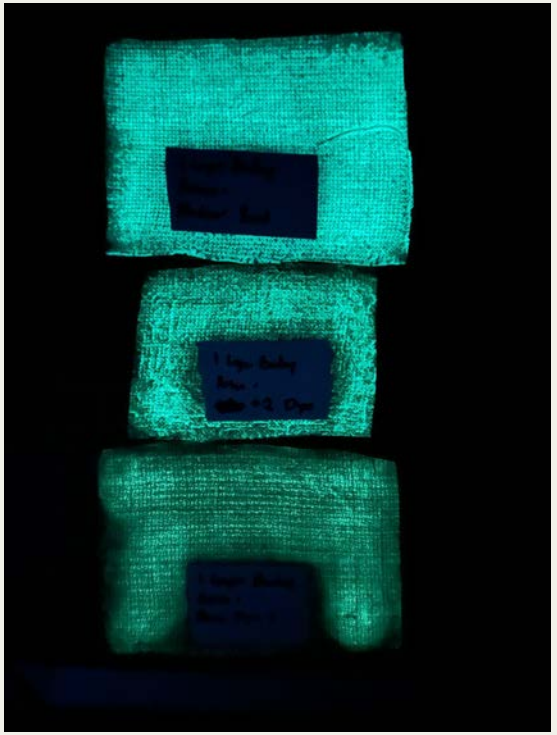
- Carbon Fiber Testing
- Linen
- Burlap
- Cloth
- UV Paint

Testing Forming Methods

- Waffle + Vacuum

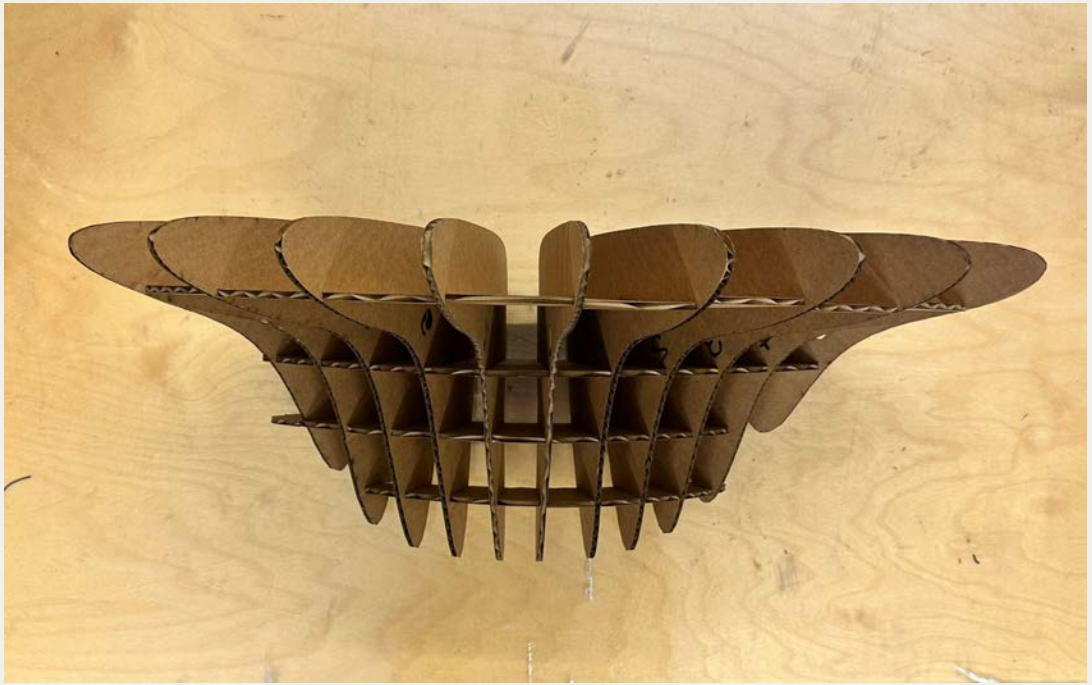
Samples Tested

1 to 5 layers of Burlap, Flax, and Carbon Fiber Samples



UV Activated Samples

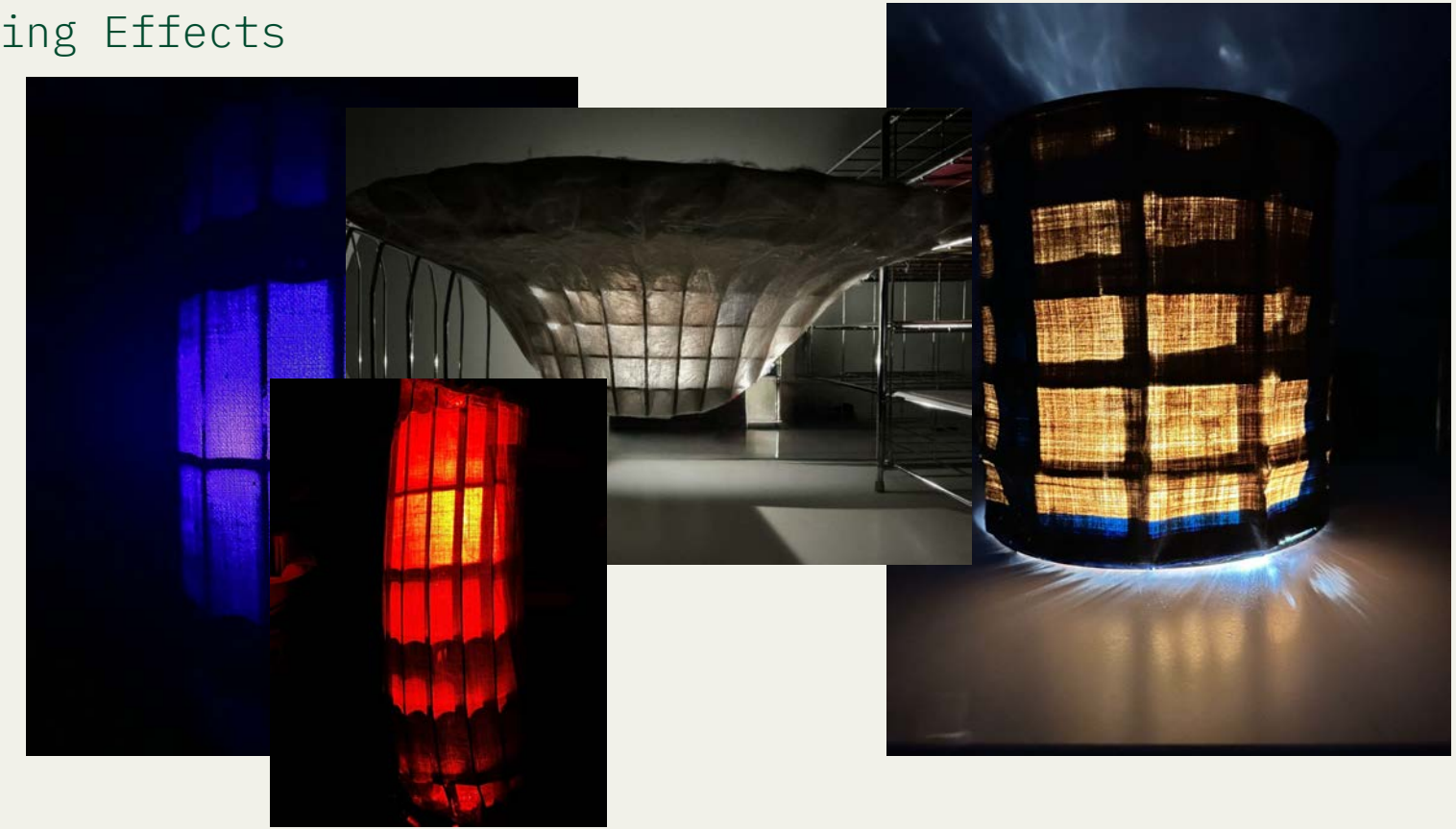
Waffle Forming



Cardboard Waffle Structure of Shelf

Trunk Section Waffle

Lighting Effects



Electronics

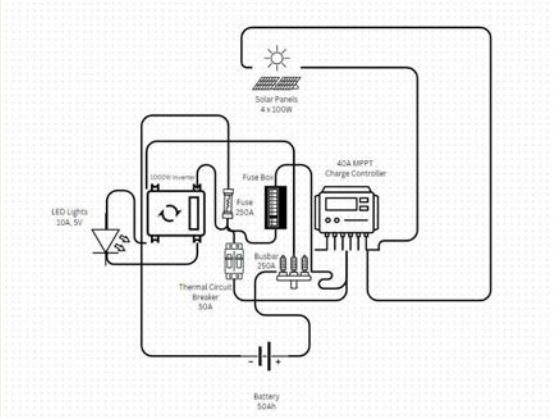
Functionality- system capabilities

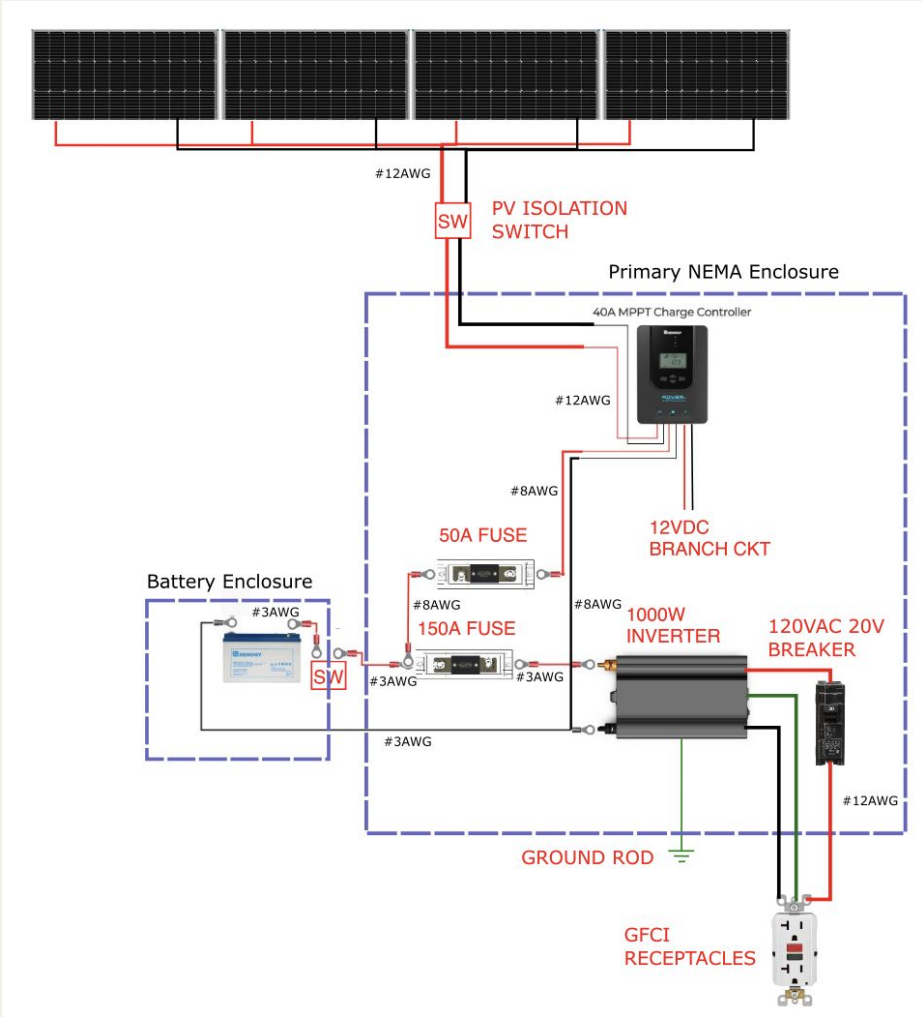
Schematic

LEDs

Interactivity

Capabilities & Electronics Schematic





LEDS + Interactivity

System A

Light Level Sensor

Detects outside ambient light levels so that the station is

- at a constant, dimly illuminated level when its at a target darkness
- off during daylight hours and not in use
- dynamically changing the illumination during daylight hours and in use

(“in use” determined by **System B**)

System B

Proximity Sensor (multiple embedded within tree trunks)

Continuously detects user distance to determine how close they are to the station and the dynamics as they come and go.

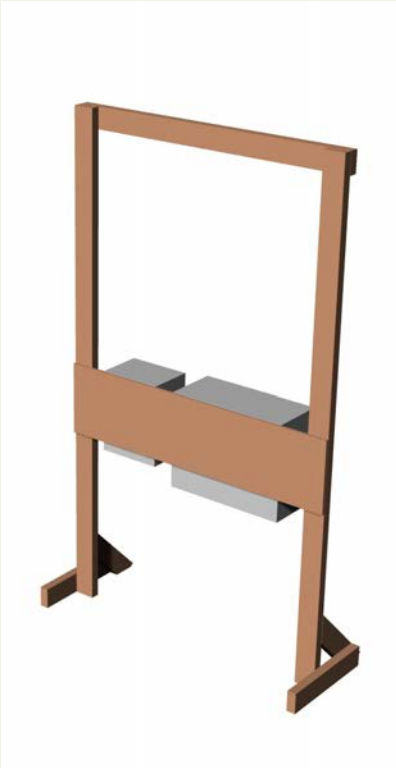
Greets new users with gradual illumination as they get closer to the station and stays at a constant target brightness while they are at the station.

System C

Capacitive Touch Sensor

When a touch sensor is activated at on area of the station, LEDs will travel from the trunk closest to the activated sensor toward the others trunks, symbolizing the mycorrhizal networks.

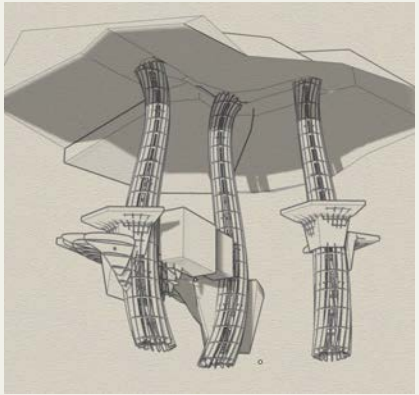
Simplified Structure Assembly



Next Steps

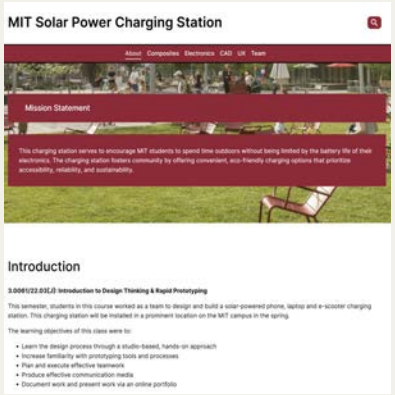
Full Construction

IAP 2025



Full Assembly

IAP 2025



Website Publication

IAP 2025

Installation

Spring 2025

Q&A

SP.248 NEET Ways of Thinking

Fall 2025