

AIDAN MAIOLO

MECHANICAL ENGINEER FROM THE UNIVERSITY OF RHODE ISLAND

aidanmaiolo@outlook.com

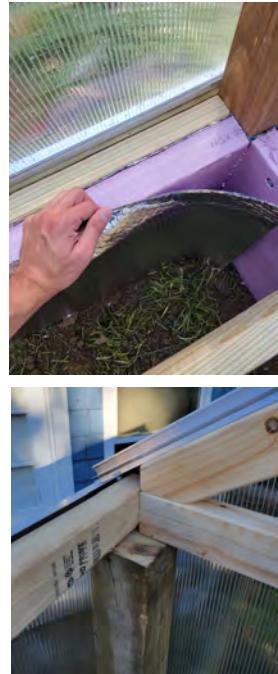
www.linkedin.com/in/aidan-maiolo-5ba695222

860-917-9737

Greenhouse (Personal Project)

What?

- Needed a sunlit, climate-controlled space to overwinter cactus collection.
 - Range: 35°–55°F and Below 55% RH



Results

- Structurally sound, climate-controlled, insulated greenhouse for cactus collection
- Able to maintain humidity and temperatures between specified ranges via controls linked to an exhaust fan, desiccant dehumidifier, and radiant heater
- Successfully weathered wind storms with gusts of up to 35 mph
- Optionally placed to receive 100% of the sunlight my backyard offers



How?

- Performed a one-month sun study to locate the best possible location in the yard
- Constructed level foundation from 6"x12" boards anchored to the ground by wooden stakes
- Built an interior wooden frame to support against high winds and snow
- Insulated the foundation to provide stable temperatures and activate the heat capacitance of interior stone flooring



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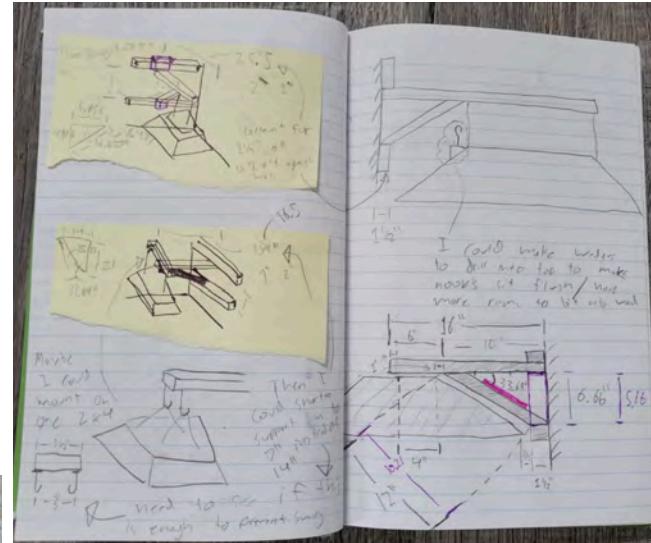
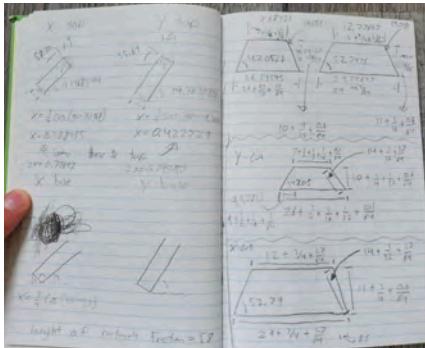
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Rectangular Frustum (Personal Project)

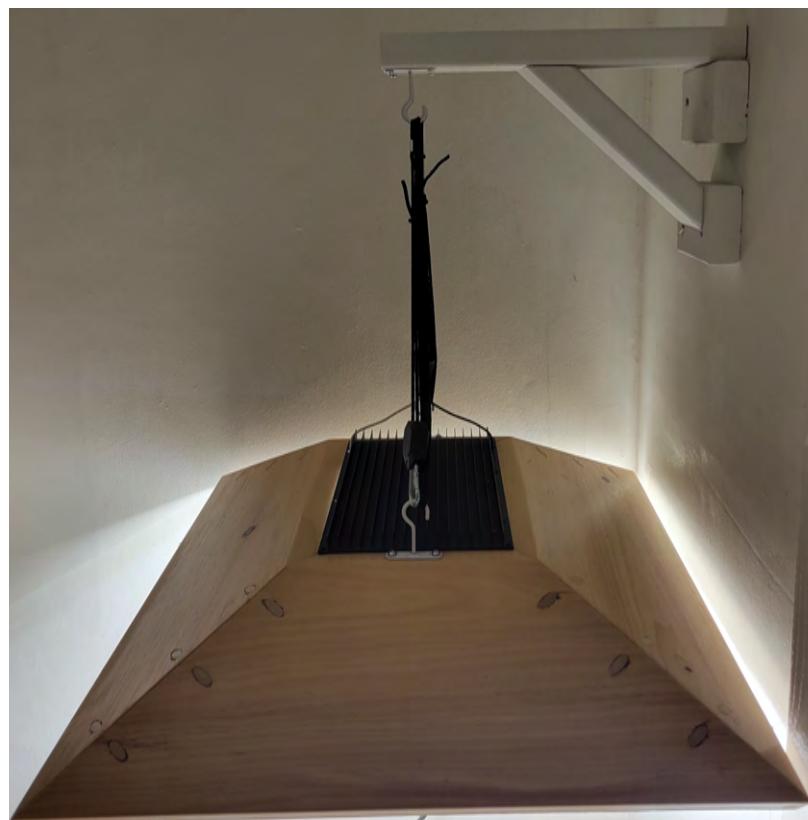
What?

- Fixture for grow light to maximize reflectivity while allowing top and side light mounting
- Aesthetically pleasing grow space for one cactus in my living room



Results

- Fully tolerated, sturdy, artistic grow light for my cactus.
- Increased total reflectivity by 22% with just the top-mounted light.
- Side-mounted lighting increased PPFD (Photosynthetic Photon Flux Density) by 300%



How?

- Brainstormed, sketched, and dimensioned the preliminary design.
- Prototyped the first model from plywood
- Identified limitations with tooling and redesigned around a fixed joining angle, using precision to the fourth significant figure.
- Developed a solution using trigonometry to drill and mount wooden dowels.
- Applied white paint mixed with barium sulfite at 25% concentration to increase diffuse reflectivity to 95%.