

2025



7/10 - 7/17

Team meeting #1

Brainstorm session : see keynote

7/17

meeting with professor:

- ↗ keep device simple, fast, high resolution images
 - try many ideas
 - be super clear on task allocation
 - thinks our design is too by too many steps
 - wants a fast clamp and roll through the leaf and get high resolution
 - remember this process for interviews, leading group, solving problem, allocating clear tasks, etc, future opportunities.
 - other members liked my leaf slide method.

- Alden mentioned that Leaf Slide could be good in laboratory setting. 1 person put in slide and other and quickly and steadily slide through the device

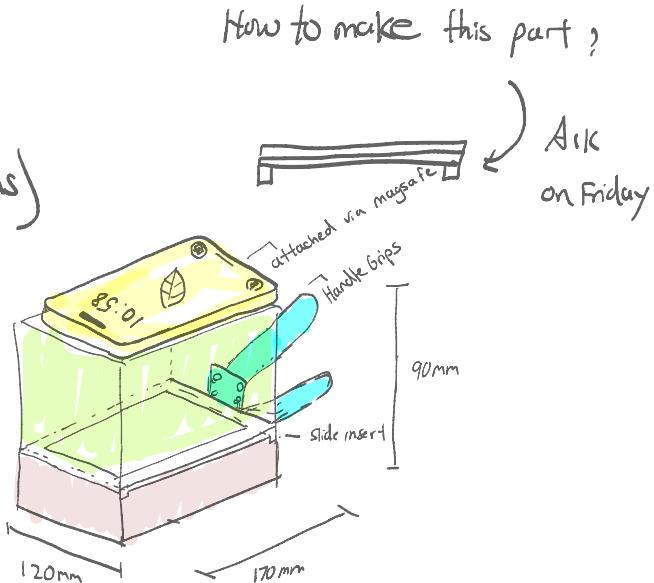
7/17 plans for Friday meeting [task delegation]

At this point we have successfully come up with design <slide rail system>

Delegating Tasks

Hardware CAD prototype (discuss dimensions)

- Top Housing (90 mm Height)
- Bottom Housing (with rail system) charges
- Handle connecting Top & bottom
- Phone mount — Weixuan



Optical & Lighting Design

Charles

- Find suitable LEDs and diffuser material and layout
- Find solutions to mount led into bottom chamber
- Heat dissipation , voltage regulator

Software

Alden , Jackie , willie → image preview + upload interface

- Review and get familiarized with the current app
- Features
 - access and control phone camera → focus, exposure, iso (manual controls)
 - research about image stitching → contact lab member w/ exp
- API development (someone to streamline file upload process)

7/18

Team meeting #2

Additional Hardware designs:

- How to turn on/off lightbox (switch / ZR proximity sensor) *> need to discuss with Alden*
- bottom compartment design (copy current layout)

- larger camera opening ✓
- rail opening idea instead of clamshell in progress

Jin Advice: idea is too simple, throughput will be too long, will not mitigate all curled leaves. leaf edge is longer than midrib. Wants to have a better idea than slides to flatten leaves. prefers rollers or other methods for faster.



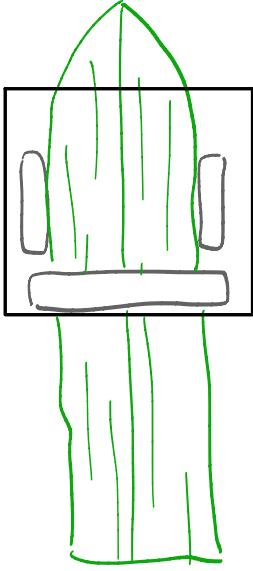
Weixuan: External rollers to get the leaf through device and internal rollers to spread the leaf.

linear polarizers

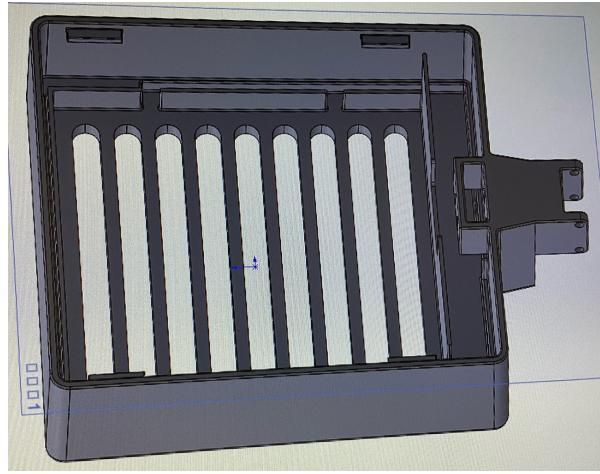
7/21 supplies arrived: Tape, Acrylic, Tablemat, LEDs

- played around with LEDs, wasn't sure if they were small enough to fit a bunch into the bottom compartment.
- Designed the bottom compartment to fit LEDs into and wiring storage
- WX showed me his roller method. There will be many many rollers. As leaf goes into device it will be rolled in. To flatten any weird leaf, there will be a second set of rollers placed in 90° to roll out the leaf from left and right using many sets of gears.
- I believe this may affect the easy replication step





mine bottom compartment was similar to this, but no handle stick out, and different dimensions

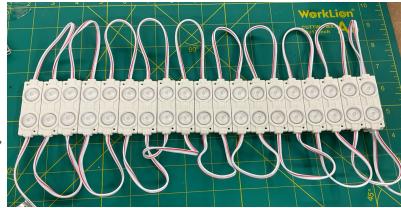


Bottom proto 1

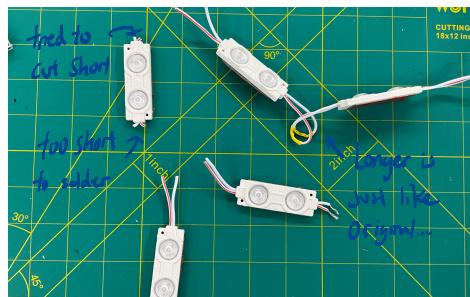
7/22

LED box and Leaf slides Proto 1 complete

- At first I cut up the leds and tried to solder back together in order to prevent a bunch of loose wires.



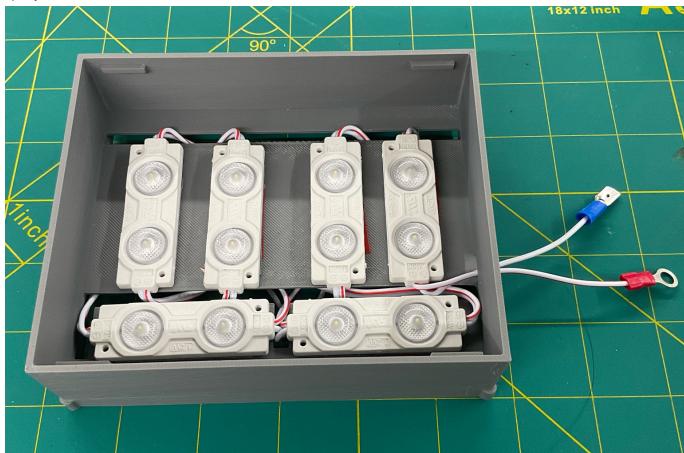
long Excess wiring



↳ basically I wanted to have perfectly fitted → realized way too much work to have
slightly less wires.

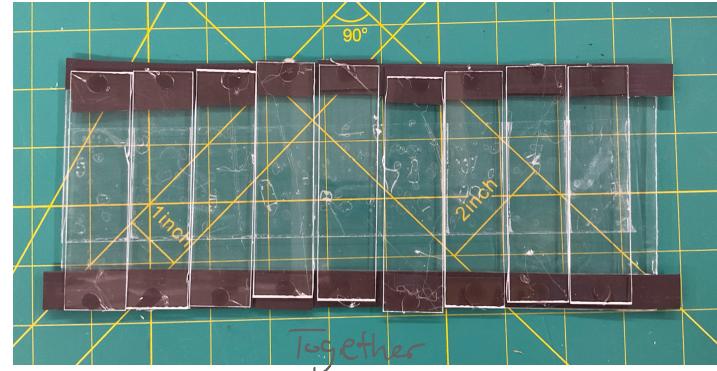
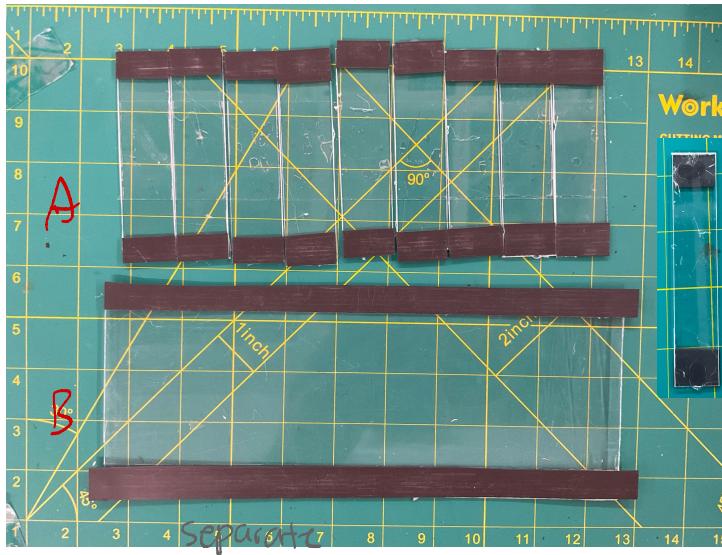
↳ redesigned bottom compartment

12 LEDs in Proto Bottom 2

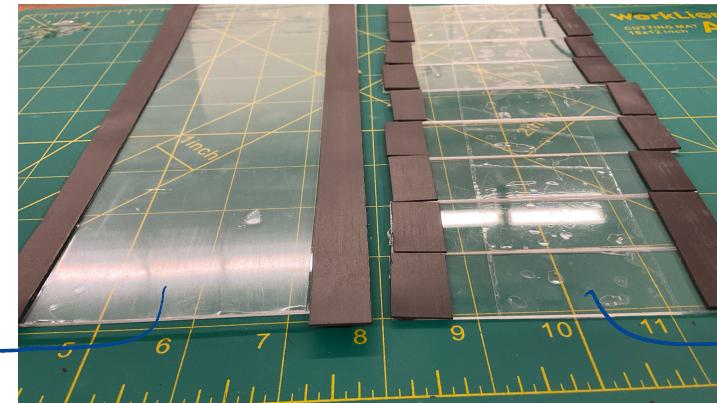


} direct power supply atm
will connect to voltage regulator
and battery - Can't use phone b/c it won't supply 12 V

Leaf Slides proto 1



A quick but messy cut of leafslide p1. One by one flattening concept works smoothly. Still need a corn leaf to test actual effectiveness.



This is window weather sealing tape. Gives it a soft touch but reduced visibility

Clear packing tape to stick art plates together. Needs to put on side to stop bubbles in middle of sheet.

[Learned that magnet sheets have a click in place effect based on different orientations

→ Instead of a uniform magnetization

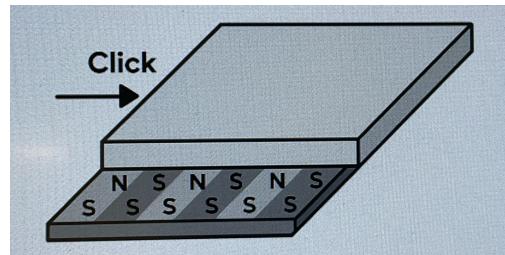
Magnetization pattern

They are alternating south and north patterns.

N S N S N S
N S N S N S
N S N S N S

- can use this as an easy way to align sheets on each other correctly every time to reduce time spent and increase throughput

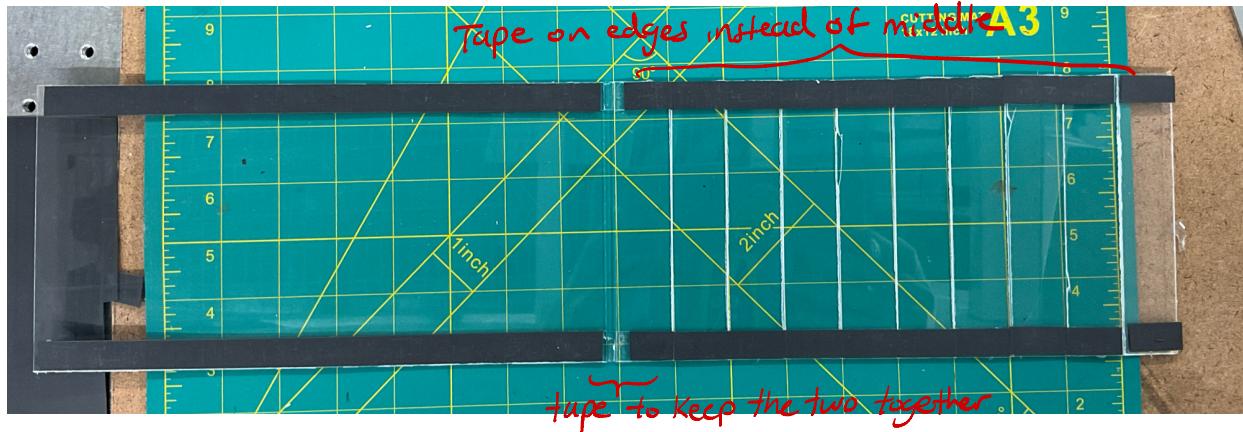
Leaf slides P1 magnets clicked left to right



7/23

Leafslides proto 2

continued developing the second iteration of the leaf slide. Today's focus was to make the slides easier to use, wider, straighter.



no use of weather tape, for better visibility - But less soft. Will not conform to leaf shape, midrib

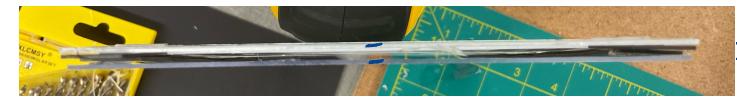
- Much neater than P1, larger viewing space for leaf.



process using demo leaf with midrib



= Gap with demo leaf with midrib, slide clearly bends to conform with shape of leaf. Need to address this issue when dealing with leaf with larger midrib.

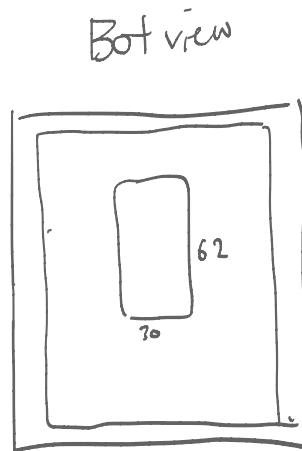
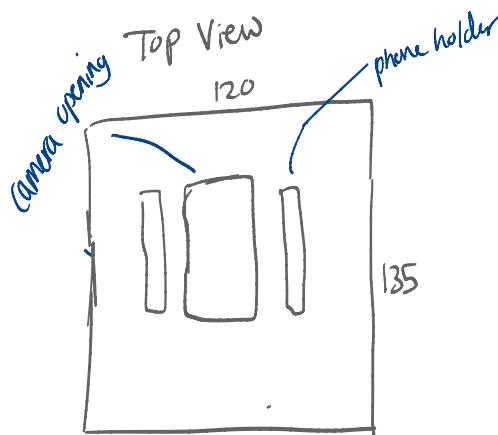


= original gap

7/24

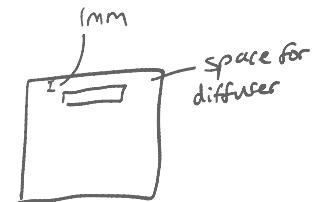
use magnets as a way to insert the slides inside the box. It will click every step in. (idea)

- will try to solid work Top component for slide method

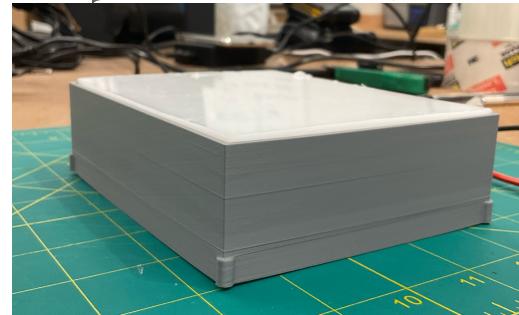


54

85

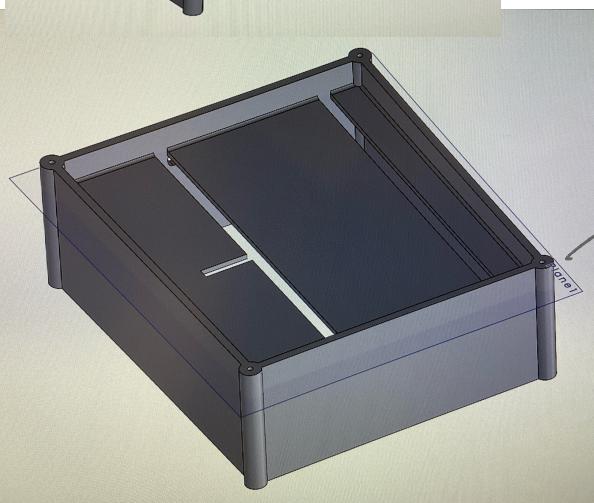
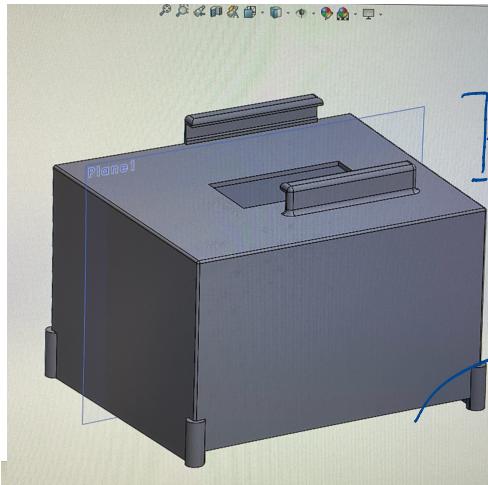


Current lightbox P1



7/25

Updated Parts for Slide Method



Lightbox P2

Friday Meeting Talking Points

Hardware :

Slides with demo leaf // roller with internal leaf flattening belt

light box //

Software: Discuss the main important thing we want for software

- Either create new app or update current App and add more tabs with better UI

functions that are necessary for this project.

Camera access // library access // file access

- Image stitching → auto take images at certain lengths

video frame stitching → selects specific frames

LLM

- Image uploading to API for processing, receive image back with description of the image



Video or camera

video | FPS

QR code on roller

- use opencv?

- right now manually taking photos as first step.

-

ArUCo Code

- Segmentation, rgb indexing
stitching

Willie: Start App base, get user camera access, multiple focus points

Jackie: Image stitching , stitch all photos in a folder together.

problems:

- reflection on the acrylic panel , can see phone camera
 - block other camera
- can see the lines on the leaf slide
 - print a piece to cover
- roller is not smooth , build issue , metal axels for smoothness

7/30

Charles: figure out ArUco code and how to implement into device

Weixuan: Continue on roller prototype, make gears smoother. Have practical uses.

Be able to fit a leaf through and start taking images. Make another roller top with enough space to fit leaf slides through the rollers.

Willy: started App, camera feature now works, next is to add focus (future need to focus on whole leaf plus ArUco code)

↳ exposure, as many manual features as possible

Jackie: Image stitching, work with Willy on the App. I will give design help and work on github project as well.

↳ to help stitch images after taking multi.

Single Multi Gallery
three tabs

Goal : After taking single image save in gallery

After taking multi image , stitch them together and save in gallery

* attempt for next week Friday

9/7/25 Thursday [away from Lab 9/1 - 9/25]

ArUco Codes Notes

- faster detection
- can use built in ArUco module (cv2.aruco) in OpenCV
- use ArUco codes on our rollers
- code needs to be small enough where it won't get distorted from curvature

Capture strategy

Camera X → Image Analysis

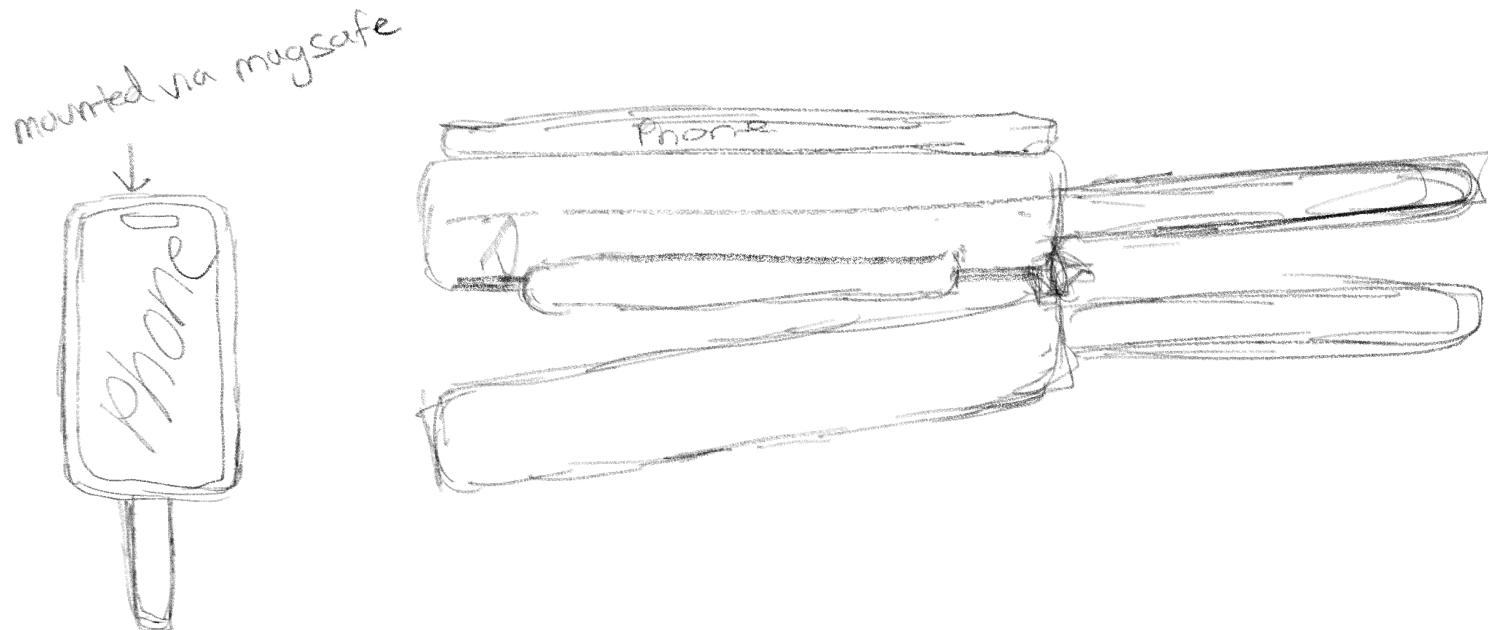
Willy:

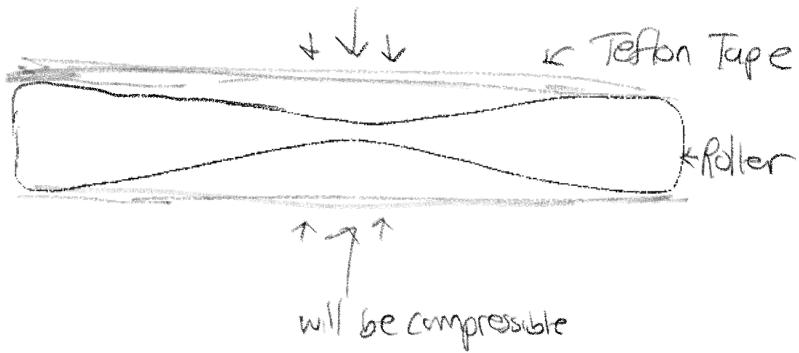
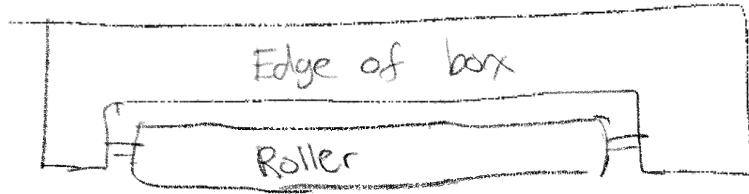
Jackie: Everything in SRC - went through dd phone program.

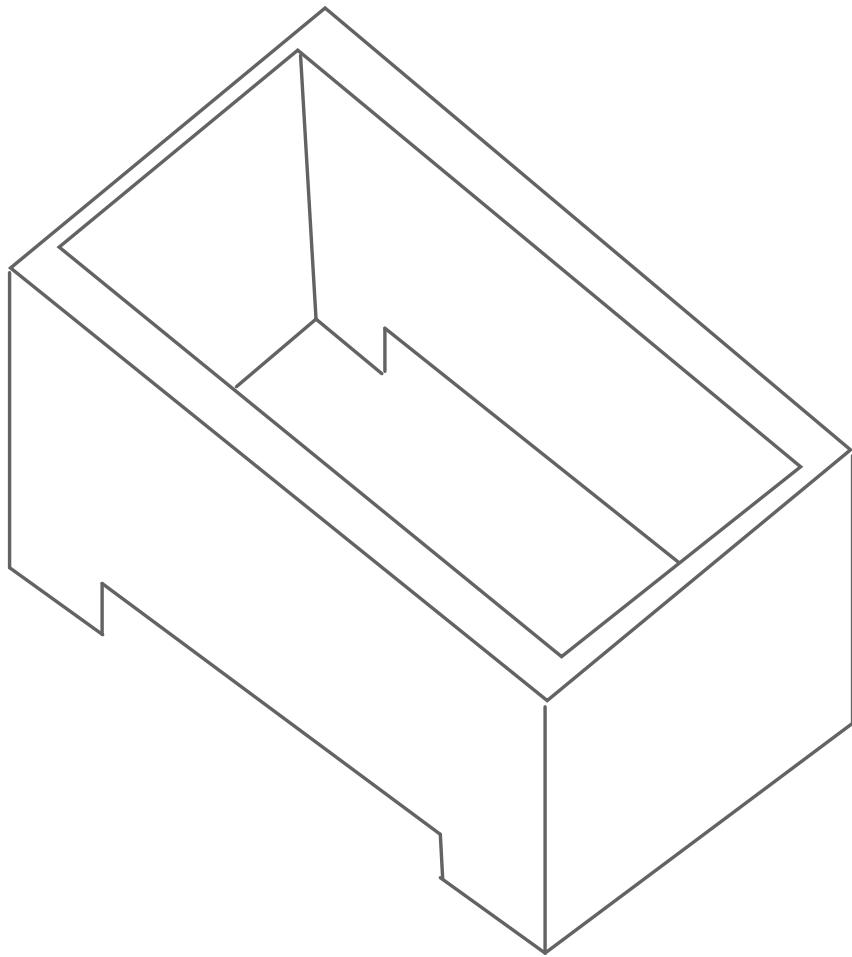
10/27/25 New Brainstorming

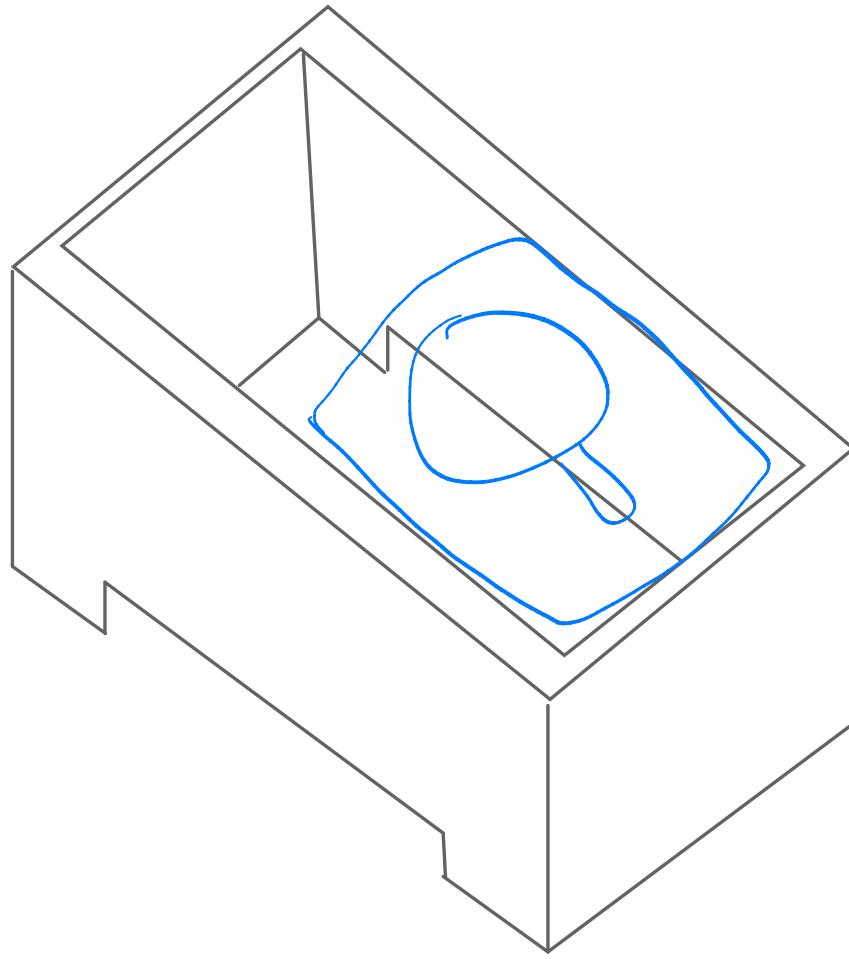
Current device is way to big, we need to shrink it down

- consider using macro lens on smartphones, this way we can reduce the height from lens to leaf
- fit the box to more like the original brainstorm sizing, with shorter height since we are using macro
- single roller method, use like leafspec









App Developement

Base App completed, camera works

image stitching needs better algorithm, faster processing