

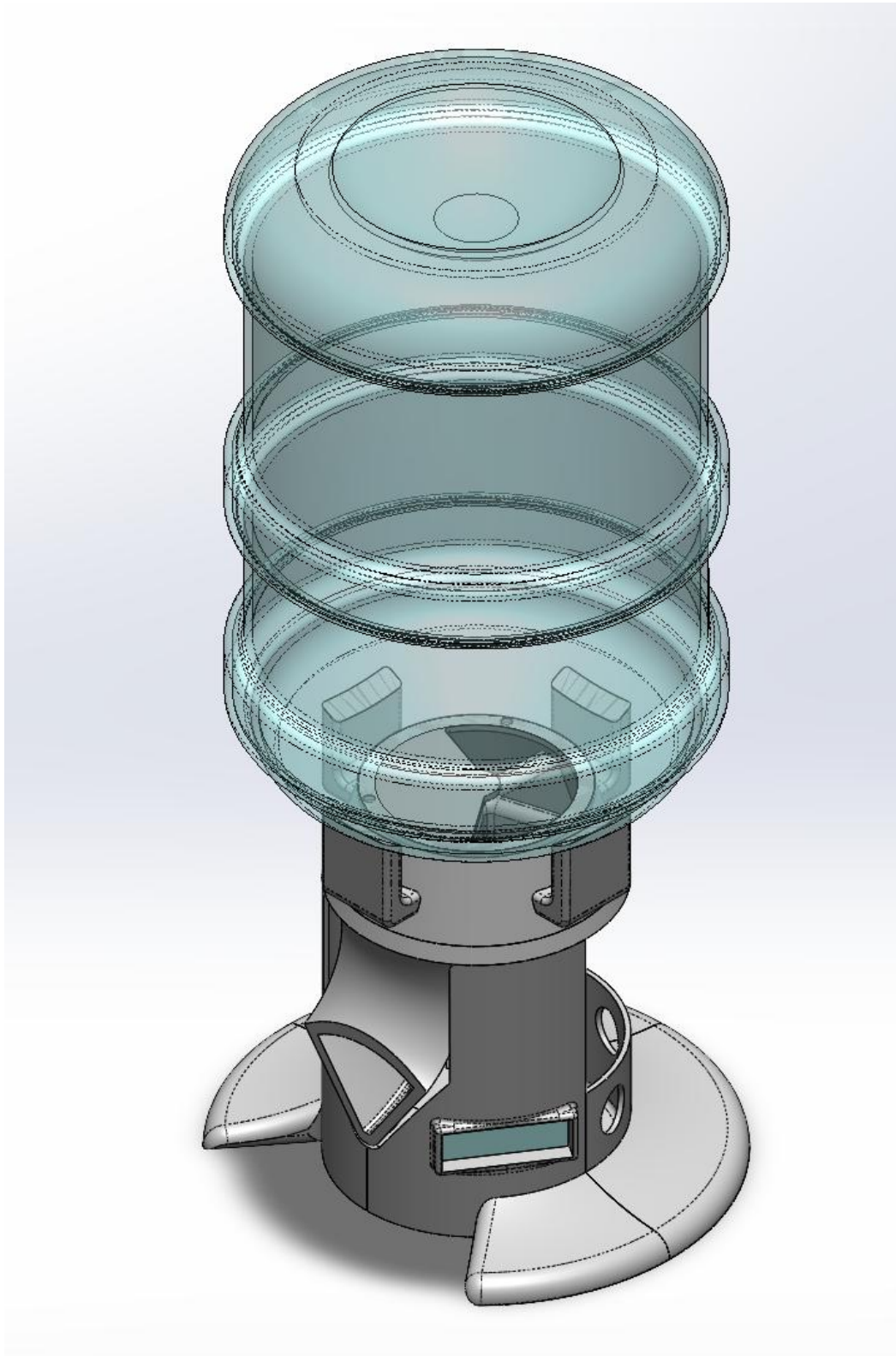
Jimmy Grozav | Automated Dog Feeder | 2026

Remotely controlled automated dog feeder via the phone to manually feed dog or automatically feed per the schedule.

Approximately 1.5 cups dispensed, 10 completed functional test cycles, and visually verified tray alignment.

YouTube link: <https://www.youtube.com/shorts/EdaGAo5-IOw>
(turn the caption on)

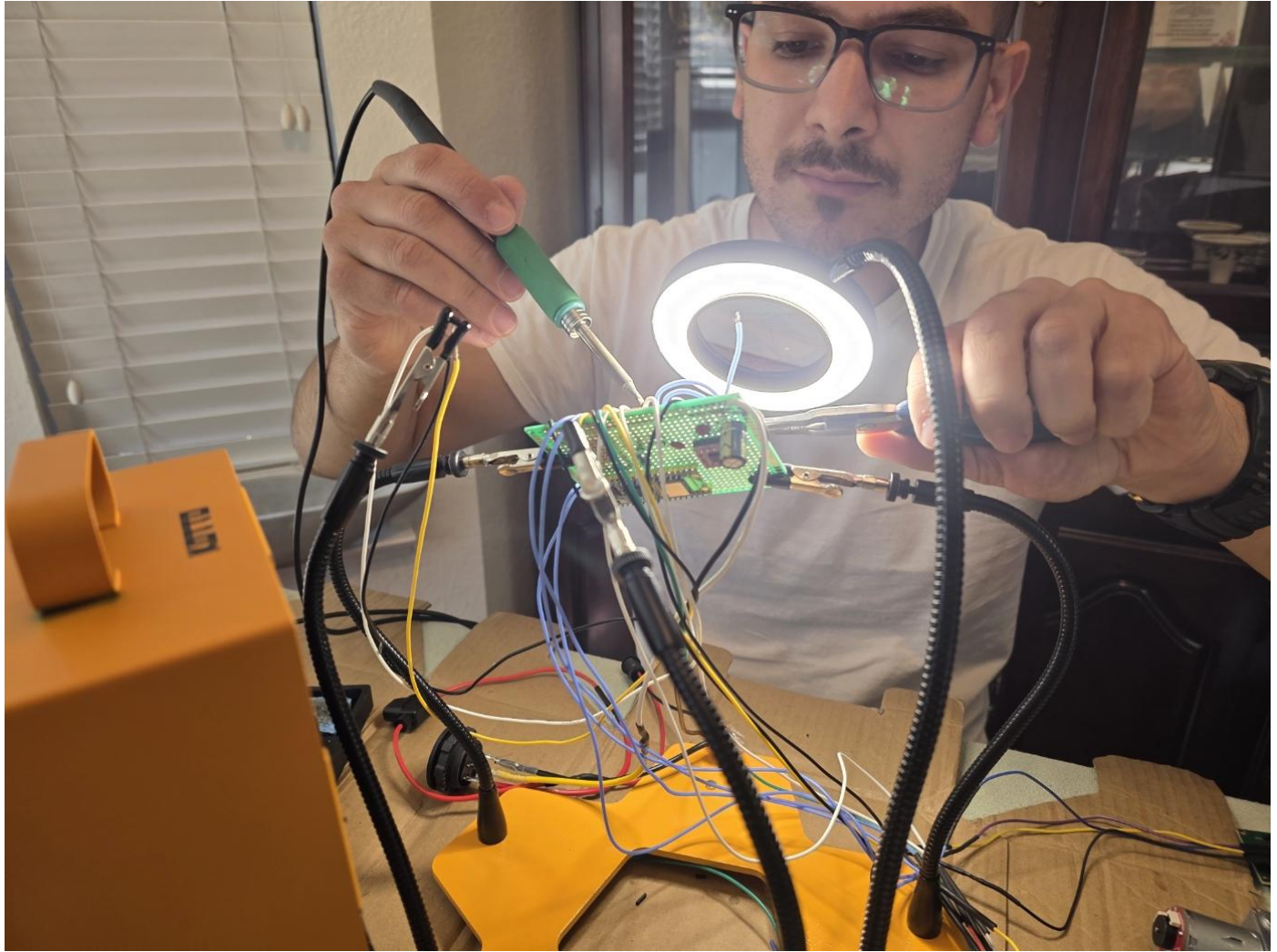
CAD Model (SolidWorks)



The first version of prototype of the dog feeder device to test the assembly, systems integration and testing, and make improvement before finalizing the product.



Soldering the prototype printed circuit board (PCB) per the drawn schematic diagram.



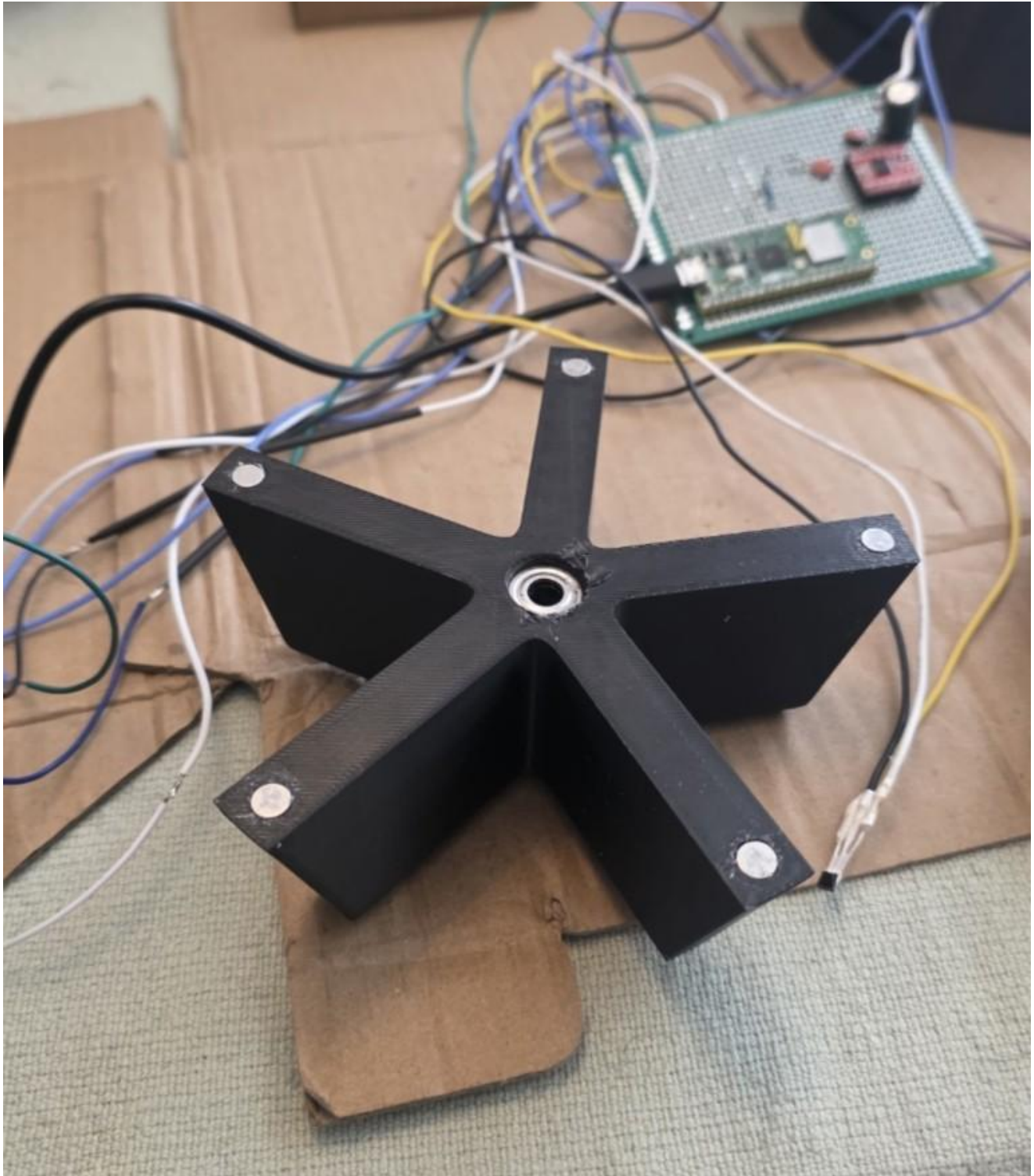
LCD displays the output results and the feeder's schedule



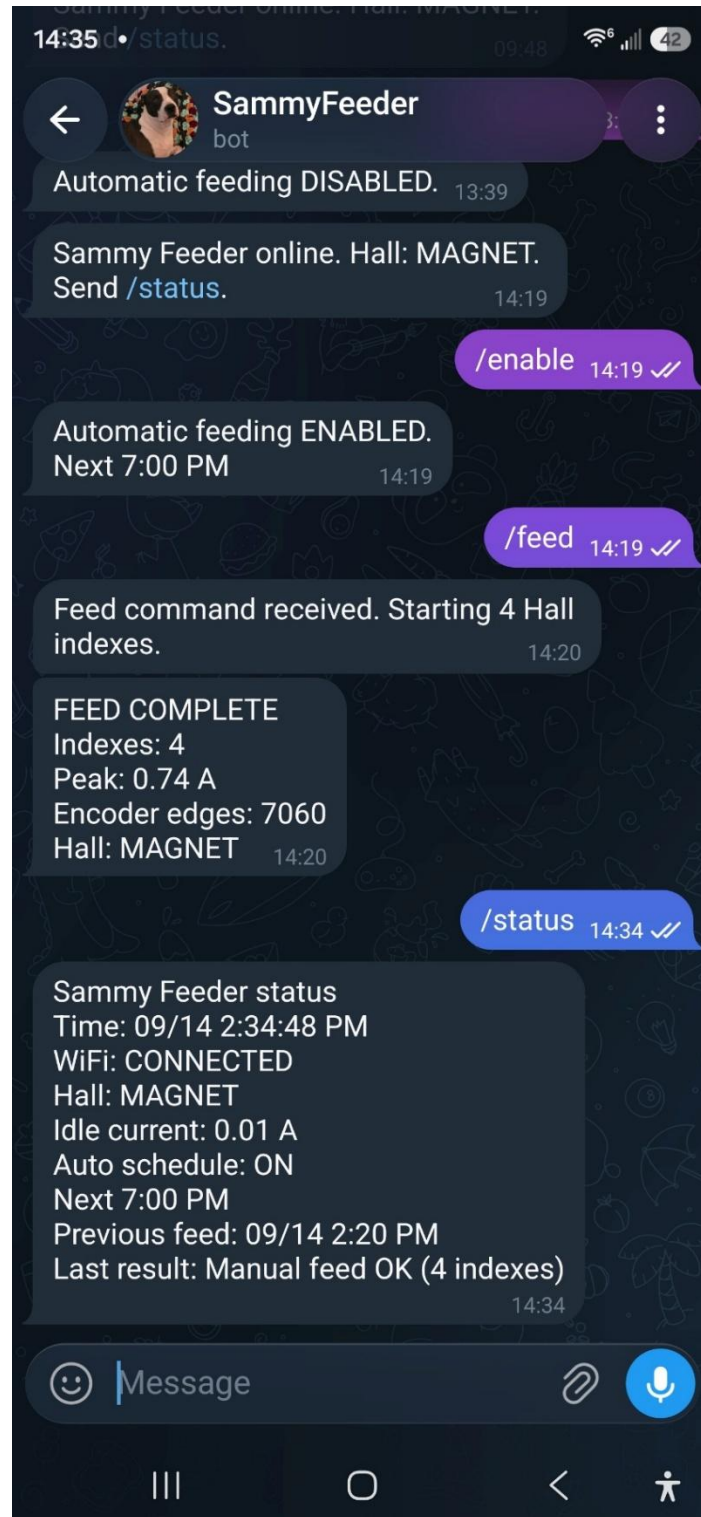
Inside with a 12V DC worm gear gearbox supported by the anti-rotational tab, the circuit board with the Raspberry Pi Pico 2 W microcontroller, and a fuse box powered up by the power supply



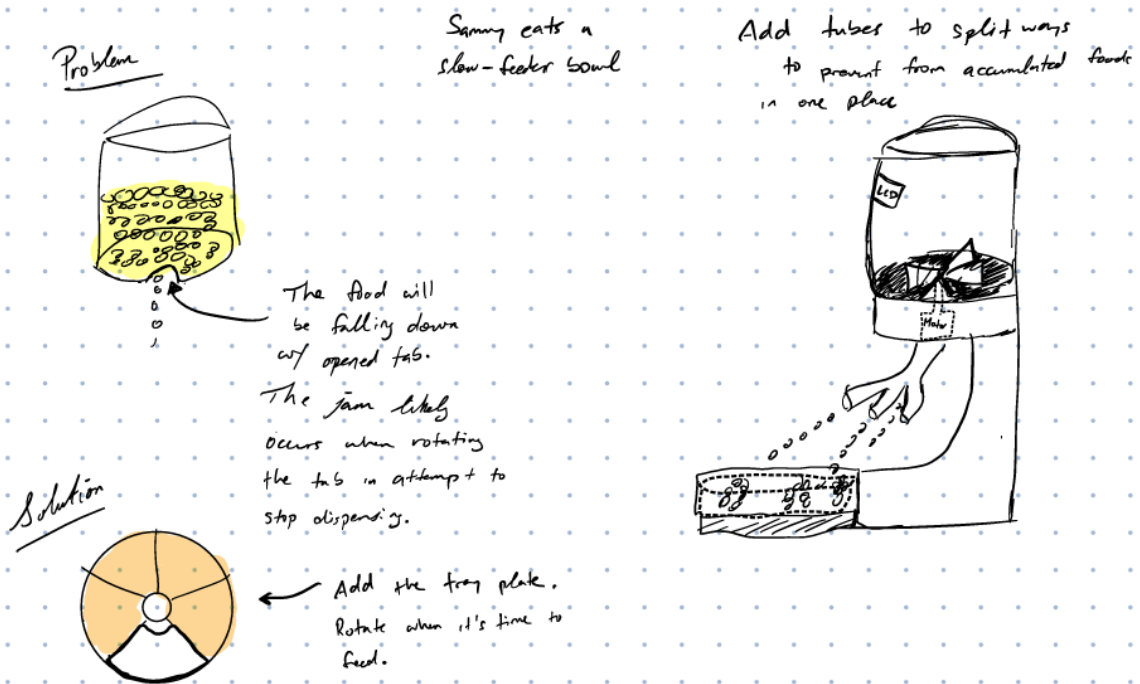
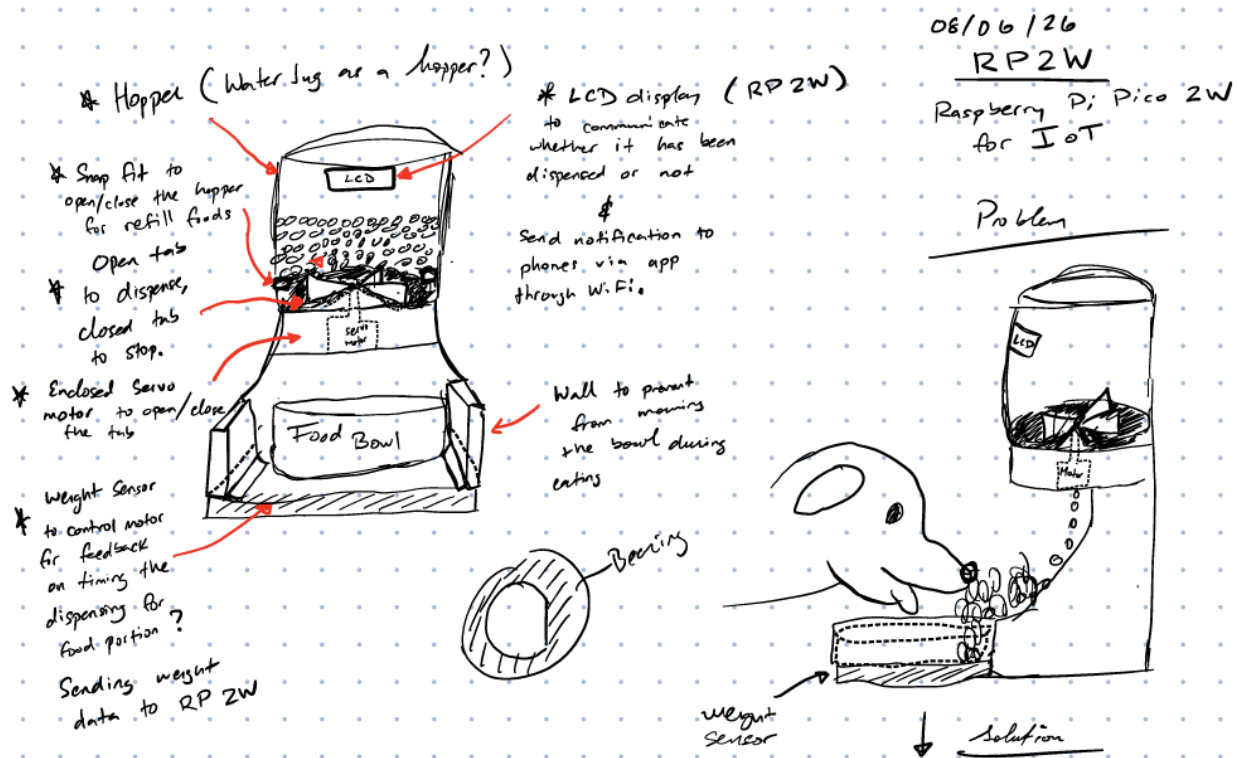
Hall-Effect sensor (A3144) with the magnets lay onto the compartment trays for alignment before and during the dispensing.



Used the bot to perform per command for the dog feeder device. The operation was successful.

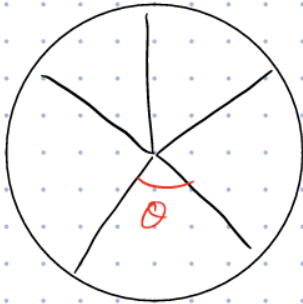


Design process - conceptualize the product and find potential undesired/failure modes.



Hand calculations to find the appropriate gearbox and the tray's volume for dispensing.

12V DC Motor - Worm Gearbox, 6mm shaft



RPM @ next tray within ~ 1 second :

$$X \text{ RPM} \left(\frac{360^\circ}{1 \text{ rev}} \right) \left(\frac{1 \text{ min}}{60 \text{ s}} \right) = 1 \text{ sec}$$

$$\frac{360^\circ}{5} \approx 72^\circ \quad (X \text{ RPM} \times 6)^\circ / \text{sec} = 1 \text{ sec}$$

$$108^\circ ? 72^\circ$$

$$\text{RPM} = \frac{72^\circ}{108^\circ} (1 \text{ sec})$$

$$\therefore \approx 18 \text{ RPM}$$

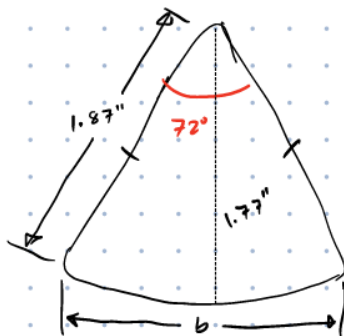
Grab

Market → 20 RPM

$$t = \frac{20 \text{ RPM} \times 6^\circ / \text{sec}}{108^\circ 72^\circ}$$

$$t \approx 1.11 \text{ sec} \checkmark$$

$$\approx 1.7 \text{ sec}$$



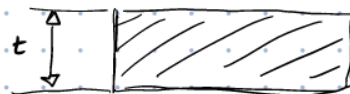
$$V = t \times A = t \left[\frac{1}{2} (b \times h) \right]$$

$$b = \sqrt{1.87^2 + 1.87^2 - 2(1.87)(1.87)\cos 72^\circ}$$

← Law of Cosine

$$b \approx 2.20''$$

$$V = t \left[\frac{1}{2} (2.20 \times 1.77) \right] \approx t (1.95 \text{ in}^2)$$



$$0.5 \text{ cup} = 7.22 \text{ in}^3$$

$$t = \frac{7.22 \text{ in}^3}{1.95 \text{ in}^2} \approx 3.70 \text{ in}$$

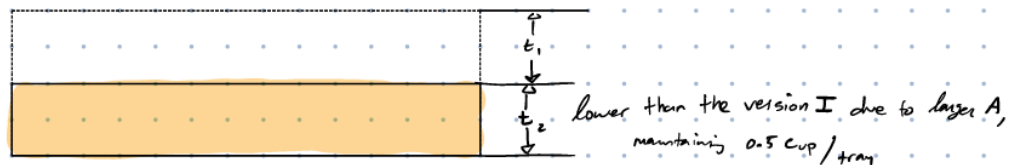
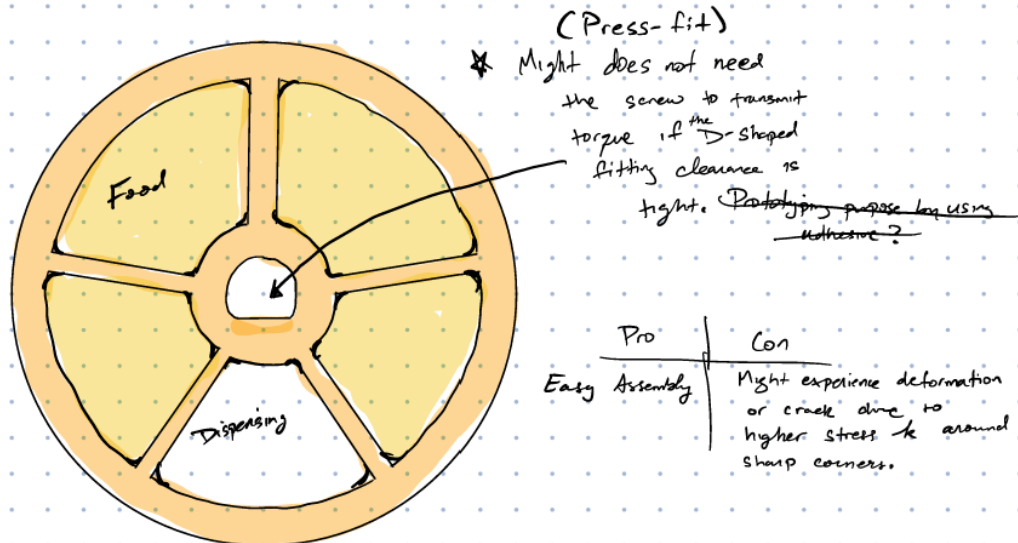
$$\text{Design: } t \approx 2.08'' \Rightarrow V \approx 1.95 \times 2.08 \approx 4.08 \text{ in}^3$$

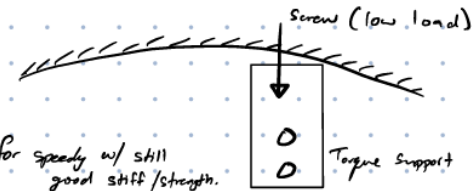
$$\# \text{ index } (V) = 7.22(3) \text{ in}^3$$

$$\# \text{ index} \approx 5$$

Discovered some improvements to make from the first version of prototype.

VERSION II



- * Utilize the hole wizard onto all fastener holes (head cap screw)
- * Create a groove for Hall-effect sensor on the top instead of the bottom due to not detecting the magnetic field from the bottom.
- * Hopper supported by the entire circular profile in groove instead of the L-bracket for cosmetic.
- * Torque Arm Support to hold 
- * Print in PETG instead of ASA for speedy w/ still good stiff/strength.
- * Dowel Pins to join parts

$$T = 19 \text{ in} \cdot \text{lb},$$

$$r \approx 3 \text{ in} \therefore F =$$

[illegible]