

MAT D-5400

Motion-Activated Treat Dispenser



Tues-54

- Ana Alberola - alberola
- Shayan Siddiqui - siddm47
- Eshal Khan - khane43
- Ahmed Shehzad - shehza6
- Stefan Fernandes - fernas72

Problem Statement

Design a product that accommodates Mark's limited dexterity and mobility, providing a comfortable and accessible way to interact and play with his dog, while simultaneously granting further independence. The design must be intuitive, easy to use, portable, lightweight, cost-effective, and durable.

Our Prototype

Motion Activated Dog Treat Dispenser

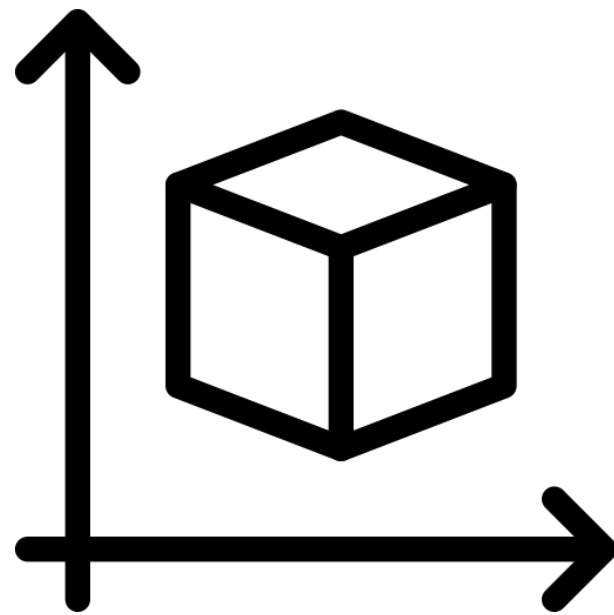
Box containing:

- A motor attached to a three different gears connected to an Archimedes screw
- Arduino Uno, DC motor Controller, and a 12V DC Motor on one side with their associated wiring
- An ultrasonic sensor on top

The box is covered with a lid with a cut out to and a plastic container to act as a funnel to funnel in food.



Constraints & Testing Plan



Size

Must fit on side of wheelchair

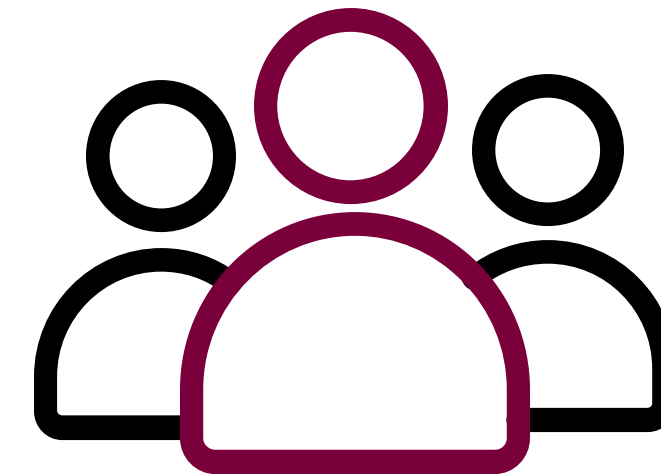
-> Measure mechanism; must be less than 40.6 cm in length



Weight

Must be less than 1 kg

-> Weigh mechanism



Client Dexterity

Must be used with limited hand mobility

-> 5 users attempt to use design without exerting excess force

Objectives & Testing Plan



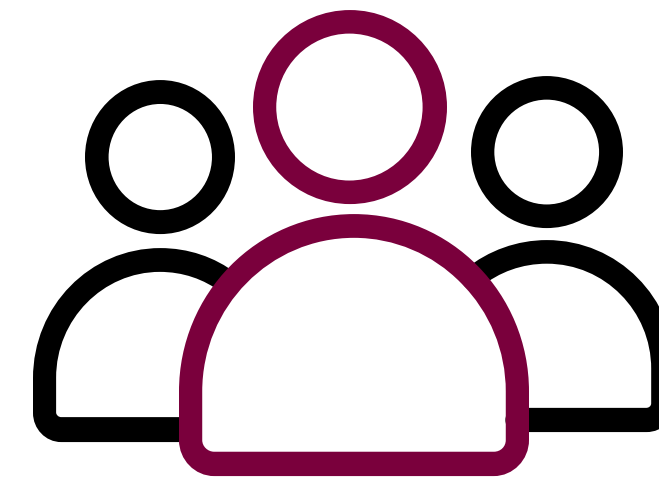
Reliable

Quantity of treats dispensed must be consistent. Smarties and Hi-Chews used to simulate treats.



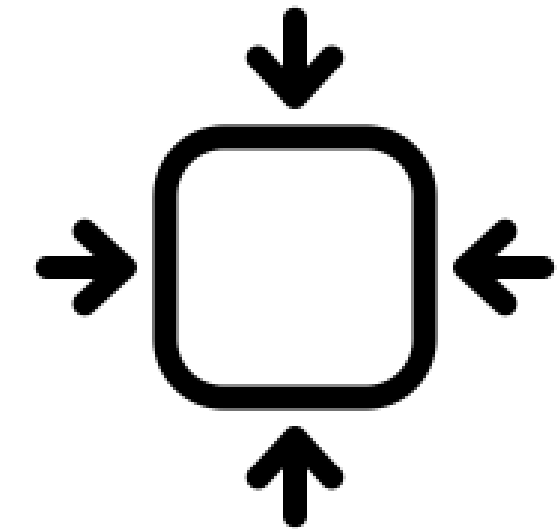
Durable

Subject to real-life physical stress simulations.
Apply force to mechanism, transport. Bike test.



Intuitive

Gather user feedback.
5 users attempt to use without guidance, rate on intuitiveness.

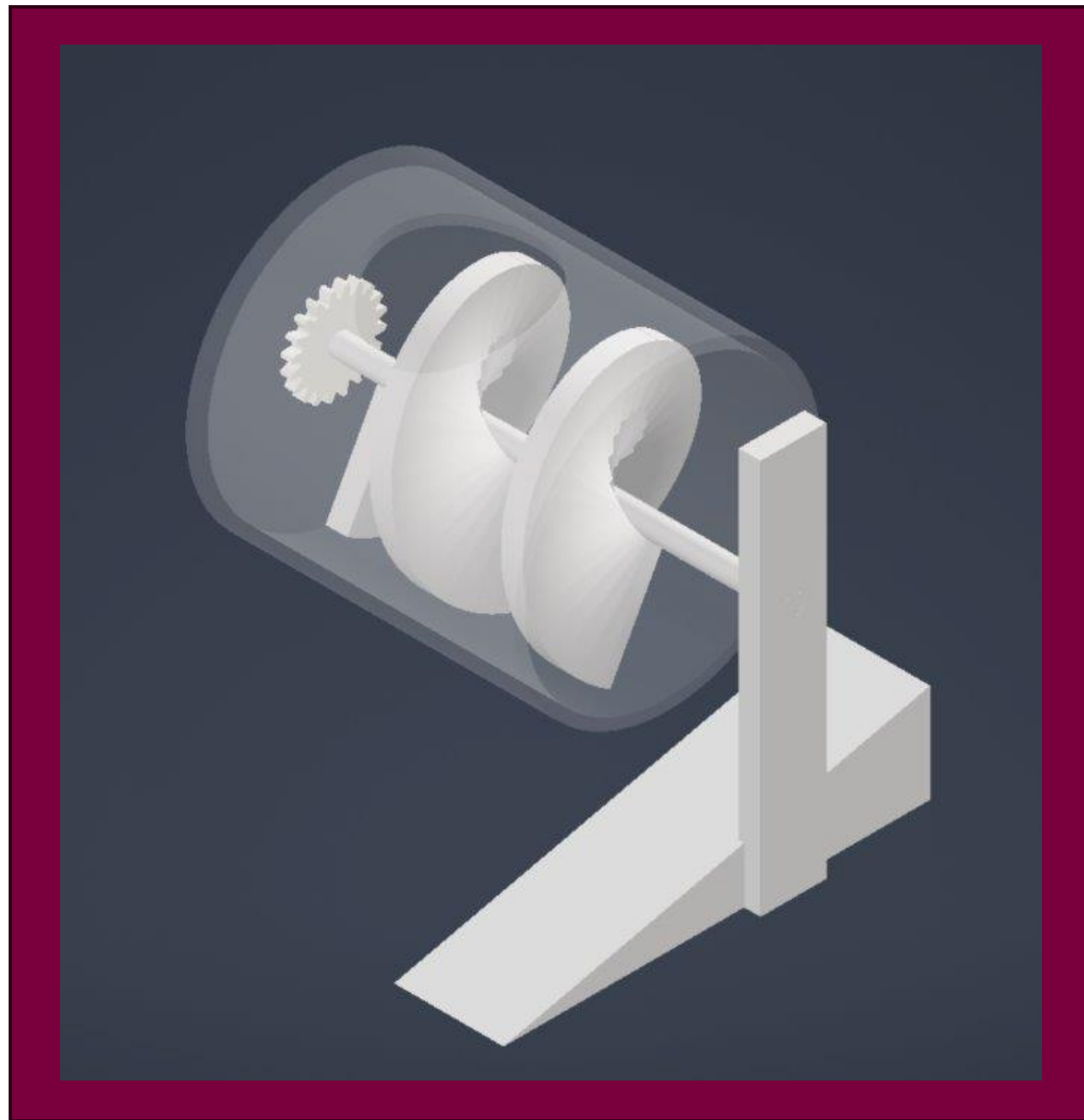


Portable

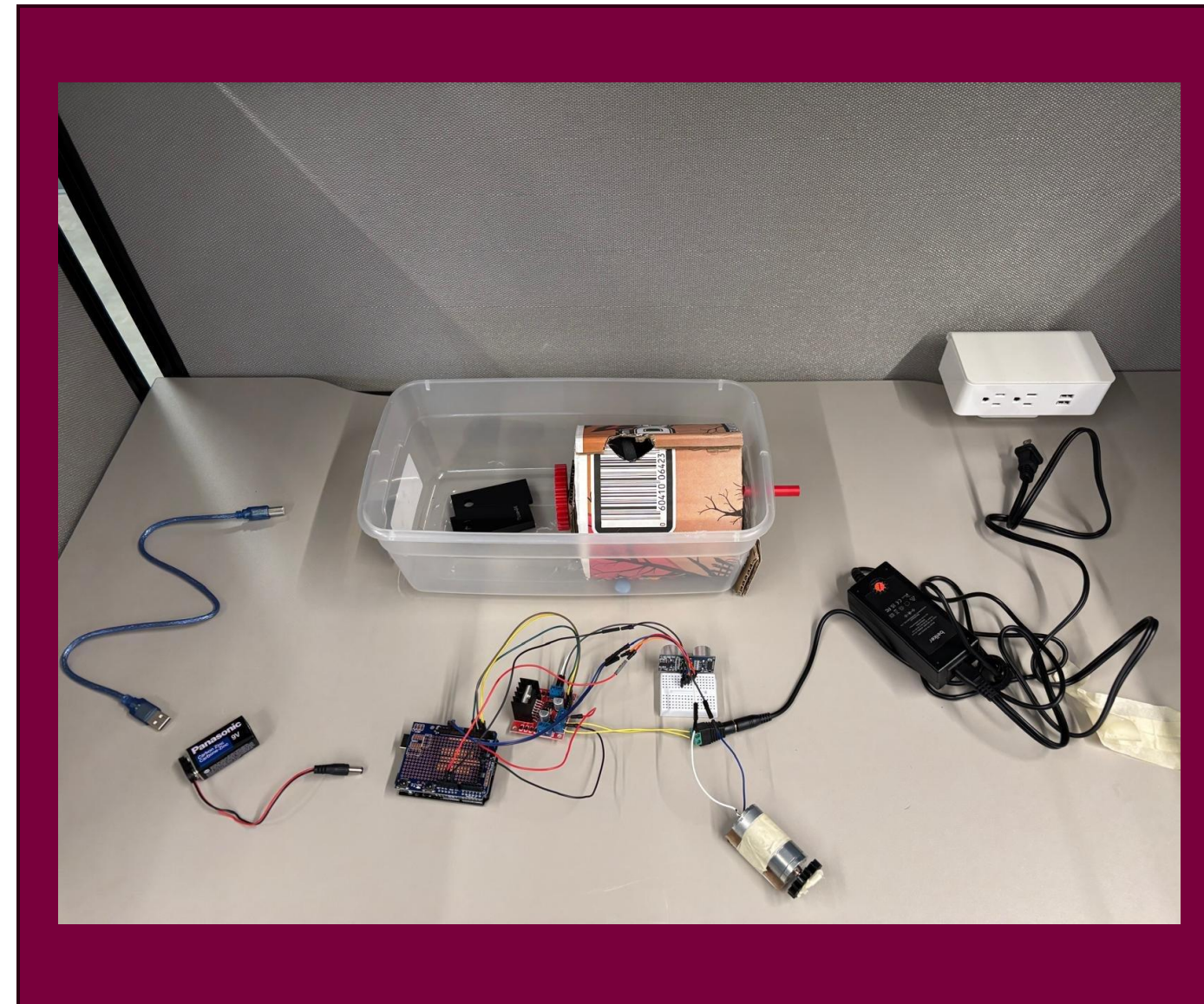
How easily does the mechanism move from one location to another, how easy is it attach and carry. Attach to chair, measure dimensions, ease of transport.

Iteration Timeline

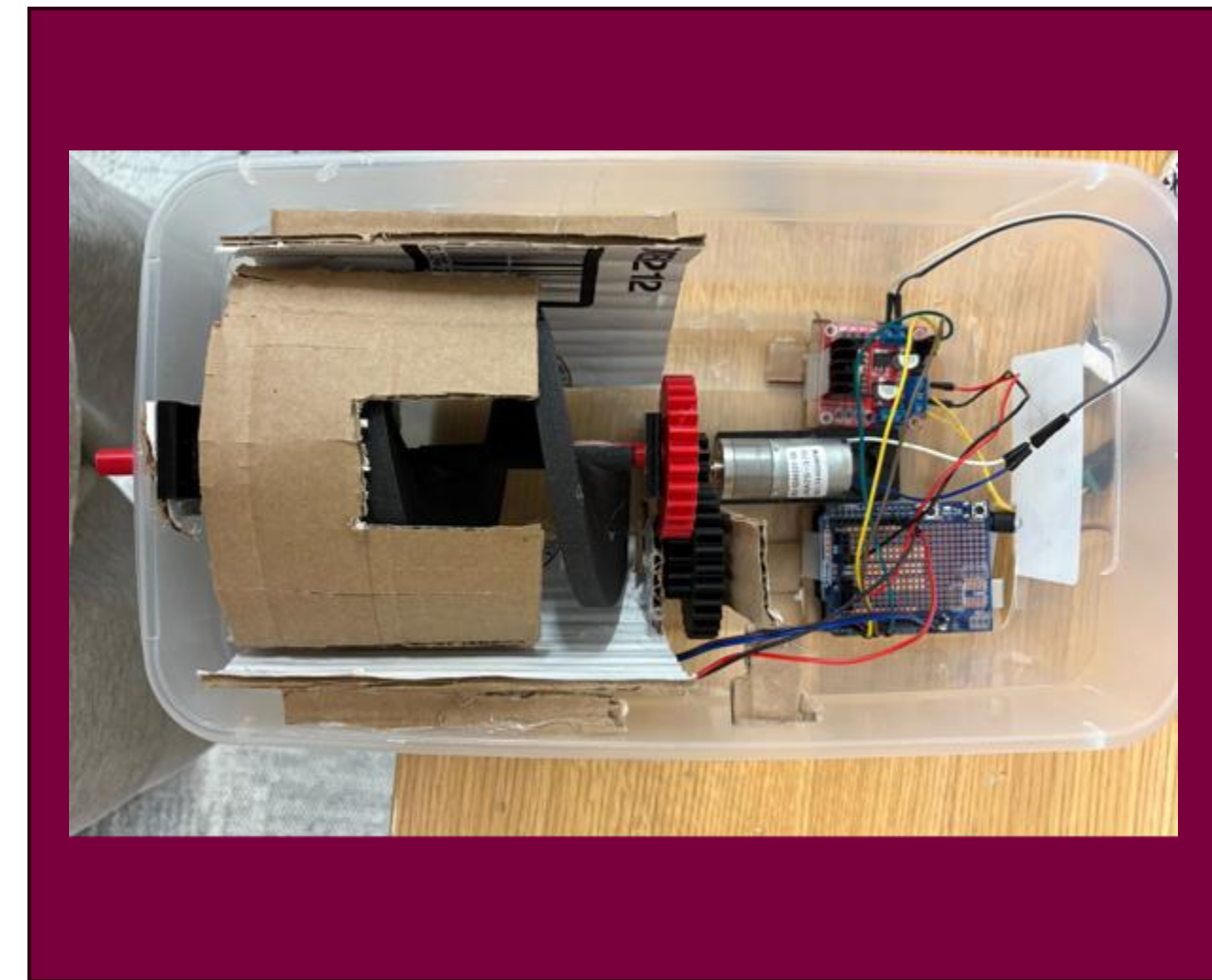
- Progress of Prototype -



CAD Model



First Consolidation of Components



Final Design

Iteration Timeline

Decision Matrix

| Criteria | Weighting (out of 5) | Button-Activated Dispenser | Treat | Secure Pouch | Motion-Activated Treat Dispenser | Ball Launcher | Arm Attached Thrower |
|-----------------------|----------------------|----------------------------|-------|---------------------|----------------------------------|---------------------|-----------------------|
| Durable | 5 | Score:3 Total:15 | | Score:3 Total:15 | Score:4 Total:20 | Score:3 Total:15 | Score: 3 Total:15 |
| Portable | 4 | Score:3 Total:12 | | Score:4 Total:16 | Score:2 Total:8 | Score:4 Total:16 | Score: 4 Total: 16 |
| Lightweight | 3 | Score:2 Total:6 | | Score:3 Total:9 | Score:3 Total:9 | Score:4 Total:12 | Score: 4 Total:12 |
| Intuitive | 4 | Score:5 Total:20 | | Score:5 Total:20 | Score:4 Total:16 | Score:3 Total:12 | Score:4 Total:16 |
| Cost-Effective | 2 | Score:3 Total:6 | | Score:2 Total:4 | Score:3 Total:6 | Score:1 Total:2 | Score:2 Total:4 |
| Feasibility | 4 | Score:5 Total:20 | | Score:4 Total:16 | Score:4 Total:16 | Score:4 Total:16 | Score:2 Total:8 |
| Sum | n/a | 79 | | 80 | 85 | 73 | 55 |

Benefits Over Other Designs

- Portable
- User Agency
- Lightweight
- Intuitive
- Storage
- Motion-Activated



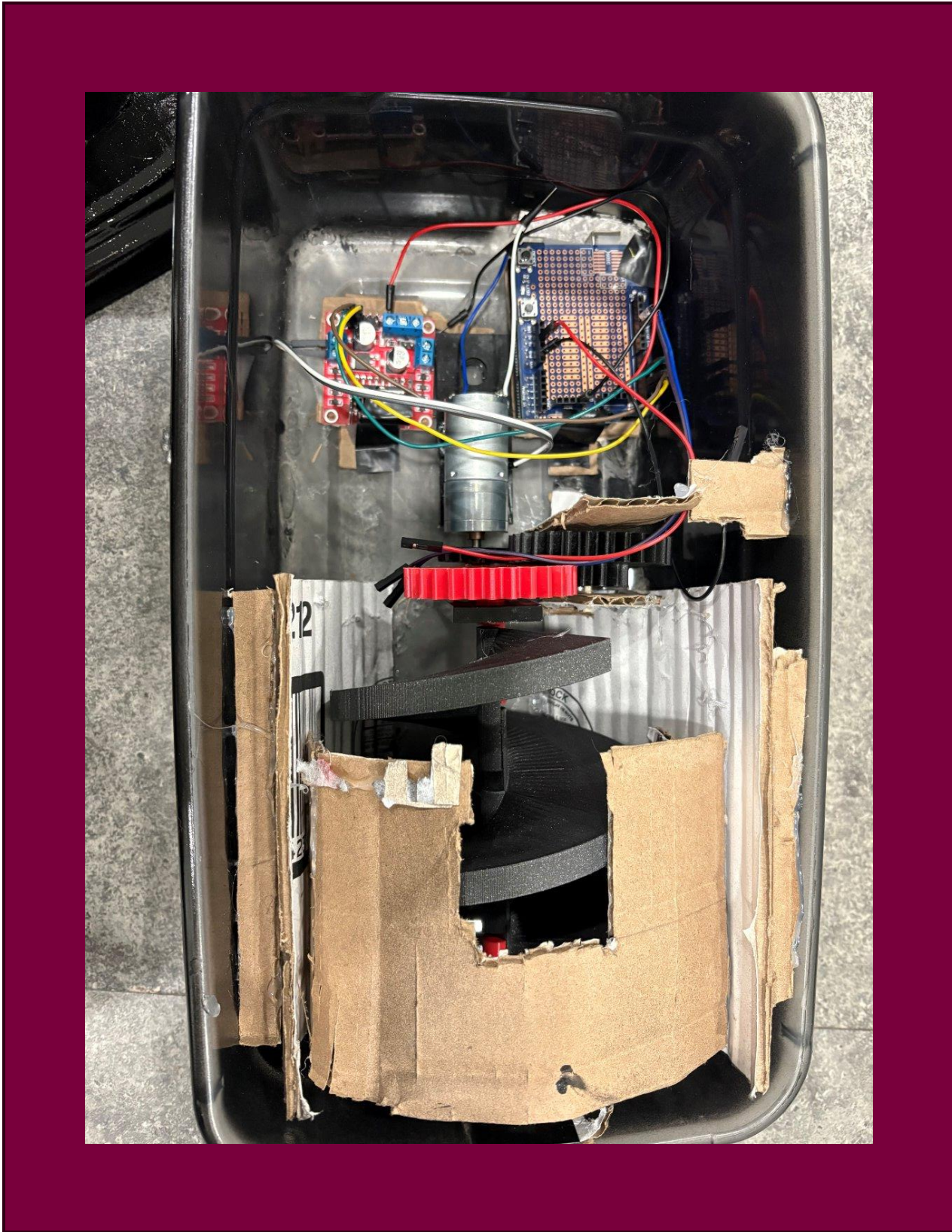
Figure 1. Dog Treat Dispenser [1]



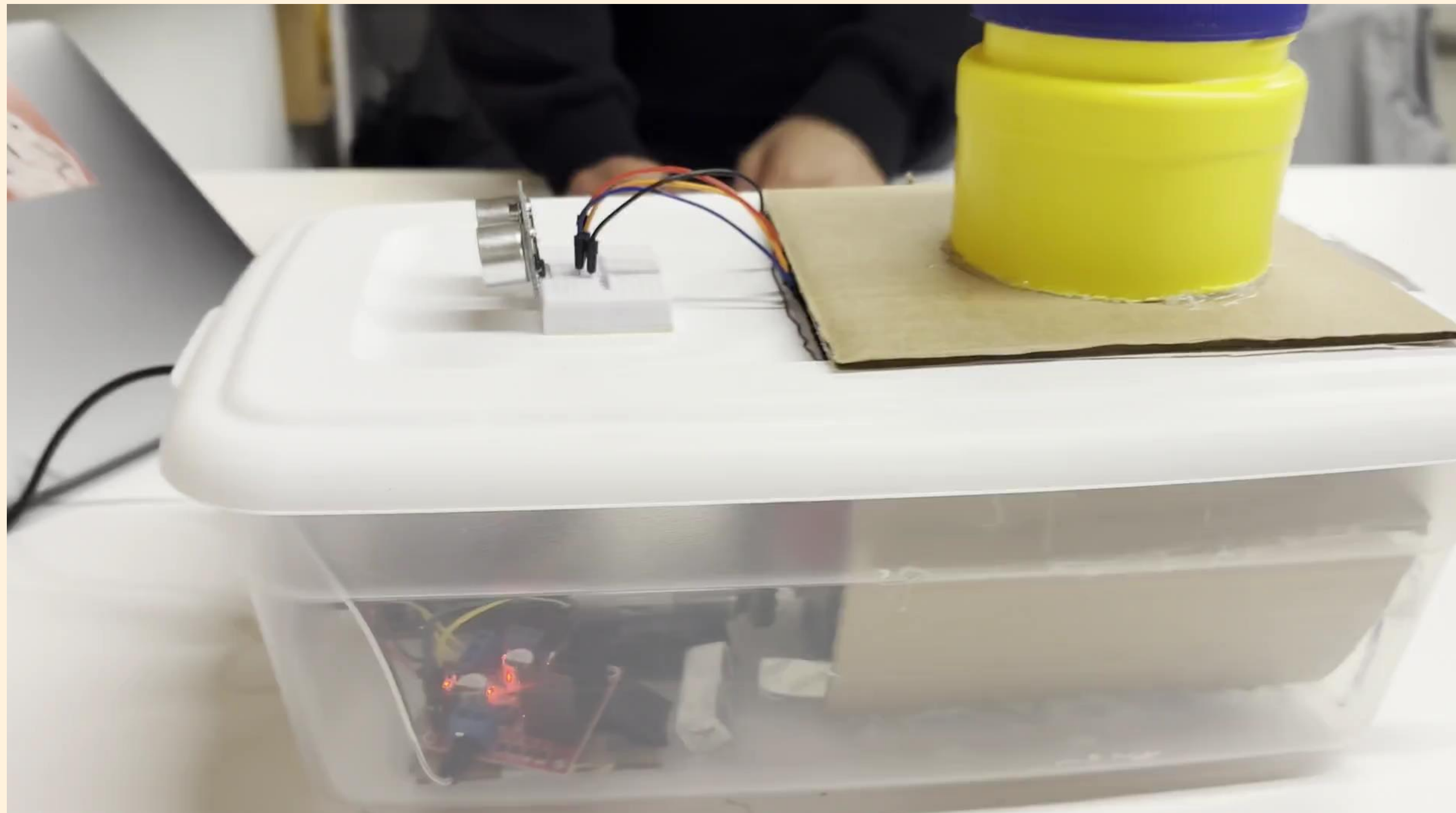
Figure 2. Furbo Dog Food Dispenser [2]

What Does Our Design Cost?

| Materials | Qty. | Cost |
|-------------------------------------|-----------------------|--------------|
| PLA (3D Printing) | 108.94g (4h 16min) | 2.77 |
| Cardboard | 580 cm ² | 0.58 |
| Plastic container | 1 | 3.47 |
| Old plastic jar | 1 | 0.00 |
| 12 V DC Motor (JGA25-270 – 400 RPM) | 1 | 13.82 |
| DC Motor Controller - L298N | 1 | 10.99 |
| Arduino UNO | 1 | 21.99 |
| 12 V Battery Pack | 1 | 11.99 |
| Total | | 65.61 |



Final Prototype Demo



References

- [1] “Arf Pets Remote Dog Treat Dispenser for memory training,” ARF PETS Remote Dog Treat Dispenser for Memory Training, <https://www.amazon.ca/Arf-Pets-Dog-Treat-Dispenser/dp/B07J9QQSS4?th=1> (accessed Mar. 29, 2026).
- [2] J. L. Dr., “Review of the Furbo Treat-Throwing Dog Camera | Dr. Justine Lee, DACVECC, DABT, Board-certified Veterinary Specialist,” Dr. Justine Lee, <https://drjustinelee.com/review-of-the-furbo-dog-camera-dr-justine-lee-dacvecc-dabt-americas-veterinarian/> (accessed Mar. 29, 2026).

Thank you!

Courtesy of Tues-54

