GNG 2101

Design Project User and Product Manual

User Manual

Short video Presentation:
https://drive.google.com/file/d/1RlA72LBDBCcQ0MV76AdVOQ7c75vjwW0i/view?usp=sharing

<Wheelie Good Treats, B4.1>

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List of Acronyms and Glossary

Table 1. Acronyms

Acronym	Definition
BOM	Bill of Materials
UPM	User and product manual
RF	Radio frequency

1 Introduction

This User and Product Manual (UPM) provides the information necessary for socializers to effectively use the accessible treat dispenser and for prototype documentation. The "Wheelie Good Treats" user manual, is your guide to an innovative treat dispenser designed to enhance communication and strengthen the bond between you and your beloved pets. At Wheelie Good Treats, we understand the importance of positive interactions with your pets, and our accessible treat dispenser is crafted with this in mind. This manual is your go-to resource for a smooth experience, covering essential aspects such as cautions and warnings to ensure the safety of both users and pets, step-by-step instructions for system setup, a detailed guide to the user interface, troubleshooting tips, and all product documentation. While conceptualizing our product, we've assumed that users have a basic understanding of smart devices and are committed to the well-being of their pets. The document is organized to take you through each stage of the product's life cycle, from setup to troubleshooting, and is designed for anyone seeking to enhance their connection with their pets. While prioritizing user-friendliness, we also emphasize the security and privacy considerations to this manual to guarantee a safe and enjoyable experience for both you and your pets. Thank you for choosing Wheelie Good Treats, where communication meets treats, making every moment with your pets Wheelie Good.

2 Overview

The major problem we wanted to solve was the issue of closing the interaction gap between individuals bound to wheelchairs and their dogs. We've learnt that the bond between a person and their dog can be a vital source of emotional support and companionship. However, physical limitations, such as being in a wheelchair, can create barriers to this interaction. To bridge this gap, we created a design that is a user-friendly treat dispenser that could attach to the client's wheelchair and enhance their interaction with their dog. Our solution not only improves their quality of life by facilitating accessible and enjoyable interaction but also promotes emotional well-being, health benefits, and empowerment by providing features like wheelchair attachment, button control, and alert measures. One of these measures being an audible signal to notify both the dog and the user when the treat has been dispensed. By taking this approach we have made pet companionship more inclusive and accessible, ensuring that everyone can experience the joys of bonding with their canine companions, regardless of their physical limititations. Addressing the most important user requirements such as accessibility, durability, and intractability is important while creating our treat dispenser that attaches to a wheelchair. Accessibility ensures that the device can be easily attached to various wheelchair models, facilitating interaction without physical strain. Durability guarantees the longevity of the product, providing a reliable means of engagement over time. Intractability encompasses user-friendliness, and features like audible signals for an inclusive and engaging interaction experience. This solution we created is important as it enhances the enjoyment and accessibility of our wheelchair-bound client. It gives our client a sense of empowerment since she can now interact with her dog independently from needing assistance of any kind. Current alternatives on the market may not offer the same level of accessibility, user-friendliness, and tailored features compared to our product. This makes our treat dispenser a vital innovation for bridging the interaction gap between individuals in wheelchairs and their dog companion. Our final prototype of a wheelchair treat dispenser excels in several key aspects that set it apart from other solutions on the market. It's tailored for wheelchair users, features a user-friendly interface, includes an audible signal for interaction, incorporates safety measures, and prioritizes durability. This comprehensive design ensures a more accessible, engaging, and inclusive interaction between individuals in wheelchairs and their dogs, making it a superior choice for enhancing their quality of life and promoting their emotional well-being compared to existing alternatives.

Figure 1: Inside of treat dispenser

Figure 2: Outside of treat dispenser

Some of our key features include a RF Button, Wheelchair mount, Various amounts of treats, Drop Treats , Sound notification, and Automatic Valve. The RF button allows for a quick and easy connectivity feature between the button and the RF receiver within the box waiting to receive the signal. With a secure wheelchair mount, the dispenser can be easily attached to a wheelchair, ensuring accessibility for individuals with mobility challenges. It can hold various types and amounts of treats, accommodating diverse preferences and dietary needs. The automatic valve dispenses treats with a simple button press, while sound notifications provide feedback and alerts. Together, these features create a versatile and user-friendly treat dispenser suitable for pets or individuals with mobility impairments.

Our system is built off of a cardboard box with a magnetic door hinge. The storage units for the treats are built from plastic and so are the valves and motors, the electronics are Arduino based, and everything is supported using cardboard. The user access mode consists of a button that connects via RF receiver to the box, when the signal is sent there is a short delay that will activate the electronics in the box and release treats while giving a notification signal that a treat has been released.

2.1 Conventions

There are no stylistic and command syntax conventions within this document. It is a straight forward read through style document with a table of contents to separate each part and to guide the reader to the part they require information on.

2.2 Cautions & Warnings

Before using the treat dispenser prototype, users should exercise caution by ensuring the safety of the treats dispensed, considering potential electrical security risks, and securely mounting the device to prevent accidents. They should also be mindful of sound notifications' volume and frequency and follow proper cleaning and maintenance procedures. They should be mindful that bad wiring and batteries may create a fire within the product or may overheat the battery and short circuit the product.

3 Getting started

General Walkthrough: From Setup to Exit

Step 1: Unboxing and Initial Inspection

Carefully open the box and remove the treat dispenser, RF button, and mounting accessories. Check for any visible damage or missing parts.

Step 2: Mounting the Dispenser to the Wheelchair

Identify a suitable spot on the wheelchair for the dispenser. Use the provided clamps or brackets to securely attach the dispenser, ensuring it does not obstruct mobility or comfort.

Step 3: Installing the RF Button

Place the RF button within easy reach of the user. Secure it using adhesive strips or clamps.

Step 4: Loading Treats into the Dispenser

Open the dispenser using the magnetic door hinge. Fill the storage units with treats, then close and secure the dispenser.

Step 5: Testing the System

Press the RF button to test the dispensing mechanism. Ensure that a treat is released and an audible notification is heard.

Step 6: Adjusting Settings

Adjust the volume of the sound notification and calibrate the dispenser for different treat sizes if necessary.

Step 7: System Shutdown and Storage

Power off the system, remove any remaining treats, and clean the dispenser. Detach it from the wheelchair and store it in a safe place.

3.1 Configuration Considerations

Physical Prototype Description and Configuration:

The physical prototype system is a wheelchair-attachable treat dispenser, designed to enhance the interaction between individuals with mobility impairments and their dogs. The main components include:

- **Cardboard Box:** This houses the treat dispensing mechanism. It is equipped with a magnetic door hinge for easy access and refilling.
- **Plastic Storage Unit:** These are located within the cardboard box and are used to store the treats.
- **Valves and Motors:** These components control the release of treats. The motors activate the valves to lift and dispense treats when signaled.
- **RF Button:** This wireless button can be placed conveniently for the user on the footrest of the wheelchair. When pressed, it sends a signal to the dispenser to release treats.
- **Arduino-based Electronics:** These are the brains of the device, controlling the treat dispensing mechanism.
- **Sound Notification:** A feature that provides audible feedback when a treat is dispensed, alerting both the user and the dog.

The dispenser attaches securely to the wheelchair, ensuring it is easily accessible and usable without physical strain. No specialized tools are required for setup; it is designed for user-friendly installation and operation.

Software Prototype Description and Configuration:

The software aspect of the system primarily involves the communication between the RF button and the Arduino-based electronics within the dispenser.

- **Input Device:** The RF Button serves as the input device. When pressed, it sends a wireless signal to the dispenser.
- **Receiver:** The Arduino-based electronics in the dispenser include an RF receiver. This receiver interprets the signal from the button.

- **Process:** Upon receiving the signal, the Arduino system triggers the motors to activate the valves, leading to the dispensing of treats.
- **Output:** The dual outputs are the physical dispensing of treats and the sound notification, providing immediate feedback to the user and the dog.

This configuration allows for a straightforward and intuitive interaction, where the user presses a button, and the treat is automatically dispensed with an accompanying sound alert. The system does not require complex programming or interfaces, making it user-friendly and accessible.

3.2 User Access Considerations

1. Individuals with Mobility Impairments:

- **Primary Users:** Those who use wheelchairs or have limited mobility.
- **Accessibility Needs:** The device must be easily attachable to different wheelchair models. Controls (like the RF button) should be within easy reach and require minimal force to operate.
- **Restrictions:** Limited physical reach and strength might restrict interaction with certain parts of the device, necessitating design considerations like the placement of the treat dispenser and the ease of refilling it.

2. Elderly Users:

- **User Group:** Older adults who may have reduced mobility or dexterity.
- **Accessibility Needs:** Similar to those with mobility impairments, but also requiring simple, intuitive controls due to potential technology apprehension or cognitive decline.
- **Restrictions:** Reduced motor skills or cognitive abilities might limit their interaction with complex mechanisms or multi-step processes.

3. Children with Disabilities:

- **User Group:** Young individuals with physical disabilities or developmental disorders.
- **Accessibility Needs:** Safety is paramount. The device should have no small, detachable parts and should be sturdy and tamper-proof. Controls should be simple and engaging.
- **Restrictions:** Depending on the disability, there may be limited understanding or physical ability to operate the device without assistance.

4. Pet Owners without Disabilities:

- **User Group:** General pet owners who might find the device useful for training or bonding with their pets.

- **Accessibility Needs:** While not having specific accessibility needs, the device should still be user-friendly and convenient.
- **Restrictions:** None specific, but the device may be less optimized for their use compared to individuals with mobility impairments.

3.3 Accessing/setting up the System

Setting Up the Physical Prototype (Wheelchair Treat Dispenser):

Initial Setup:

- **Unboxing:** Carefully remove the dispenser and its components from the packaging.
- **Inspection:** Check all parts for any damage incurred during shipping.

Mounting the Dispenser:

- **Positioning:** Identify a suitable spot on the wheelchair where the dispenser can be mounted without interfering with the wheelchair's functionality or the user's comfort.
- **Attachment:** Use the provided clamps and mounting brackets to securely attach the dispenser to the wheelchair. This should be a straightforward process, requiring minimal tools.

Installing the RF Button:

- **Placement:** Decide on a convenient and easily accessible place for the RF button, such as the wheelchair armrest or a location within easy reach of the user. (For those with different abilities we suggest the foot rest which could make for an easier push)
- **Securing the Button:** Attach the button using adhesive strips, ensuring it is firmly in place and won’t move during use.

Loading Treats:

- **Opening the Dispenser:** Use the magnetic door hinge to open the dispenser.
- **Filling with Treats:** Place the desired treats into the storage units inside the dispenser. Using the funnel at the top of the box
- **Closing the Dispenser:** Securely close the dispenser to ensure treats are contained.

Personal Adjustments:

- **Volume Control:** Adjust the volume of the sound notification according to personal preference and environment.
- **Treat Size Calibration:** If the dispenser allows, adjust settings to accommodate different treat sizes, ensuring smooth dispensing.

Final Check:

- **Testing:** Press the RF button to test the dispensing mechanism and ensure everything is working correctly.

3.4 System Organization & Navigation

Main Component: Dispenser Unit

- **Description:** This is the central component of the system, box-like structure.
- **Materials:** Made from durable cardboard with a magnetic door hinge for easy access.
- **Function:** Houses the treat dispensing mechanism, including storage, release system, and electronic controls.

Accessory: RF Button

- **Description:** A wireless button designed for easy activation of the treat dispensing process.
- **Connectivity:** Communicates with the dispenser unit via RF (radio frequency) signals.
- **Placement:** Mounted on a convenient spot on the wheelchair for easy access by the user.

Accessory: Mounting System

- **Description:** Includes clamps and brackets for attaching the dispenser to the wheelchair.
- **Materials:** Made of sturdy materials to securely hold the dispenser in place.
- **Function:** Enables the dispenser to be attached to various parts of the wheelchair, depending on user preference and wheelchair design.

Feature: Treat Storage

- **Location:** Inside the dispenser unit.
- **Materials:** Constructed from plastic to ensure durability and ease of cleaning.
- **Capacity:** Varies in size to accommodate different types and amounts of treats.

Feature: Automatic Valve and Motor

- **Function:** Controls the release of treats from the storage area.
- **Operation:** Activated by signals received from the RF button.
- **Mechanism:** Utilizes motors to operate valves that dispense treats.

Feature: Electronic Controls

- **System:** Based on Arduino technology.
- **Purpose:** Manages the operation of the motors and valves in response to signals from the RF button.
- **Integration:** Embedded within the dispenser unit.

Feature: Sound Notification System

- **Function:** Provides audible feedback when treats are dispensed.
- **Integration:** Part of the electronic control system.
- **User Interaction:** Volume and sound type may be adjustable for user preference and environmental considerations.

3.5 Exiting the System

Putting Away the Physical Prototype (Wheelchair Treat Dispenser):

Powering Off and Disconnecting:

- If the dispenser has any electronic components that are powered on, such as the Arduino-based system, ensure they are properly turned off.
- Disconnect any power sources or batteries to prevent drainage or potential hazards when not in use.

Removing Treats:

- Open the dispenser using the magnetic door hinge.
- Remove any remaining treats from the storage units to prevent them from going stale or attracting pests.

Cleaning:

- Wipe down the dispenser's exterior and interior with a suitable cleaning agent, especially if there are remnants of treats. Ensure the cleaning agent is safe for the materials used in the dispenser.
- Clean the RF button and any other external components that are regularly touched.

Storing the Dispenser and Components:

- Choose a dry, cool place for storage to prevent any damage from moisture or heat.
- Store the dispenser and its components in a way that prevents them from getting crushed or damaged. If the original packaging is available, it can be ideal for storage.

Documentation and Manuals:

- Store any user manuals or documentation in an easily accessible place. This is important for troubleshooting or for reference when setting up the system again.

By following these steps, you can ensure that the wheelchair treat dispenser is properly put away, maintained, and ready for its next use.

4 Using the System

4.1 Mounting the Dispenser to the Wheelchair

Function Overview:

This function involves attaching the treat dispenser securely to the user's wheelchair. This is the first step in setting up the system for use.

Required Input:

- **Physical Effort:** Using hands to manipulate clamps or mounting brackets.
- **Tools Needed:** Basic tools like a screwdriver, may need to screw in the clamps to the box.

Output:

- A securely attached dispenser on the wheelchair.

Step-by-Step Instructions:

Locate Mounting Point: Identify a suitable spot on the wheelchair that does not obstruct the user's movement or comfort.
Attach Dispenser: Position the dispenser against the chosen spot.
Secure with Clamps/Brackets: Use the provided clamps and brackets to firmly secure the dispenser in place. Tighten screws if necessary.

Caveats and Exceptions:

- Ensure the dispenser is not positioned where it can interfere with the wheelchair’s functionality.

4.1.1 Loading Treats into the Dispenser

Function Overview:

This sub-function involves filling the dispenser with treats for the dog.

Required Input:

- **Physical Effort:** Opening the dispenser and placing treats into the storage units.
- **Material Needed:** Dog treats of appropriate size for the dispenser.

Output:

- Dispenser loaded with treats, ready for dispensing.

Step-by-Step Instructions:

Open Dispenser: Use the magnetic door hinge to open the dispenser.
Fill with Treats: Place the treats into the storage units.
Close Dispenser: Ensure the dispenser is closed and secured properly.

Caveats and Exceptions:

- Avoid overfilling to prevent jamming the dispensing mechanism.

4.2 Operating the RF Button

Function Overview:

The RF (Radio Frequency) button is used to remotely activate the treat dispenser.

Required Input:

- **Physical Effort:** A gentle press on the RF button.

Output:

- Wireless signal sent to the dispenser to release a treat.

Step-by-Step Instructions:

Locate the RF Button: Ensure the button is within easy reach.
Press the Button: Apply a gentle press to activate.

Caveats and Exceptions:

- Ensure the button's battery is charged for uninterrupted operation.

4.3 Receiving Treat Dispensation Notification

Function Overview:

This feature alerts the user and their dog when a treat has been dispensed.

Required Input:

- Automatic: Triggered by the dispensing of a treat.

Output:

- Audible notification signal.

Step-by-Step Instructions:

Dispense Treat: Use the RF button to dispense a treat.
Listen for Notification: An audible signal will be emitted once the treat is dispensed.

Caveats and Exceptions:

- Volume of the notification may need adjustment based on user preference and environment.

5 Troubleshooting & Support

5.1 Error Messages or Behaviors

The Wheelie Good Treats dispenser is equipped with a notification sound system to alert users in the event of a treat clog. If the system detects blockage, it will emit three distinct "Beep" sounds to notify the user. This audio informs the user of potential clogging issues. Additionally, if there is a drastic change in the system's serving size without user input, it is advised to consider it as a potential internal system error. Users are encouraged to refer to the troubleshooting section of the manual for guidance in such cases. Furthermore, should users notice unusual sounds coming from within the dispenser, it is likely that these sounds are caused due to a lining issue. In such instances, it is recommended to renew the storage unit to maintain the optimal functionality of the treat dispenser and ensure a better experience for both users and their pets.

5.2 Special Considerations

As previously mentioned any alerts such as a distinct “Beep” sound, uncommon serving size, or distinguishable faint sounds from within the system are all troubleshootings messages. These alerts should caution the user of a minor system malfunction that should comfortably be repaired.

5.3 Maintenance

While refilling the Wheelie good treat dispensers users should ensure that the storage component of the dispenser holds the same weight of treats (No more or less then the indicated amount on the box). Users should also frequently confirm the treat serving size to ensure both the users and their pets safety. The user should regularly confirm that the treat notification sound is functioning correctly to ensure software composure.

5.4 Support

For any urgent assistance or system support related to the Wheelie Good Treats dispenser, our dedicated support unit is always ready to help. To reach out to our Support Staff Manager, Bilal Hajji, feel free to contact him at bilal.hajji@wheeliegoodtreats.com. For general inquiries, help desk support, or product-related concerns, please email our support team at support@wheeliegoodtreats.com. To report unidentified problems with the system, please include a detailed description of the issue and send it to our support email.Our support team is committed to providing swift and effective assistance, ensuring a Wheelie Good experience for you and your pets.

6 Product Documentation

6.1 Treat dispenser

In order to build the full product, the treat dispenser is absolutely a necessity. This subsystem performs the storage of the dog treats, as well as the dispensing of the treats to the dog. All of the elements in this part are absolutely critical to the overall function of the entire design. For the capacity unit inside the treat dispenser box, we would've liked to make it a nicer design, but we found that using a 2L water bottle was a way to save money and have a food safe product. The capacity unit can be modified based on the builder's discretion, as long as the unit is food safe and can easily be connected to the knife valve entrance. We also found that using a ply tube to transport the treats to the knife valve would be efficient and aesthetically pleasing, but we used a cheaper alternative with toothpaste boxes. Although the BOM and instructions include the poly tube and our design includes a toothpaste box, both can be interchanged as they serve the same purpose with similar efficiency.

6.1.1 BOM (Bill of Materials)

These are all of the elements that need to be obtained in order to create this subsystem:

Name	Price	Quantity	Total	Link
RF Transceiver	$11	1	$11	Amazon
Arduino Uno	$15	1	$15	Maker Store
Passive Buzzer	$9	1	$9	Amazon
Arduino motor shield	$13	1	$13	Amazon
Magnetic Box	$8	1	$8	Amazon
Funnel	$2	1	$2	Amazon
Knife valve	$8	1	$8	Amazon
Gear	$1.33	2	$2.66	Amazon
Motor	Free	1	Free	Amazon
Jumper wires	1$	10	1$	Maker Store

Empty 2L water bottle	Free	1	Free	
Poly tube	0.75	1 ft	0.75	Hydro Lite
Arduino IDE	Free	1	Free	Arduino IDE
Ultimaker Cura	Free	1	Free	Cura
		Subtotal	$70.41	

Table 3: Bill of materials

6.1.2 Equipment list

- Exacto knife
- Soldering kit
- Scissors
- Epoxy glue
- Ultimaker 2+ 3D printer
- Wire cutters

6.1.3 Instructions

Electronics (Receiver unit)

1. Connect the Arduino Uno to a laptop using the USB cable
2. Open Arduino IDE, copy and upload the receiver unit code into the Arduino Uno
3. Disconnect the USB and place the Arduino motor shield on the Arduino Uno
4. Strip both sides of two jumper wires using the wire cutters and solder one side of each wire onto the metallic tips of the motor
5. Use the jumper wires to connect the motor, buzzer, transceiver and Arduino Uno according to the circuit schematics.

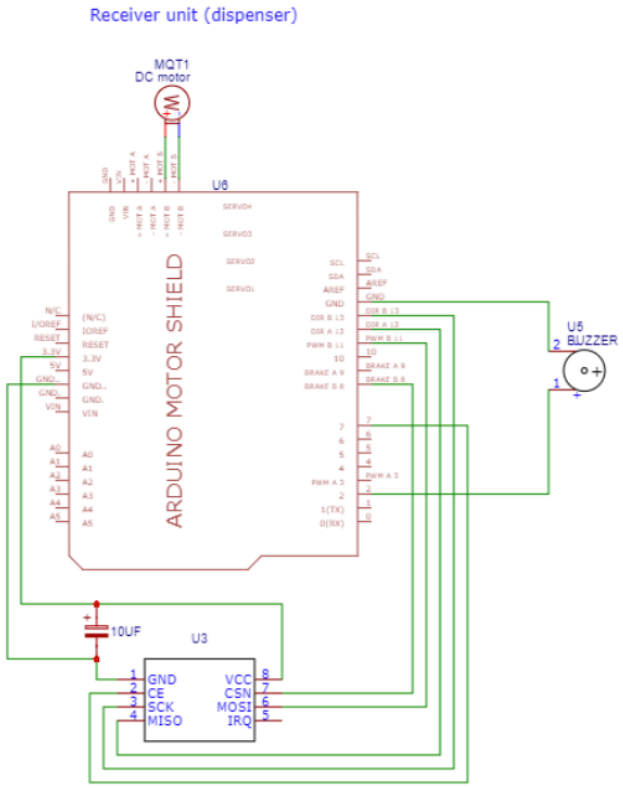

Figure 3 - Receiver unit circuit schematics

Dispenser box

1. First, start with the black magnetic box. Place the box such that it's height is the most it can be
2. Place the funnel at a desired position on top of the box and trace the hole needed
3. Cut the traced hole using the Exacto knife
4. Fix the funnel on top of the whole using epoxy glue, lightly push the funnel while it is in position for around 5 mins
5. Starting from the bottom of the water bottle, strip off about half of it using scissors.
6. Use epoxy to fix the new opening of the water bottle to the hole from the inside of the dispenser box
7. Place the knife valve on the small side of the inside of the box, ensure there is enough space to pull the lever up completely
8. Use epoxy to fix the knife valve, hold it in position for five minutes.
9. Use the Exacto knife to cut a hole the same size as the knife valve hole
10. Cover the tip of the bottle using poly tube
11. Cut a part of the poly tube such that the end of the tube touches the gate while the valve is closed
12. Using Ultimaker Cura, load motorcasebottom.stl into the file, press Slice and save it into an SD Card
13. Insert the SD card into the Ultimaker 2+ 3D printer and select the file, then start the print

14. Place the electronics at the bottom of the box, under the poly tube
15. Place the motor case on the biggest side of the dispenser box
16. Place the gear onto the motor and place the motor into the slot of the motor case such that the gear is facing the knife valve
17. Place a gear on the front side of the knife valve such that the teeth of the two gears are locking with each other
18. Use epoxy glue to stick the valve gear and the motor case to the wall.(a second person may be necessary for this step)

6.2 External button

The external button is another important part of the product, since it increases the accessibility of the product for the client. WIth an external button, the machine can be operated with a simple button press. The button can be used anywhere, which means that remote care for the dog is increased with this feature.

6.2.1 BOM (Bill of Materials)

Name	Price	Quantity	Total	Link
RF Transceiver	$11	1	$11	Amazon
Arcade button	$3	1	$3	Ebay
Arduino Micro	$21.16	1	$21.16	Maker Store
Jumper wires	1$	10	1$	Maker Store
10uF capacitor	Free	1	Free	
Arduino IDE	Free	1	Free	Arduino IDE
Ultimaker Cura	Free	1	Free	Cura
		Subtotal	$33.16	

6.1.2 Equipment list

- Ultimaker 2+ 3D printer
- Wire cutters

6.1.3 Instructions

1. Strip both sides of three jumper wires using the wire cutters and solder one side of each wire onto the metallic tips of the button
2. Use the jumper wires to connect the transceiver and button according to the circuit schematics

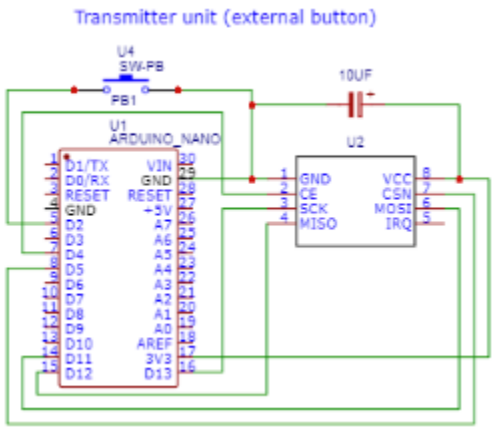

Figure 4 - Transmitter

6.3 Testing & Validation

Testing system

- If everything works correctly, pressing the button should activate the motor, which will raise and drop the knife valve, causing the treats inside the capacity unit to drop to the floor.

Testing button range

- We also tested the operation of the treat dispenser while varying the distance between the two transceivers. You may test this too, also this is not crucial for the product.

Testing for favorable speed

- Depending on the position of the motor case, the speed of the motor may have to be altered to compensate for it. To find the favorable speed, you must:
    1. Disconnect the motor from the case
    2. Remove the battery pins from the Arduino and connect it by USB
    3. Open Arduino IDE

7 Conclusions and Recommendations for Future Work

In conclusion, the project aims to create an accessible treat dispenser for wheelchair-bound clients, enhancing their interaction with their pets. Throughout the process, detailed assessments and prototypes were developed for various subsystems, emphasizing factors like durability, intractability, usability, and sustainability. Key insights from client meetings influenced design evolution. These insights included emphasizing durability, changing the dispenser's location for convenience, and shifting from a wall-mounted to a wheelchair-mounted design.

7.1 Lessons learned

As a result of this project, we may be able to learn the following lessons:

1. Throughout the project, it is crucial to understand and revisit the client's needs and preferences. By doing so, the final product aligns closely with their expectations and requirements.
2. Iterative Design Process: Iterative design processes allow continual improvement based on feedback from client meetings, testing, and evaluation.
3. The collaborative efforts of team members with diverse skill sets improve the quality of the project and facilitate comprehensive solutions to complex problems.
4. A product's accessibility and inclusivity should be prioritized in its design to ensure the product caters to a broader range of users, accommodating various needs and disabilities.
5. Assuring sustainability in product development, such as reducing energy consumption and using recyclable materials, showcases the project's social and environmental responsibility.
6. Flexibility and Adaptability: Meeting evolving project requirements requires the ability to adapt to change and be willing to modify initial plans or designs based on evolving insights.
7. Maintaining continuous communication with the client and within the team ensures everyone is on the same page as far as the project's goals, progress, and challenges are concerned.
8. The documentation of project progress, deliverables, and decisions made is crucial for future reference and smooth project management.

As a result of these lessons, teams can navigate challenges and optimize their processes to achieve successful outcomes in future projects.

7.2 Recommendations for future work

1. Prototype Refinement: Continuously refine and optimize the treat dispensing mechanism, focusing on compatibility with various treat sizes and types.
2. User Interface Development: Add the smartphone app to the product by incorporating additional features, ensuring accessibility for all users, particularly those with disabilities.
3. Continuous Reliability Testing: Conduct extensive testing of the entire assembled system for long-term performance and durability.
4. Client Collaboration: Maintain regular meetings with the client for feedback on prototypes and design modifications, ensuring alignment with their needs.
5. Sustainability Enhancement: Explore further ways to improve sustainability, potentially through material choices, energy efficiency, or recyclability.

By addressing these recommendations, the project can progress toward a finalized design that meets but exceeds the client's expectations. This will ensure an inclusive and functional treat dispenser for wheelchair users and their pets.

7.3 What difference if we had more time

Due to time constraints, aspects that might have been abandoned but would have been crucial to add if given more time include:

1. Testing with a wider range of individuals in diverse scenarios in order to gain more in-depth feedback.
2. As part of the iterative design process, the product is fine-tuned based on customer feedback or input from experts.
3. Analyzing diverse materials, production methods, and manufacturing processes to optimize durability, accessibility, and sustainability.
4. Documentation covering every stage of the design, development, and testing process, allowing seamless continuity if the project is handed over to another team.

With more time, these actions would improve the project's quality, usability, and effectiveness. As a result, users with disabilities and their pets would have access to a more refined and adaptable product.

8 Bibliography

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9 APPENDIX I: Design Files

This document serves as a comprehensive overview and progress report on the project. It is closely linked and supported by various other documents and platforms that contribute to the project's development, management, and technical details.

Project Proposal: The initial project proposal outlines the foundational objectives, client requirements, and initial scope. This proposal sets the groundwork for the project's direction and goals, guiding subsequent actions and decisions.

https://makerepo.com/project_proposals/380

MakerRepo: The MakerRepo platform houses all design files, technical documentation, CAD models, and related materials crucial to the project's technological aspects. It serves as a repository for accessing and reviewing project design components and progress.

https://makerepo.com/Fadiedy/1857.accessible-treat-dispenser-by-wheelie-good-treats

Wrike: The project management platform Wrike contains detailed timelines, tasks, milestones, and collaborative efforts. It tracks project progress, and schedules, and allows efficient communication and task management among team members.

https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=78gRXGPxOtZGgeLdfpheAOXIsKp7j3KH%7CIE2DSNZVHA2DELSTGIYA

By interacting information from these sources and platform, this document provides a comprehensive overview of the project’s progress, goals achieved, challenges faced, and future directions. The links provided enable a deeper dive into specific aspects, technical details, and project management elements.

Table 3. Referenced Documents

Document Name	Document Location and/or URL	Issuance Date
MakerRepo	https://makerepo.com/Fadiedy/1857.accessible-treat-dispenser-by-wheelie-good-treats	Nov 18 2023
Project Proposal	https://makerepo.com/project_proposals/380	Aug 23 2023

Wrike	https://www.wrike.com/frontend/ganttchart/index.html?snapshotId=78gRXGPxOtZGgeLdfpheAOXIsKp7j3KH%7CIE2DSNZVHA2DELSTGIYA	Sep 9 2023
3D Motor case bottom	MakerRepo	Nov 3 2023
Transmitter code	MakerRepo	Nov 23 2023
Receiver code	MakerRepo	Nov 23 2023