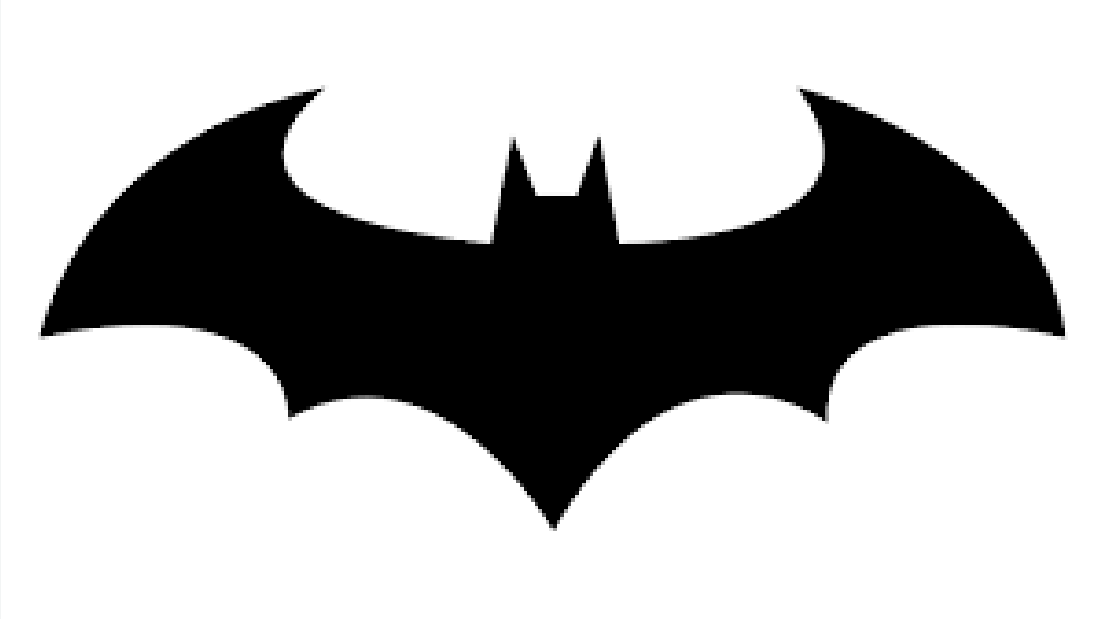


The Dark Knights: Final Presentation

Brayden, Jordan, Adam, Rami and Hala

Goals of the Presentation

- Explain the purpose of the project
- Present the final prototype for our bat box
- Explain changes we have made over the past client meetings to fully satisfy the client's needs and explain testing results
- Answer any questions you may have

Brayden

Problem Statement

A need exists for bat conservationists in Canada to track bat visits to bat boxes with a low-cost, weatherproof device that is easy to install, requires minimal maintenance, and does not interfere with bat movement, providing essential data for monitoring populations.

Jordan

What is the purpose of this project?

Monitor and analyze the frequency of bat visits to the bat box to understand behavioral patterns.

1

Provide valuable data for ecological studies or conservation efforts related to bats.

2

Incorporate client feedback from multiple meetings to ensure alignment with their goals and address concerns.

3

Deliver a reliable, client-focused solution for tracking and understanding bat activity effectively.

Jordan

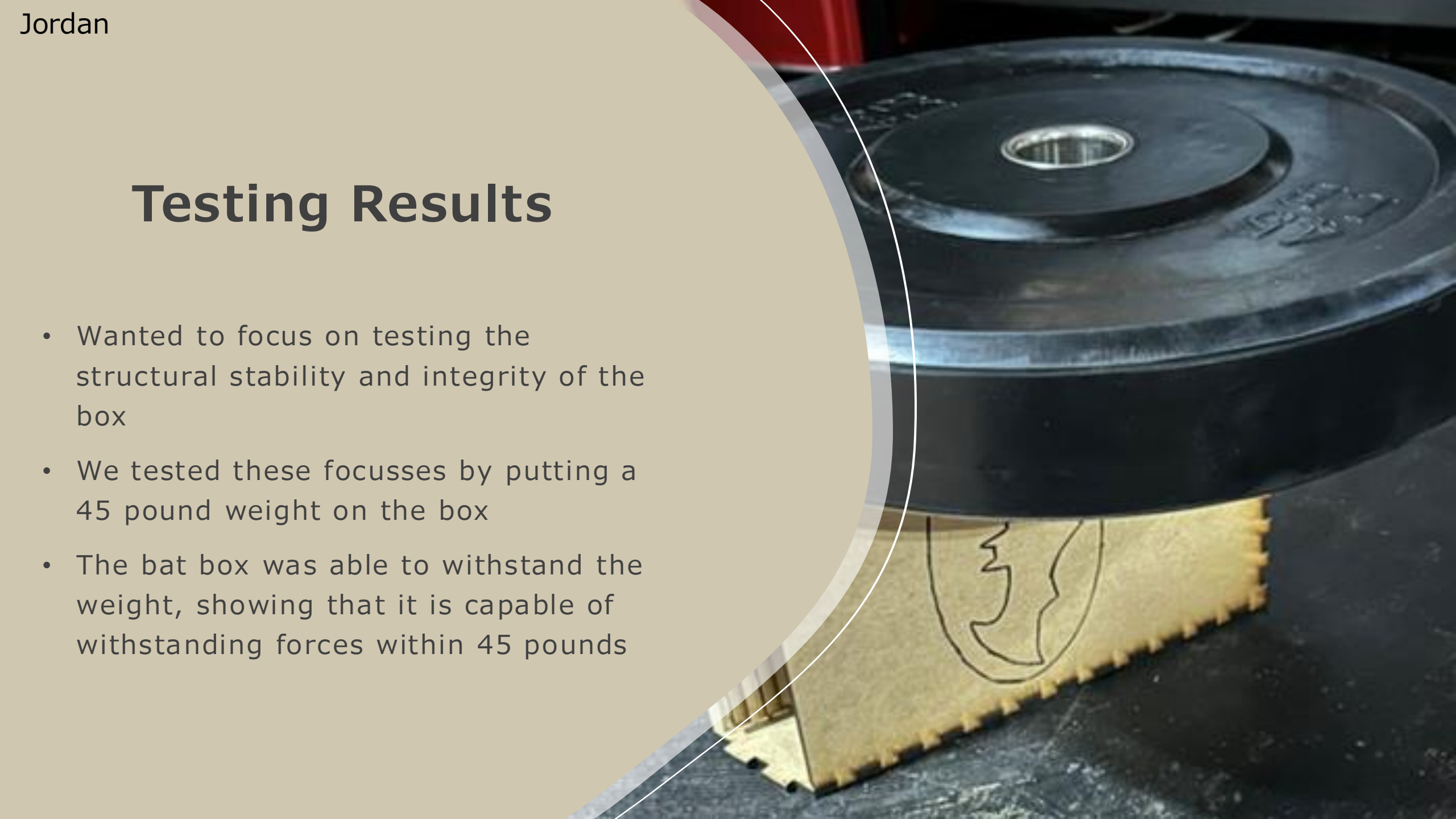
Bat Box Structure

- Made from ¼” MDF plywood with laser-cut joints, reinforced with wood glue; dimensions: 16.875” x 11” x 3”; weight: 2.338 lbs (without electronics); weather-resistant.
- Includes a landing pad for single bat entry, mesh for predator protection and guano escape, ventilation vents, and a sloped roof to prevent rain/snow buildup.
- Arduino housing for protection, wire channel with cover, laser sensor opening for tracking, and hand-chiseled grooves for precision.

Jordan

Testing Results

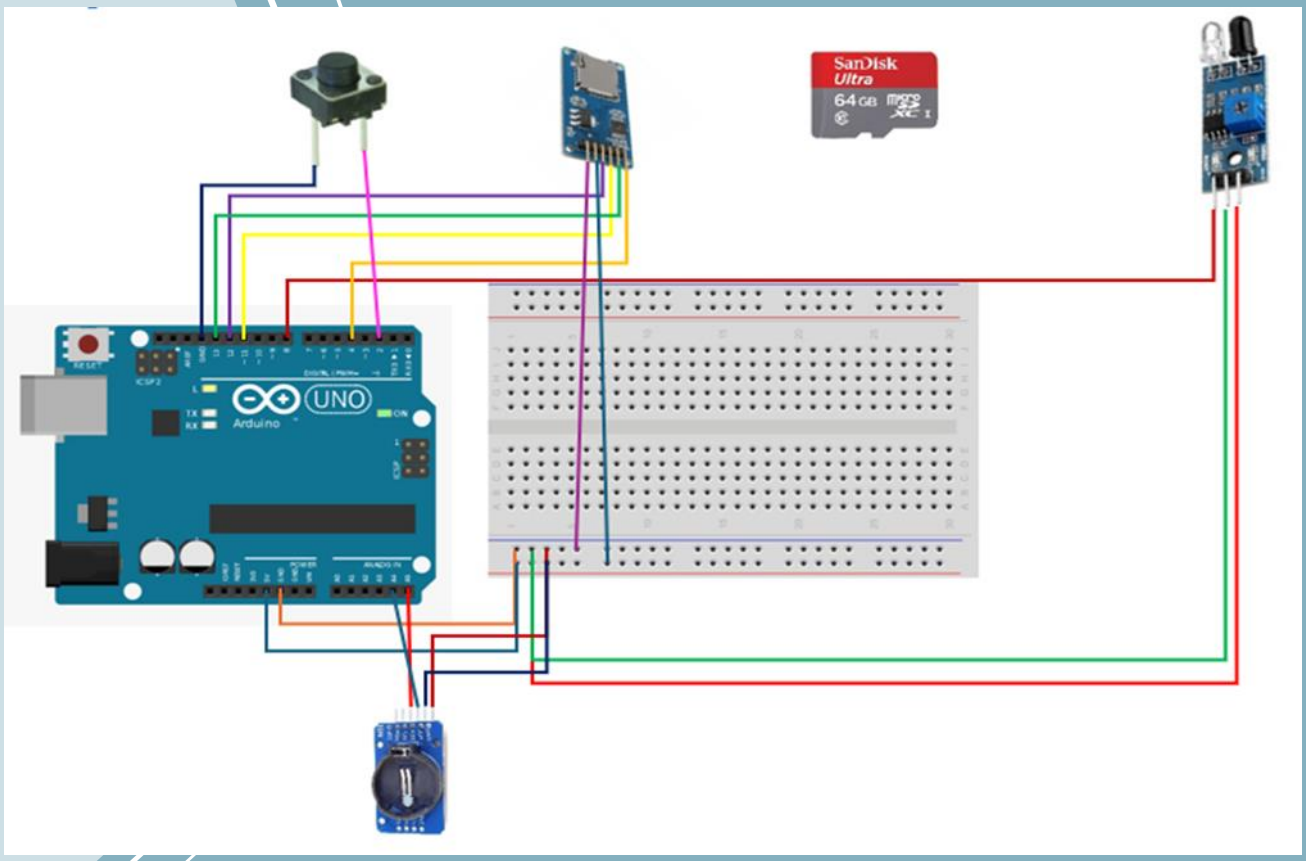
- Wanted to focus on testing the structural stability and integrity of the box
- We tested these focusses by putting a 45 pound weight on the box
- The bat box was able to withstand the weight, showing that it is capable of withstanding forces within 45 pounds



Rami

Tracking Device

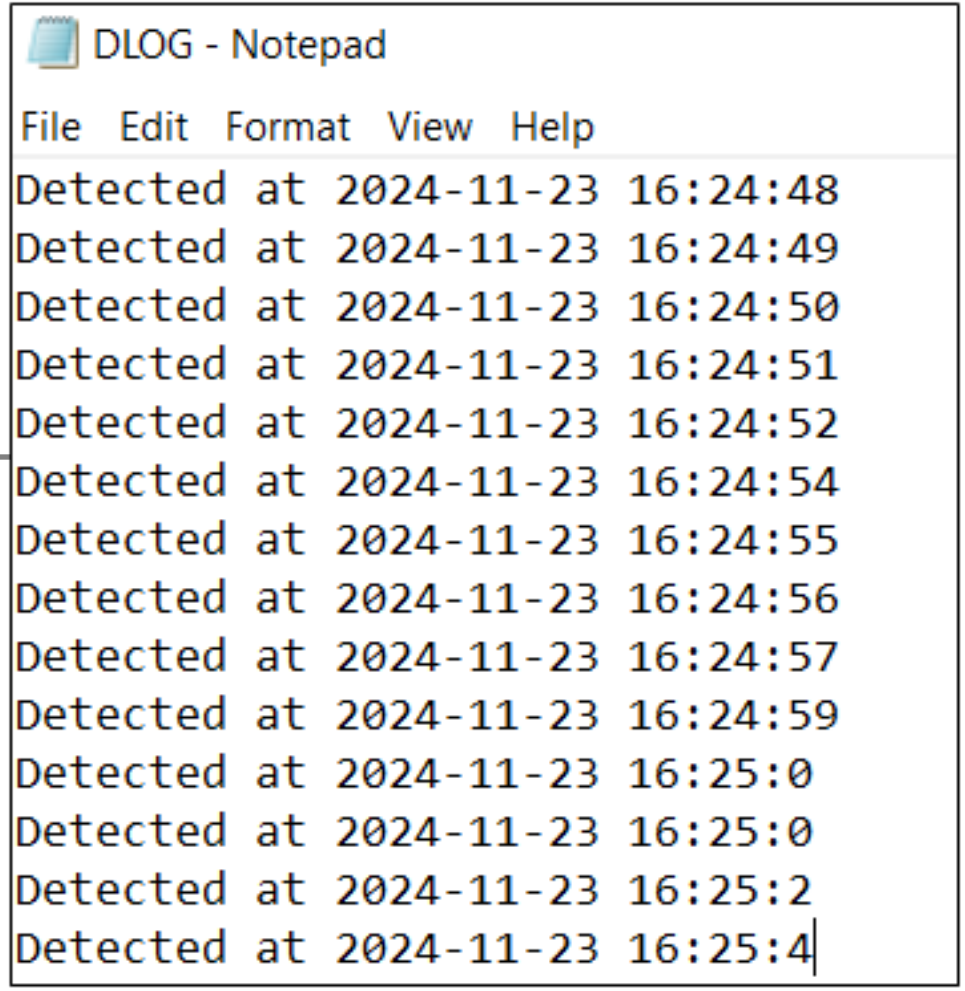
- Laser Sensor: Detects obstacles with a green LED and displays "motion detected" or "motion ended" in the serial monitor; adjustable detection distance calibrated to 2 cm.
- MicroSD Card: Logs data in four files (.txt) for detection, daily, monthly, and total counts; verifies proper initialization, manages existing files, and displays bat counts on the serial monitor; resets data upon reinsertion.
- RTC Module: Records real-time data for bat visits; results compared against a clock for accuracy and verified on the microSD card.
- Push Button: Displays total bat count on the serial monitor when pressed twice; stores data in the total.txt file for comparison.

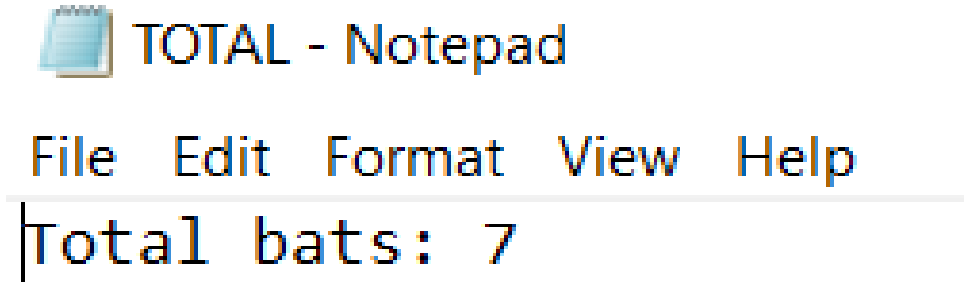


Rami

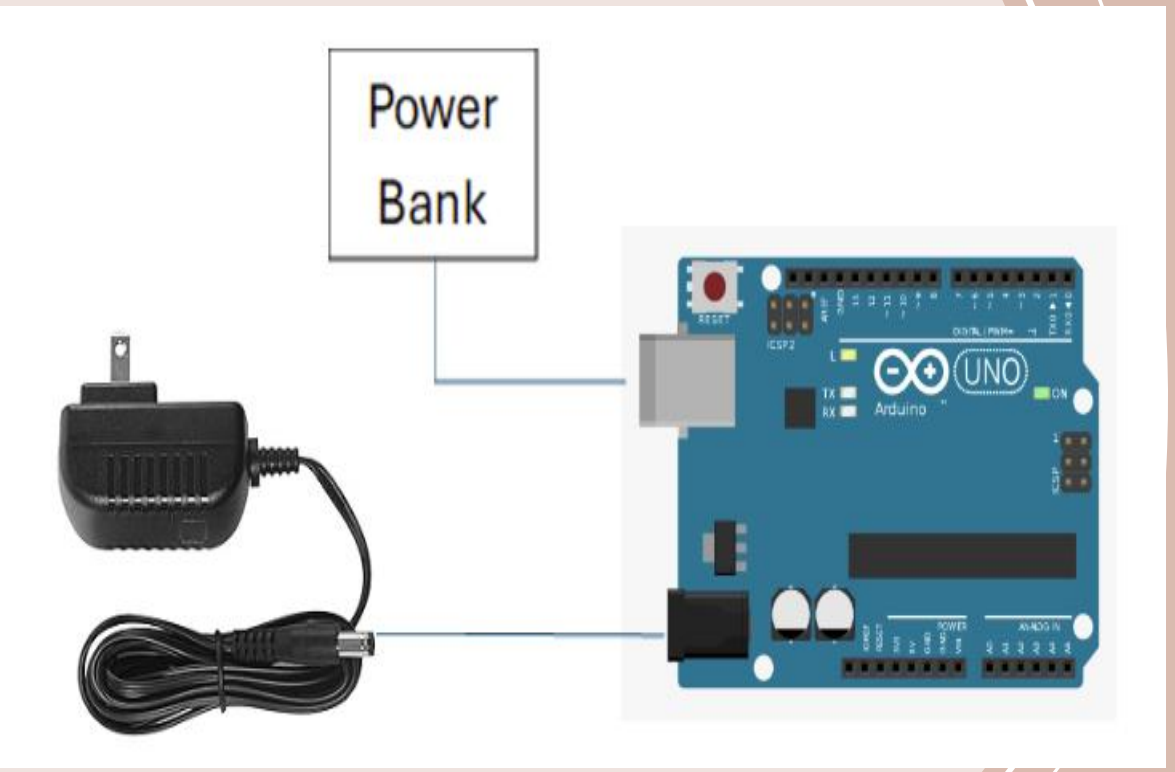
Testing Results

- Laser sensor accurately detected bat movements.
- RTC module reliably recorded timestamps.
- MicroSD card stored data without issues.
- Push button allowed easy access to bat counts.
- System was robust and handled unexpected events like microSD card ejection seamlessly.





Hala



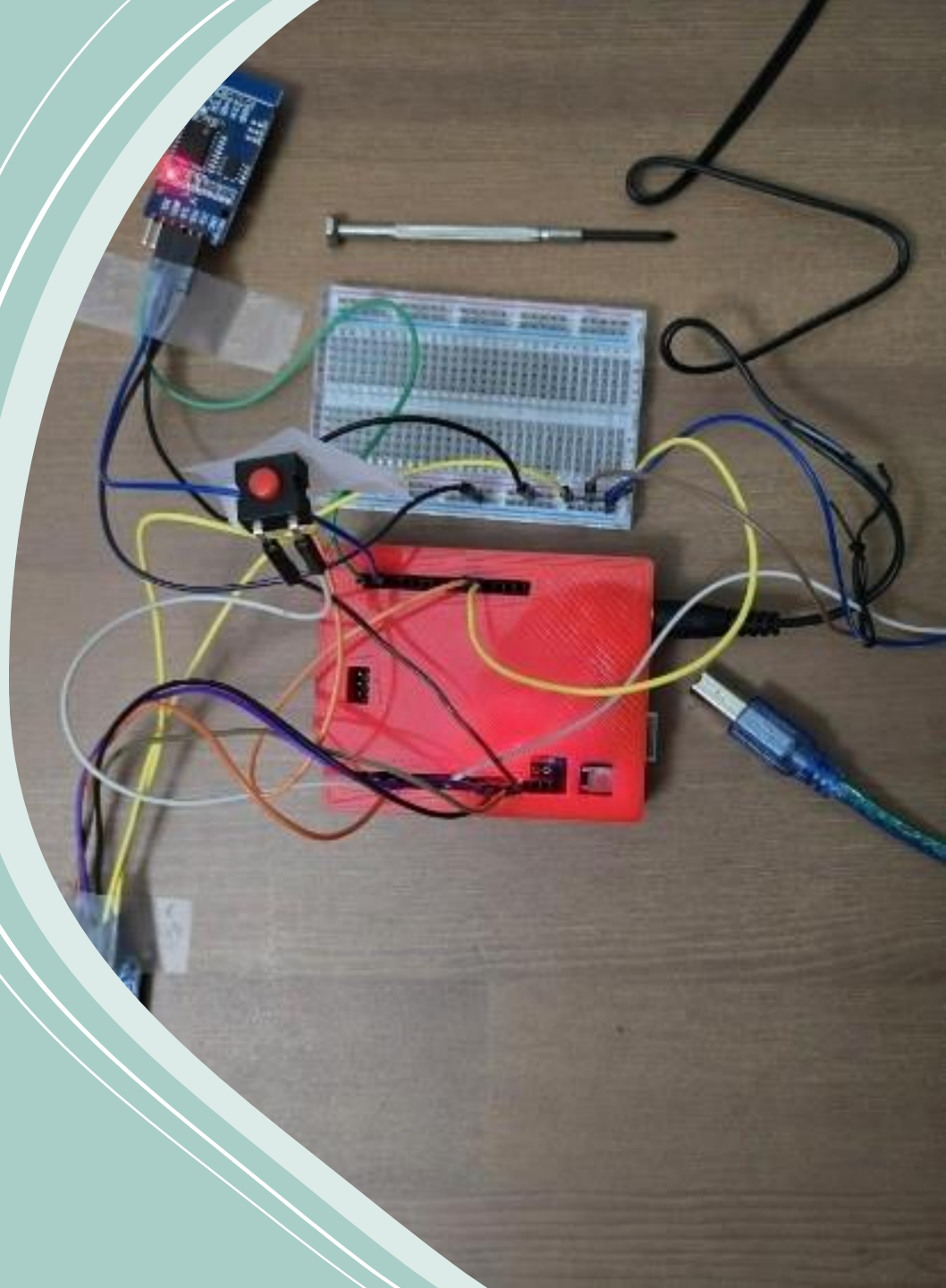
Power and Coding Functionality

- **Code Functionality:** Tests ensure the code compiles and uploads successfully; interactions between components are evaluated, and the code's effectiveness is judged based on tracking system performance.
- **Power Alimentation:** The 9V adapter powers the Arduino Uno, with a backup power bank ensuring continued operation during power failures.

Hala

Testing Results

- Code compiled and uploaded successfully, enabling seamless component interaction.
- Reliable code ensured accurate data logging and real-time functionality.
- 9V adapter provided consistent power during normal operation.
- Backup power bank maintained uninterrupted functionality during power failures.



Rami

Walk through of Tracking System

Adam

Changes made throughout Client Meetings and Prototypes

Changed the bottom of the bat box to mesh, allowing bat guano to fall through effectively.

Added a backup power source to ensure the system continues to operate during primary power outages.

Adjusted the laser sensor’s position to prevent interference with bat entry.

Narrowed the landing pad to improve bat entry and tracking accuracy.

Adam

Final Cost of the Project

- Total cost after adding everything up came out to be $134.10
- Our group is not very happy with going over the budget, and took this as a learning experience for when we have a cost to focus on
- Now looking back on the project, we realized we should have planned out the materials that were going to be needed a bit differently, and realize how costly they may be in the future

Adam