BPS - Bat Preservation Society

Deliverable E: Project Schedule and Cost

Team C03-14

Engineering Design GNG1103

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Abstract

In the previous deliverable, individual conceptual designs were created and discussed to determine 3 global designs. These designs were presented to the client, and feedback was provided to our team. Using this feedback, modifications have been made to the design plan to better suit the expectations of the client.

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1. Introduction

In the previous deliverable, deliverable D, conceptual designs were created by each member that were later used to create 3 global designs. These global designs were presented to our client for feedback to improve our design. In this deliverable, an edited and improved final design based on the client's feedback is presented. Additionally, this deliverable includes a comprehensive bill of materials that contains needed equipment and their cost, a project schedule outline, and a protype test plan.

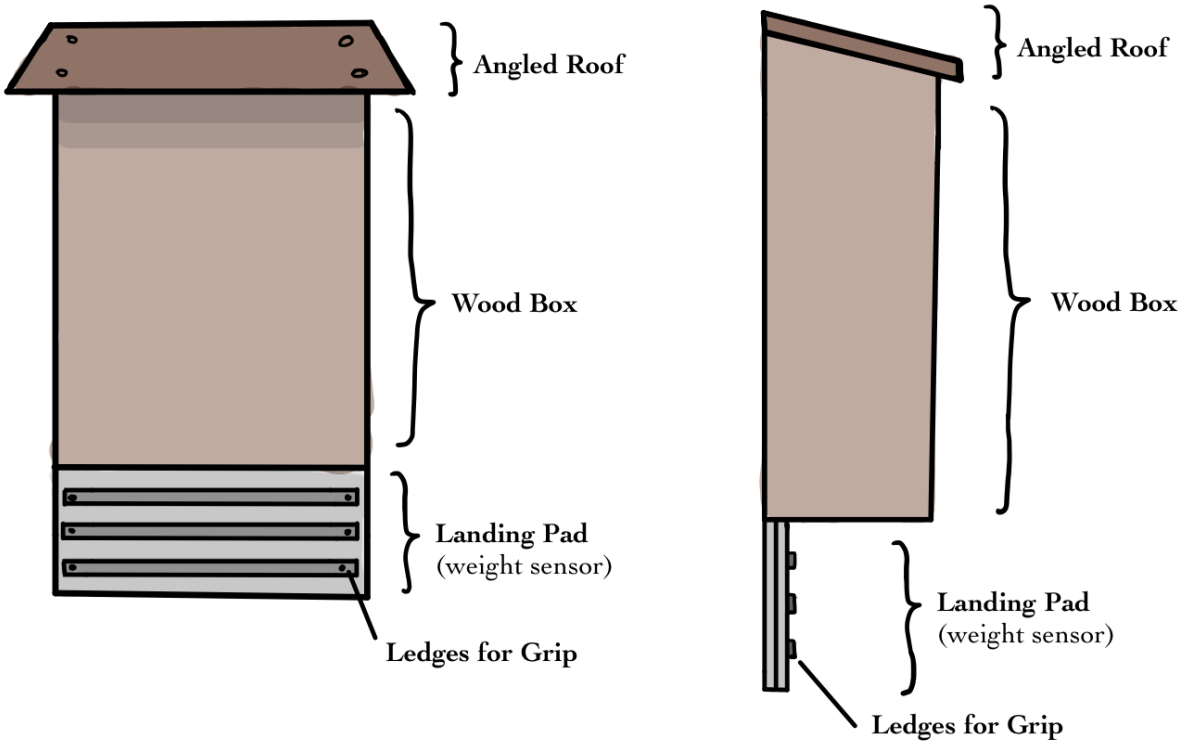
2. Final Conceptual Design

2.1 Physical Product: Hardware

Following the presentation of our design concept to the client, changes have been made to better suit their expectations.

2.1.1 Bat Box

The client specified that a large maintenance door on the front of the box may disrupt the bats using the bat house. For this reason, the door on the front of the box was removed and will be replaced with a solid panel.



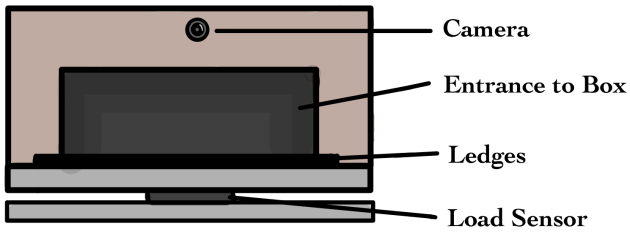


Figure 1. The Bat Box (Front, Side, and Bottom View)

2.1.2 Sensor System

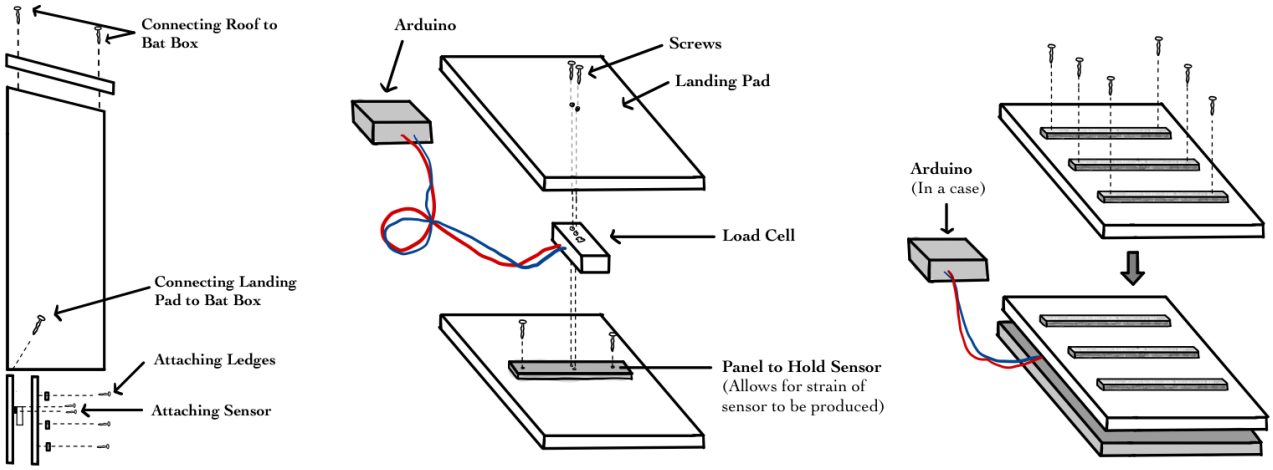


Figure 2. Sensor System

2.2 Application: Software

2.2.1 User Interface

The user interface has been redesigned but is still similar to the original concept. This new design has been has the ability to upload data collected to the user interface application that we create. This due to the device requiring Wi-Fi, our product can only be used on bat boxes that are situated where they can receive Wi-Fi. This would result in not having to physically retrieve data and it can also be accessed anytime anywhere.

Figure 3. User Interface

2.2.2 Application Flowchart

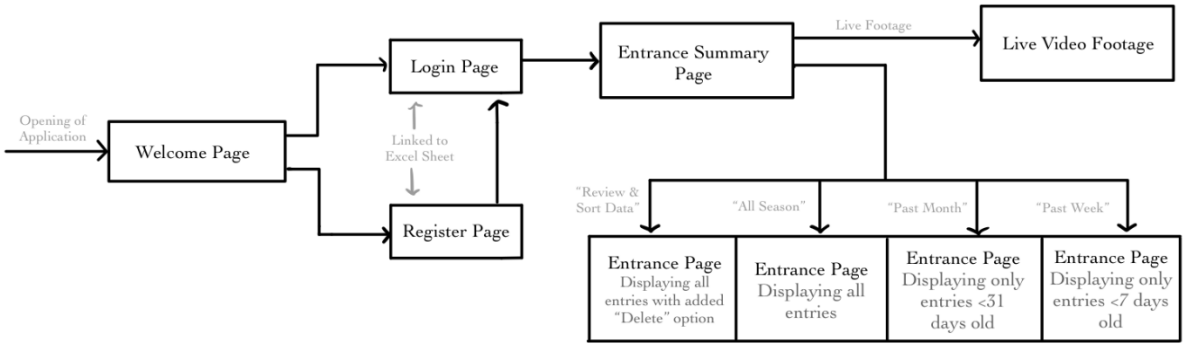


Figure 4. Application Flowchart

3. Project Schedule Outline

3.1 Task Scheduling & Duration

Table 1. Project Schedule Outline

Item	Description	Teammates	Date Due	Duration
New Design	Based on client feedback, the team will create a new design that incorporates all the client's needs.	The whole team	Oct. 27	One meeting length
Equipment List	Create a list of equipment needed to build the design.	Syamalan	Oct. 27	One hour
Cost Outline	Based on our new design, create a cost outline spreadsheet that allows us to track if our design is too expensive and to make changes accordingly	Kian	Oct. 27	One hour
Sensor prototype	Write most of the code for the sensor.	Kian and Syamalan	Oct. 31	Two days
Data storage Prototype	Write code to represent the data system. Not the complete system but a representation of it	Jake and Jett	Oct 31	Three days
Bat box prototype	Create a model of what the bat box will be on design day	Tawfiq	Oct 31	Two days
Client Meeting	Team will meet with the client to discuss prototypes	Whole team	Week 8	5 minutes
Final Design	Team will create a final design based on client feedback	Whole team	Week 8	One meeting length
Data Storage System	Finish coding the data storage system	Jett and Jake	Week 9	2 weeks
Bat Bax	Construct bat box	Tawfiq	Week 9	2 weeks
Sensor	Finish coding and build the sensor	Kian and Syamlan	Week 9	2 weeks
Testing	Team will test their designs and determine if the designs need to be changed at all.	Whole team	Week 10	3 hours
Redesign	Team will make the necessary readjustments to the design	Whole team	Week 11	1 week
Design day	Team will present the final design to the client	Whole team	Week 12	1 day

3.2 Contingency Planning

Table 2. Project Risks

Risk	Probability	Impact	Contingency Plan
User Interface Application not viable	Moderate	Low	Switch to using an SD card storage method that can be retrieved and uploaded into a spreadsheet.
Not able to transfer data via WiFi	Moderate	Low	Switch to using an SD card storage method that can be retrieved and uploaded into our application.
Financial Issues (Costs changing / Unrealistic Budget)	Low	Moderate	Team members will research ways to reduce the cost of the project to fit the financial requirements.
Tasks not completed on time	Moderate	High	Frequently updating Trello and giving updates in the group chat on progress. Asking for help if having trouble finishing.
Sensor Code Issues	High	High	Research how we can fix the issue and ask for help from peers or TA.
Conflict between members	Low	High	Team members work together to fix the issue.
Product Performance	Moderate	High	Team members will brainstorm solutions to fix problems with the performance of the device. If device performance does not meet our expectations, team members will try not to be disappointed.

4. Prototype 1 Test Plan

Table 3. Prototype Test Plan

Design Specifications	Relation (=,<, or >)	Value	Units	Verification Method
Low Cost	<	150	Dollars	Estimate, Final Check
Weatherproof	=	Yes	N/A	Testing
Low Maintenance	<	1	Month	Testing, Analysis
Easy to Assemble	=	Yes	N/A	Analysis

Design Specification	Relation (=,<, or >)	Value	Units	Verification Method
Tracking	=	Yes	N/A	Testing
Entrances vs. Exits	=	Yes	N/A	Testing
Data storage	=	Yes	N/A	Testing
Auto uploads data	=	Yes	N/A	Testing

Table 4. Prototype Test Plan

Test ID	Objective	Test Description and Materials needed	Description of results to be recorded	Test duration
1	Partially Validating Spec 4	Write code that will be able to add one to a counter when sensor is triggered (Needs Arduino IDE)	Check if the code successfully compiles	<1 week
2	Validating Spec 4	Assemble a small-scale prototype made of cardboard	Record the amount of time it takes to assemble	<2 hours
3	Validating Spec 7	Create code for an app that lets you access data from cloud storage	Check if code compiles and can draw from storage	2 weeks

5. Bill of materials

Table 5. Bill of Materials

Item/material	Quantity	Size/Dimensions	Est. Cost per	Total est. Cost
Bat Box				
MDF	2	12" x 24	$ 3.50	$ 7.00
Screws	1	1" long	$ 3.97	$ 3.97
Sensor				
Arduino Uno R3	1		$ 15.25	$ 15.25
Load Sensor	1	3.0" x 0.5" x 0.5"	$ 13.59	$ 13.59
Power Source	1		$ 2.50	$ 2.50
AA Batteries	1x4		$ 3.98	$ 3.98
Camera	1		$ 9.99	$ 9.99
Wi-Fi	1		$ 13.35	$ 13.35
Bread Board	1		$ 5.00	$ 5.00
Wires	3		$ 1.00	$ 3.00
Software				
Python v3.14	1	N/A	N/A	free
tkinter library	1	N/A	N/A	free
Arduino IDE	1	N/A	N/A	free
DFRobot_HX711.h	1	N/A	N/A	free
ArduImageCapture plug	1	N/A	N/A	free
Ada_fruitOV7670	1	N/A	N/A	free
ESP32	1	N/A	N/A	free
LiveOV7670	1	N/A	N/A	free
TOTAL (with tax)	$ 87.72			

BOM Excel spreadsheet containing links to materials

6. Conclusion

In conclusion, this deliverable presents our final design that has been edited based on feedback received from the client. It outlines a project plan, a bill of materials, and a prototype test plan. This final design will be used as a guideline as we build our first prototype.