

Bat Box Monitoring System

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About Bat Boxes

Bats are an essential part of a healthy ecosystem. Bat boxes with the ability to track bat usage are needed to improve conservation efforts and provide data to inform better bat box design and assess the health of bat colonies.



CLIENT REQUIREMENTS

Overview

Tiree, a company that is analyzing the effectiveness of bat boxes, needs bat boxes with a device that can monitor bat entry and exits to track box effectiveness.

Challenge

Currently bat boxes do not have sensors and therefore no data to understand bat box usage to influence bat box design or colony.

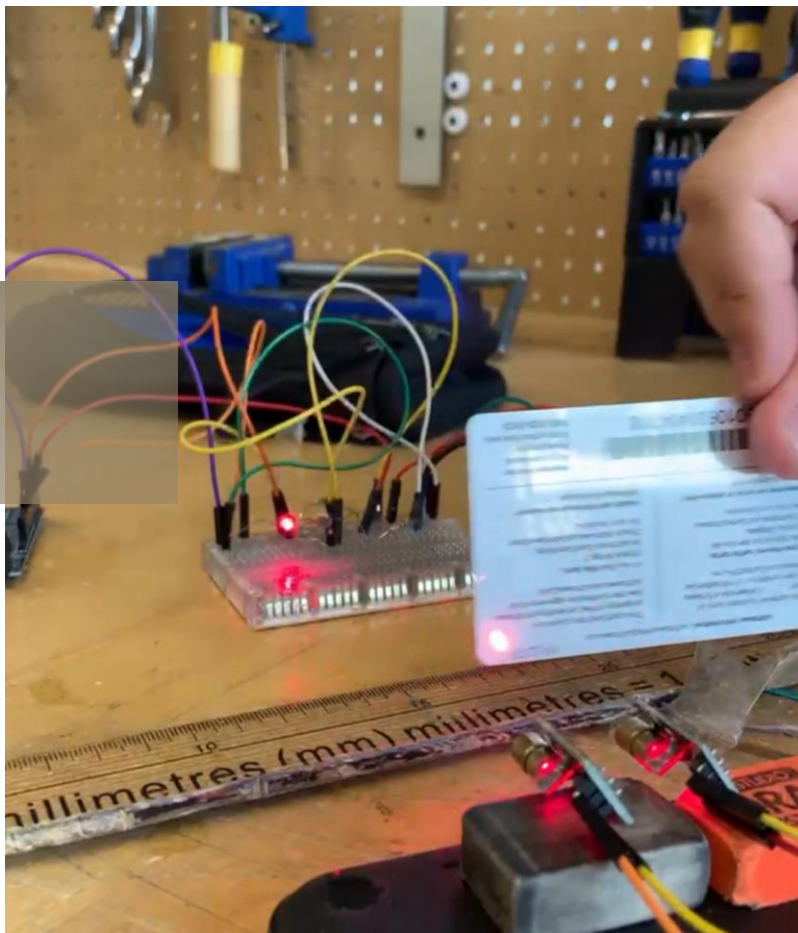
Bat Box & Sensor

- Tracks bat usage
- Weatherproof
- Protects from predators
- Maintains Comfortable Temperature
- Data storage and retrieval
- Low cost <\$150
- Low Maintenance (once/month)
- April - October climate

Alternatives

Current on market:

- Lack of sensors
- Large but expensive bat boxes
- Separate sensors: Acoustic, Camera, Motion



DESIGN FEATURES & DIFFRENTIATORS

- High accuracy tracking via entry-exit photosensors
- Specialized species entrance for better predator protection
- Waterproof
- Low Cost
- Low Maintenance
- Comfortable Temperature
- Data Storage

TESTING RESULTS



Temperature



Waterproofing



Sensor



Temperature

Location	Temperature of location (°C)	Temperature inside box 1 (°C)	Temperature inside box 2 (°C)
Room	20.1	22.1	21.6
Outside	4.8	15.7	15.9
Heated conditions	29.3	27.8	27.4

After paint

Location	Temperature of location (°C)	Temperature inside box 1 (°C)	Temperature inside box 2 (°C)
Room	18.8	19.9	20.0
Outside	4.4	19.5	19.9
Heated conditions	29.3	22.4	22.5

Waterproofing

Water poured: 150mL
Results: No water leakage,
minimal absorption

TRIAL 1

Water poured: 300mL
Results: minimal water leakage,
more absorption

TRIAL 2

Water poured: 450mL
Results: : minimal water
leakage, absorption from walls,
minimal damage

TRIAL 3



SENSOR

SENSOR RANGE TEST

Successful

Required Range >40 cm
Result Range= 80cm

LIGHT LEVEL

Successful

Sensor detects movement in dark and bright room.

SENSOR SENSITIVITY

Successful

Sensor placement at 3.5cm will trigger both sensors.
This will prevent false triggers from bat guano

DETECTION SPEED

Successful

Sensor detects slow to fast moving objects

Very fast movement beyond anticipated bat speed detected 30% of time.

ACCURACY

Successful

Sensor detection >98%

Simulated bat movement consistently detected.



FINAL DESIGN

A close-up photograph of two brown bats in flight. The bat on the left is slightly behind and to the side of the one on the right. Both have their wings spread, showing the intricate vein structure of the translucent, reddish-brown skin. Their bodies are covered in soft, brown fur, and they have small, dark, pointed ears. The background is a soft, out-of-focus green, suggesting foliage. A semi-transparent grey rectangle is overlaid on the left side of the image, containing the text.

THANK YOU

Questions?