Bird Nest - Phoenix Zoo

Partnering with the Phoenix Zoo
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2nd Semester of Project, FSE 494

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The Arizona Center for Nature Conservation (Phoenix Zoo) wishes to breed Thick-Billed Parrots, an endangered Parrot species; to aid their efforts, they need quantifiable data from the Parrots and their exhibit. This project will build a sensor nest box for the Thick-Billed Parrot that cools the interior and collects mass, temperature, and humidity data

Community Partner: Arizona Center for Nature Conservation

- Located North of ASU's Tempe Campus on N. Mill Ave. and E. Curry Rd.
- Richard Sartor - Director of Living Collections
- Bryan MacAulay - Birds Collection Manager

Project Goals:

- Construct a nest box for the Thick-Billed Parrot to inhabit
- Cool the nest box to about 70℉ year round
- Collect temperature and humidity data inside and outside the nest box
- Wirelessly display and save the collected data

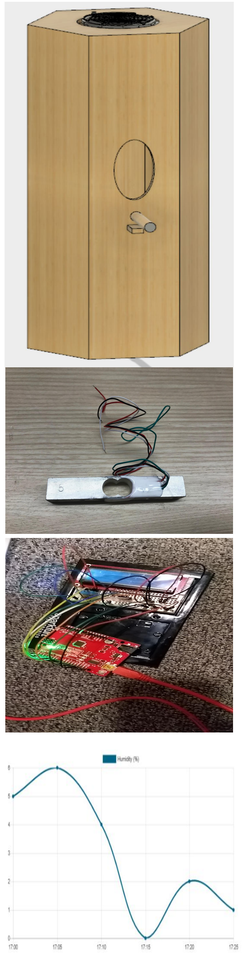
Project Requirements:

- Structurally sound (durable)
- Non-toxic
- No heavier than 50 lbs.
- Cost Effective (<$300)

Ideation and Design Process:

Few nest boxes currently incorporate temperature, humidity, and mass sensors into an artificial nest cavity. Thus, the team decided to build a hexagonal structure with the electronics installed in a separate compartment as it's easier to build and deconstruct for storage. The corners are a weak point because the bird picks at them so they need to be covered with another material such as iron.

Conceptual Design and Prototype:



Physical Structure:

This team is currently working on its first prototype. The hexagonal box is made out of plywood and will be insulated with sheep wool. It is modeled after a tree trunk, with the nest cavity the same size as the Parrots' nests in the wild. In order to keep the nest box temperature within suitable conditions we will be using a fan to expel warmer air while diffusing in cooler air.

Sensors:

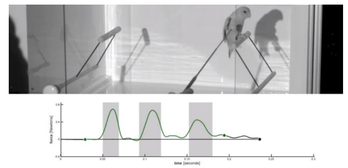
Used to monitor the health of the birds and how closely the exhibit matches their environmental conditions in the wild. Our sensors will have to be discrete so as to not disturb the birds. The current sensors have a precision of 2-5% for humidity and ± 0.5 ℃ for temperature to ensure that accurate data is collected for the keepers.

Interface:

To help the Phoenix Zoo log and display the data collected from the nest box, this project incorporates a JavaScript graphic display. This interface will display time graphs for the mass, temperature, and humidity data, and it will store the collected data into a time-stamped file on the keepers' computer for future reference.

Next Steps: Complete the first prototype for the nest box

- Finish the interface server to process the collected data
- Identify which bird(s) activate(s) load cell
- Integrate the identification system with the data interface
- Test the accuracy and efficiency of the structure, cooling system, and interface
- Anticipated prototype completion date: May 2018 (end of this semester)



Identification of the Mass of a Bird

The Team:

Works Cited:

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- "Dinosaurs in the Desert| Photo Gallery." Phoenix Zoo, 4 Oct. 2017, www.phoenixzoo.org/gallery-items/phoenix-zoo-dinosaurs/.
- Lanning, Dirk V., and James T. Shiflett, "Nesting Ecology of Thick-Billed Parrots." The Condor, vol. 85, 1983, pp 66–73. https://sora.unm.edu/sites/default/files/journals/condor/v085n01/p0066-p0073.pdf.
- "Thick-Billed Parrot." *The Cincinnati Zoo & Botanical Garden*, cincinnatizoo.org/blog/animals/thick-billed-parrot/.