Smart Birdhouse

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ABSTRACT

The Smart Birdhouse is a five-week project exploring different research methods and prototypes designed for both humans and wild birds, to create a mutual beneficial arrangement. Bird feeder ailments such as trichomoniasis fueled the design process as it seeks to motivate the human user through a "actions and rewards" system. Mending a 15th century design that created unintended repercussions for bird species all over the world, for the benefit of the actual user; the birds.

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INTRODUCTION

As a designer it should be important to find meaningful insights that can benefit the voiceless beings around us. Where it be making plants sing to communicate watering needs[2], building nature bridges for wildlife around highways[4], or making a bird sock puppet to feed a chickling[3]; all are for the benefit of those who cannot ask for them.

[5] *"Stories about environmental destruction and the overwhelming scale of animal oppression are not always helpful for designers […] that attempt to construct, ideate, or imagine more desirable futures. […] These anthropocentric definitions, however, always poses the follow-up question of whose problems designers actually attempt to solve? Who has the power to change things? And whose problems are thereby created or ignored*?" When it comes to environmental problems that affect wildlife, specifically man-made problems, there is a moral problem and lack of hindsight that certain designs create for the environment. Man made artifacts designed for a human experience are humancentric. Birdhouses were created in the 15th century during the pre-Ottoman period and their use was not meant for human observation, but rather a trap to consume the eggs or even the birds themselves. The origins of the birdhouse no longer reflect how we use them today, the average feeder owner will enjoy birds and offer this artifact as an aesthetic gift all while receiving pleasure in feeding wildlife and observing the visitors.

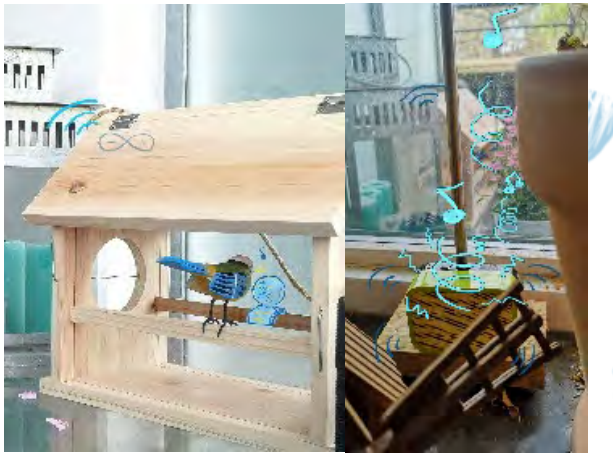
Feeders have changed how birds eat, leading them to memorize feeder locations and sometimes fly 2km distances just to reach a specific feeder. Leading to a circulation of birds, flying from different parts of the area to a very small, wooden box frequented by potential sick birds that could infect the rest. This man-made problem started off with small intentions but it's creation has helped contribute to repercussions for birds across the globe. This project took[1]"changing existing situations into preferred ones" to heart.

USER TESTING

My human subjects were interviewed three times, each round posing different sets of questions and creating a UI that they could directly give feedback on or add to. I noted a common problem during my research, interviewees and livestreams that had feeders or birdbaths had them in poor hygienic conditions, cleaning them once a month with a hose. Health of a garden and those living in or around it can be directly impacted, this includes the human habitants.

The bird subjects were tested through observational research supported by Birding techniques and given a series of treats to see which they preferred and what objects they would tolerate in their feeding space.

COUCOU



Coucou derived from the playful French word of “Hello, was inspired by the users desiring to see the birds, exploring an adapted version of a sound notification would get a positive reaction. In short, it is a bird door bell that triggers every time a bird is at the feeder and will play the audio captured there. Using a camera to detect motion in the feeder, a signal is sent to a speaker inside the home that plays the audio at the birdhouse; letting the user know a bird was present at the feeder. The reasoning behind not starting directly with a camera was to potentially explore other not so obvious possibilities.

The results while mixed showed that birds are not only not always singing, but they came back to the feeder: a lot. On average the same bird returned to the feeder 8 times an hour during their daily routines. The loud noisy eating, thudding, tapping, wind would cloud the audio. Audio may not be the best solution on its own, but also this prototype revealed a key problem to my design: I did not understand the birds.

OBSERVATIONAL RESEARCH

I would need to interview a bird. Using the method of observational research I mapped out the territory this Magpie couple had created. These tireless creatures carried on their rounds and routines, flying back and forth tending to their young. During the brighter lunar cycles, they would also perch in the tall trees and sing. The bird’s schedule ranged from 4:30 to at times 22:30.

Normal user testing would require verbal communication or observation with some context. I attempted to feed the bird around the same hours it would make it's round back to the nest. Once they were inside tending to their young, I would place a seedball audibly, then say "Hello" with the same intonation every time and retreat inside to watch if the bird would come. It takes the Magpie couple less than a day to consume an entire seedball.

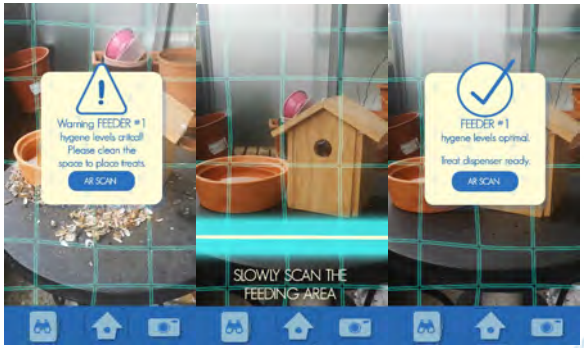
Once this audio notification was understood the bird started associating "Hello" as a positive call. When roaming in the garden, the first few weeks I was met with fleeing birds, cautious of my approach. Now however, if I say "Hello" the Magpie no longer flees but observes me from a close distance, closer than he had in the past. What this “interview” revealed is that positive communication from a respectful distance can be established if the human party has patience and commitment. But this small Birder experiment helped build contact with the most important user of this design. With the Magpies now willing to entertain my offerings it was time to place technology around their feeding area.

It comes to the shock of none that the birds were not receptive to mechanical noises such as loud clicking, beeping, etc. If the device was silent then it was treated as any other object on the balcony.

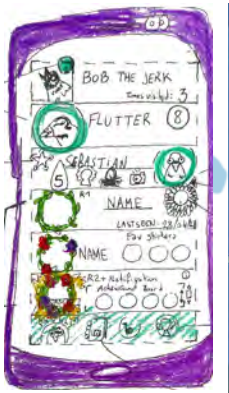
SMART BIRDHOUSE 1.0

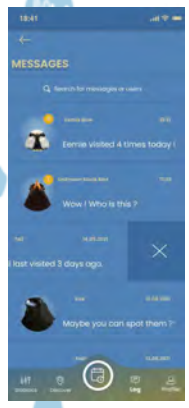
With new feeding areas established, it was time to train my camera to recognize the birds coming to my feeder as I felt it was key to the design that the user would have the ability to rename the birds that came to their feeder in order to create a one way attachment (human to bird).

I attempted to piece together a paper prototype using an Arduino micro and ESP32S Camera and encountered several difficulties, leading me to use an old webcam instead. Using a neural network (Learning Machine) for image recognition, training the algorithm to recognize what a *clean* and *not clean* feeder is very surface level, however for the purpose of this design should be sufficient. The setup of the feeder would require that the user "scans" the feeder in order for the program to establish a baseline of cleanliness.



The tech involving bird facial recognition exists however it is not open domain and with this in theory it would allow human users to name the birds that come to their feeder. It would also open for the opportunity to count the amount of times they come as well as collecting photos of the same bird. The Bird "contacts list" UI evolved with user suggestions and understanding of the wireframes presented to them, the final look is the result of these changes. Originally the idea was a collecting game, that turned into a messaging app, that turned into the final design you observe here. The final layout including the "King of the feeder" rankings and a collection of cards of the birds containing information regarding their species, how many times visited and last seen.





FUTURE DESIRED UPDATES:

Laser cut birdhouse made of hygienic materials, with functioning streaming capabilities and treat dispenser, with updated UI and more options to share data with the Ornithology database for tracking birds in the area. If granted more time I would also like to explore different structural designs aimed for making feeders for larger birds such as Magpies.

CONCLUSION:

Birdhouses are mostly made of porous materials that can accumulate bacteria leaving animals prone to diseases such as trichomoniasis, salmonella, aspergillosis, avian pox as well as parasites that can be found at a feeder. A wooden birdhouse would not be ideal, as birds are known to expel in their feeding areas, but they are the most common you can find on the market. An update in what sorts of materials used in the fabrication of birdfeeders should be revised, as well as other animal intended designs. While 15th century designers lacked the hindsight, insights, and scientific breakthroughs we now have, it would be immoral as a designer to continue to use such materials in the crafting of Birdhouses.

There is no real end to these types of projects, as months and years go by only more possibilities for such a creation will arise and further developments for quality of life for both birds and humans. My hope for the future is that designers will be more inspired to repair flawed designs that harm the wildlife around us, that humancentric interactions and designs will change, to include all life that coexists around us. Something as innocent as a birdhouse can have real change to the animal kingdom, will we have the foresight for the future of animal design?

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Example 1 link to Video

Smart Birdhouse

What it uses

An Arduino micro
A micro servo
A webcam
Sunflower seeds

Quick Guide

After scanning the clean feeder, insert Sunflower seeds in treat dispenser.

Select release treat button and enjoy watching the birds devour your treats!