Abstract

The bird box is a piece of experimental equipment used to determine what sounds birds can hear and distinguish. The bird box automatically trains the birds and runs the experiment trials. The bird has access to two buttons: the observation button for indicating that they are ready for the next sound and the report button for indicating that they hear different sounds. The bird box gives food rewards to birds if they press the report button when there is a different sound playing and punishment when there is not. When the bird does not press any buttons for a certain period of time, the bird box automatically aborts the experiment.

Conclusion

Accomplishments

The bird box can be considered a finished project at its current state. Our sponsor is ready to use the bird box in her research and run actual experiments on it. The bird box has two operating modes, the training mode, and the experiment mode. Both of them were fully tested and verified by our sponsor. She was able to run the experiment, test sample inputs, and output to excel files in the format she wanted.

During our tests with real birds, the birds ate from the food dispenser and flew away when the lid closed. So we verified that our food dispenser design is safe for birds. Also, our sponsor verified that our other designs, including the choice buttons, were safe and “bird-friendly”.

Future work

The bird box, especially the mechanical and electrical design, is at a finishing state. Our sponsor is ready to deploy the bird box into research. During the development of the software, however, we encountered several bugs that led to the collapse of the program. Many of the errors came from the formatting of string variables into integers and floating-point numbers. Due to time constraints, we focused most of our energy on the actual logic of the training and experiment rather than manipulating strings and handling user inputs properly. Similarly, our graphical user interface is also basic and is not very user-friendly. In the future, we would like to improve the user experience running the program and get rid of the trivial bugs related to incorrect user inputs that we did not fix.

Though our sponsor verified our training and experiment logic, we did not test and cover all the edge cases because the logic was too long. We would like to fully verify the training and experiment logic in the future and make sure the outputs are correct under any situation.

In addition, for the simplicity of the power subsystem, we used 5 V for everything. Although it was a very efficient design choice for prototyping, it does lead to problems like having rare parts including 5 V LEDs and 5 V light bulbs. We only found one manufacturer who produces 5 V light bulbs, and we do not know if they will continue making it over the upcoming years. 12 V light bulbs, on the other hand, are much

more common. Even though it will lead to a complication in design, the researchers could get replacements more easily in the future.