Utilizing Animal Audiograms for the Development of Safe and Shared Ecosystems

Anuraag Karunakaran

University of Maryland, Baltimore County

Objective

- To harness animal audiograms for developing technologies that enhance safety and balance in shared ecosystems. This approach aims to optimize human-wildlife interactions through precise sound-based species identification and behavior monitoring.

Problem

- Existing wildlife deterrence systems often rely on ultrasonic sounds triggered by motion sensors. These systems typically emit a single frequency, which can be problematic.
- Animals can become habituated to the constant sound, rendering the deterrence ineffective over time.
- The constant triggering just based on motion can inadvertently harm non-target species, causing distress to animals they are not intended to deter.(e.g. bees, birds even pets)

Animal`	Hearing Frequency (Hz)
Human	64 - 23,000
Dog	67 - 45,000
Rabbit	360 - 42,000
Deer	250 - 30000
Squirrel	113 - 49000

Proposed Solution

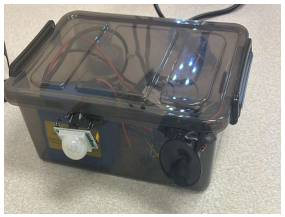
- We aim to develop a wildlife interaction system that identifies the specific animal present and adjusts the signal's type and frequency accordingly only when unwanted wildlife is perceived . This approach seeks to create a more ethical and effective deterrence method.

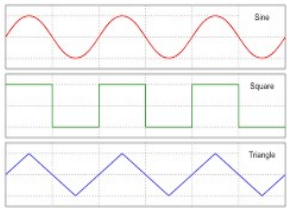
Vision System

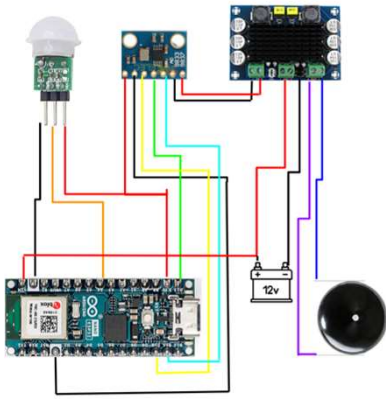
- A Raspberry Pi and camera setup classifies common animals and humans. This allow us to determine what animals are on screen and if an interaction is needed

Sound System

- Sound emission unit that is triggered by Vision System to perform certain action upon detected animals.







• **Sound Component**: The system comprises an Arduino Nano, signal generator, audio amplifier, speaker, and motion sensor. The Arduino Nano communicates with the vision system and sends a specified signal to the speaker.
• **Motion Sensor Functionality**: Initially used solely as a detection sensor, the motion sensor now also triggers the vision system, improving energy efficiency.
•**Dynamic Sound Wave Generation:** For targeted and humane deterrence by adjusting frequencies and types of sound based on the specific animal detected. This approach prevents habituation, minimizes impact on non-target species, and adapts to environmental factors for optimal effectiveness. We can randomize frequencies from 0 – 12.5 MHz and use 3 types of signals, square, triangle and sine waves

Future Work

- The system not only deters animals but also monitors and differentiates them, providing more possibilities for interaction.
- Multiple sound components linked to one vision system allow for randomized deterrence, keeping animals away from specific areas.

References

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