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Title
Beehive Health Monitoring System

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Authors
Dickinson, Jacob Carl
Medina-Ramos, Jossue
Ogikubo, Masaki
et al.

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Beehive Health Monitoring System

Masaki Ogikubo(EECS) Hengen Zhou(EECS) Jacob Carl Dickinson(CSE) Jossue Medina-Ramos(CSE)
Professor Quoc-Viet Dang
Department of Electrical Engineering and Computer Science

UCI Samueli School of Engineering | Department of Electrical Engineering and Computer Science

Project Goal

The goal for this project is to design a beehive monitoring system by analyzing the sound frequencies emitted by the beehives using DSP principles. An autonomous drone will fly from beehive to beehive using image recognition to identify them. The sound samples will be processed and the results sent to a main computer.

Background

The Californian economy is heavily dependent upon agriculture, which provides about $82 billion per year, as well as 760,000 total jobs. Much of this industry is dependent on the humble honeybee. Currently, farmers must maintain hundreds of hives, making maintenance an incredibly difficult task. BeeAware aims to help farmers by offering an automated health monitoring system. An autonomous vehicle will fly from hive to hive using computer vision, taking measurements of the sound emanating from each hive, and using DSP analysis to quickly find a rough measure of the health of each hive.

Team

Masaki Ogikubo (mogikubo@uci.edu)
Hengen Zhou   (hengenz@uci.edu)
Jacob Carl Dickinson (jdickins@uci.edu)
Jossue Medina-Ramos(jmedinar@uci.edu)

See Our work

Website : https://sites.uci.edu/beeaware/

System Design

System Start → Beehive Tracking → Beehive Identification and System Positioning → Sound Sampling and filtering

DSP Analysing Data Diagrams

Normal Condition of the beehives | Excited(Abnormal) Condition of the beehives

References

https://www.kcet.org/food/californias-agriculture-makes-a-bigger-impact-on-the-economy-than-you-think
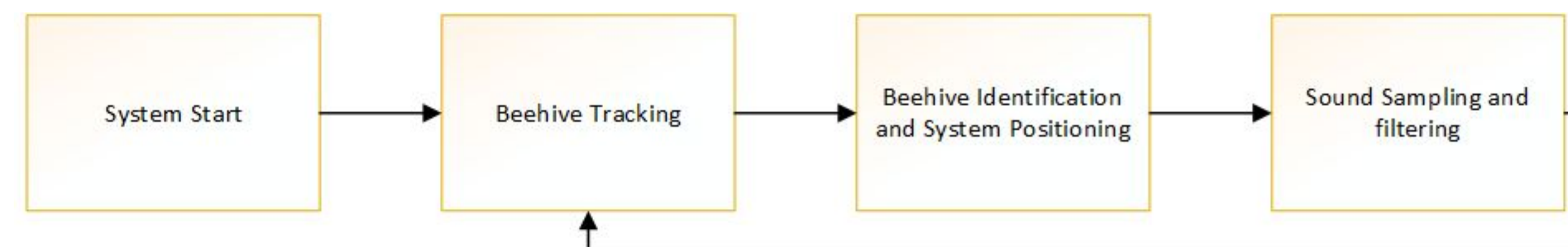https://www.sciencedirect.com/science/article/pii/S0168169908001385

Current Achievements

- Developed machine learning application that successfully performs object detection.
- Created self-flying drone prototype.
- Illustrated the FFT spectrum for audio samples
- Categorize bee signals through different time of the day and frequency spectrums at various conditions.
- Uses a Band Pass Filter to eliminate any invalid range of frequency picked up for audio samples
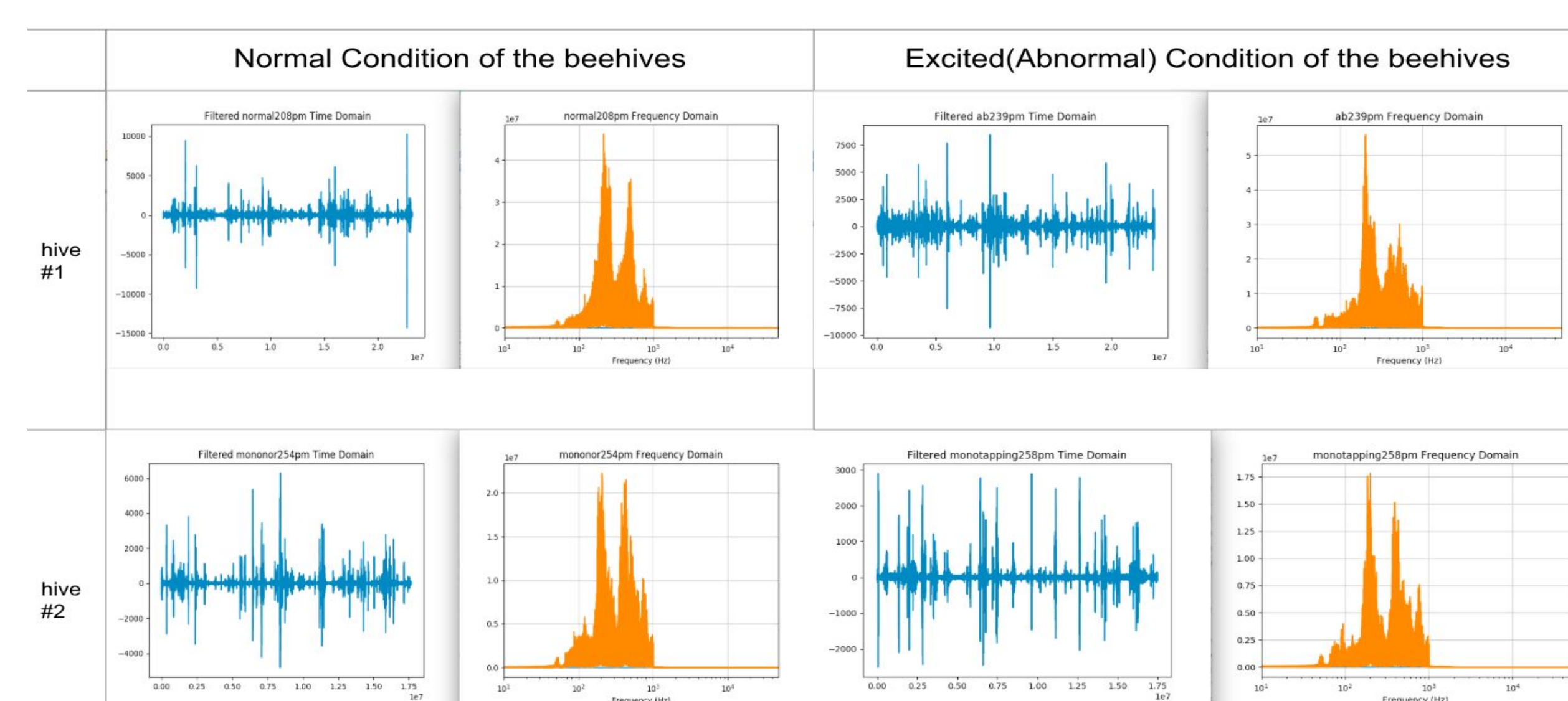
Future Potential Usage

- Include multiple GPS location handling
- Integrate individual systems to a fully functional prototype
- Establish the distinct differences between signal spectrums.

System Hardware