

**SONOMA
STATE
UNIVERSITY**

ENGINEERING

Apiary Assistant

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PROBLEM

The problem pertains to hobbyist beekeepers who want to raise healthy and productive colonies. They want to stay informed on the conditions inside their hives without disrupting them. They feel frustrated by the loss of bees and damage due to opening and inspecting the hive.

PURPOSE

- Helps hobbyist beekeepers who want to stay informed on the internal condition of their hives
- Helps beekeepers reduce bee loss and damage to the hive.
- Enables beekeepers can perform inspections less frequently.
- Supply data to beekeepers. (Stores over a years worth)

METHODOLOGY

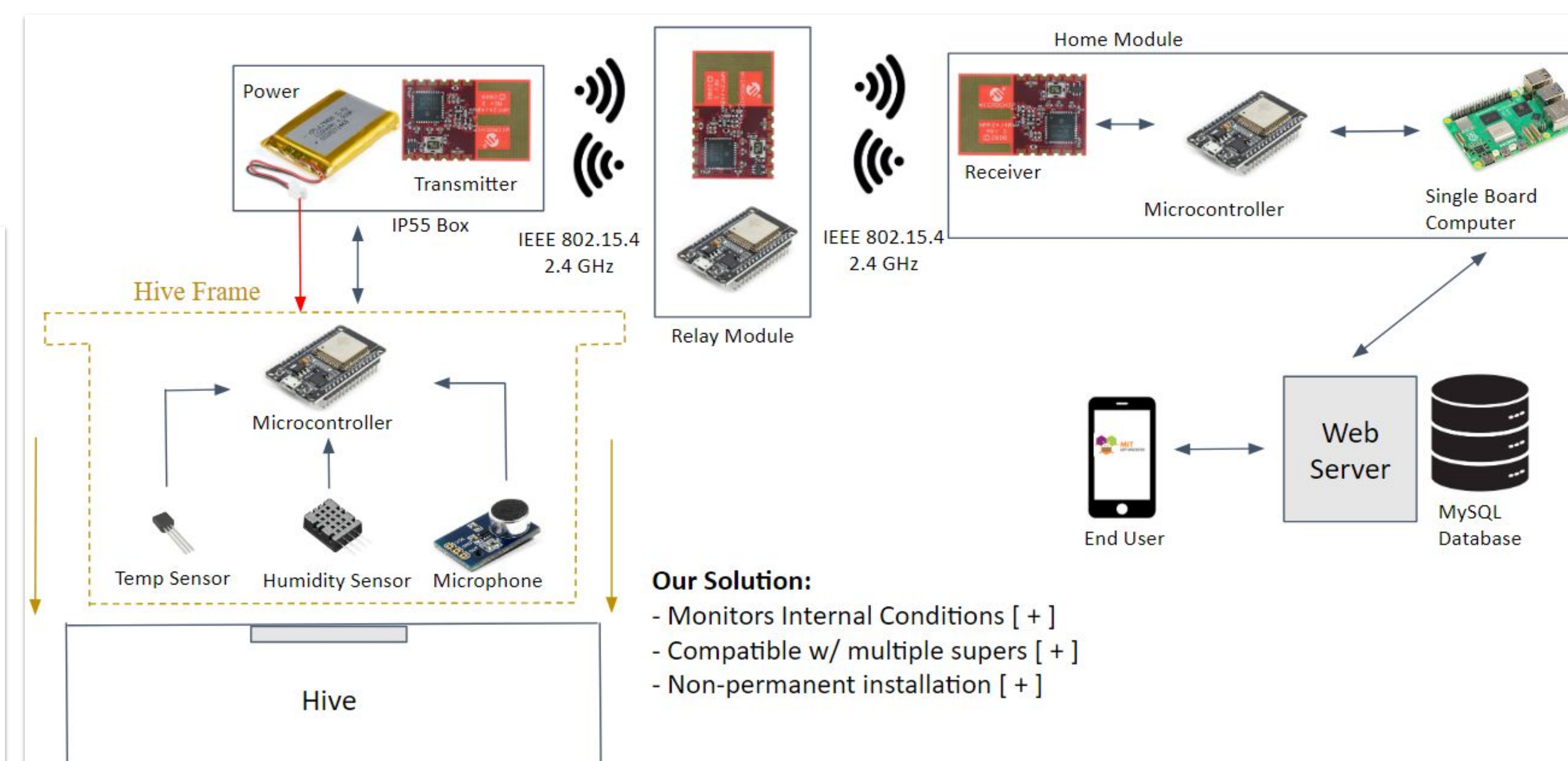
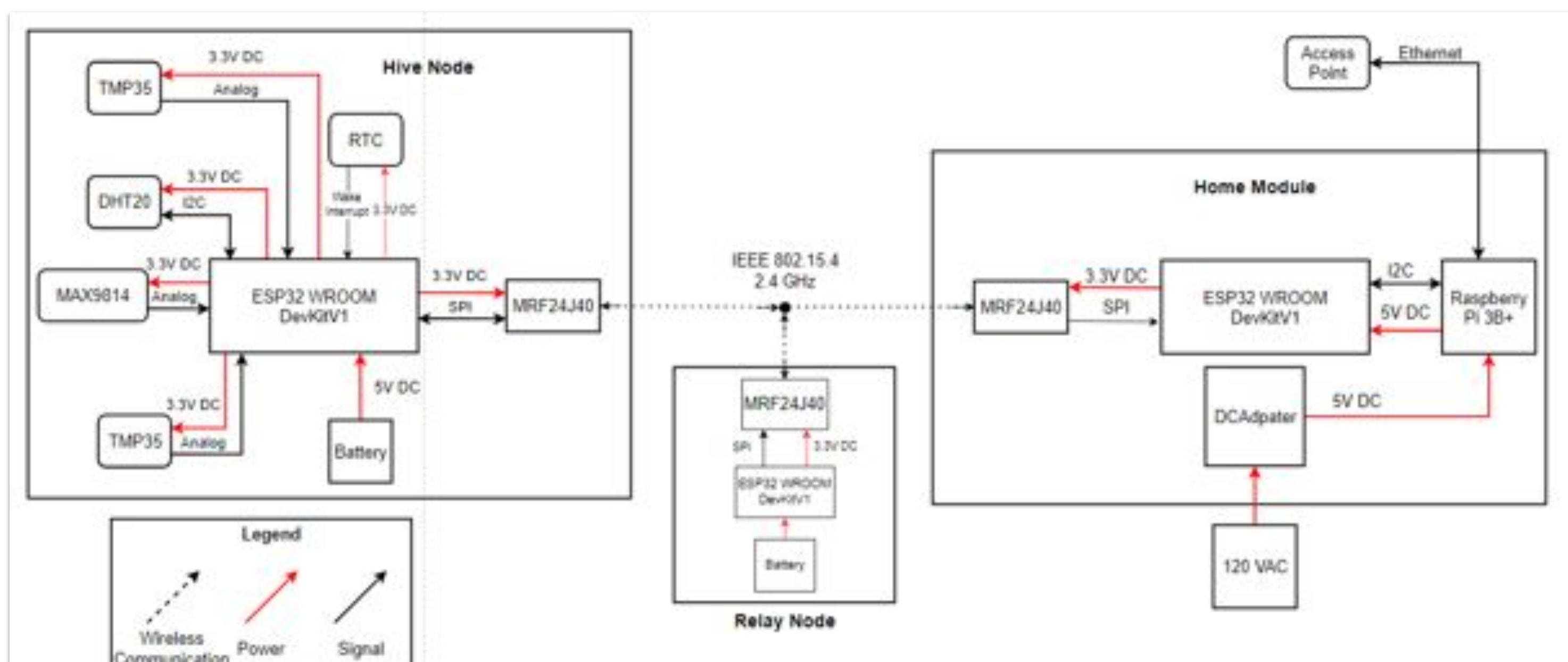
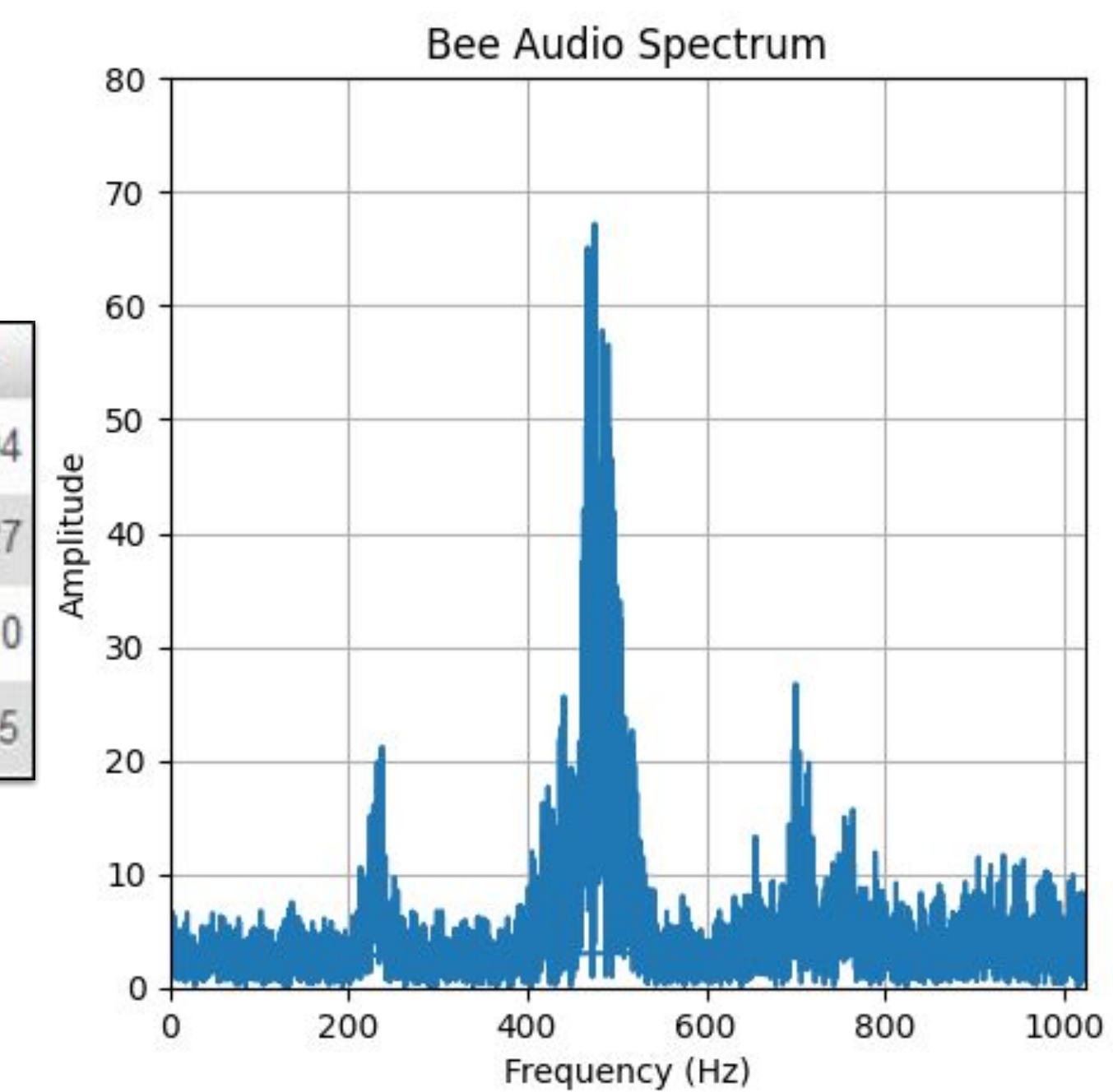
- Sensors and microcontroller embedded in Langstroth-type frame.
 - 3D-printed frame to inhibit propolis and comb
- FFC cables connect to externally-housed power supply + transceiver.
- Temperature and humidity sampled hourly, audio every four hours.
- Data transmitted and received on ZigBee transceivers
- Received data interpreted via I2C on gateway device and uploaded to database
 - Gateway performs Fast Fourier Transform on audio before uploading to database
- Database is queried via PHP script on webpage for display

RESULTS

- 5 second audio Samples were successfully transmitted from hive to home every 4 hours.
- Hourly temperature and humidity transmitted from hive to home.
- Frequency response of bee audio was plotted accurately.
- Interpretable MP3 files were produced from the sensor data.
- Recorded audio and temperature data stored on cloud

MP3 and PNG Uploaded to DB

id	bee_audio	FFT_image	current_datetime
1	[BLOB - 5.3 KiB]	[BLOB - 28.7 KiB]	2024-02-28 19:31:04
2	[BLOB - 5.3 KiB]	[BLOB - 28.7 KiB]	2024-02-28 19:33:27
3	[BLOB - 5.3 KiB]	[BLOB - 30.6 KiB]	2024-02-28 19:46:10
4	[BLOB - 5.3 KiB]	[BLOB - 30.6 KiB]	2024-03-11 15:38:15



Our Solution:
 - Monitors Internal Conditions [+]
 - Compatible w/ multiple supers [+]
 - Non-permanent installation [+]

