

Hive Monitor - Weight Sensing Concept Overview

1. Overview

This document outlines the weight sensing subsystem of the hive monitor project.

Using a load cell and HX711 ADC amplifier, this system will measure and log the hive's weight at regular intervals to monitor honey accumulation, colony behavior, and environmental effects.

2. Hardware and Configuration

- Load Cell: Strain gauge-based weight sensor
- Amplifier: HX711 24-bit ADC module
- Interface: 2-wire digital (DT and SCK)
- Wiring:
 - VCC: 3.3V or 5V from Feather
 - GND: Ground
 - DT: GPIO pin (e.g., D6)
 - SCK: GPIO pin (e.g., D5)

3. Use Cases

- Track honey accumulation over time
- Detect swarming or absconding events
- Monitor diurnal weight fluctuations
- Identify rain ingress or moisture retention
- Flag sudden changes (theft, removal, environmental events)

4. Sampling Strategy

- Take weight readings every 10 minutes, aligned with other sensor modules
- Collect multiple samples (e.g., 5-10) and average them for noise reduction
- Optional: implement a smoothing filter or rolling average
- Calibration required with known reference weights

5. Output Format

Each log entry includes:

- Timestamp
- Calculated weight (kg)
- Status (e.g., Stable, Alert, Weight Drop Detected)

Example:

2025-04-10T18:00:00Z | Weight: 42.78 kg | Status: Stable

2025-04-11T02:10:00Z | Weight: 39.15 kg | Status: Weight Drop Alert

6. Calibration and Configurability

- Calibration requires measuring known weights and adjusting gain factor
- Gain factor can be stored in EEPROM, SD card config file, or hardcoded
- Adjustable thresholds for triggering alerts on sudden weight changes