Hive Monitor - Environmental Monitoring Concept Overview

1. Overview

This document outlines the environmental monitoring subsystem of the hive monitor project.

It describes how temperature, humidity, and barometric pressure data will be collected using onboard sensors and logged at the same interval as the acoustic monitoring system.

2. Sensors and Hardware

- Microcontroller: Adafruit Feather nRF52840 Sense
- Primary Sensors:
  - SHT (Humidity + Temperature)
  - BMP280 (Pressure + Temperature)
- Interface: I2C
- Sampling Interval: Every 10 minutes (synchronized with microphone sensing)

3. Parameters Monitored

- Temperature (°C)
- Humidity (%)
- Barometric Pressure (hPa)
- Optional alert column (Nominal, Warning, Critical)

4. Output Format

Each environmental capture session logs:

- Timestamp
- Temperature (°C)
- Humidity (%)
- Pressure (hPa)
- Alert status

Example:

2025-04-10T18:00:00Z | Temp: 34.8C | Hum: 59.3% | Pressure: 1013.2 hPa | Status: Nominal

5. Alert Thresholds

Default thresholds for alerts:

- Temperature: < 30°C or > 38°C = Alert

- Humidity: < 50% or > 70% = Alert

- Pressure: Used for correlation only (no direct alerts)

Status Levels:

- Nominal: All values within range

- Alert: One or more values out of range

6. Configurability

Threshold values can be updated through:

- Config file on SD card

- BLE command (future feature)

- Hardcoded overrides for testing

This allows adaptive tuning during real-world deployment.