Final Presentation

Firmware

Spring 2018

Overview

- Project Background & Motivation
- Project Goal
- Block Diagram / Overall Design
- Problems & Solutions
- Remaining Issues
- Final Status
- Future Improvements

Project Background & Motivation

- Update weatherbox firmware to control tower repository

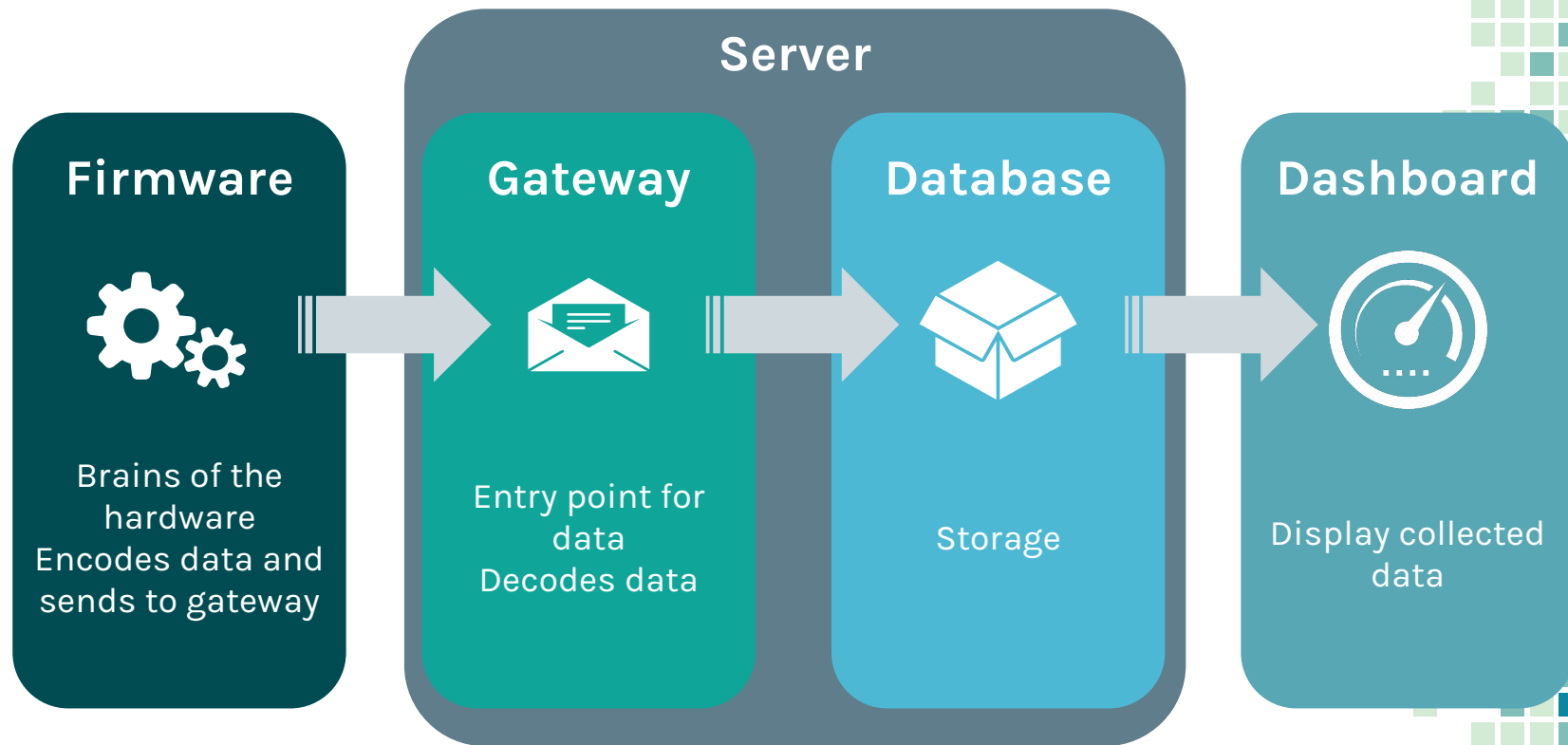- Successfully transmit weatherbox data to the lab's database
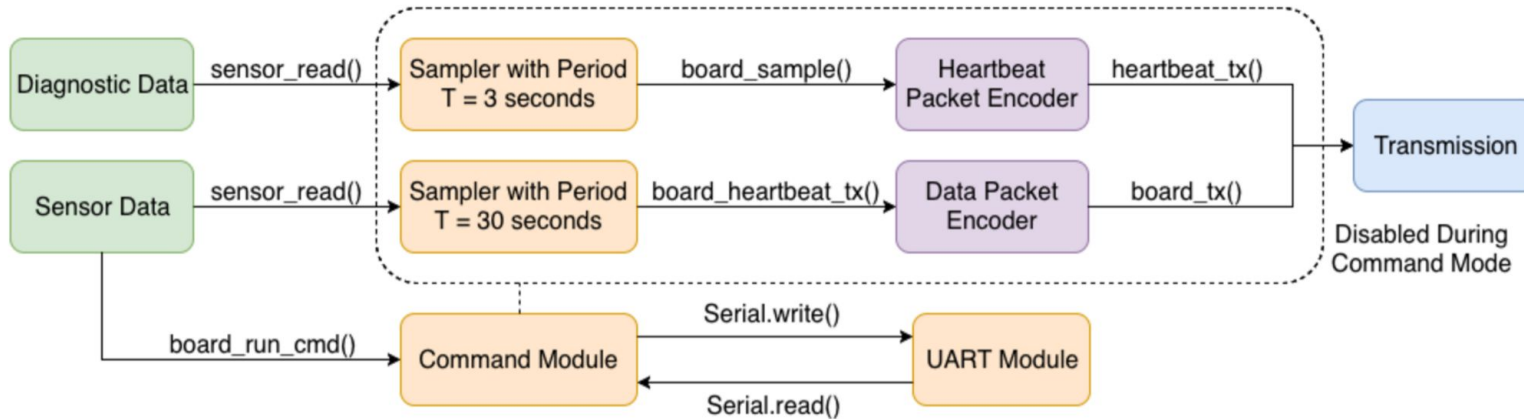
Project Goals

- Understand current weatherbox firmware

- Implement firmware for Snapdragon

- Utilize new sensors on weatherboxes

  - Global Positioning System (GPS)

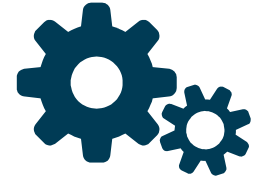 - Real Time Clock (RTC)

Software Block Diagram

Server

Firmware

Brains of the hardware
Encodes data and sends to gateway

Gateway

Entry point for data
Decodes data

Database

Storage

Dashboard

Display collected data

Firmware Functional Block Diagram
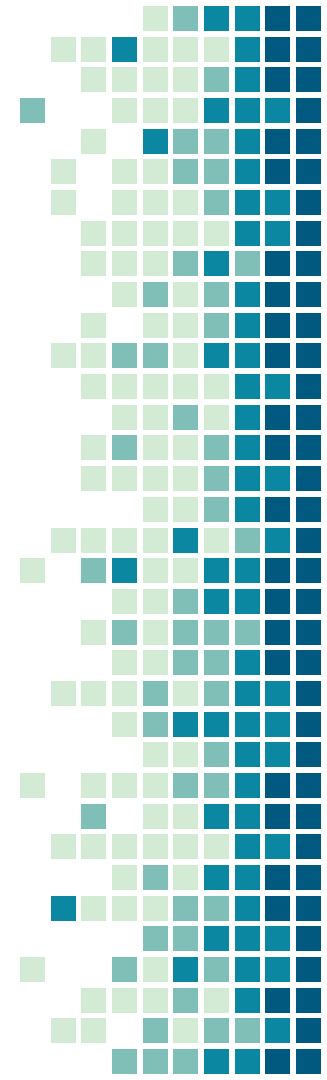
Firmware Block Diagram

Firmware Pseudocode

SETUP

Build based on generation of weatherbox

Initialize board struct

LOOP
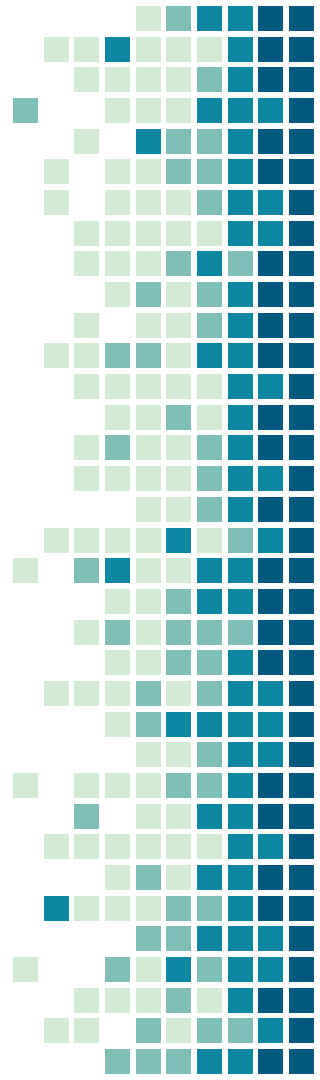
Check if there's user input

     If input, enter Command Mode

Sample Heartbeat Data

Transmit Heartbeat Packet

Sample Sensor Data

Transmit Sensor Packet

Problems & Solutions

- Unfamiliarity with code and boards
- Implementing Snapdragon
  - XBee Communication
  - Debugging Code
- Implementing Cranberry
  - New sensors used
  - Create and organize code into firmware

- Practiced with current firmware to implement Snapdragon
- Researched new sensors & utilized example code to receive data
- Asked for assistance when needed
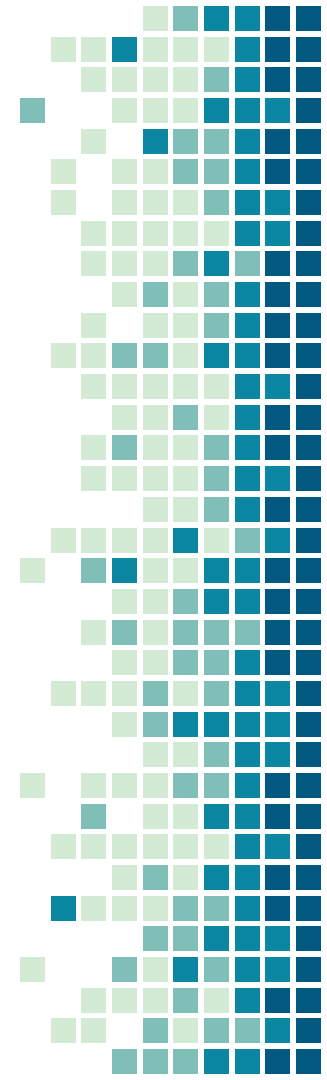
Remaining Issues

- Code for Cranberry runs varingly
  - Uploads sometimes
    - Otherwise, programmer not in sync error
  - No output when running
    - Applies to both GPS & RTC code

Final Status

- Understand current firmware
- Learned git commands & protocol
- Completed Snapdragon generation code
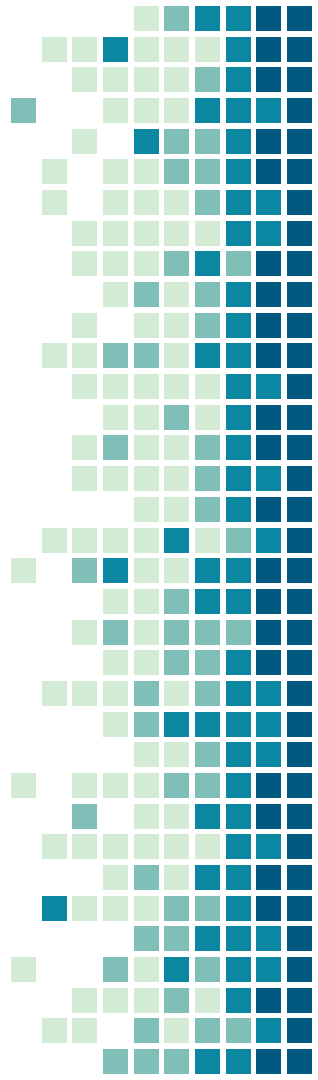- Integrated GPS & RTC code into firmware for Cranberry

	Firmware Gantt Chart															
Week	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Date	1/22/2018	1/29/2018	2/5/2018	2/12/2018	2/19/2018	2/26/2018	3/5/2018	3/12/2018	3/19/2018	3/26/2018	4/2/2018	4/9/2018	4/16/2018	4/23/2018	4/30/2018	5/7/2018
Presentations / Final Report																
Proposal	2/3/2018									SPRING						
Preliminary Design Review					2/24/2018					BREAK						
Critical Design Review								3/24/2018		SPRING						
Demonstration/Final Presentation										BREAK				4/28/2018		
Final Report										SPRING						5/11/2018
Research																
Overview of Firmware										SPRING						
C++										BREAK						
Firmware																
Implement Snapdragon										SPRING						
Implement GPS										BREAK						
Implement Real-Time Clock										SPRING						
Gateway (Snapdragon)										BREAK						

Future Improvements

- Learn how to implement sleep mode on the weatherboxes
  - Previously worked on from Spring 2017
  - Would lower XBee's power consumption from weatherbox

Questions?