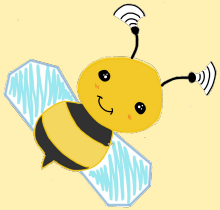# Final Presentation

Team Bumblebee
Spring 2020

Presentation Overview

- Background and Motivation
- Team Progress
- Block Diagrams
- PCB Layouts
- Networking of XBee
- Problems We Encountered
- Bill of Materials
- Final Status
- Future Work
- Questions

Background and Motivation

Bumblebee is the second generation communications module designed to relay meteorological data collected by the other weatherboxes
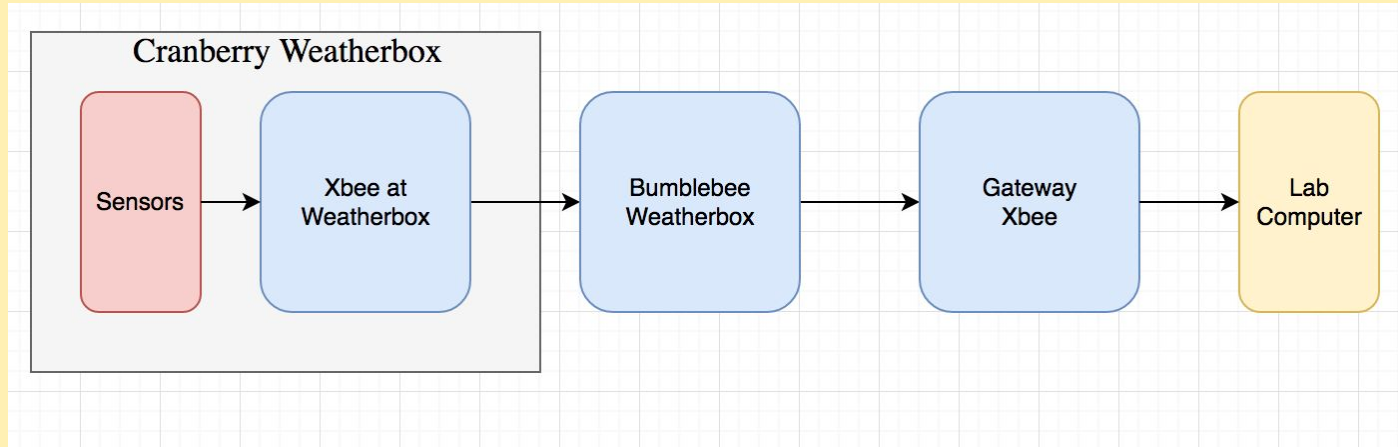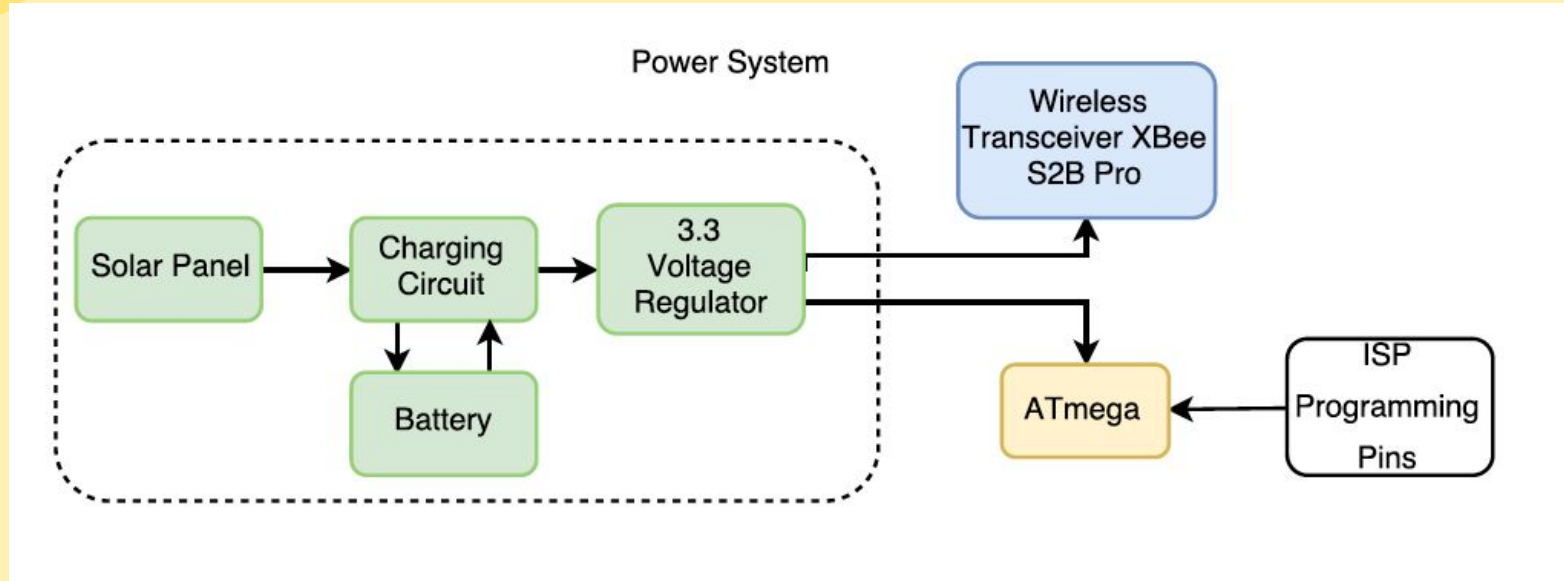
Team Progress

- Rebuilt Bare Bumblebee board
  - Range Testing
- Fabricated and ordered v4.0 and v4.1
  - Populated and programmed (blink) v4.0
  - Received v4.1, but still need to pick up
- Range Testing Documentation on Wiki
- Research on XBee Networking
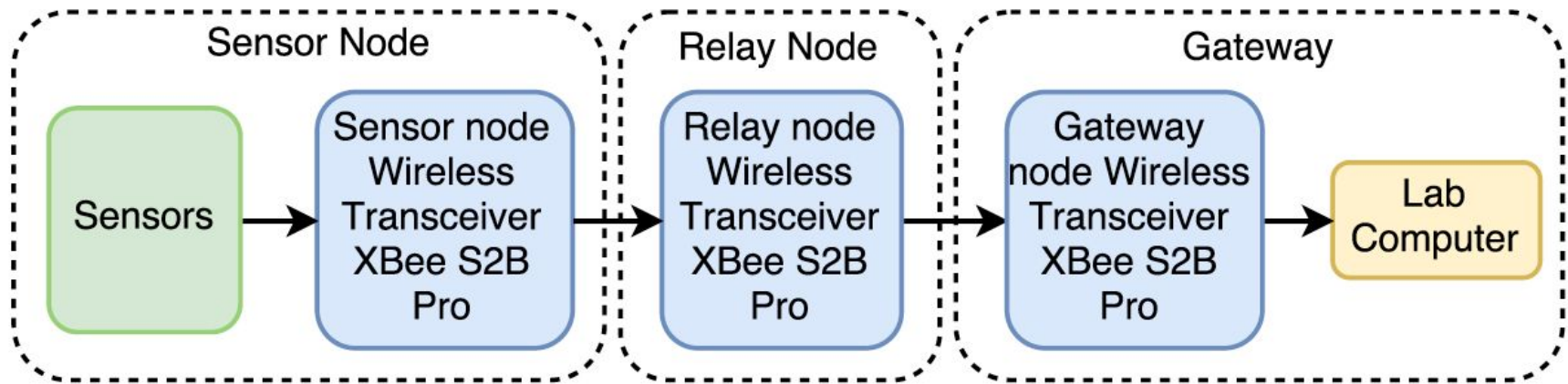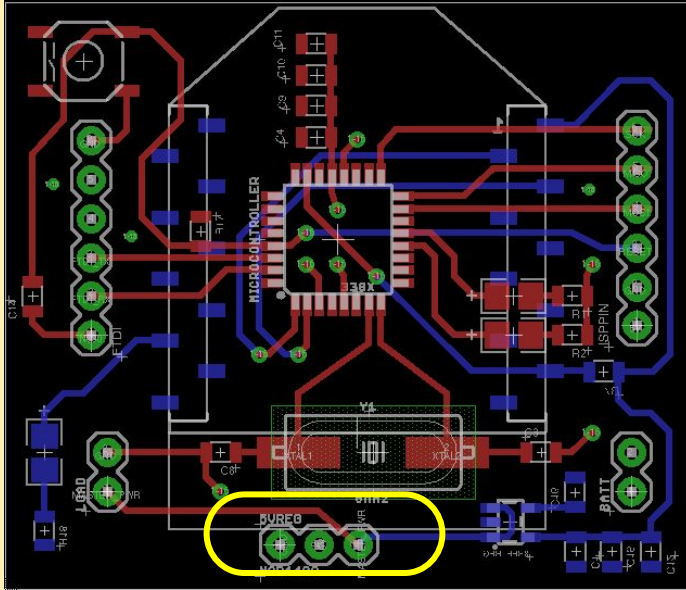 - One-to-Many, Many-to-One,
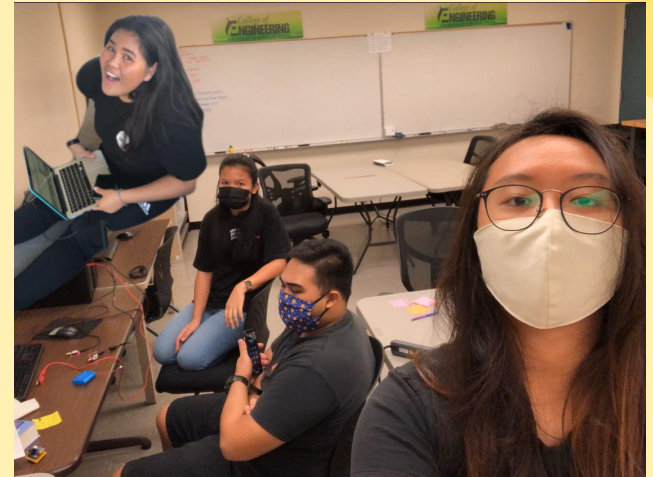
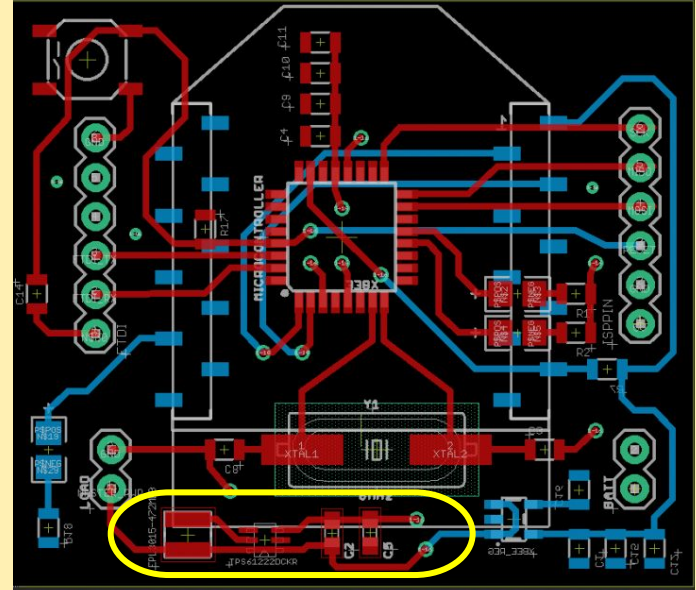# Block Diagram - Power

Block Diagram - Signal/Communication

PCB Layouts

Ver 4.0: 5V Step Up Breakout board

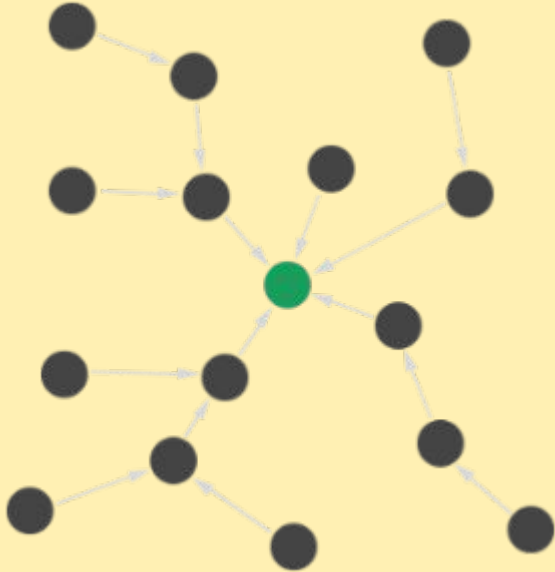**Ver 4.1:** 5V regulator SMD (TPS61222DCKR)

One-to-Many Routing

- Also known as point-to-multipoint communication

- A module can communicate with one or multiple devices on the network

- Coordinator: central node

- End nodes: remote node

Coordinator

Network Topology called Star

Many-to-One Routing
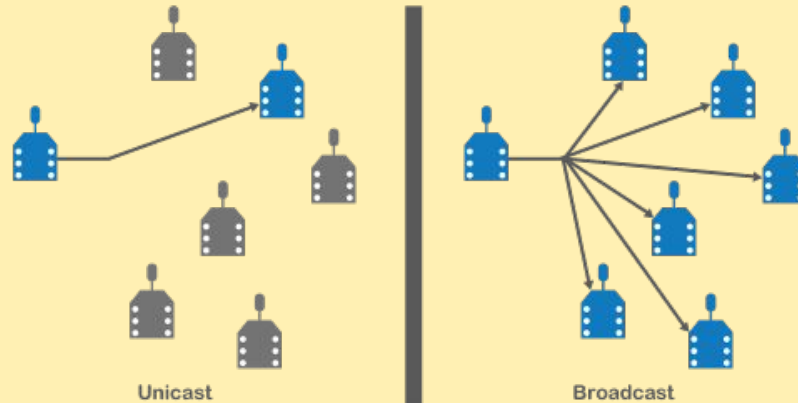
- Multiple nodes need to communicate with a <u>single node</u> that performs some centralized function
  - Referred to as collector or concentrator
- Can have multiple data collector

Broadcast Transmission

AR Values:

1. 0 → enabled
   - Sends many-to-one broadcast
2. FF → disabled

(i) **AR** Many-to-One Route Broadcast Time | FF | x 10 sec

Unicast   Broadcast

Problems Encountered

- COVID-19
  - Put an unexpected hold on the progress of our project

- Tried to range test with v4.0 but Xbees couldn't detect each other
- Rx and Tx declaration in code
- Trace for switch chipped off (again)

Bill of Materials

Items Ordered	Quantity	Price ($)
2mm 10pin Xbee Socket-SMD	15	14.25
2.2uF 0805 Capacitors	10	3.83
3.3V IC Regulator Linear	10	8.90
Version 4.0 PCB from Seeed	10	4.90
Version 4.1 PCB from OSHPark	3	13.10
		Total: $44.98

Final Status

- Designed and fabricated 2 separate PCB
- Range Tested multiple times
- Taught Raellis and Arnold many things
  - How to range test
  - Configure the Xbees
  - How to look at the code
- Did more documentation on SCEL Wiki
- Have more knowledge on Xbee Networking
- Work on final paper
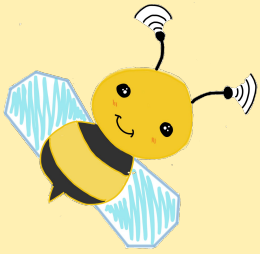
Future Work

- v4.0
  - Declare TX and RX pins in Relay code
  - Consult Firmware Team
  - Repopulate due to broken reset trace
  - Test v4.0
- v4.1
  - Populate
  - Program
  - Test v4.1
- Conduct more Range Testing
- Experiment on the different XBee Network

Questions?