Team Bumblebee Final Presentation

Sharmaine Javier, Mizpah Mansanao, Xiao Chen

SCEL
Smart Campus Energy Laboratory

Overview

SCEL
Smart Campus Energy Laboratory

Background and Motivation

The Bumblebee Weatherbox is a second generation communications module designed to relay meteorological data collected by the other weatherboxes. Its purpose is to increase the effective range of the weatherboxes.

Project Goals

- Catch up with past team's progress
- Do more extensive Xbee field tests
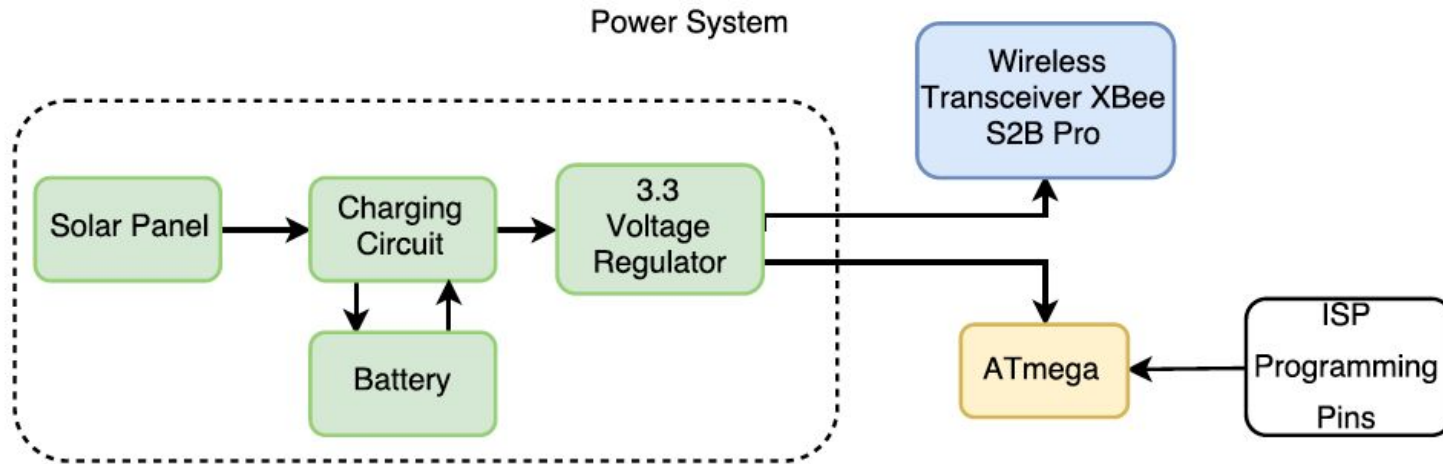- Populate and debug PCBs
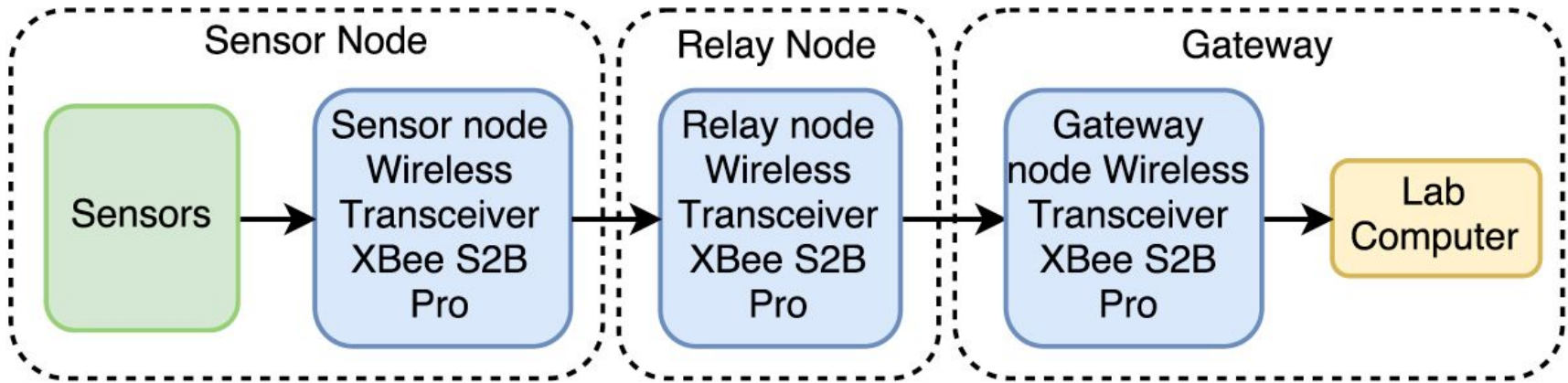- Deploy a Bumblebee box

Block Diagram (Power)

Power System

```
Solar Panel → Charging Circuit → 3.3 Voltage Regulator
                    ↓ ↑
                 Battery
```

3.3 Voltage Regulator → Wireless Transceiver XBee S2B Pro

3.3 Voltage Regulator → ATmega ← ISP Programming Pins

Block Diagram (Signal/Communication)

PCB
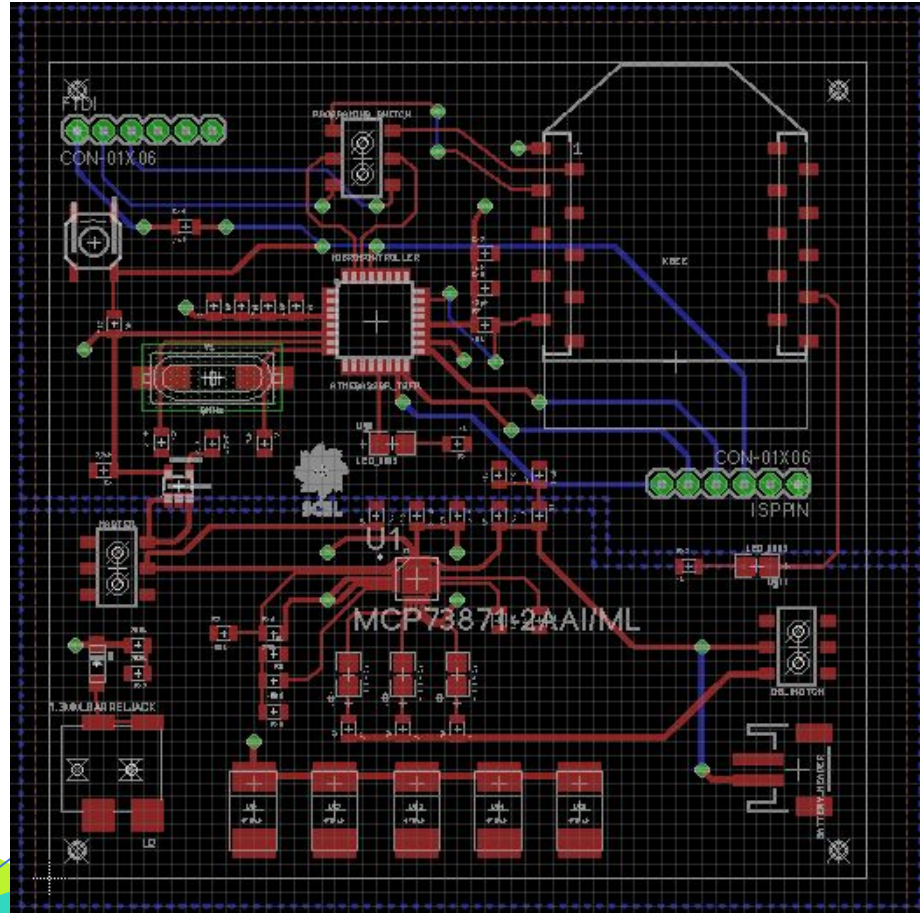
# Problems Encountered

Problems

- Understanding Bumblebee
- Unable to upload code to XBee
- XBee Configuration
  - API mode 2
- Unable to deploy
- PCB connections
- Unable to receive package on PCB
  - Hardware vs software

Solutions

- Contacted past Bumblebee team and read up on Wiki reports
- Changed clock back to 16MHz
- Contacted past teams for solution and worked with the mentors
- NONE
- Resoldered parts
- TBA
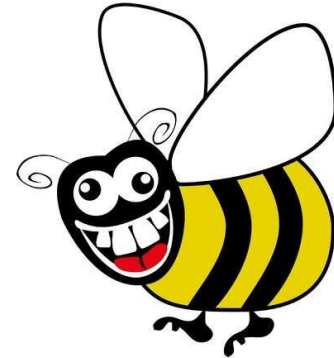
Power Budget

Bumblebee Power Budget

Part Name	Idle Current (mA)	Typical Current (mA)	Max Current (mA)	Voltage (V)	Avg Power (mW)	Max Power (mW)
XBee Transmit	15.00	205.00	220.00	3.3	484	726
XBee Receive				3.3		
V. Reg 3.3V (Main)		0.35	0.90	3.3	1.375	2.97
Atmega 328P MCU	0.70	1.70	2.70	3.3	5.61	8.91
Total	15.70	207.05	223.60	13.2	490.985	737.88

Battery	Voltage (V)	Current (mAH)	Useable Energy (%)
6600 mAH Li-ion 3.7	3.7	6600	80.0%

Battery	Energy (mWH)	V. Reg Efficiency (%)	Max Power Consuption (mW)	Max (Hrs)	Max w/ V. Reg Efficiency (Hrs)
6600 mAH Li-ion 3.7	19536	80.0%	75.99	257.1	205.67

Run Time (Hrs)	21.18067979
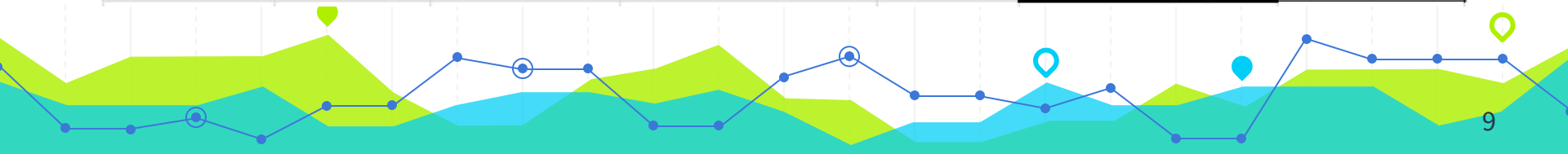
Bill of Materials

Team Bumblebee's Bill of Materials			
Part Name	quantity	Unit cost	Total Cost
Assorted Resistors	18	$0.54	$9.63
Assorted Capacitors	20	$0.32	$6.36
Assorted Diodes	6	$0.50	$3.00
Microprocessor	1	$2.08	$2.08
Charging Chip	1	$1.84	$1.84
XBee Headers	2	$0.95	$1.90
Xbee Pro S2B	1	$29.00	$29.00
Xbee Breakout Board	1	$2.95	$2.95
Duck Antenna	1	$10.50	$10.50
Solar Panel	1	$59.00	$59.00
Battery	1	$29.50	$29.50
8 Mhz clock crystal	1	$0.59	$0.59
FTDI and headers	1	$6.75	$6.75
Voltage Regulator	1	$0.92	$0.92
Reset Button	1	$2.94	$2.94
DC Barrel Power Jack	1	$1.25	$1.25
Sliding switch	3	$0.26	$0.78
PCB	1	$0.50	$0.50
Plastic Box housing	1	$10.89	$10.89
		Total Parts Cost	$180.38

Final Status

- Un-Successfully deployed but working board
- Populated PCB
- Hardware Vs Software problems on PCB

Completed

Future Work

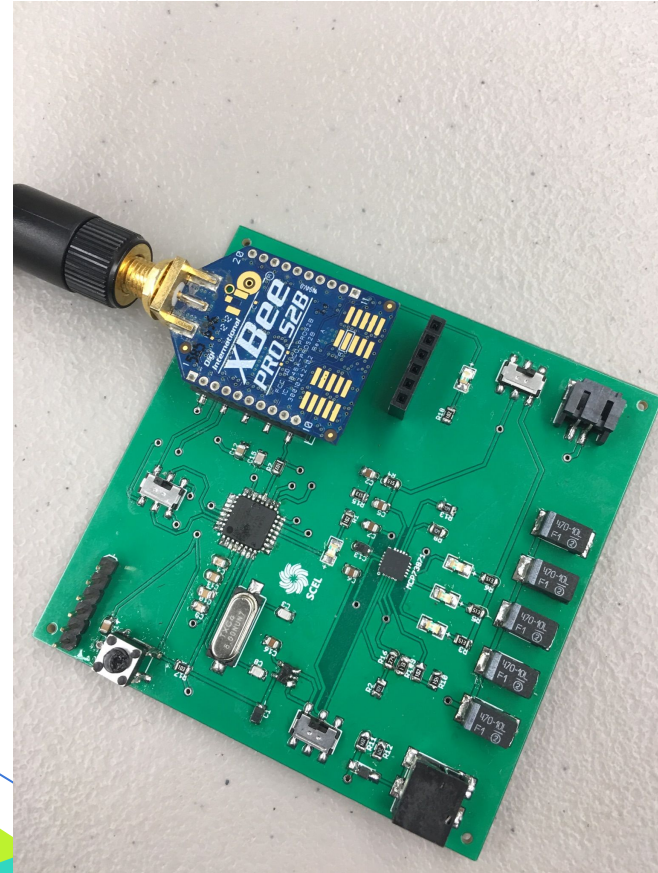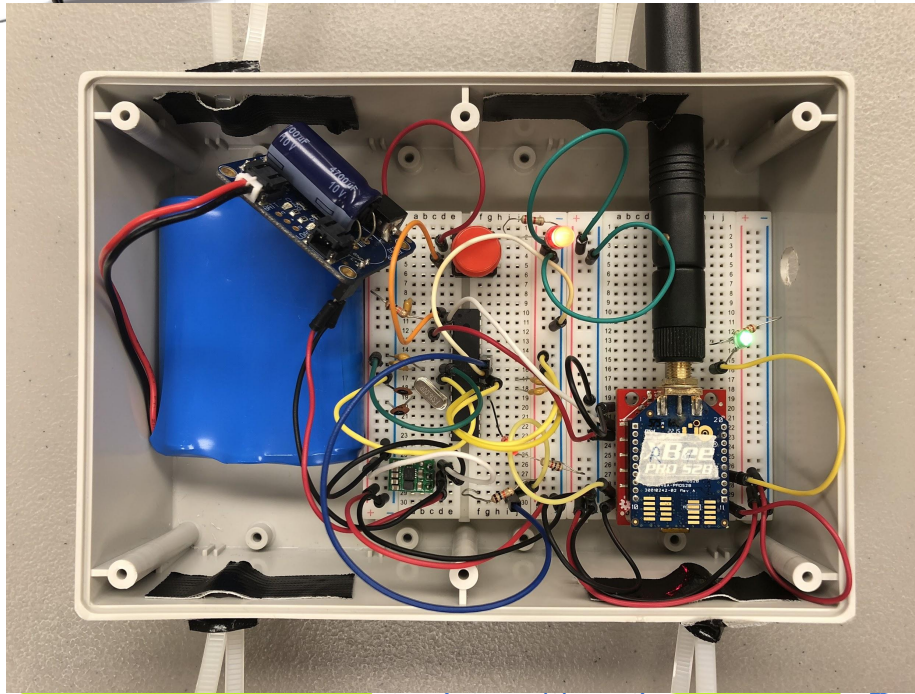- Debug PCB Hardware and software
- Deploy!!
- Print Housing
- Start working with XBee S2C Pro
- Establish network with more than one weatherbox

QUESTIONS?