Cranberry

EE496 Final Presentation

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Overview

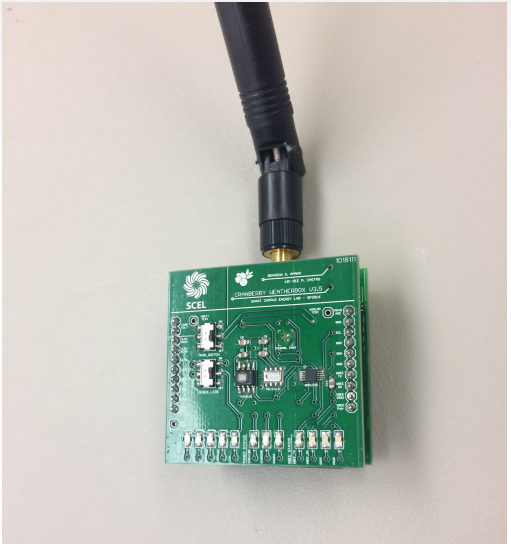
- Motivation & Goals
- Overall Design
- Block Diagram
- Housing Design
- Power Budget and BOM
- Progress & Final Status
- Problems and Solutions
- Remaining Work & Future Improvements

Team Motivation

- Improve hardware of first generation weatherbox
  - Add functionality
  - Lower cost
- Deploy Cranberry 4.1

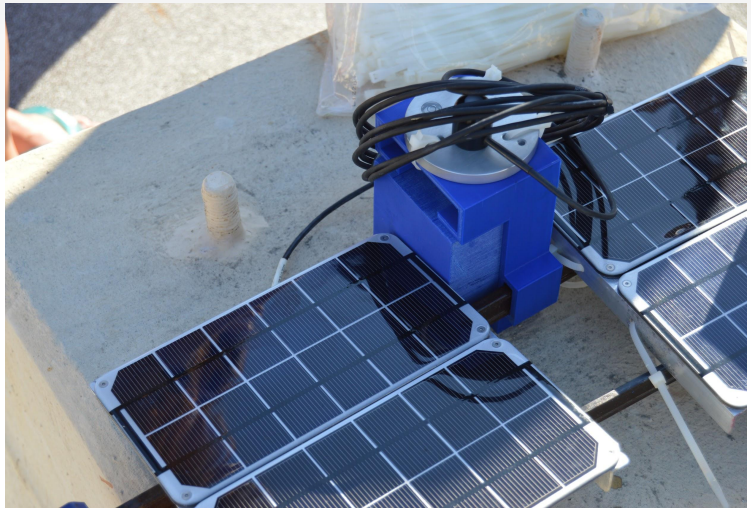
Semester Goals

- Populate & Deploy Cranberry v4.1
- Fix problems (Cranberry v4.1)
- Design Cranberry v4.2



Overall Design

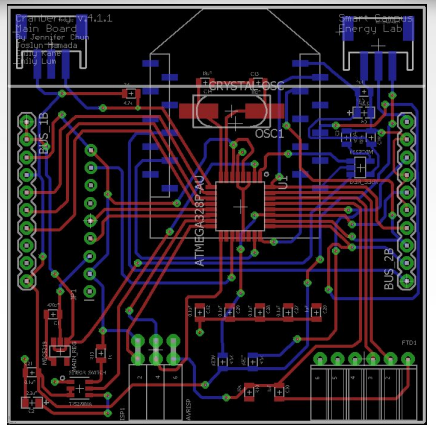
- 2.25” X 2.25” stacked boards
- Top: Sensor Board
- Bottom: Main Board
    - GPS and RTC

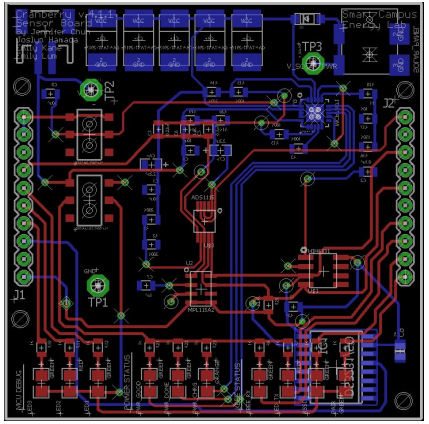


Block Diagram

Progress

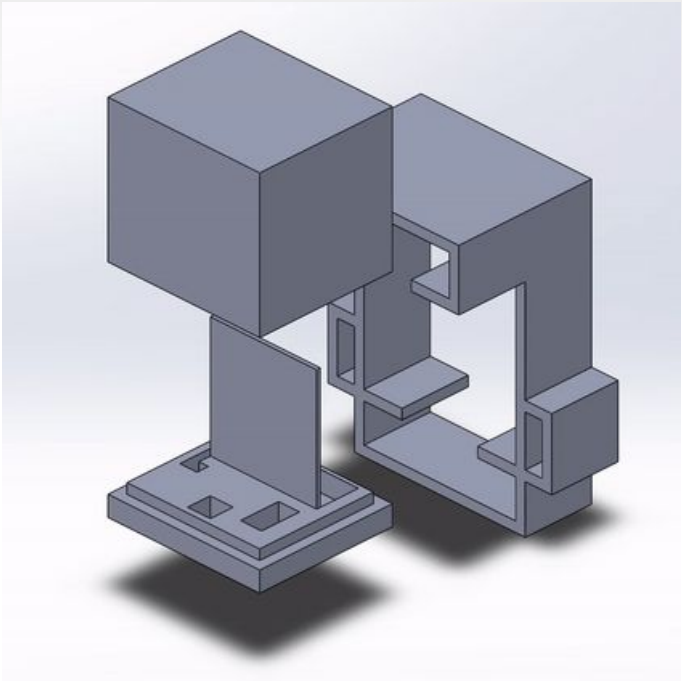
- Finished populating Cranberry v4.1
  - One main board
  - Two sensor boards
- Deployed Cranberry v4.1
  - On roof for 3 days - stopped transmitting
  - Currently fixing existing problems.
- Working on design for v4.2





Housing Design

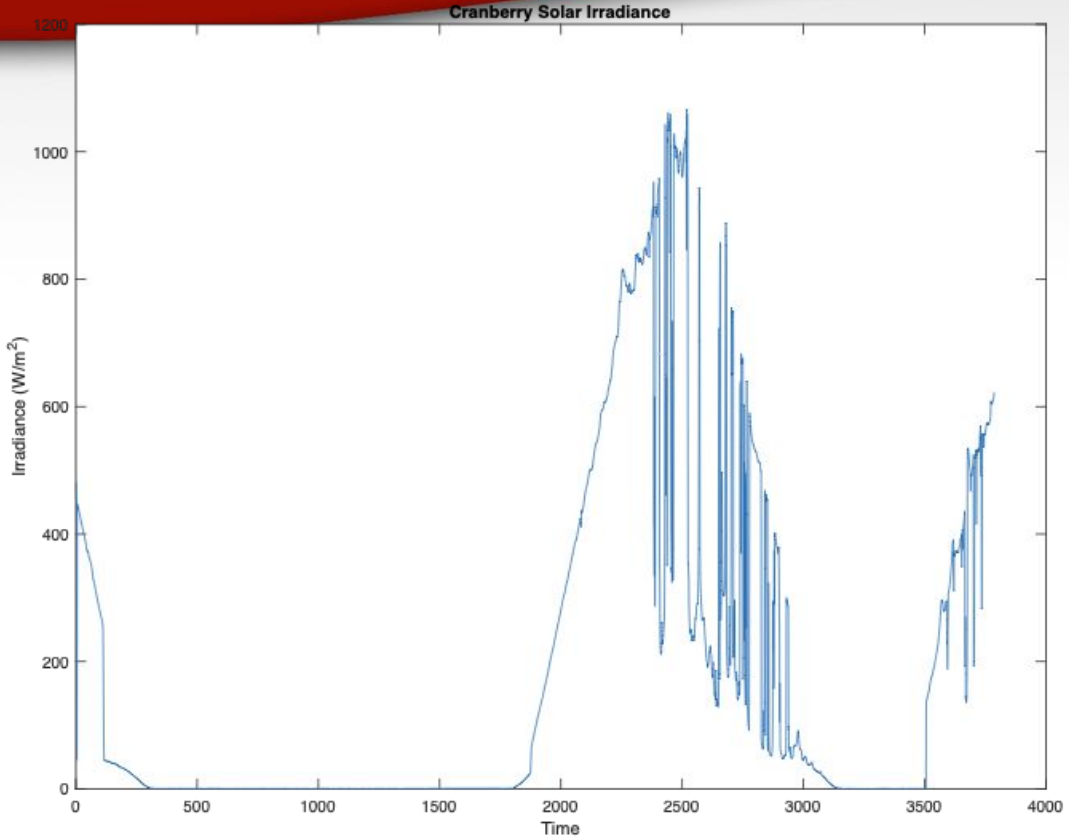
- New housing design by the housing team



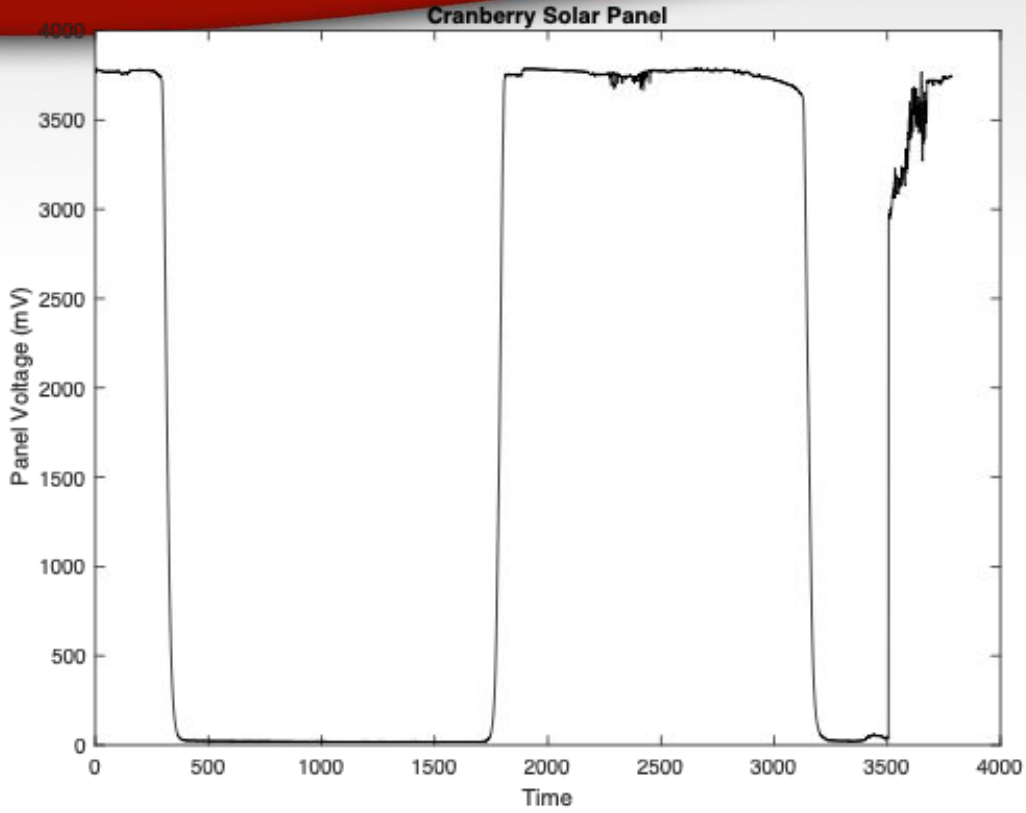
Power Budget

Device Name	Idle (mA)	Typical Current Draw (mA)	Max Current Draw (mA)
XBee Transmit	15.00	205.00	220.00
XBee Receive			
Barometer	0.01	0.01	0.01
Humidity (HIH6031)	0.00	0.65	1.00
V. Reg 3.3V (Main)		0.35	0.90
V. Reg 3.3V (Xbee)		0.35	0.90
Atmega 328P MCU	0.70	1.70	2.70
Irradiance ADC	0.01	0.15	0.30
Irradiance Op Amp		0.80	2.20
Adafruit GPS (MTK3339)		20	
RTC (DS3231)	0.11		0.2
Total Current Draw (mA)	15.83	229.01	228.21
Supply Voltage (V)	3.30	3.30	3.30
Total Power Consumption (mW)	**52.23**	**755.72**	**753.08**

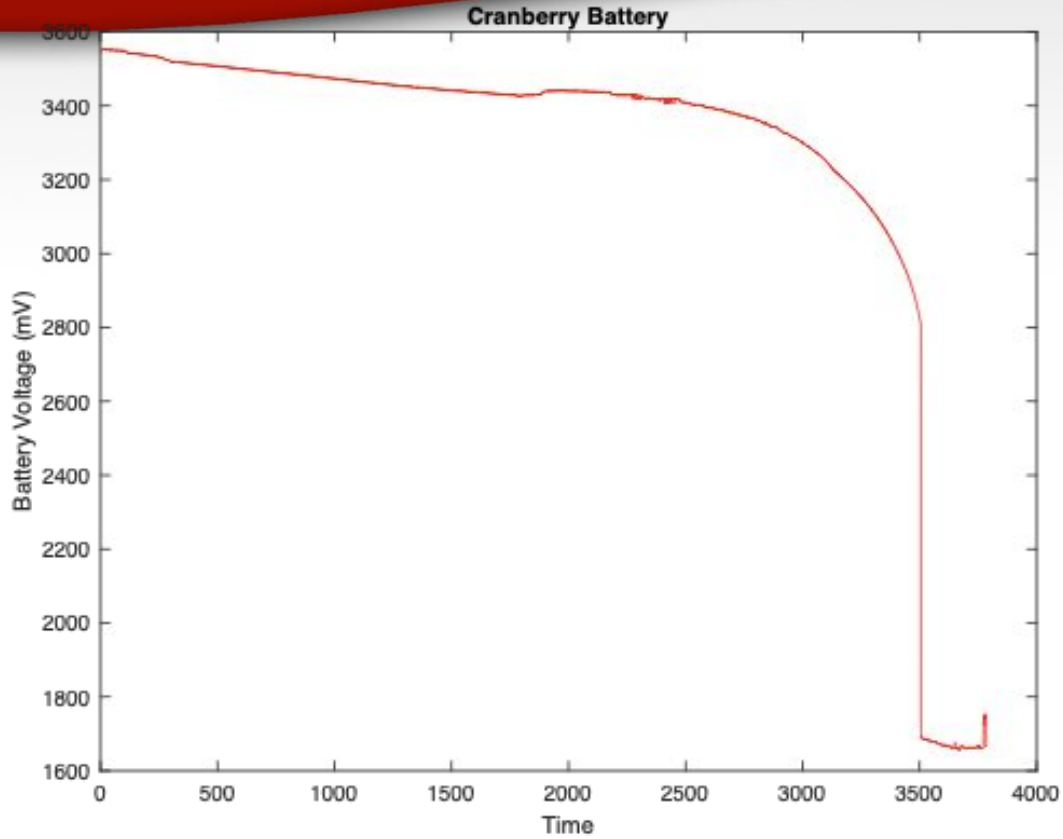
Cranberry Graph



Cranberry Graph



Cranberry Graph



Bill of Materials

#	Part Name	Unit Cost	Quantity	Sub-Total
1	Solar Irradiance Sensor	$235.00	1	$235.00
2	PCB Manufacturing Costs	$30.00	2	$60.00
3	6V Solar Panel	$59.00	1	$59.00
4	Solar Irradiance Leveling Plate	$35.00	1	$35.00
5	3.7V Lithium Ion battery	$29.00	1	$29.50
6	XBee Pro S2B	$29.00	1	$29.00
7	Humidity Sensor	$15.13	1	$15.13
8	Polarized 470 uF Decoupling Capacitors	$2.26	5	$11.30
9	External Temperature Sensor	$9.95	1	$9.95
10	Solar Irradiance ADC	$6.51	1	$6.51
11	Barometer Sensor	$5.10	1	$5.10
12	Status and Debugging LEDs	$0.38	12	$4.55
13	ATMEGA328P MCU	$3.70	1	$3.70
14	XBee Pin Headers	$1.48	2	$2.96
15	Polarized 2.2uF Decoupling Capacitors	$0.69	4	$2.76
16	Mechanical Sliding Switches	$1.37	2	$2.74
17	Miscellaneous Discrete Components			$17.74
18	Adafruit Ultimate GPS Breakout	$15.95	1	$15.95
19	RTC Module	$14.95	1	$14.95
	Cranberry v4.0 Total Cost			**$545.89**

Previous Problems

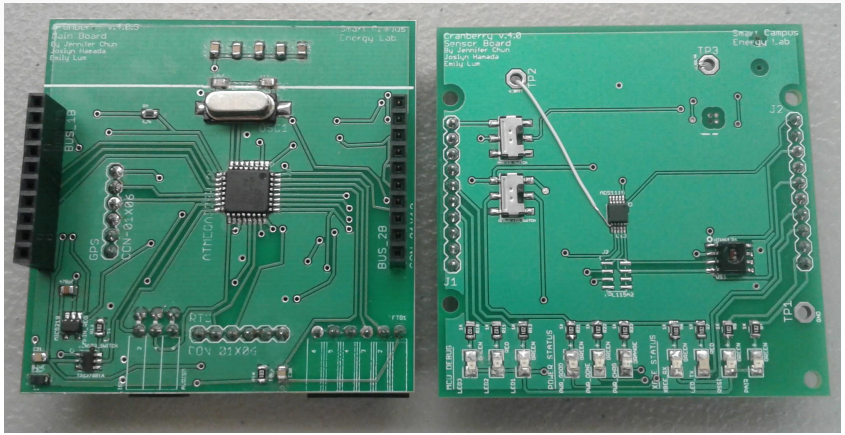
- Voltage regulator outputting 1.4V
  - ADC was soldered upside down
- Two failed deployments
  - XBee header was shorted
  - Battery was not charging
- Solar irradiance crimps were wrong size
  - Soldered wires directly to board

Current Problems

- Battery has not been charging
- XBee stops transmitting when solar panel voltage is above 6V

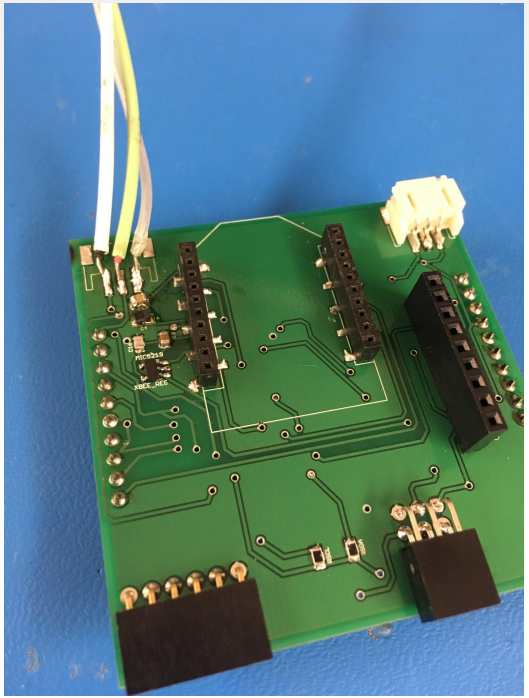
Final Status

- We have a populated v4.1 board
- Debugging v4.1 solar panel & XBee issue
- Designing v4.2
  - Clyde - Main board
  - Kane - Sensor board



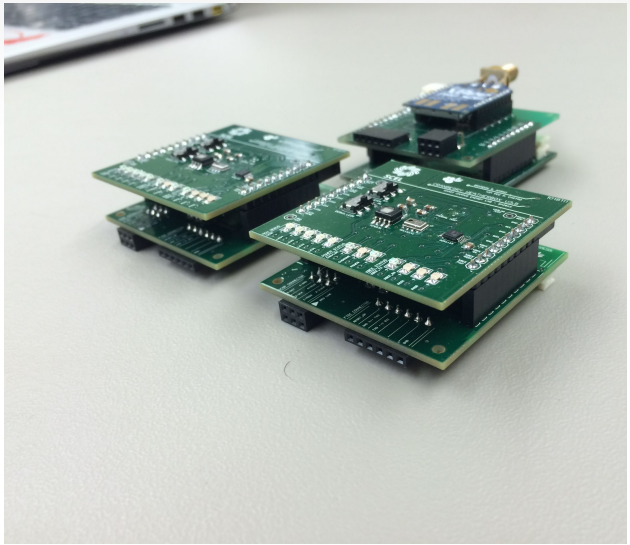
Remaining Work

- Fully deploy Cranberry v4.1 to the roof
- Debug more potential issues with v4.1



Future Work

- Finalize designing v4.2
  - Minimize size
  - Potential issues with v4.1
- Deploy v4.2
- Mass deploy



Any Questions?