Cranberry

EE496 Critical Design Review

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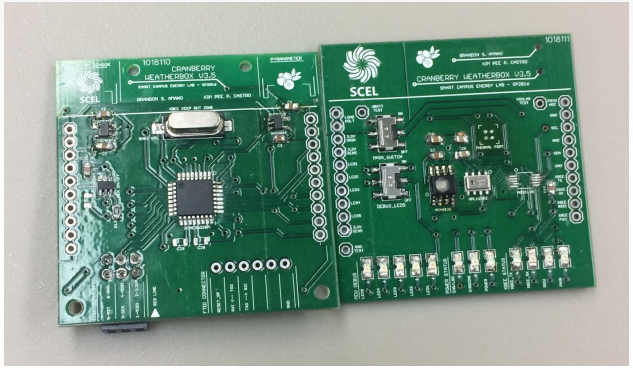
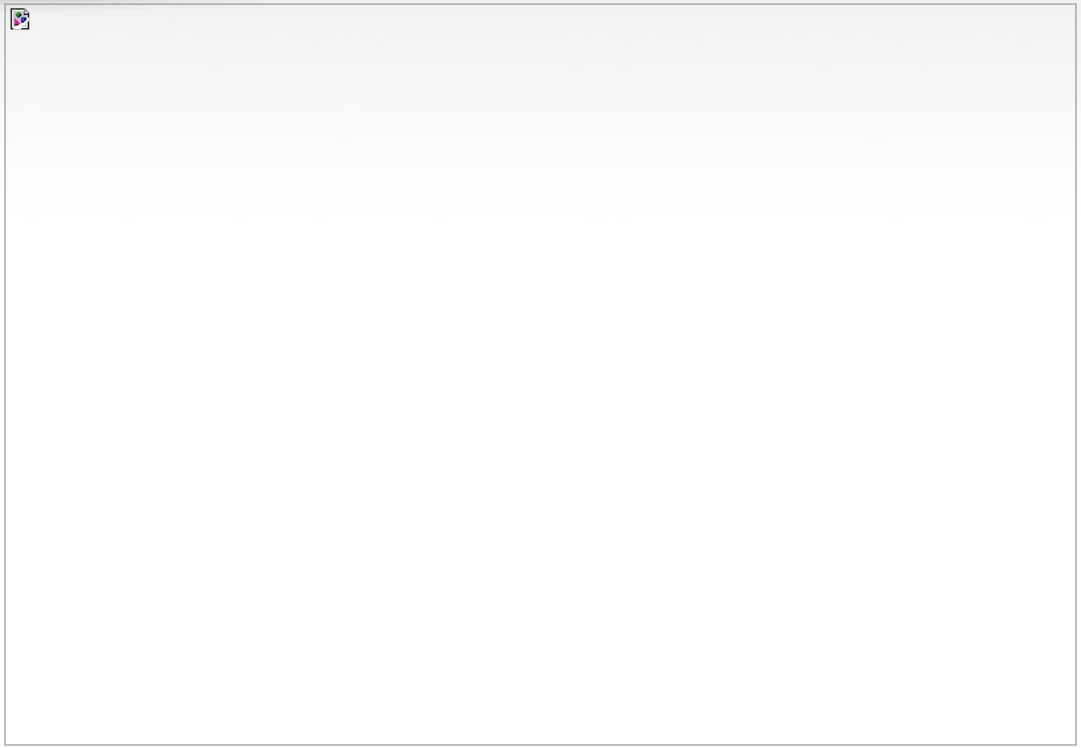
Overview

- Hardware Block Diagram
- Progress
- Bill of Materials
- Power Budget
- Problems & Solutions
- Future Work
- Updated Schedule
- Questions



Hardware Block Diagram



Progress Since PDR

- Fixed all board problems
  - Solar irradiance
  - Solar panel
  - XBee
- Deployed
  - First time with Bumblebee failed
  - Second time lasted almost 2 days

Bill of Materials

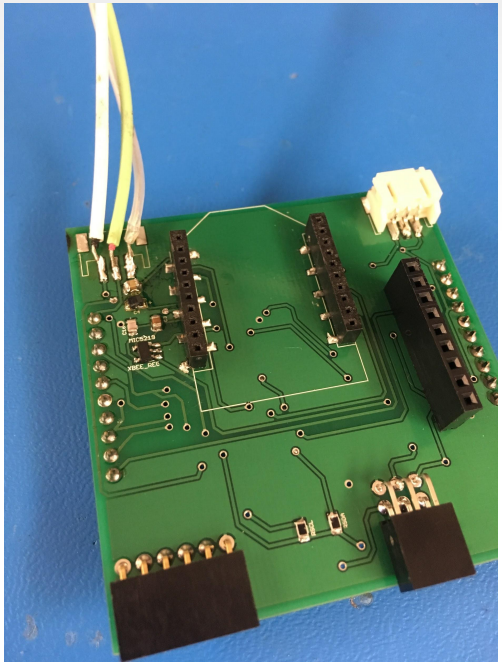
#	Part Name	Unit Cost	Quantity	Sub-Total
1	Solar Irradiance Sensor	$235.00	1	$235.00
2	PCB Manufacturing Costs	$30.00	2	$60.00
3	6V Solar Panel	$59.00	1	$59.00
4	Solar Irradiance Leveling Plate	$35.00	1	$35.00
5	3.7V Lithium Ion battery	$29.00	1	$29.50
6	XBee Pro S2B	$29.00	1	$29.00
7	Humidity Sensor	$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**

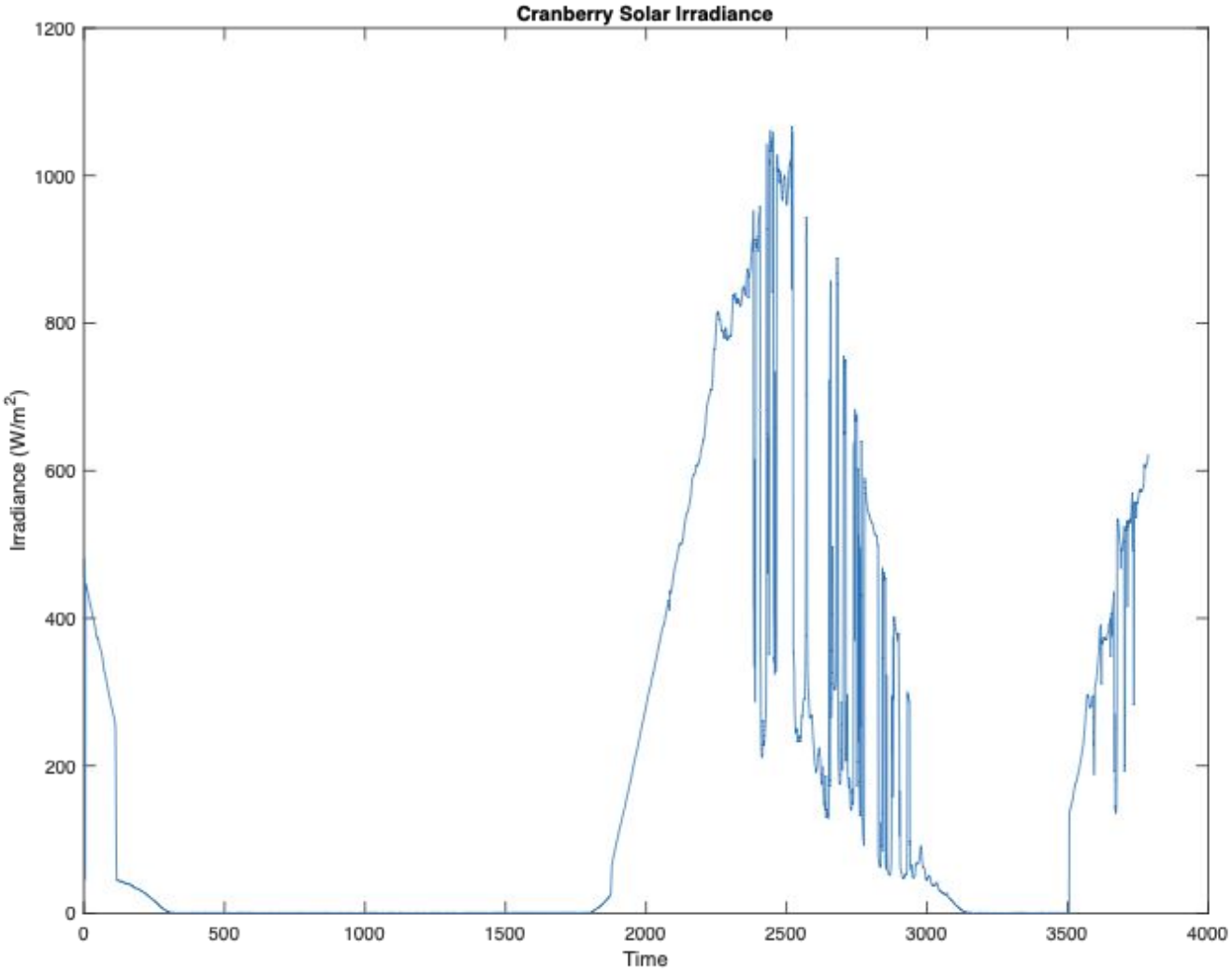
Power Budget

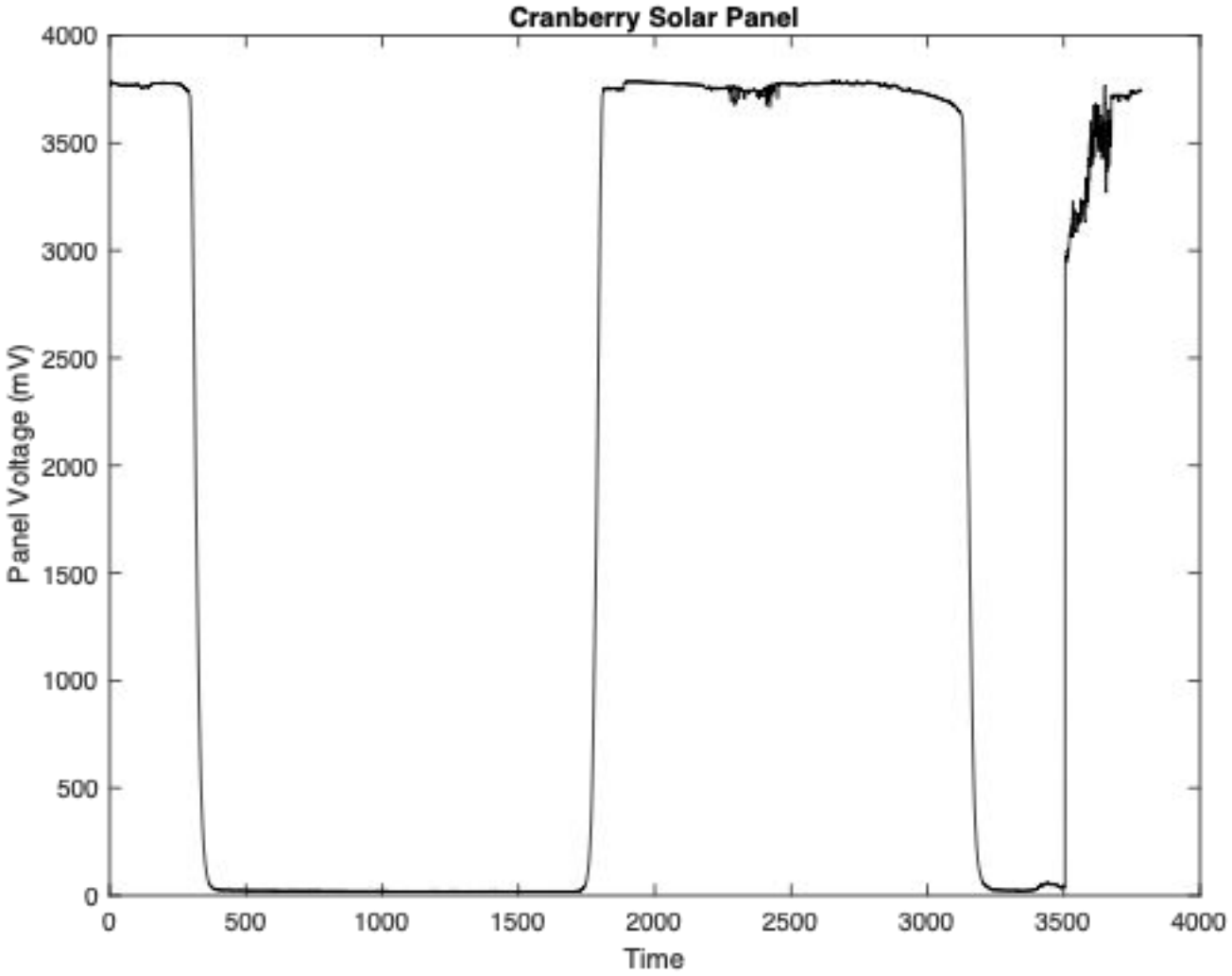
Device Name	Idle (mA)	Typical Current Draw (mA)	Max Current Draw (mA)
XBee Transmit	15.00	205.00	220.00
XBee Receive			
Barometer	0.01	0.01	0.01
Humidity (HIH6031)	0.00	0.65	1.00
V. Reg 3.3V (Main)		0.35	0.90
V. Reg 3.3V (Xbee)		0.35	0.90
Atmega 328P MCU	0.70	1.70	2.70
Irradiance ADC	0.01	0.15	0.30
Irradiance 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**

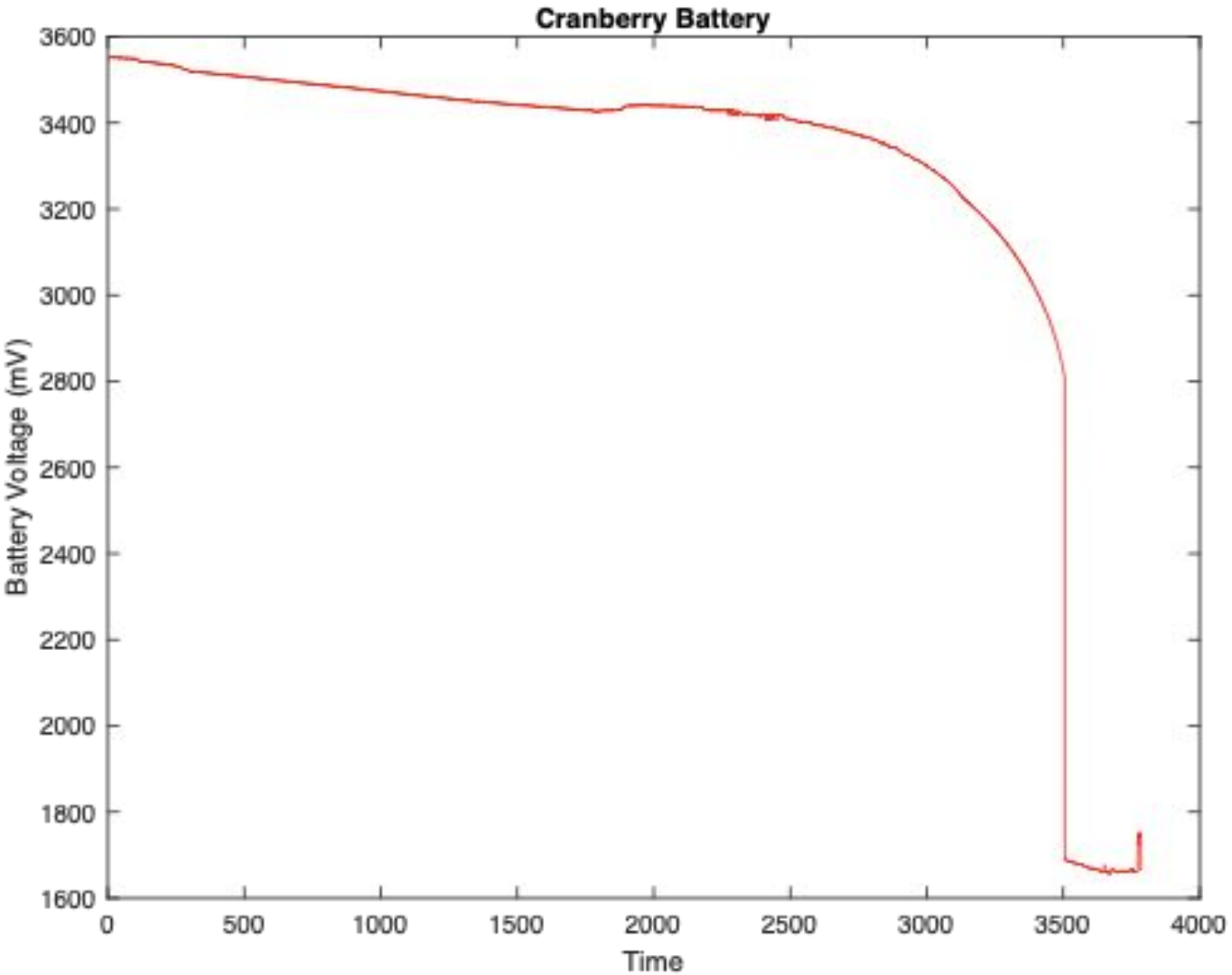
Problems

- Solar irradiance crimps
  - Wrong sized crimps
- First time deployment failed
  - XBee header was shorted so we replaced it
- Second time deployment
  - Battery has not been charging




Cranberry Solar Irradiance
Irradiance (W/m^2)
Time
0
200
400
600
800
1000
1200
0
500
1000
1500
2000
2500
3000
3500
4000


Cranberry Solar Panel
Panel Voltage (mV)
Time
0
500
1000
1500
2000
2500
3000
3500
4000

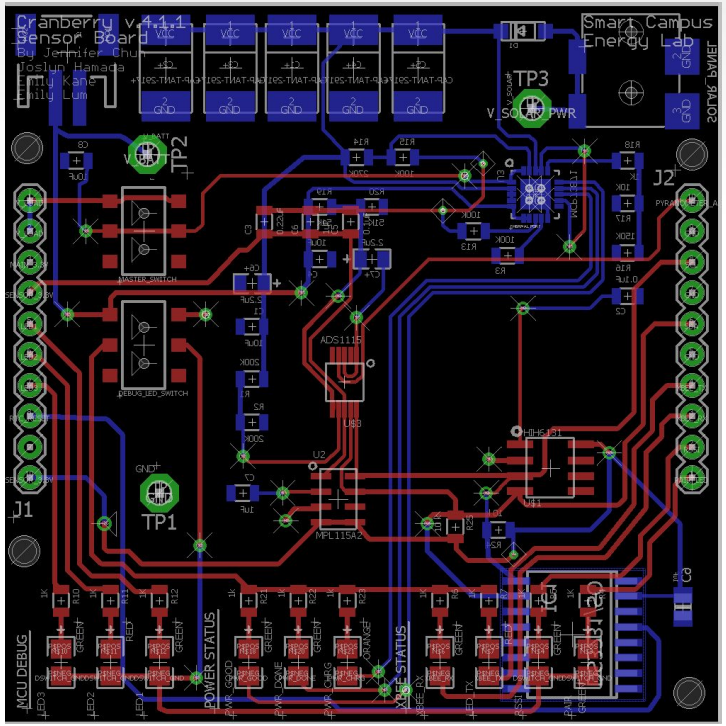

Cranberry Battery
Battery Voltage (mV)
3600
3400
3200
3000
2800
2600
2400
2200
2000
1800
1600
0
500
1000
1500
2000
2500
3000
3500
4000
Time

Future Work

- Figure out why our battery is not charging
- Design Cranberry v4.2
- Mass deploy

Cranberry 4.2

- Design smaller board (2” x 2”)
- Rearrange board so mounting holes will be on the corners
- Add more test points
- Fix potential charging chip problem
- Remove external temperature sensor



Updated Schedule

	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10
Cranberry Update	X	X	X														
Solder 2nd Board (4.1)				X	X	X	X										
Debug 4.1				X	X	X	X	X									
Deploy 4.1									X	X	X						
Design 4.2																	
Documentation																	
Write Final Report																	

Any Questions?