



# **Cranberry**

## **EE496 Critical Design Review**

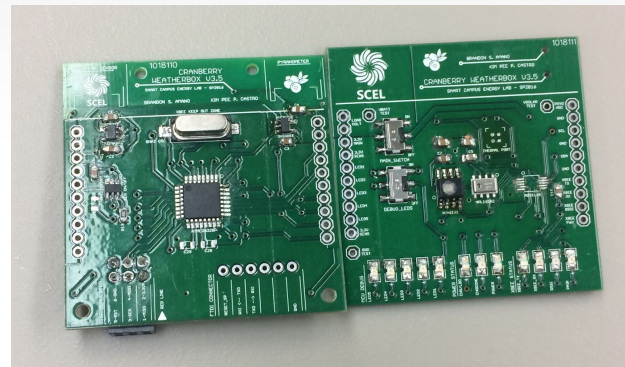


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# Overview



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



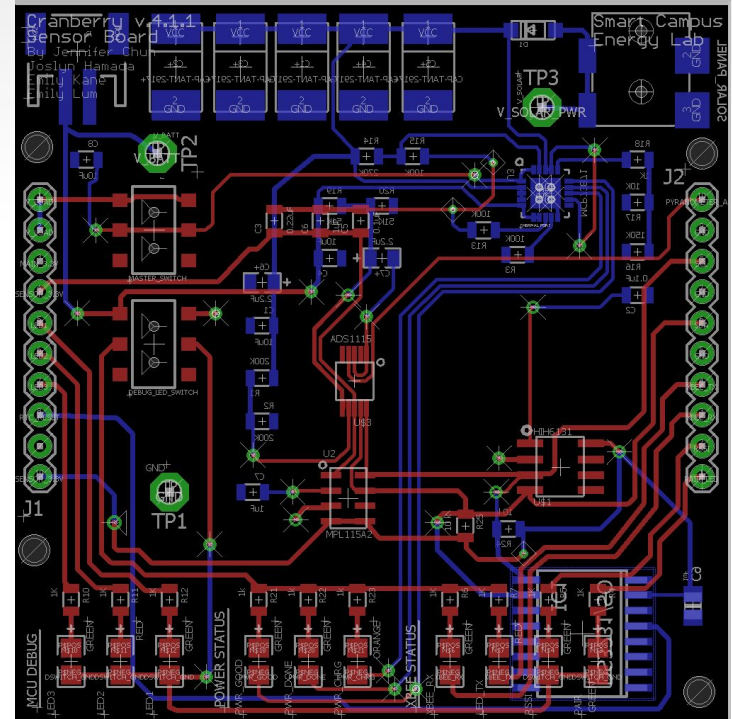
# Hardware Block Diagram



# Progress Since PDR



- Almost done with soldering v4.1
- Ready to deploy v4.0
- Ran battery test
  - Lasted two days
- Ordered housing



# 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         |
| <b>Cranberry v4.0 Total Cost</b> |  |           |          | <b>\$545.89</b> |



# 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                   |
|                                     |              |                           |                       |
| <b>Total Current Draw (mA)</b>      | 15.83        | 229.01                    | 228.21                |
| <b>Supply Voltage (V)</b>           | 3.30         | 3.30                      | 3.30                  |
| <b>Total Power Consumption (mW)</b> | <b>52.23</b> | <b>755.72</b>             | <b>753.08</b>         |



# Problems



- Waiting for parts to complete soldering
- 3D printer not working
- Waiting for housing box to be shipped

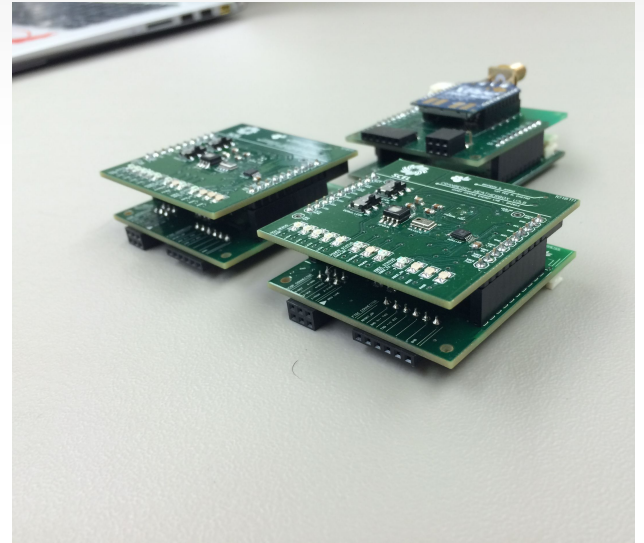




# Future Work



- Finish soldering v4.1
- Debug v4.1
- Deploy v4.0 and v4.1







# Updated Schedule

|                             | 1/15 | 1/22 | 1/29 | 2/5 | 2/12 | 2/19 | 2/26 | 3/5 | 3/12 | 3/19 | 3/26 | 4/2 | 4/9 | 4/16 | 4/23 | 4/30 | 5/7 |
|-----------------------------|------|------|------|-----|------|------|------|-----|------|------|------|-----|-----|------|------|------|-----|
| Cranberry Update            | X    | X    |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Implement GPS and RTC       |      |      |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Solder 2nd Board (4.0)      |      | X    | X    |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Debug 2nd Board (4.0)       |      |      | X    | X   | X    | X    | X    |     |      |      |      |     |     |      |      |      |     |
| Deploy (4.0)                |      |      |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Order/Receive Cranberry 4.1 |      |      |      | X   | X    | X    |      |     |      |      |      |     |     |      |      |      |     |
| Solder Cranberry 4.1        |      |      |      |     |      | X    | X    | X   | X    |      |      |     |     |      |      |      |     |
| Test and Debug 4.1          |      |      |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Deploy (4.1)                |      |      |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |
| Final Report                |      |      |      |     |      |      |      |     |      |      |      |     |     |      |      |      |     |





Any  
Questions?

