Critical Design Review (CDR)
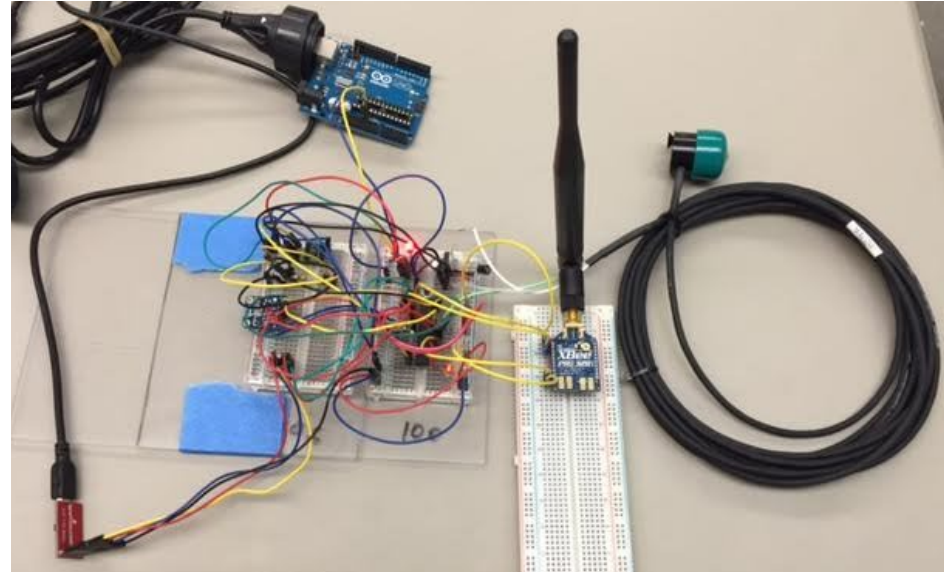
Team Asteroid

Mentor: Brian Chan
Advisor: Dr. Kuh
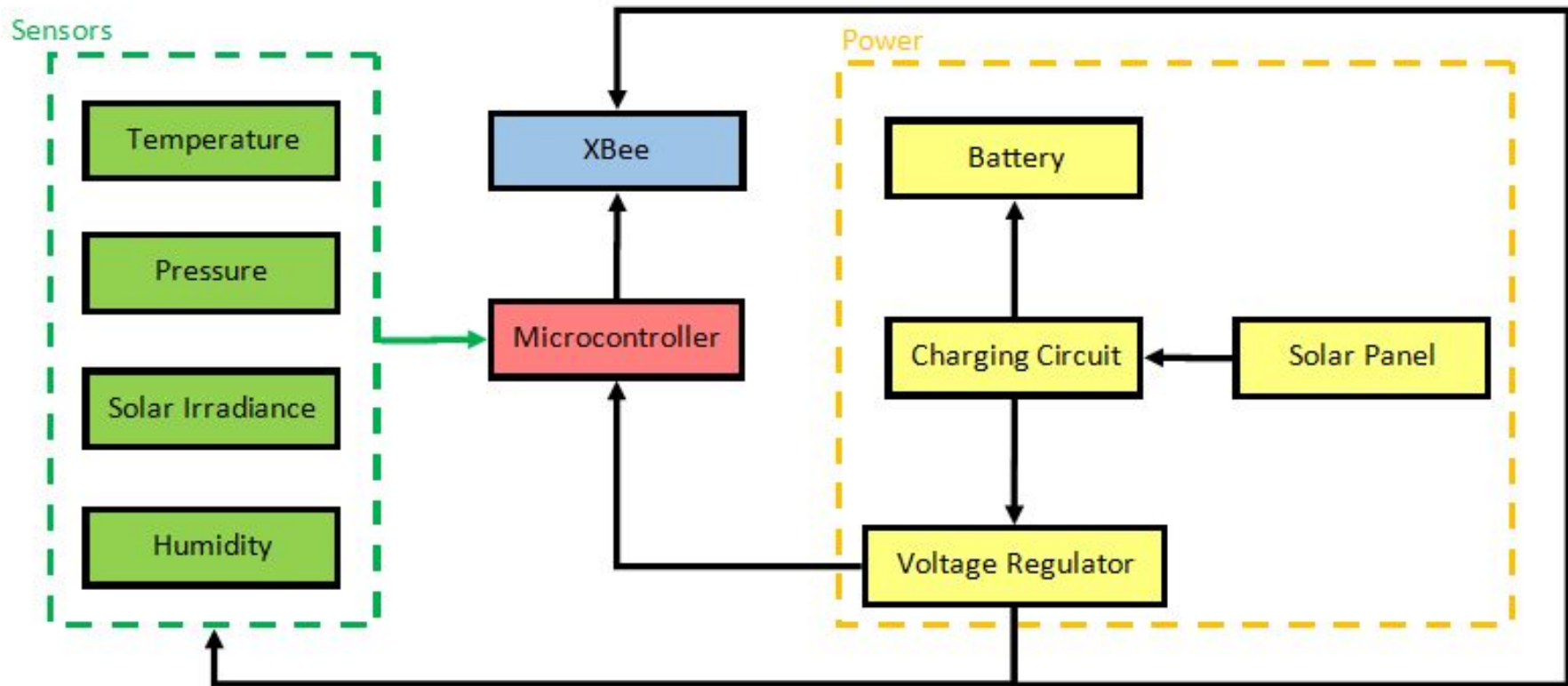
Overview

1) Block Diagrams
2) Pseudocode/Algorithm
3) Progress Since PDR
   a) Firmware Development
   b) EAGLE PCB Design
   c) Housing Design
4) Problems/Challenges Encountered
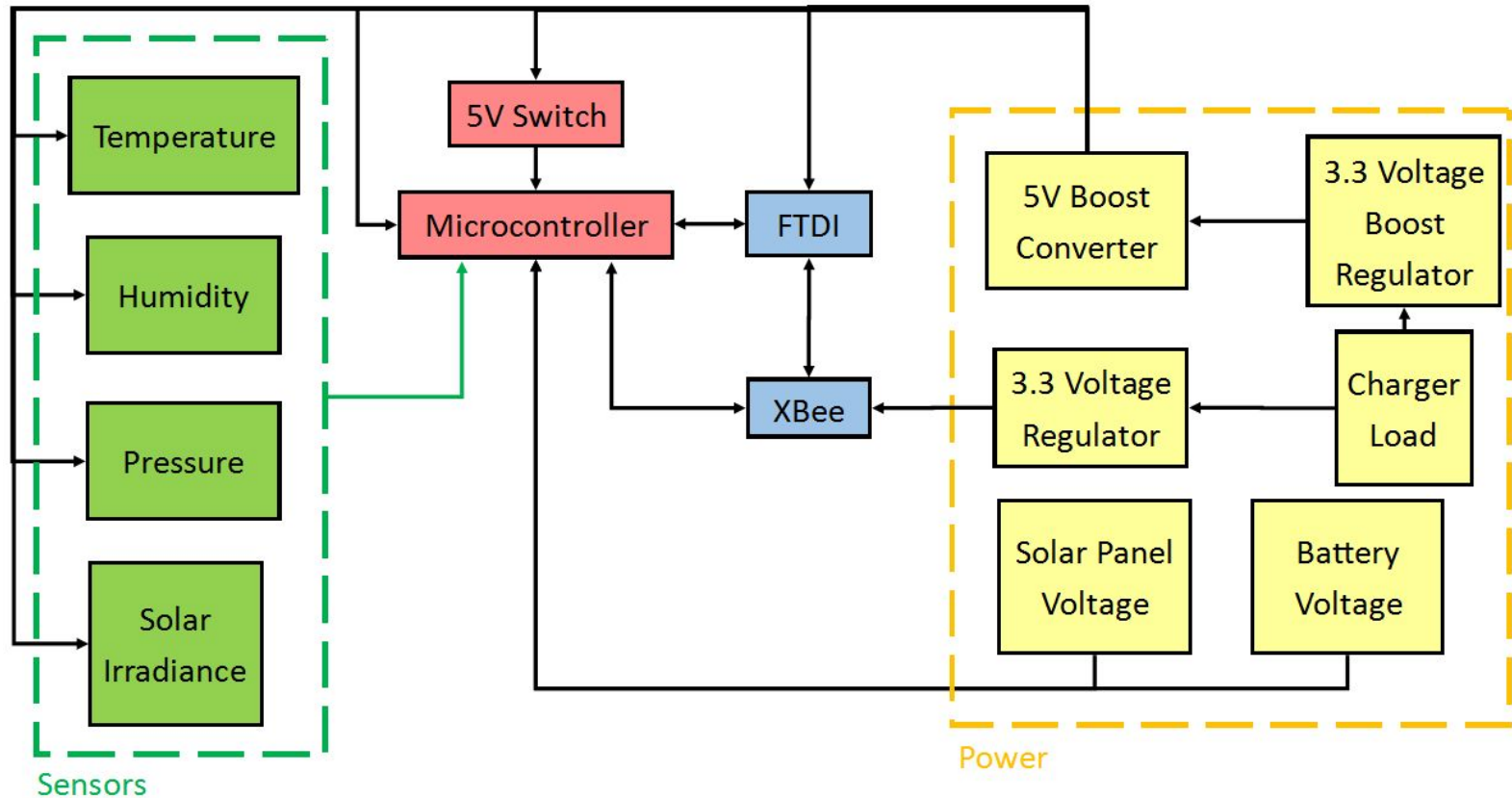5) Team's Overall Progress
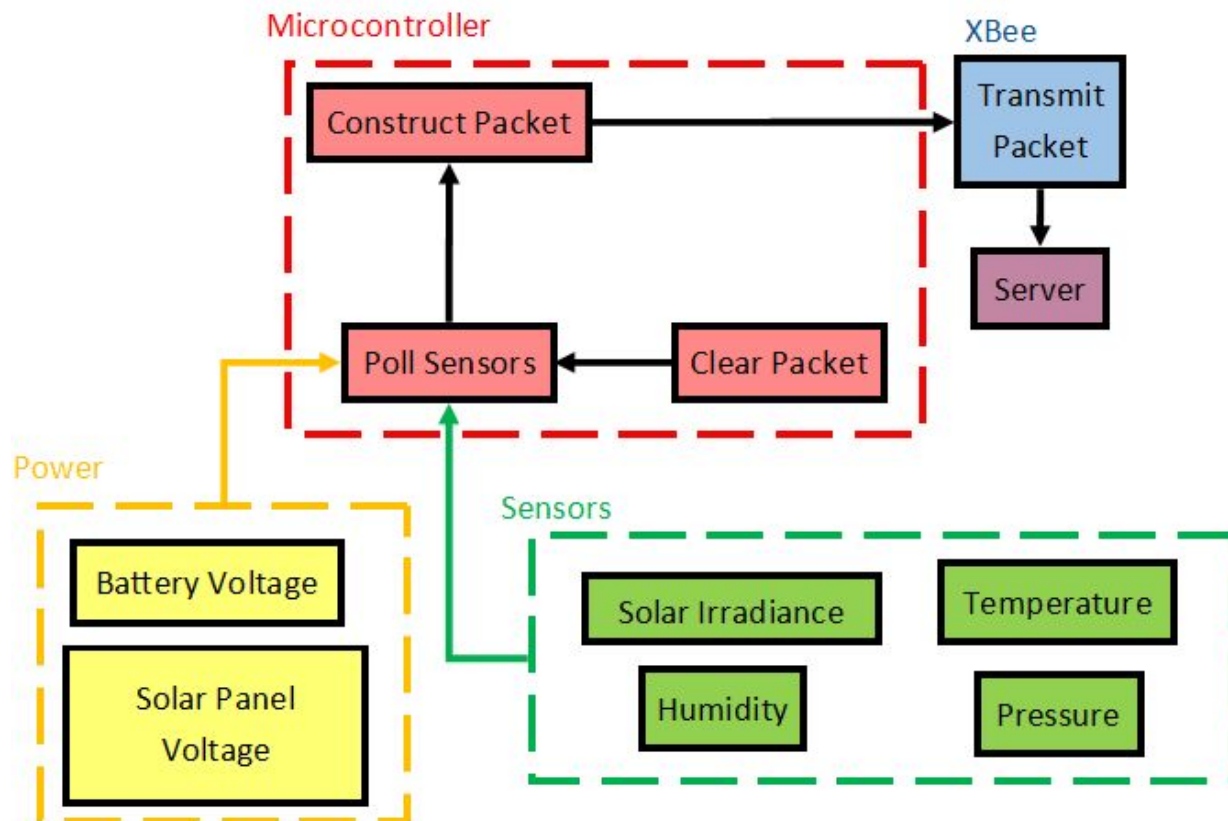6) To Be Completed

Bare Arduino Weatherbox Circuit

Overall Block Diagram

Hardware Block Diagram

[5]

Software Block Diagram

[4]

Pseudocode/Algorithm

Initialization (setup)

    Initialize sensor functions, variables, and packet

Execution (loop)

    Clear packet

    Construct packet

        Poll sensors

    Transmit packet

Firmware Development

- Referenced firmware's code
  - Wrote sensor codes, tested individually on arduino
  - Attached sensors onto bare arduino
- Switched to FTDI
- Wrote Xbee transmit code (referenced firmware)
  - Initially on Arduino Shield -> bare arduino
  - Modified code to fit schema
  - Initially used hard-coded packets, then sensor functions
- Successfully able to poll and transmit sensor data on bare arduino

EAGLE PCB Design

- Parts based on provided schematic on SCEL Wiki
- Used Team NOVA's charging chip to check dimension.
- Double-sided board
  - Two layers
  - Inverted labels indicate reverse side
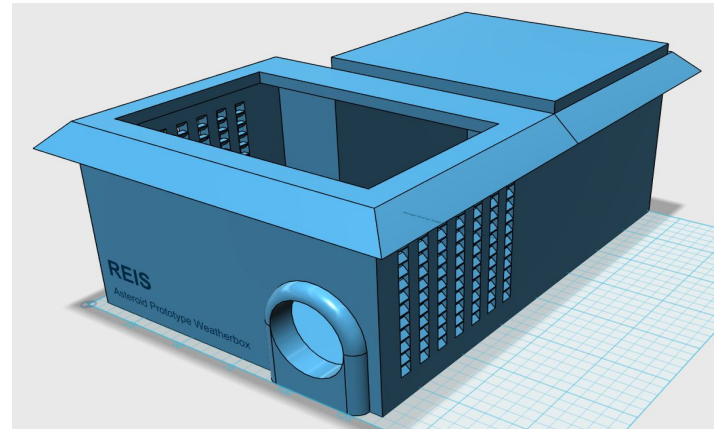 - FTDI will be elevated
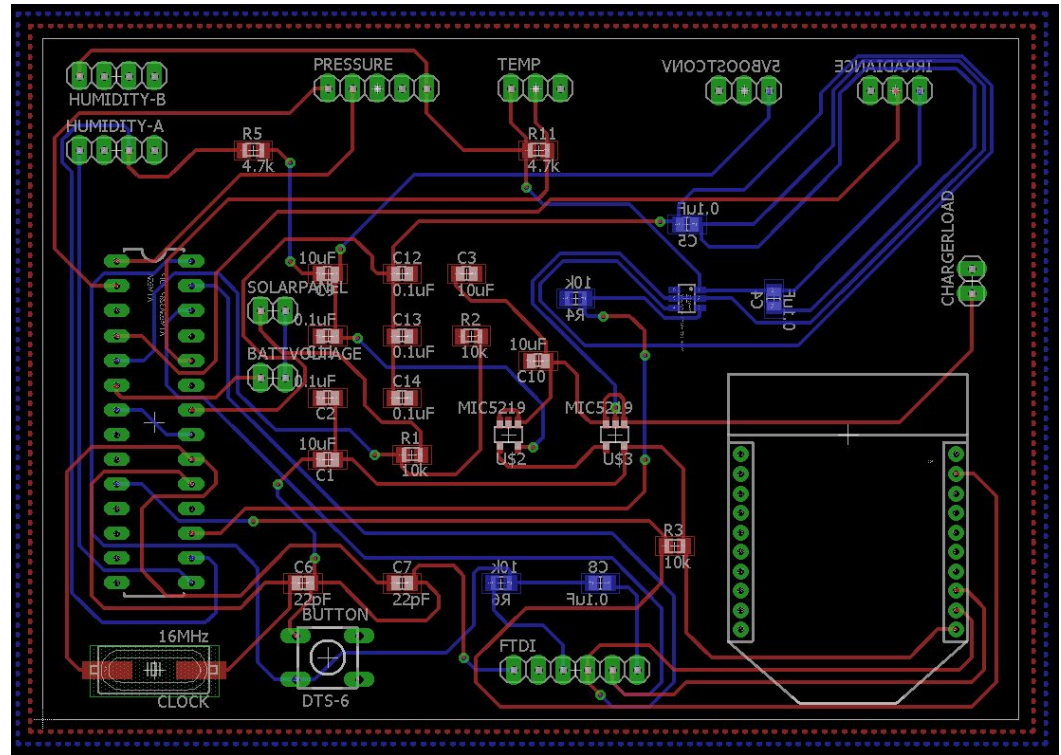
PCB Board Layout

Housing Design

- Referenced Apple's first design
- 123D Design software
- Waterproof
  - "House" design
    - Tapered roofing
  - Angled ventilation slits
    - Modified to consider overhang limitation (version 2)
- Space for mounting
  - Solar panel
  - Solar irradiance (version 2)
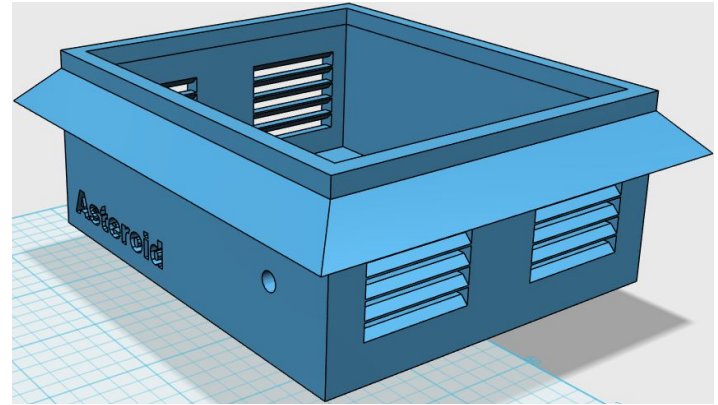
Version 1 Housing Design

Version 2 Housing Design
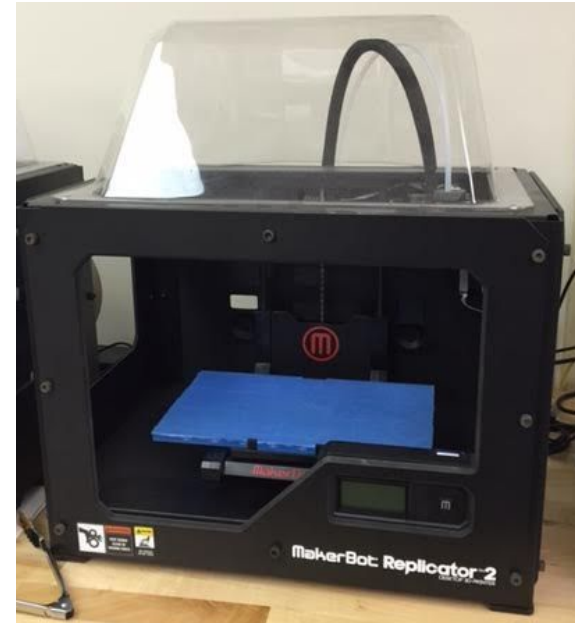
[9]

Problems/Challenges Encountered

1) Configuring packet data
    a) Matching schema
2) XBee transmission
    a) Shield
    b) Bare Arduino
3) PCB designing
4) Proper housing dimensions and printing limitations

To Be Completed

- PCB Printing

- Housing Printing

- Debugging

- Full integration with PCB

- Diagnostic health checks

PCB Example
(XBee Adapter)

3D Printer

[11]

Team's Overall Progress

Date	3/21/2016	3/28/2016	4/4/2016	4/11/2016	4/18/2016	4/25/2016	5/2/2016
Modules							
Microprocessor							
Sensors							
Charging Circuit							
XBee							
Build							
System Integration			*				
Overall System Firmware		*					
Design/Print PCB			*				
Housing			*				
Test							
Debug		*	*				
				Finish Weatherbox			

*** Tasks been pushed back 1 week due to setbacks ***

[12]

Questions?

Image Sources

1. http://cdni.wired.co.uk/620x413/a_c/asteroid.jpg
2. Bare Arduino Weatherbox Circuit by Nathan
3. Overall Block Diagram by Gordon
4. Software Block Diagram by Nathan
5. Hardware Block Diagram by Gordon
6. PCB Board Layout by Kevin
7. Housing Design Versions 1 and 2 by Gordon
8. XBee Adapter PCB
9. 3D Printer