Final Presentation

Verification Subsystem

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Background & Motivation

- Background
  - Perform quality assurance
    - Process validation
    - Documentation verification
- Motivation
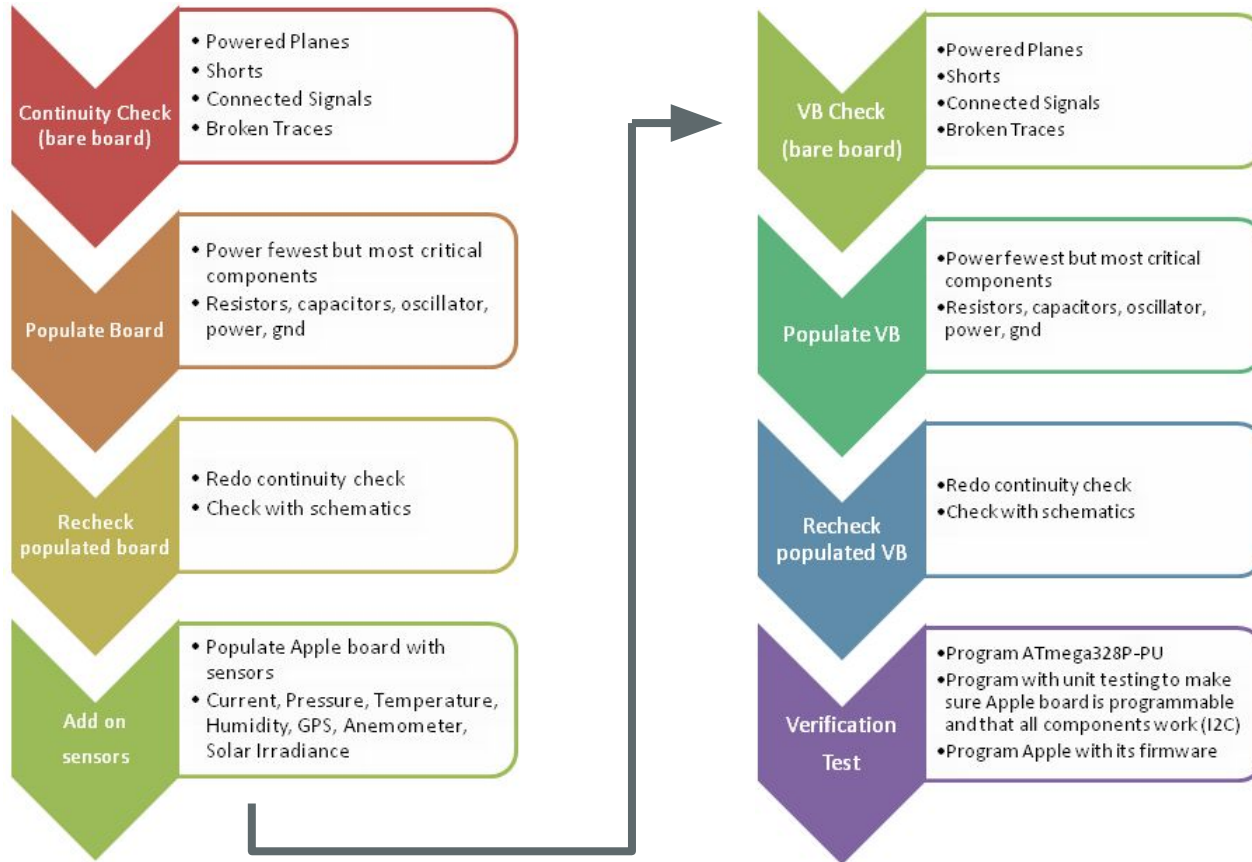 - Establish an efficient & uniform methodology for testing

Overview

- Goals
- Updated Block Diagram
- Draft Schematic of Verification Board
- Methods
- Obstacles
- Final Status
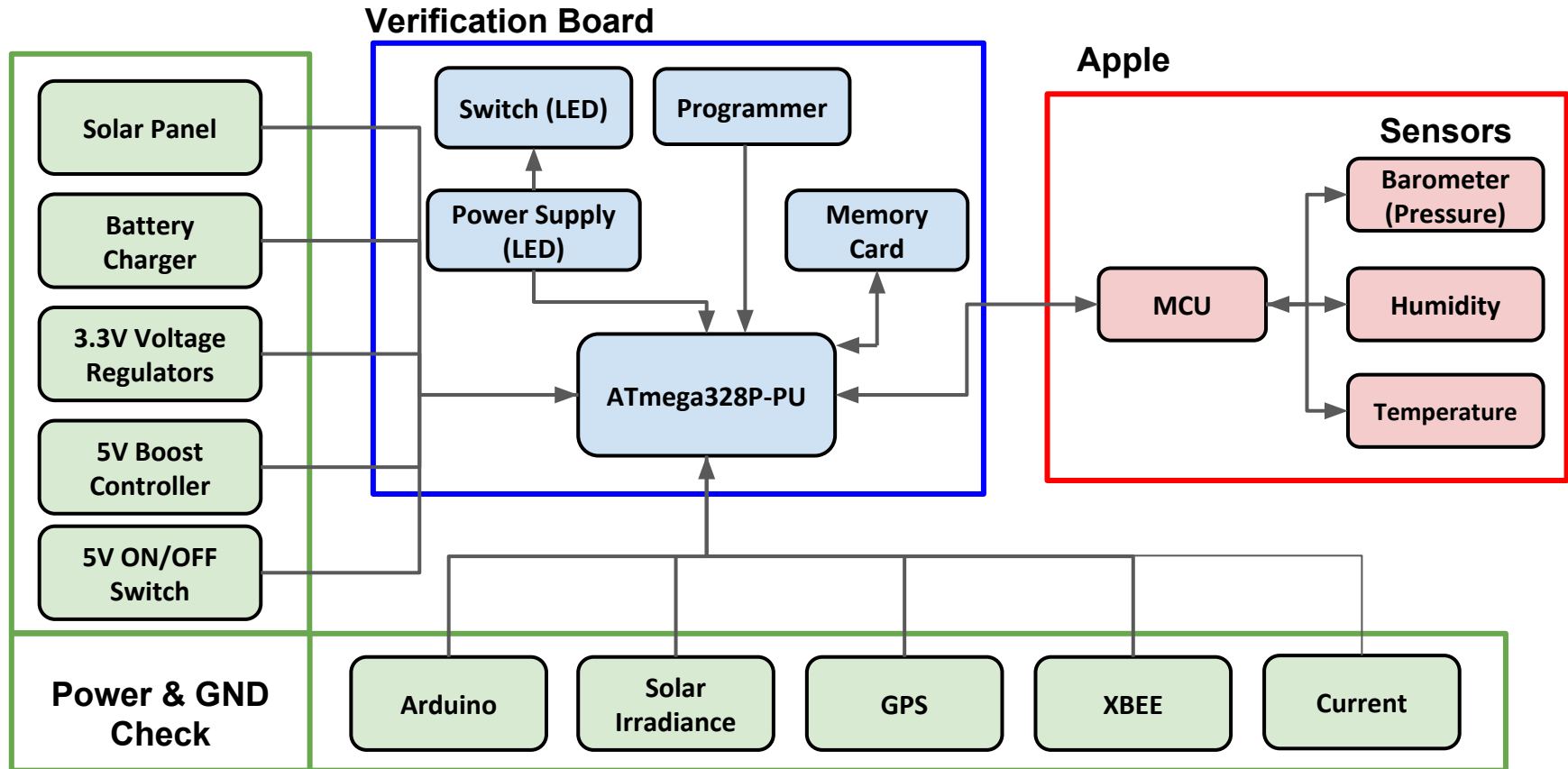- Remaining Problems
- Future Improvements

Goals

- Overall Goal:

  - Build verification board that can verify Apple Hardware

- Semester Goal:

  - Have a design ready to be sent out for fabrication

    - Min: Hardware
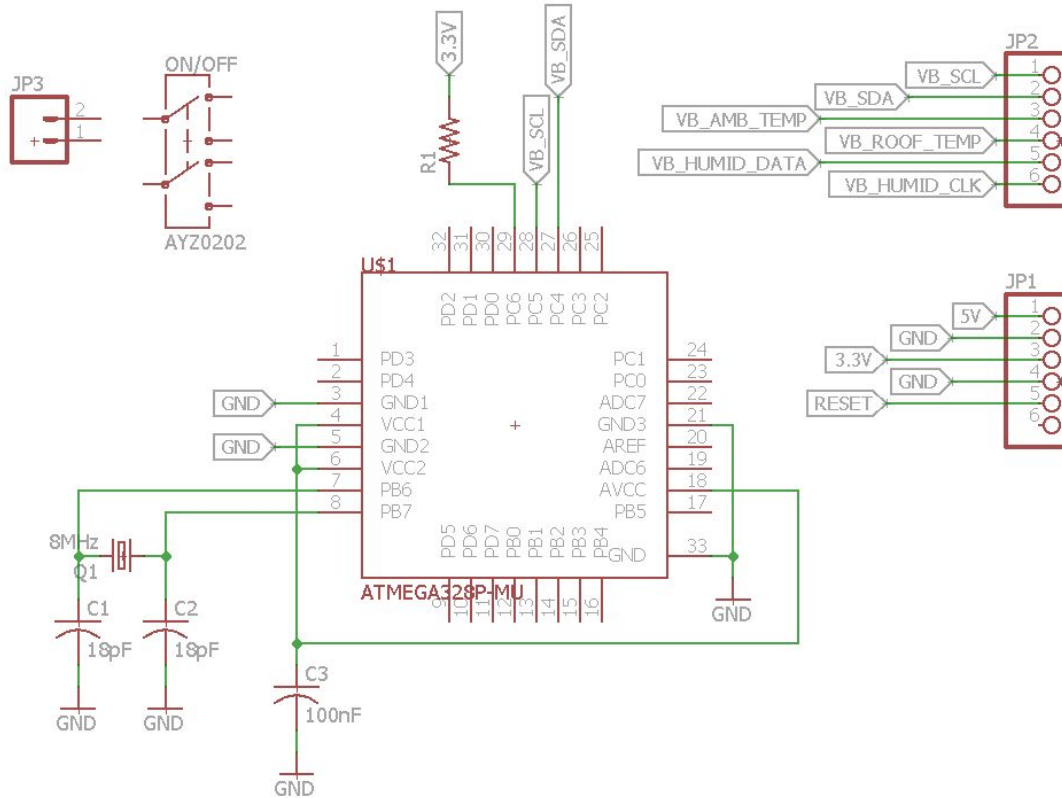
    - Max: Unit test hardware
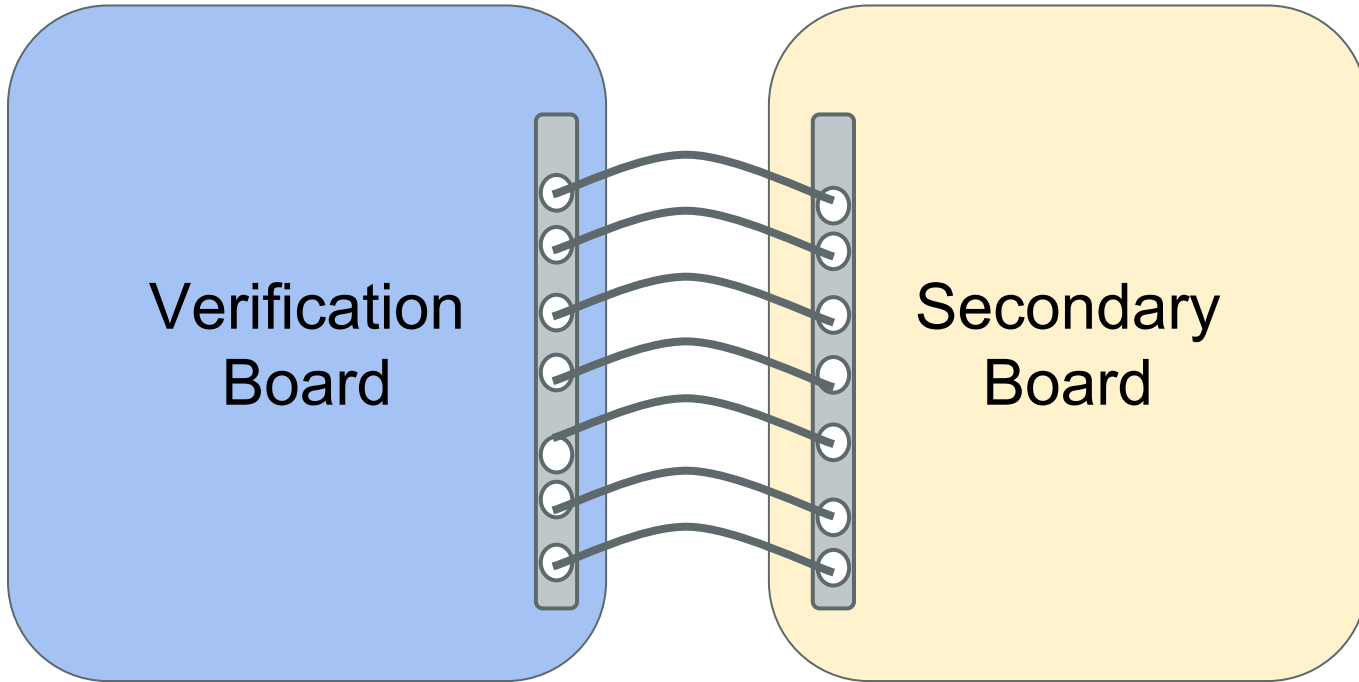
Block Diagram – Apple Verification Procedure

Continuity Check (bare board)
- Powered Planes
- Shorts
- Connected Signals
- Broken Traces

Populate Board
- Power fewest but most critical components
- Resistors, capacitors, oscillator, power, gnd

Recheck populated board
- Redo continuity check
- Check with schematics

Add on sensors
- Populate Apple board with sensors
- Current, Pressure, Temperature, Humidity, GPS, Anemometer, Solar Irradiance

VB Check (bare board)
- Powered Planes
- Shorts
- Connected Signals
- Broken Traces

Populate VB
- Power fewest but most critical components
- Resistors, capacitors, oscillator, power, gnd

Recheck populated VB
- Redo continuity check
- Check with schematics

Verification Test
- Program ATmega328P-PU
- Program with unit testing to make sure Apple board is programmable and that all components work (I2C)
- Program Apple with its firmware

Block Diagram – Verification Board (VB)

EAGLE Schematic – Draft

EAGLE Schematic – Draft

Methods

- Research
  - Researched datasheets of sensors and ATmega328P
  - Analyzed schematics of different designs
  - Communicated with design teams
- Documentation
  - Documented compilation of information & research
  - Assembled quality assurance checklist
  - Documented design specifications
- Design
  - Analyzed sensor modules for test specifications
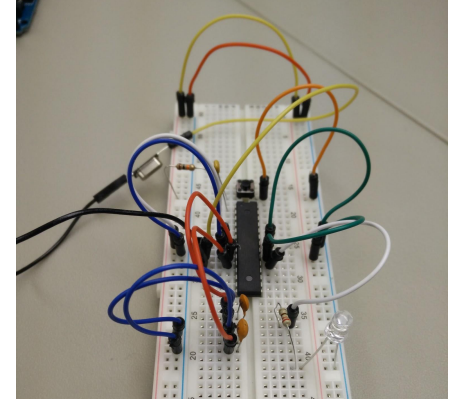 - Design verification board using EAGLE CAD
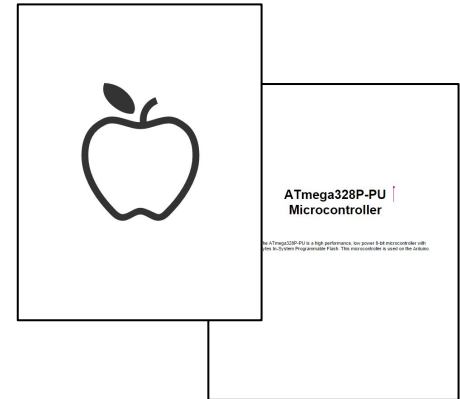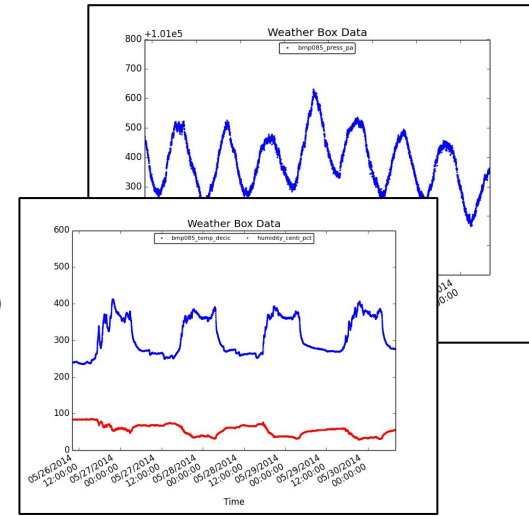
Obstacles Encountered

- Project definition
  - Prioritization
  - Verification board specifications
- Inexperience
  - Quality Assurance
  - Hardware design

Final Status

- Verification Board
  - Implementation of MCU ready to apply on VB
  - Draft schematic of board (WIP)
- Quality Assurance Checklist
  - Can be applied to general hardware tests
- Documentation
  - Easy-to-read compilation of information & research
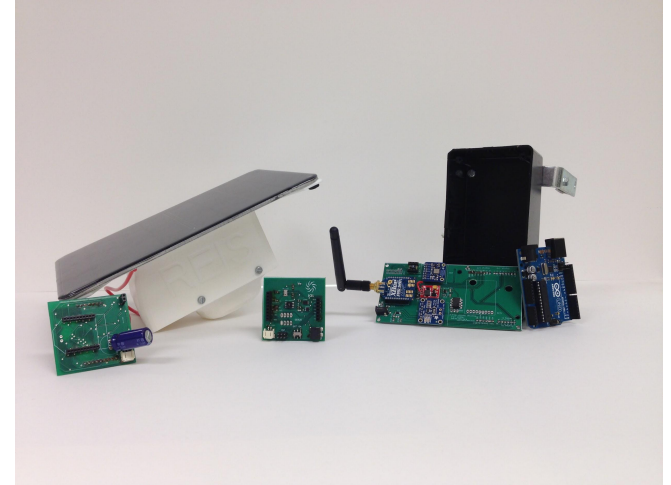   - Apple
    - ATmega328P-PU

	Quality Assurance Checklist							
	Evaluator Names:						
	Date of Assessment:						
Section	**Topics**	**Check Date**	**Operator Initals**	**Yes/No**	**N/A**	**Date Fixed**	**Comments**
A	**Unpopulated PCB Check**						
A.1	Did you do a continuity check?						
A.2	Are all the necessary planes powered?						
A.3	Are there no shorts?						
A.4	Are the signals properly connected?						
A.5	Are there any broken traces?						
B	**Populated PCB Check**						
B.1	Did you obtain the Apple circuit schematics?						
B.2	Is the PCB populated with the fewest but most critical components?						
B.3	Do all the voltages fall in the correct voltage ranges?						
B.4	Are all the reference planes correct and grounded properly?						
C	**Compeletely populated PCB Check**						
C.1							

Remaining Tasks

- Verification Board:

    - Complete EAGLE schematic & board

    - Fabricate, build, & test

    - Implement firmware

Future Improvements

- Verification Board
  - Expand to verify Cranberry/Dragonfruit
- Quality Assurance Checklist
  - Make more specific for each design
  - Include measurements & ideal values
- Documentation
  - Comprehensive "user manual" for Apple & ATmega328P-PU
  - Expand to cover Cranberry/Dragonfruit

Thank you!