Team Guava

Final Presentation

S18

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Overview

- Motivation/Goals
- Block Diagram
- Current progress since CDR
- Bill of Materials
- Problems Encountered
- Gantt Chart
- Final Status/Future Work
- Questions

SCEL Motivation

Guava is the fifth iteration in the weatherbox design. The main goal for Guava's weatherbox is to incorporate newer components into the existing SCEL weatherbox layout. The motivation of team Guava is to improve upon the recent generations by using a new processor.

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Project Goals

Produce a self-sustaining environmental sensor module that will collect meteorological data

- Create a schematic
  - Properly integrate new processor
- Design and fabricate a printed circuit board
- Draft and build a weatherproof housing
  - (thank you Josh)

Test and Deploy the completed weatherbox

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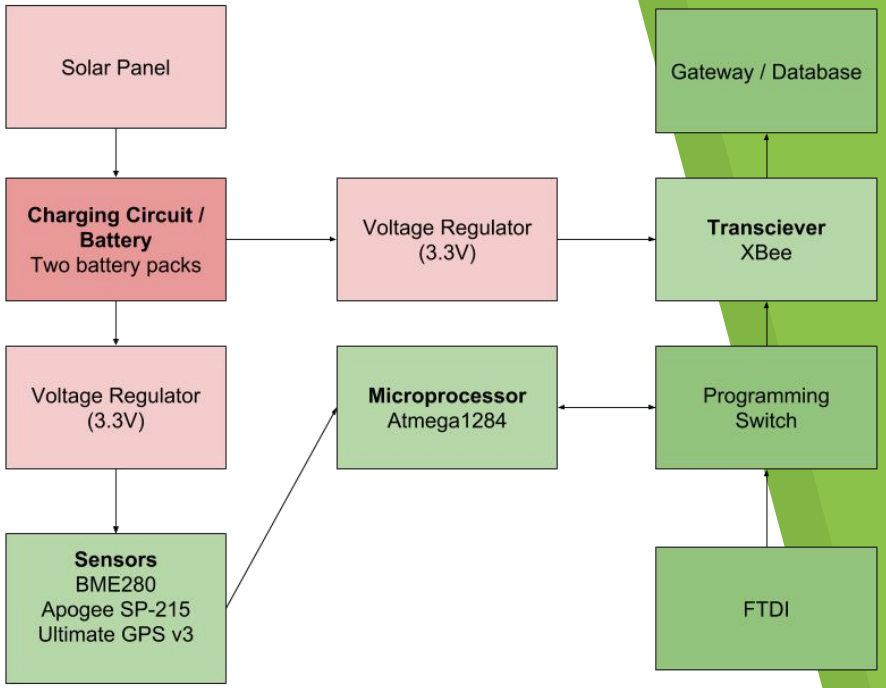
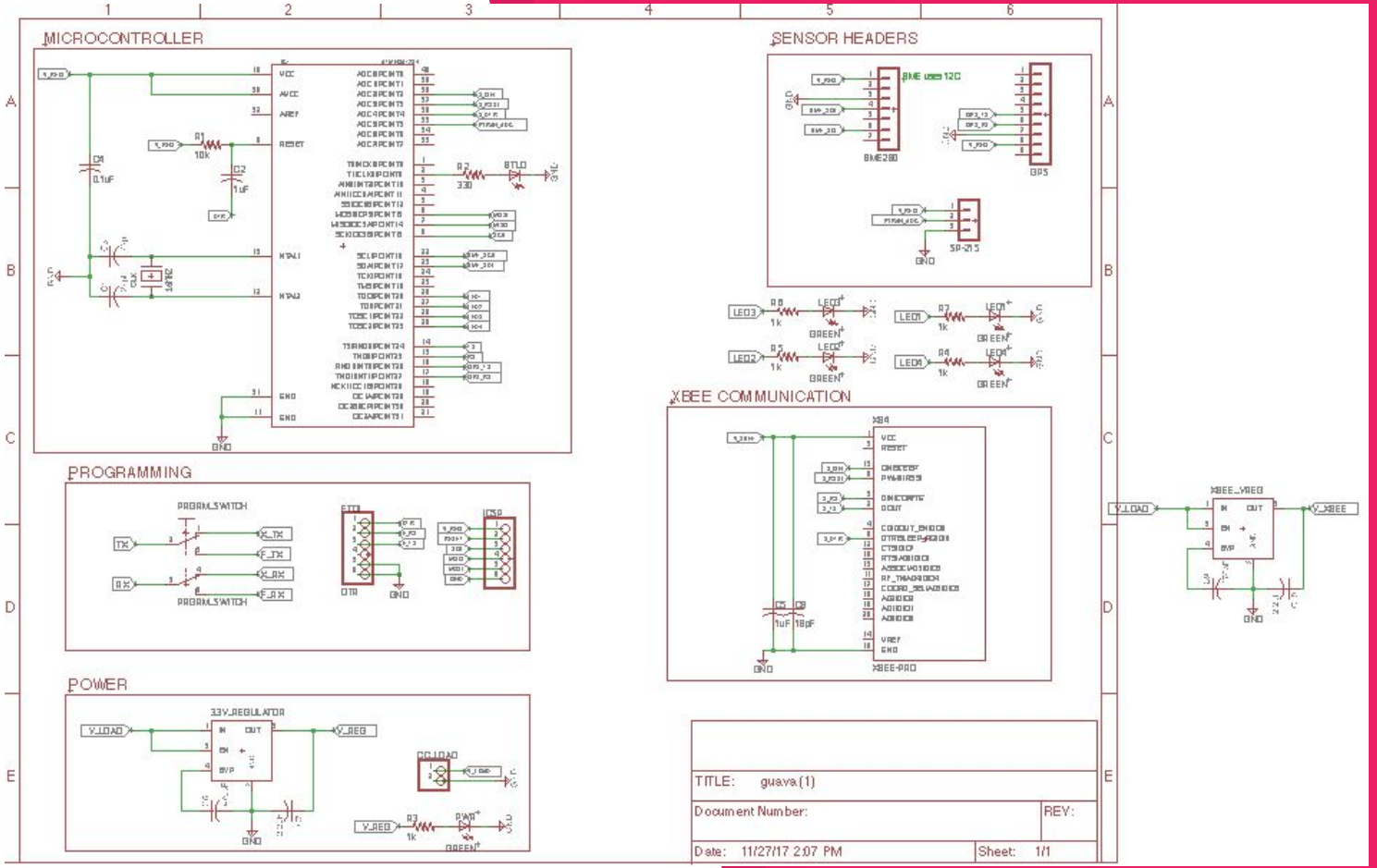
Block Diagram

- Using two 3.3V voltage regulators
- Unsure of programming switch
- Instead of two battery packs, considering using just one big fat one



Schematic


MICROCONTROLLER
SENSOR HEADERS
XBEE COMMUNICATION
PROGRAMMING
POWER
33V_REGULATOR
TITLE: guavs (1)
Document Number:
REV:
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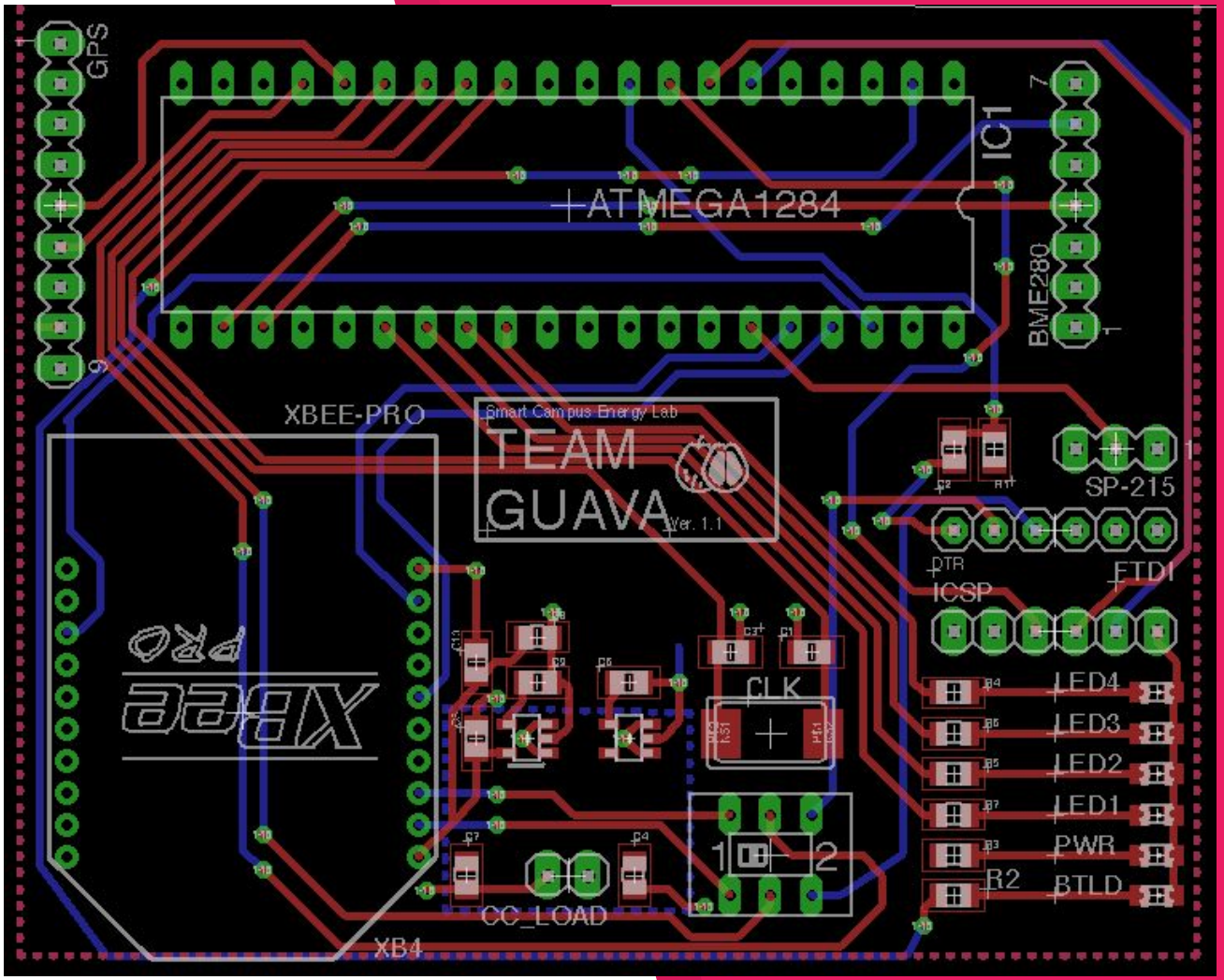
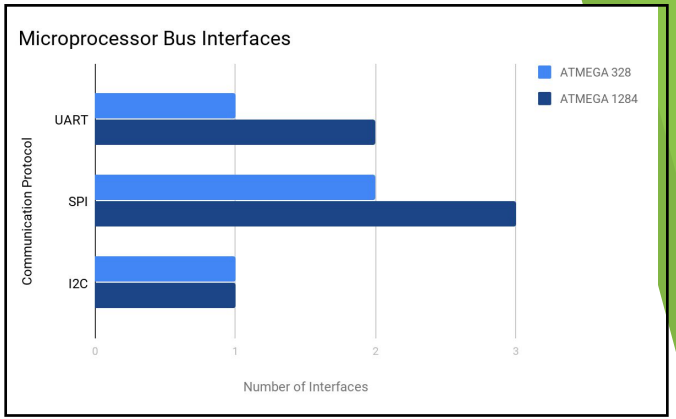
Sheet: 1/1

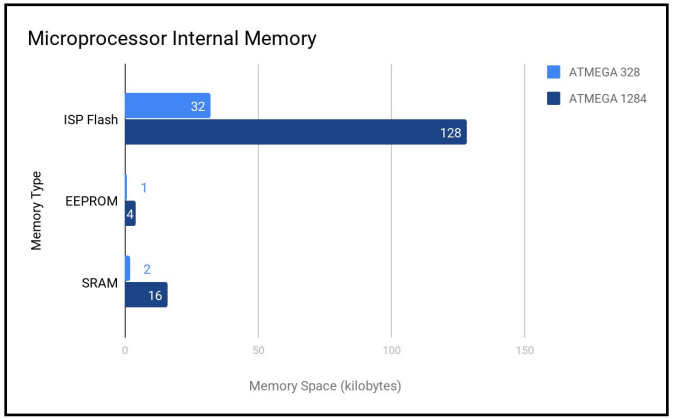
PCB


GPS
IC1
ATMEGA1284
BME280
XBEE-PRO
Smart Campus Energy Lab
TEAM
GUAVA
Ver. 1.1
SP-215
DTR
ICSP
FTDI
CLK
LED4
LED3
LED2
LED1
PWR
BTLD
R2
CC_LOAD
XB4

Current Progress

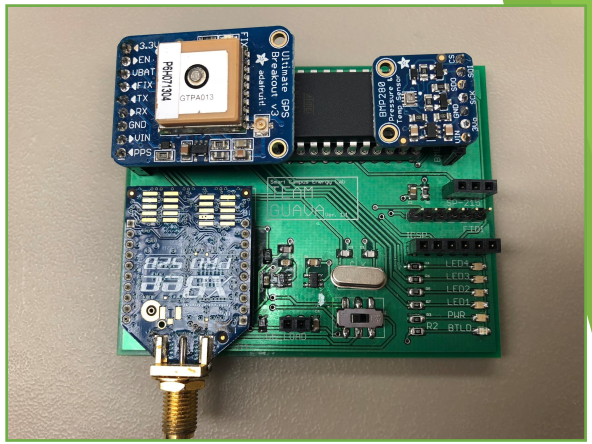
- Completed the first design of a board with a more powerful processor.
  - Initial data shown improvements over its predecessor.
- All four boards confirmed to successfully and reliably boot-load and program
  - Except for one. We broke it.
- Worked with firmware team to start testing the full functionality of the board.

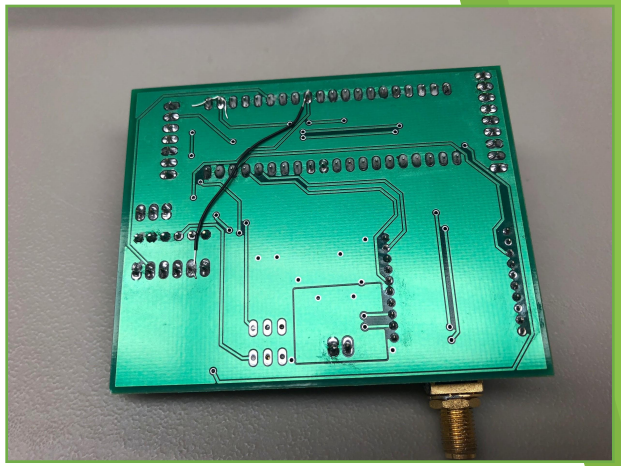




Current Progress

- Found out errors in first schematic and PCB design
  - Missing reset connection for bootloader
  - Missing several data connections
  - Missing reset button circuit
- Added connections using jumper wires to test program
- Program successfully polls data and displays data polled, but does not transmit packet correctly.
  - Debugging XBee
  - Somewhere during debugging broke the board.





Part	Value	Device	Package	Description	MF	MPN	QTY	Price	Total Price		
3.3V_REGULATOR		MIC5219XX	SOT23-5	VOLTAGE REGULATOR	Digikey	MIC5219-3.3YM5-TR	2	0.93	1.86		Have
7x1 Pin Header		MA07-1	MA07-1	7x1 Pin Header for BME280	Sparkfun	PRT-00115	1	1.5	1.5		Have
2x1 Pin Header		PINHD-1X2	1X02	2x1 Pin Header for charging chip	Sparkfun	PRT-00115	1	0	0		Have
BTLD	RED	LEDCHIPLED_0805	CHIPLED_0805	Bootloader LED	Mouser	598-8110-107F	1	0.42	0.42		Have
C1	22pF	C-USC0805	C0805	SMD Capacitor	Digikey	490-5534-1-ND	2	0.34	0.68		
C2	1uF	C-USC0805	C0805	SMD Capacitor	Digikey	311-1365-1-ND	2	0.11	0.22		Have
C4	0.1uF	C-USC0805	C0805	SMD Capacitor	Digikey	478-1395-1-ND	1	0.1	0.1		
C6	470pF	C-USC0805	C0805	SMD Capacitor	Digikey	1276-1300-1-ND	2	0.1	0.2		Have
C7	2.2uF	C-USC0805	C0805	SMD Capacitor	Digikey	490-3336-1-ND	2	0.21	0.42		Have
C8	18pF	C-USC0805	C0805	SMD Capacitor	Digikey	1276-1107-1-ND	1	0.1	0.1		Have
CLK	16MHZ	XTALNX8045	NX8045	16MHz Crystal Oscillator for CPU clock	Digikey	535-10226-1-ND	1	0.25	0.25		Have
6x1 Pin Header	DTR	PINHD-1X6	1X06	6x1 Pin Header for ICSP and FTDI	Sparkfun	PRT-00115	2	0	0		Have
9x1 Pin Header		MA09-1	MA09-1	9x1 Pin Header for GPS	Sparkfun	PRT-00115	1	0	0		Have
IC1	ATMEGA1284	MEGA1284	DIL40	Atmel ATmega1284P 8-bit AVR Microcontroller	Digikey	ATMEGA1284-PU	1	5.25	5.25		Have
LED1	GREEN	LEDCHIPLED_0805	CHIPLED_0805	Debugging LED	Digikey	APT2012SGC	5	0.39	1.95		Have
PRGRM_SWITCH		A68-A31	A68-A31	SLIDING SWITCH for programming	Digikey	401-2002-1-ND	1	0.46	0.46		
R1	10k	R-US_R0805	R0805	RESISTOR, American symbol	Digikey	311-10KARCT-ND	1	0.1	0.1		Have
R2	330	R-US_R0805	R0805	RESISTOR, American symbol	Digikey	RMCF0805JT330RCT-ND	1	0.1	0.1		
R3	1k	R-US_R0805	R0805	RESISTOR, American symbol	Digikey	RC0805JR-071KL	5	0.1	0.5		Have
3x1 Pin Header		MA03-1	MA03-1	3x1 Pin Header for SP-215	Digikey	732-5316-ND	1	0.13	0.13		Have
XBEE Sensor	XBEE-PRO	XBEE-PRO	XBEE-PRO	Headers for Xbee	Sparkfun	PRT-00115	1	0	0		Have
BME280		BME280	Breakout Board	Pressure/Temp/Humidity Sensor	Adafruit	2652	1	19.95	19.95		Have
GPS v3		GPS v3	Breakout Board	GPS/RTC Sensor	Adafruit	746	1	39.95	39.95		Have
SP-215		SP-215	Sensor	Irradiance Sensor	Apogee		1	285	285		Have
PCB				Printed Circuit Board			1	33	33		
									392.14		
									34.34		

Bill of Materials

🕐 Problems Encountered

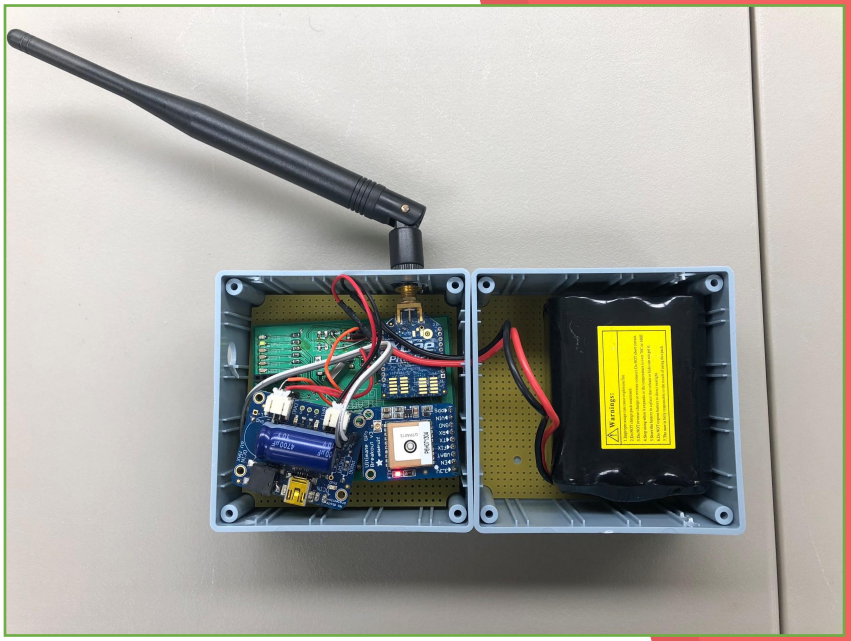
- Ran too much voltage across the board
- RX/TX pins are interfering with each other (even through switch)
- Missing connections to capture battery and PV panel voltage
- Soldering shenanigans
- Board programmed and ran program successfully, but is now not resetting properly.

	Guava													
Week	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Date	1/29/2018	2/5/2018	2/12/2018	2/19/2018	2/26/2018	3/5/2018	3/12/2018	3/19/2018	3/26/2018	4/2/2018	4/9/2018	4/16/2018	4/23/2018	4/30/2018
s														
Proposal	2/3/18													
PDR				2/24/18										
CDR								3/24/18						
Final													4/28/18	
496 Poster Session													4/26/18	
t														
									Spring Break					
Designing														
Printing														
ill of Materials														
Fabrication Time														
Testing														

Gantt Chart

Final Status/Future Work

- Populated 4 Guava boards
  - Able to boot-load and program
- Deploy a finalized design and use initial data to optimize the modules performance.
  - Optimizing power consumption, including reset button, update to new solar sensor.
  - Build sensor breakouts on main PCB to reduce costs



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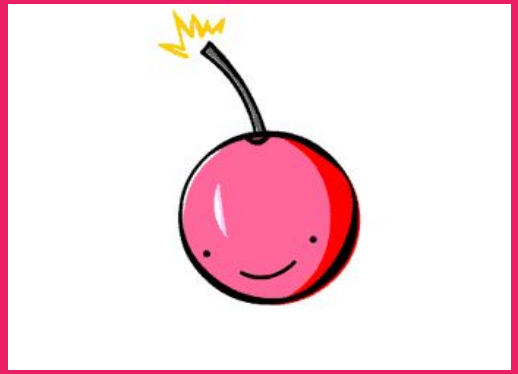
Thank you!
Any Questions?



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