

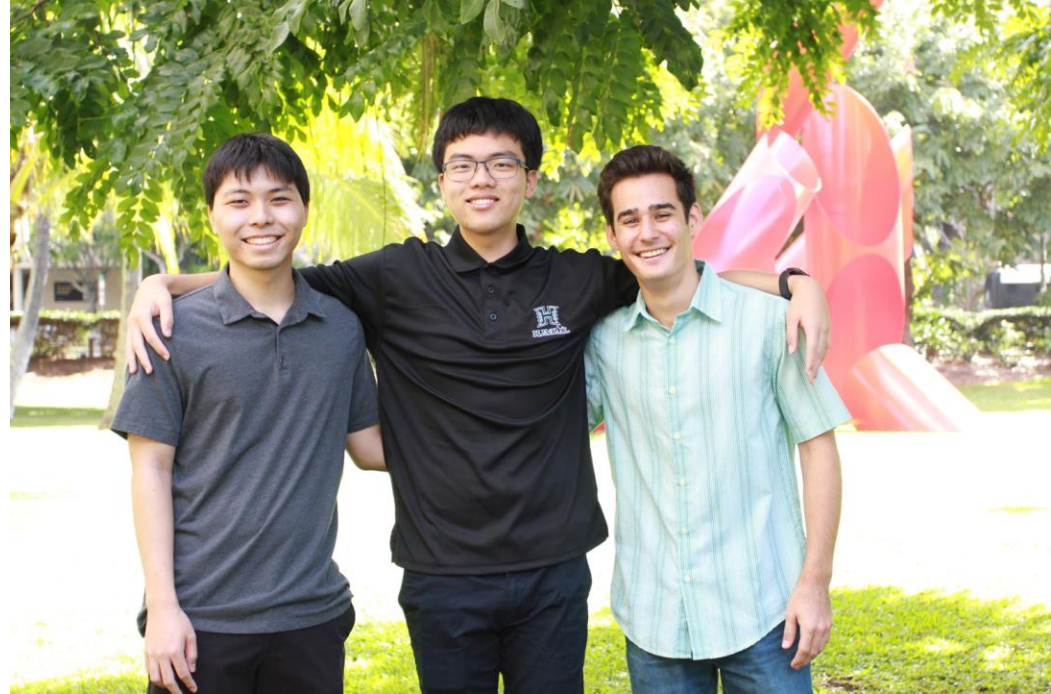
Congrats Babies

For Not Giving Up Your Life
Throughout College

To: SCEL Babies

Lovingly yours,

Guava





Team Guava
Final
Presentation
SP20



Presentation Overview



- Motivation
- Goals
- Block Diagram
- Progress
- REV D
- Problems
- Research
- Future Work
- Gantt Chart
- 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.



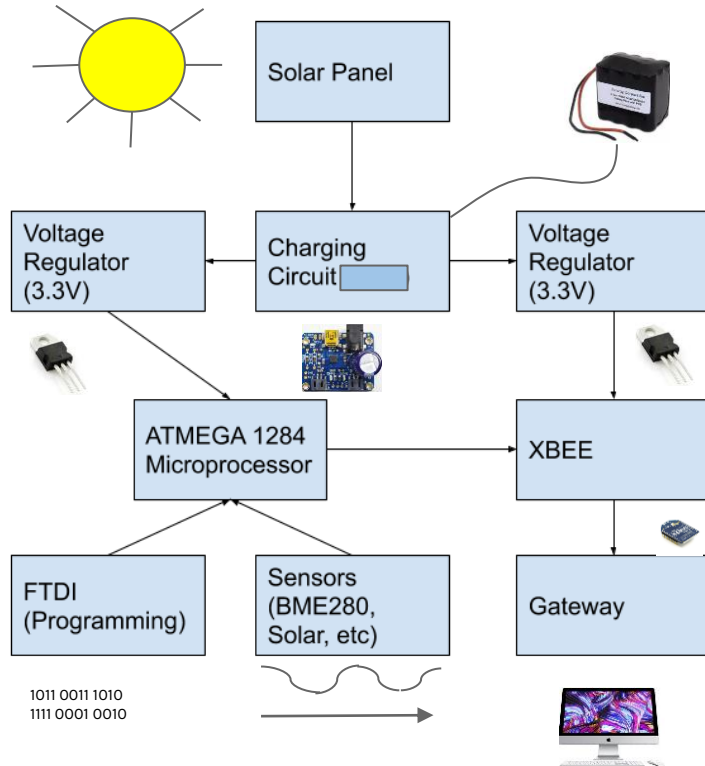
Project Goals

- Produce a self-sustaining environmental sensor module
 - Collect meteorological data
 - Help UH Manoa
- Conduct research on weather boxes and similar systems for improvement
 - Other universities
 - Commercial
 - DIY





Block Diagram

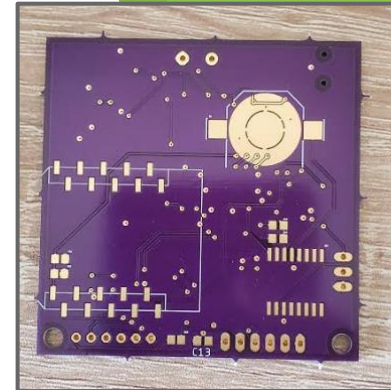
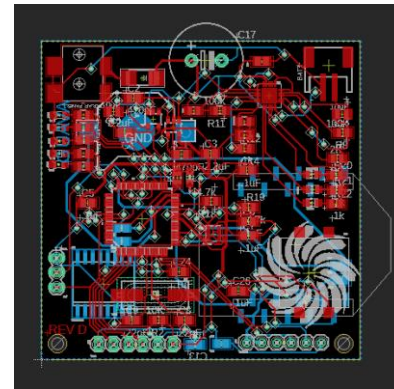




Semester Progress

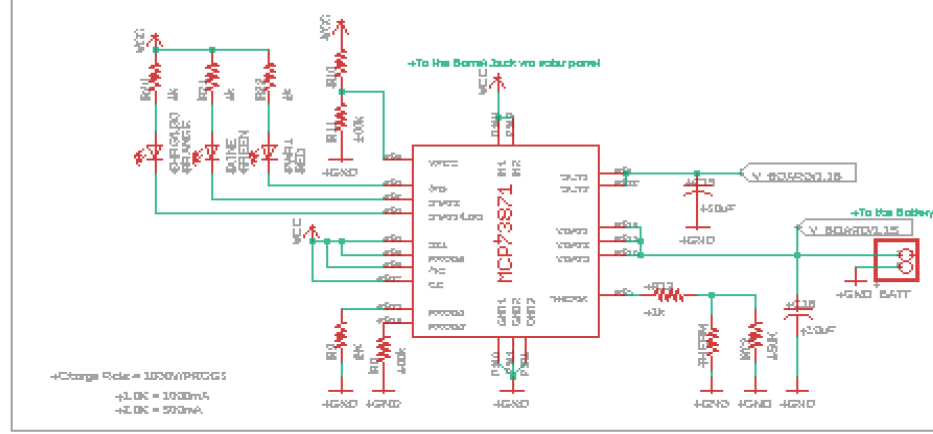
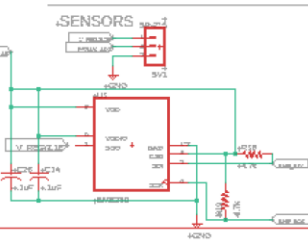
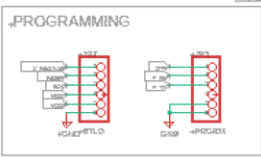
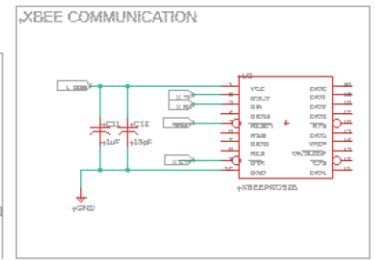
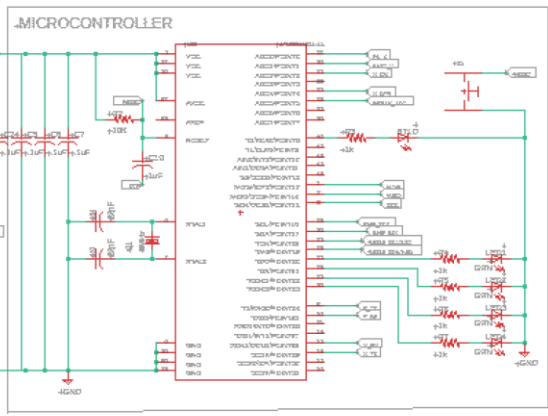
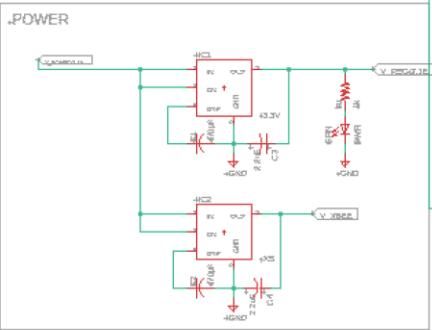


- New members familiarized with previous Guava design
- Boot-loaded ATmega1284P and documented the process
- Found problems with previous revisions
 - Solar Charging Chip
- Designed and ordered Rev D

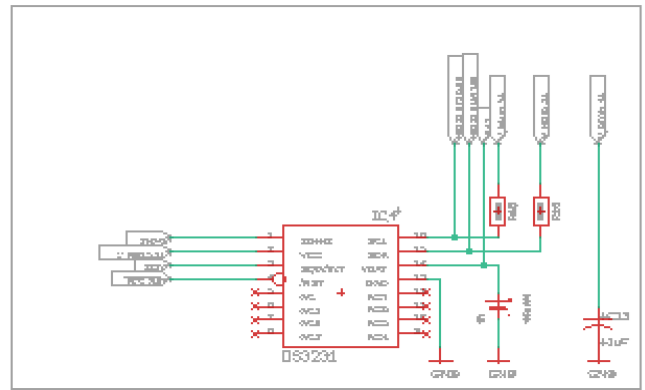
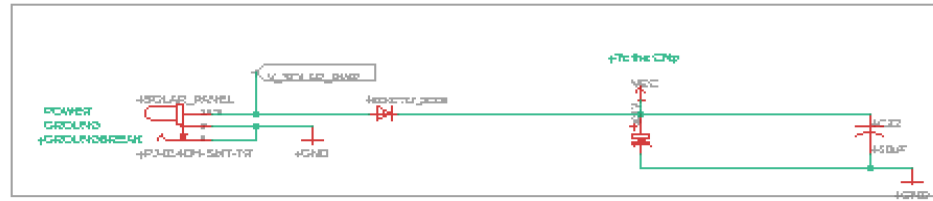


REV D

TITLE: „REVd_newcap	
Document Number:	REV:
Date: „31/1/2020 4:43 PM	Sheet „1/2



+Charge Rate = 10500VPROGS
+I.DK = 1000mA
+E.DK = 500mA





Semester Problems

- Not sure if REV D would work under 3.3V @ 8MHz
 - Currently able to run 5V @ 8MHz
- Faulty PCB fabrication or design
- Sending data to gateway
- Unable to meet in person

Research: Commercial

Dyacon

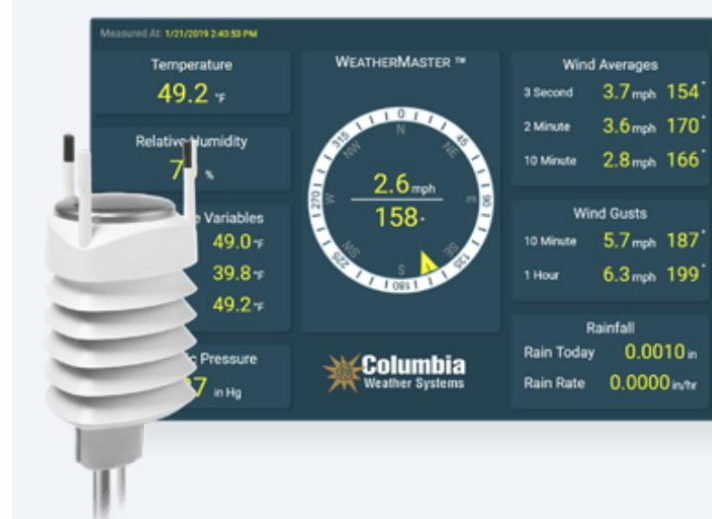
Wind	>\$1000
Temperature humidity and pressure	>\$500
Thermistor	>\$72
Solar Sensor	\$265 (same as SCEL)



Research: Commercial

Columbia Weather Systems

_____ -Orion



Similar sensor list: Uses impact sensor for raindrop

Cost: >\$4700



Research: **Commercial**

Optical Scientific

OWI-650

Uses visible sensor to detect
the weather

Cost Unknown, must be >\$2000





Research: Commercial

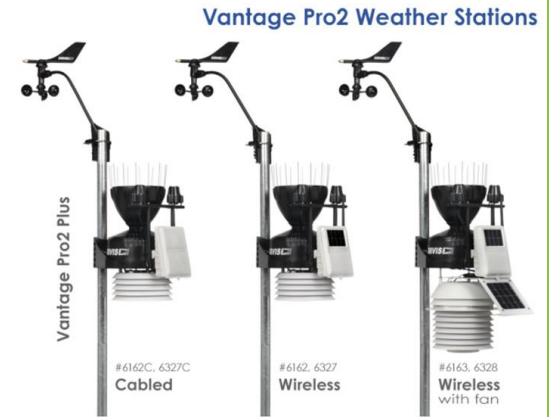
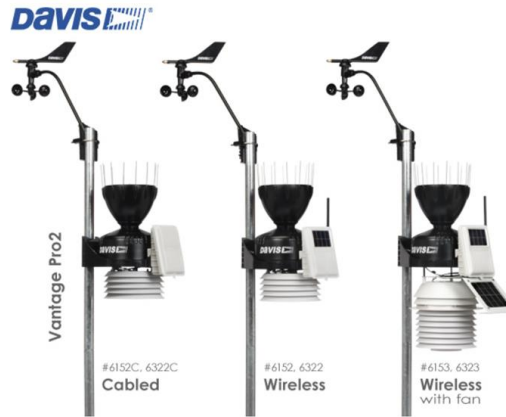
Davis Instrument

- Vantage Pro2

Integrated

- Rain (self empty tipping spoon)
- Wind
- T.H.
- Optional UV and Solar

Cost: \$605 - \$1400

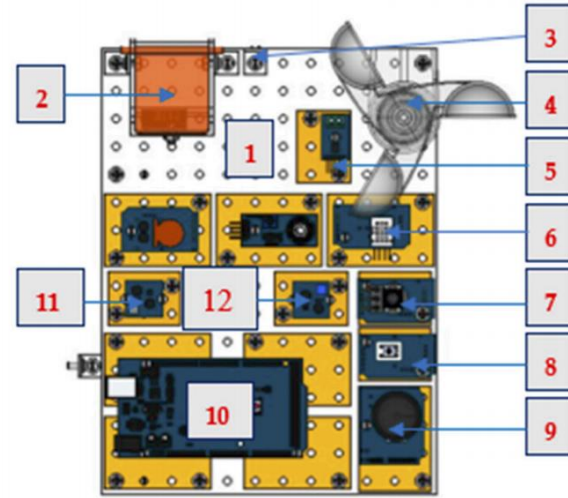




Research: **DIY**

energies Journal

- Uses Arduino Mega 2560 (ATMEGA 2560) to handle multiple sensors



(b)

Component	Description
1	Aluminium perforated plate, holes diameter 4.2 mm, 15 mm separations.
2	Water detection sensor SSHU005. Operation at 5.25 V and 20 μ A.
3	Piezoelectric vibration sensor for hail detection PZT LDT0-028.
4	Anemometer 6710-WINd02. Operation at 5 V, IP44 protection level.
5	Air quality sensor MQ135. Operation range between 2.25–3.5 V.
6	Relative humidity and environmental temperature sensor DHT-22. Operation at 6 V and 1.5 mA.
7	Analogue potentiometer with 300° rotation. Operation between 0 and 5 V.
8	Commutator ON/OFF in automatic mode for control tasks.
9	Joystick for manual simulation. Operation between 3.3 and 5 V.
10	Arduino Mega 2560 ADK Android. Recommended operation voltage 7–12 V, 54 digital pins, 16 analogue inputs, 40 mA, RAM 256 kB memory, Clock speed 16 MHz.
11	Barometric pressure sensor BMP085. Operation at 5.5 V and 130 μ A.
12	3-Axis electronic compass HMC5883L. Operation between 3.3 V and 6 V, 116 Hz.

Research: **Universities**

Cornell University

- Onboard weather station for race cars
- Uses internal memory storage and xBee Pro

University of New York at Albany

- Waterproofed connectors
- PVC sensor housing

Shahjalal University of Science and Technology

- LCD display to read data



DIY Sensors

Name/Link	Type	Technology	Digital/Analog	Communication	Voltage/Power	Cost
DS18B20	Temperature	Thermistor - 1 data wire - Parasitic power	Digital	1 Data Wire	3 - 5.5 V	\$3.92
DHT22	Temperature Humidity	Thermistor Capacitive humidity sensor - Records every 2 seconds	Digital	1 Data Wire	3 - 5 V	\$9.95
BME280	Temperature Humidity Pressure Humidity	Thermistor Barometer Humidity sensor	Digital	IC2 or SPI	1.8 - 3.6 V	\$19.95
SP215	Solar Irradiance	Silicon-cell photodiode	Analog	N/A	5.5 - 24 V	\$273.00
Rain Sensor Module	Rain	Rain board - Can adjust sensitivity	Digital Analog	N/A	3 - 5 V	\$1.80
GUVA-S12SD	UV Light	UV photodiode	Analog	N/A	2.5 - 5.5 V	\$6.50
Soil Moisture Sensor	Soil Moisture	Variable Resistor	Digital	UART	3.3 - 5 V	\$5.95
Anemometer Wind Speed Sensor	Wind Speed	Anemometer	Analog	N/A	7 - 24 V	\$44.95
LM35	Temperature	Thermistor	Analog	N/A	4 - 30 V	\$2.90
RG-11	Rain	Infrared light	Digital	NO (normally open) or NC (normally closed)	12 V	\$59.00





Future Work

- REV D
 - Assemble and program
 - Deploy
- Work with firmware team/ Bumblebee for the XBee parts and potential code
- Document all procedures and improvements implemented by Team Guava

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Date	1/12 - 1/18	1/19 - 1/25	1/26 - 2/1	2/2 - 2/8	2/9 - 2/15	2/16 - 2/22	2/23 - 2/29	3/1 - 3/7	3/8 - 3/14	3/15 - 3/21	3/22 - 3/28	3/29 - 4/4	4/5 - 4/11	4/12 - 4/18	4/19 - 4/25	4/26 - 5/2	5/3 - 5/9	5/10 - 5/16
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CDR										I								
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Review																		
Development										B								
Deploy										R								
Test & Debug										E								
Parts Order and Billing										A								
Build										K								
Research																		
Documentation																		
Final Report										!								





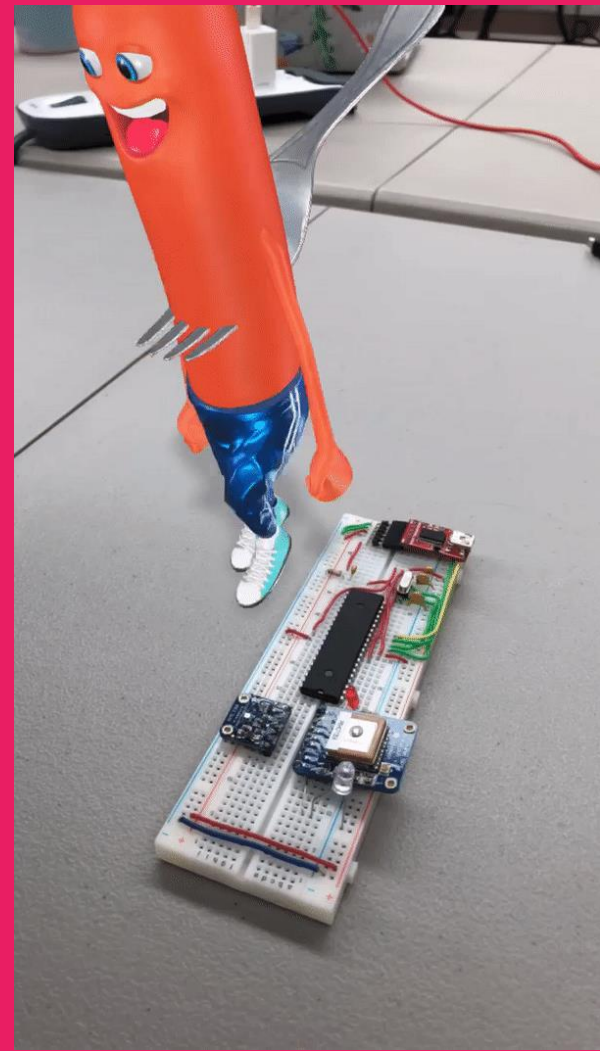
Thank you!
Any Questions?



<https://github.com/scel-hawaii/guava>



<https://wiki.scel-hawaii.org/doku.php?id=weatherbox:guava:start>





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