



Team 29: Automated Greenhouse Bi-Weekly Update 4

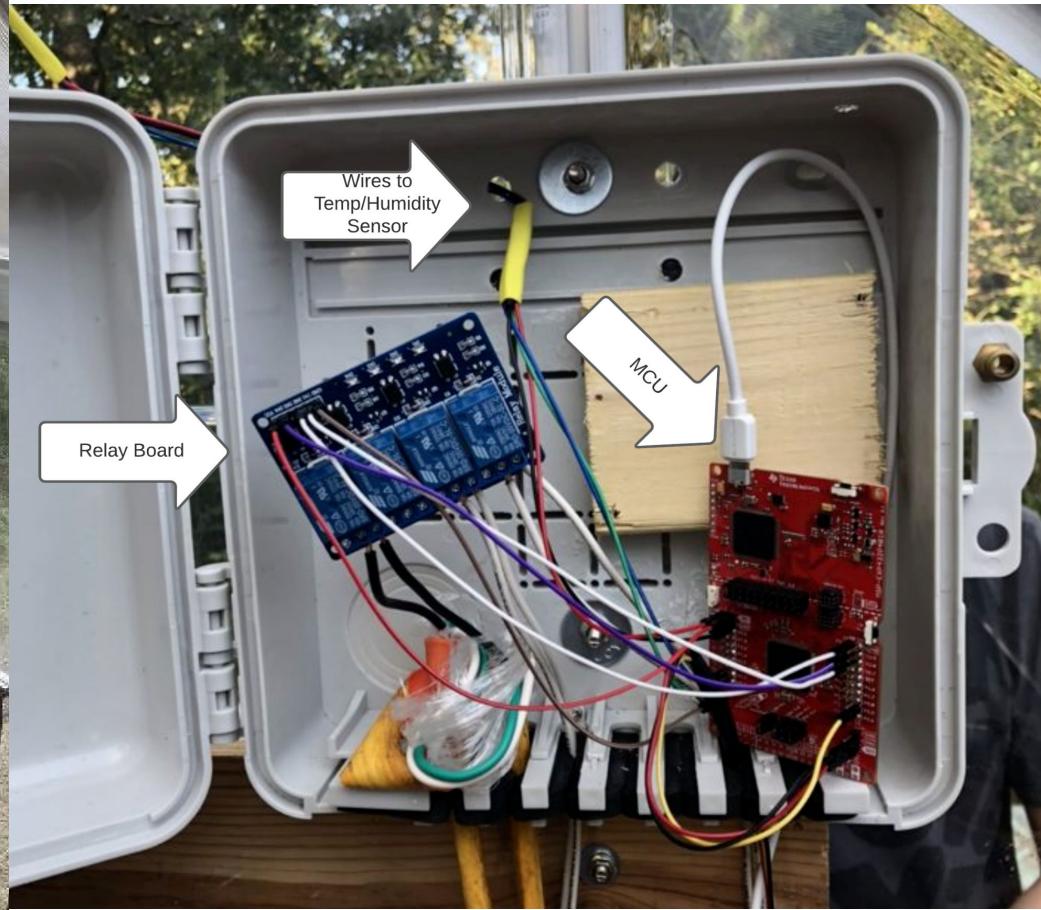
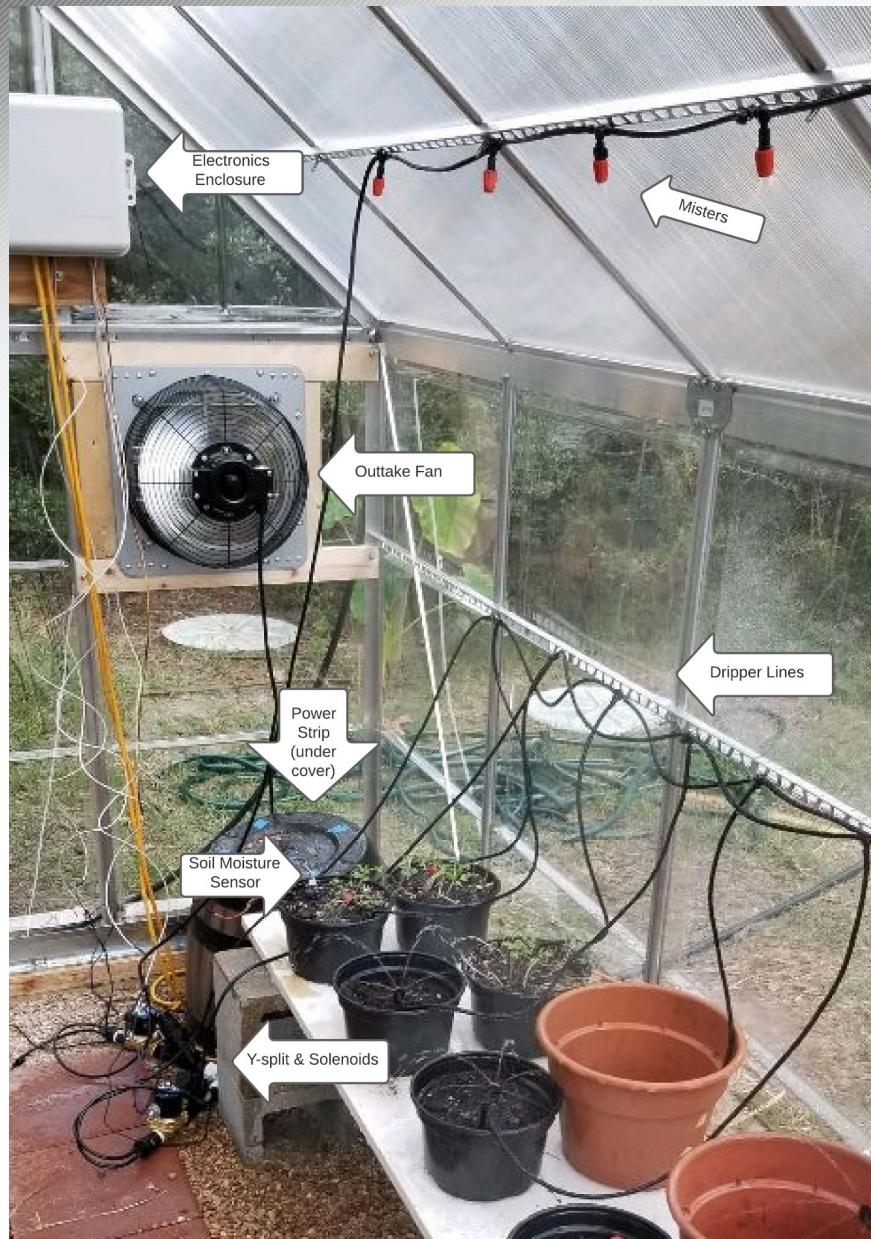
Chandler Kramer, Samuel Erickson, Mengtian Ke
Sponsor: Kevin Nowka
TA: Skyelar Head

Project Summary

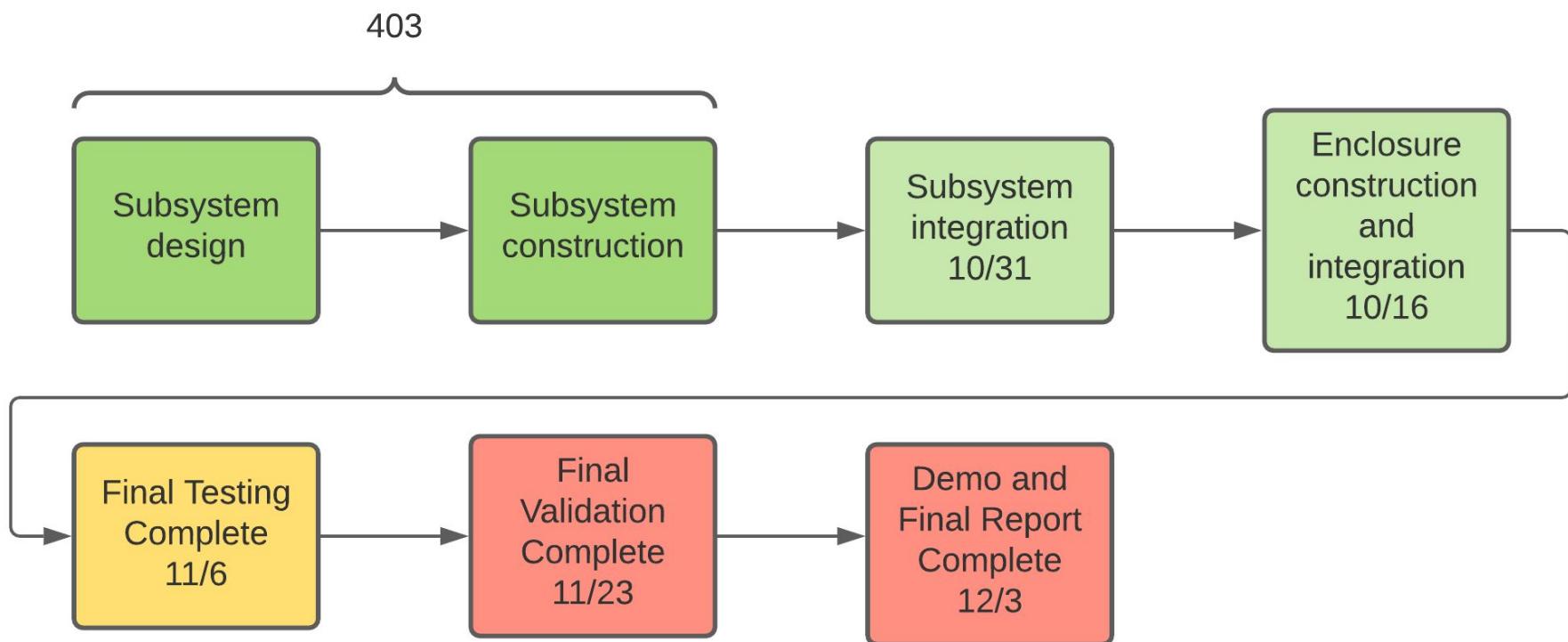
- Traditional gardening, even with a greenhouse, is a very manual process that can be very time consuming and plants are still vulnerable to the elements.
- The automatic greenhouse attempts to alleviate this problem by automating water delivery, temperature regulation, and airflow according to remotely set values by the user.



Integrated System Diagram



Project Timeline



Power Subsystem

Owner: Chandler Kramer

Accomplishments since last update 14 hrs of effort	Ongoing progress/problems and plans until the next presentation
<ul style="list-style-type: none">- Obtained a PERF board for permanent configurations of the buck converter circuit- Buck converter is soldered to the breakout board- Bench tested buck converter circuit	<ul style="list-style-type: none">- Fix any issues with the BC circuit- Permanently wire the buck converter circuit to the PERF board- Install permanent configuration inside the greenhouse enclosure and begin testing

MCU and Sensor Subsystem

Owner: Samuel Erickson

Accomplishments since last update 12 hrs of effort	Ongoing progress/problems and plans until the next presentation
<ul style="list-style-type: none">- Fully integrated MCU, relay board, and sensors with environment actors and greenhouse enclosure- Tested functionality of environmental actors, result: fully functional, limits TBD- Completed MCU side of wifi board communication code.	<ul style="list-style-type: none">- Fix signal integrity issue with temp/humidity sensor- Integrate MCU with wifi board and power subsystem- Start series of control algorithm tests in the greenhouse

Client Interface Subsystem

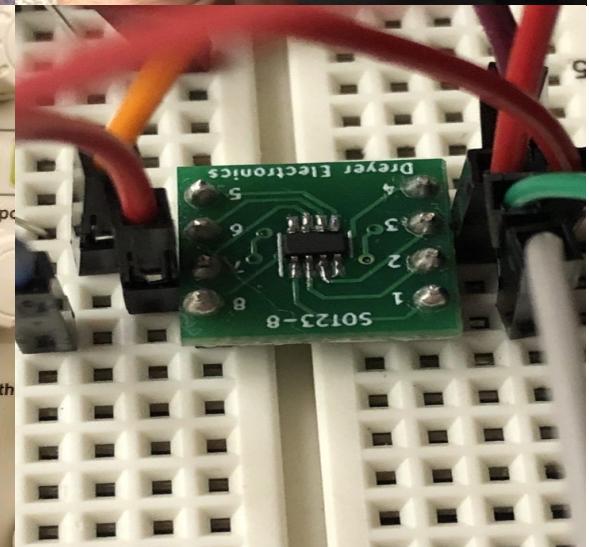
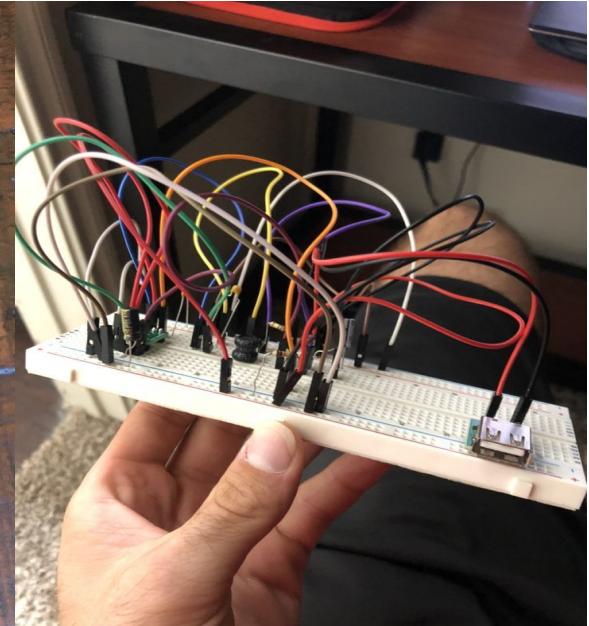
Owner: Mengtian Ke

Accomplishments since last update 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
<ul style="list-style-type: none">- Build connection with MCU and transceive data in both way- MCU receives data sends from the Client Interface- Photon received data from MCU and stored in Particle cloud	<ul style="list-style-type: none">- display data from Particle cloud to website



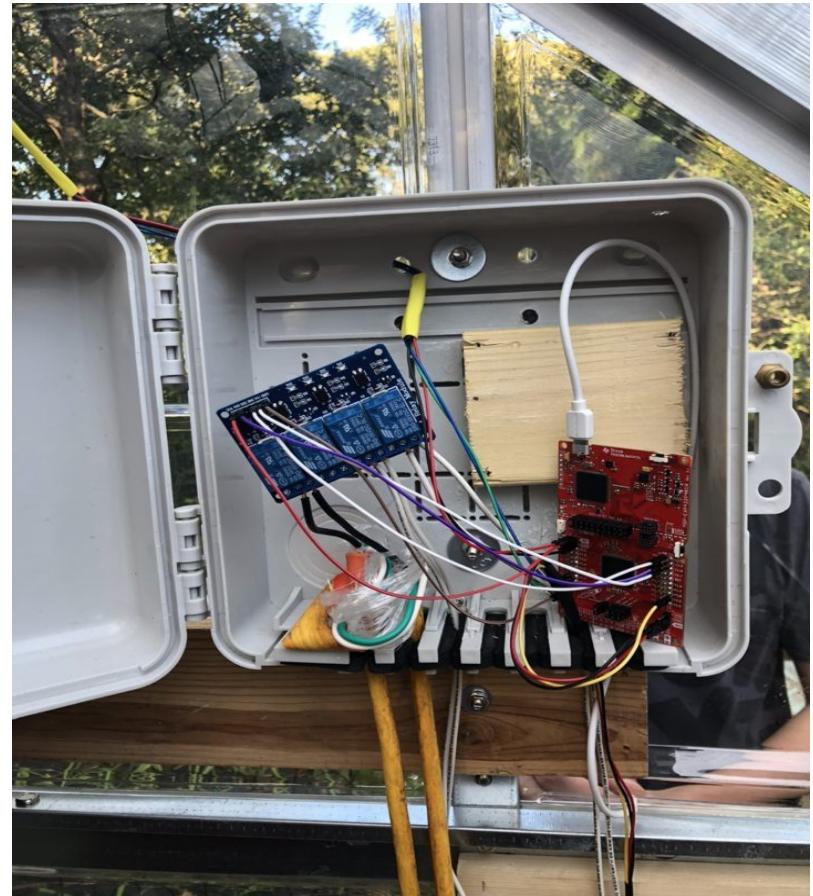
Power Subsystem

- BC Board
- Configuration
- Perf board
- Issues/Fixes



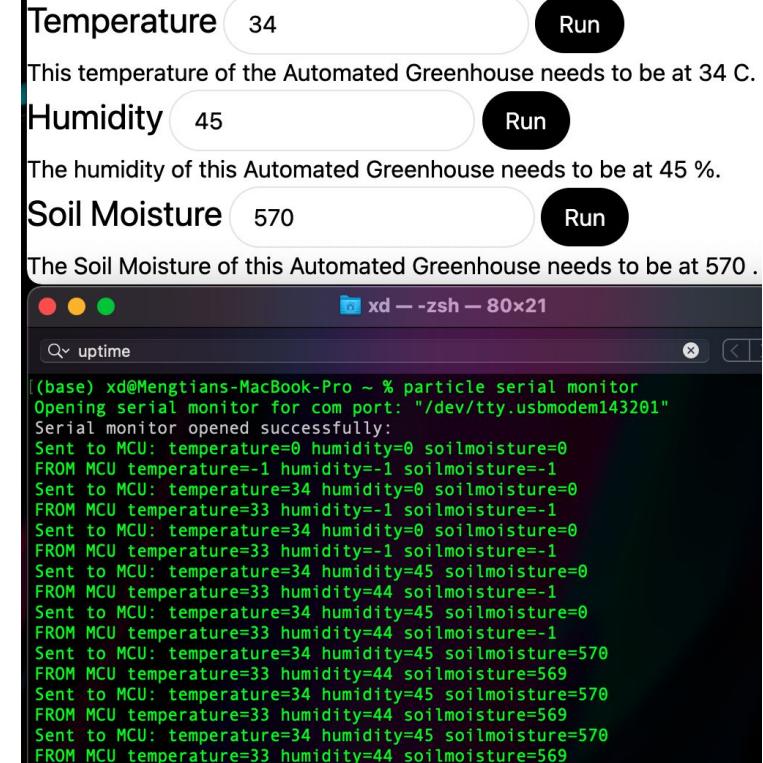
MCU and Sensor Subsystem

- Functional Test Code
- Permanent wiring
- Waterproofing sensor electronics



Client Interface Subsystem

- Client inputs a number to Temperature, Humidity, and Soil Moisture. These number will pass to the MCU.
- debug: MCU decrease the number by 1 and sends the number back.



Temperature 34 Run

This temperature of the Automated Greenhouse needs to be at 34 C.

Humidity 45 Run

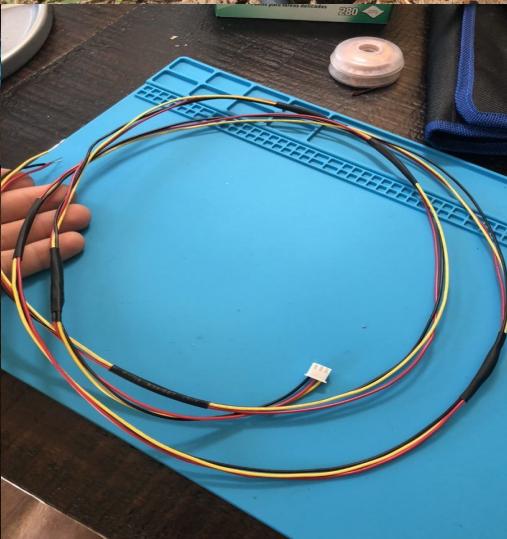
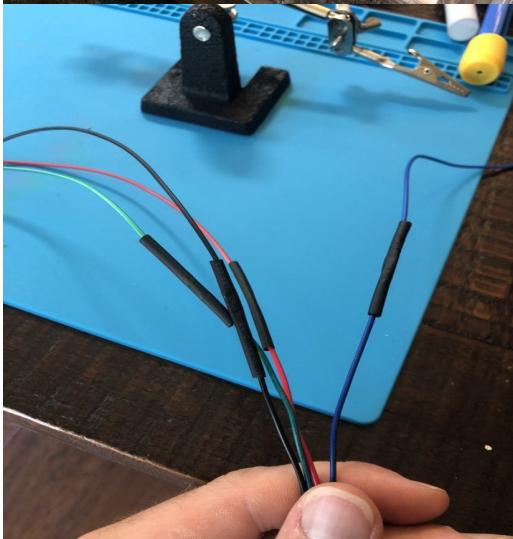
The humidity of this Automated Greenhouse needs to be at 45 %.

Soil Moisture 570 Run

The Soil Moisture of this Automated Greenhouse needs to be at 570 .

```
[base] xd@Mengtians-MacBook-Pro ~ % particle serial monitor
Opening serial monitor for com port: "/dev/tty.usbmodem143201"
Serial monitor opened successfully:
Sent to MCU: temperature=0 humidity=0 soilmoisture=0
FROM MCU temperature=-1 humidity=-1 soilmoisture=-1
Sent to MCU: temperature=34 humidity=0 soilmoisture=0
FROM MCU temperature=33 humidity=-1 soilmoisture=-1
Sent to MCU: temperature=34 humidity=0 soilmoisture=0
FROM MCU temperature=33 humidity=-1 soilmoisture=-1
Sent to MCU: temperature=34 humidity=45 soilmoisture=0
FROM MCU temperature=33 humidity=44 soilmoisture=-1
Sent to MCU: temperature=34 humidity=45 soilmoisture=0
FROM MCU temperature=33 humidity=44 soilmoisture=-1
Sent to MCU: temperature=34 humidity=45 soilmoisture=570
FROM MCU temperature=33 humidity=44 soilmoisture=569
Sent to MCU: temperature=34 humidity=45 soilmoisture=569
FROM MCU temperature=33 humidity=44 soilmoisture=569
Sent to MCU: temperature=34 humidity=45 soilmoisture=570
FROM MCU temperature=33 humidity=44 soilmoisture=569
```

Misc. Update





Misc. Update continued





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Execution & Validation Plan

	8-Sep	15-Sep	22-Sep	29-Sep	6-Oct	13-Oct	20-Oct	27-Oct	3-Nov	10-Nov	17-Nov	24-Nov	1-Dec
Interface Subsystem: Checked subsystem from 403 to verify functionality Connect with the MCU and transfer data Design a report page to present data Report page prints out the value from each sensor Monitoring and testing data from MCU to photon board (vice versa) Testing data received in the web-interface from the MCU and displaying them on the website Testing web-interface, photon board, and MCUs data as a transmission line Final integration testing	Green	Green	Green	Green	Green	Yellow	Green	Green	Green	Yellow	Yellow	Yellow	Yellow
Microcontroller Subsystem: Make sure subsystem works from 403 Establish connection with wifi board Order solenoids and relay board Connect solenoids and fans to relay board and drive through MCU Establish permanent wired connections between components Create automatic control algorithm Test algorithm in enclosure Monitoring and testing humidity sensor within enclosure Monitoring and testing soil moisture sensor within enclosure Monitoring and testing temperature sensor with enclosure Final integration testing	Green	Green	Green	White	Green	Green	Green	White	Yellow	Yellow	Yellow	Yellow	Yellow
Power Subsystem: Checked subsystem from 403 to verify functionality of components Compare and purchase upgraded fans for new design Order buck converter for MCU Receive buck converter for MCU Connect power subsystem with MCU subsystem and relay board Establish permanent wired connections between components MCU power testing Relay board power testing Photon board power testing Final integration testing	Green	Green	Green	White	Green	Green	Green	Green	Green	Yellow	Yellow	Yellow	Yellow

**Thank you!
Any Questions?**