Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 14: RF Triangulation
Bi-Weekly Update 1

Josh Broyles, Brandon Stokes,
Jack Parkinson, Kathleen Hutchinson
Sponsor: Max Lesser
TA: Dalton W. Cyr

Project Summary

RF Triangulation deals with **determining the random location of a transmitter** in an 100 meter area.

This project utilizes **three receivers** with motors to scan an area for the **strongest radio frequency signal** from the transmitter and use their collective angles from “true” North to determine the location of the transmitter.

Then, the GUI will display this information to the user.

Project/Subsystem Overview

Josh Broyles - Transmitter

- PCB design for Transmitter
- Programming Transmitter MCU
- Sends out Radio Frequency

Jack P. - Receiver - Antenna/Motor

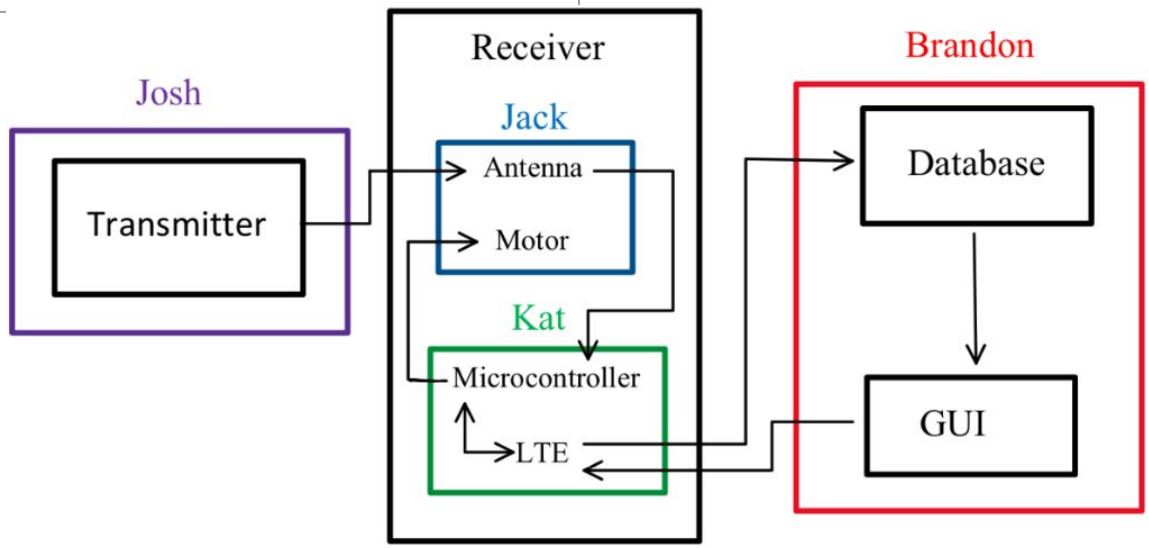
- PCB design for motor driver
- Programming ESP32 for motor
- Receives signal

Kathleen H. - Receiver - ESP32 Modules

- PCB design for ESP32 and 4 modules
- Programming ESP32 for modules
- Sends signal to Database

Brandon Stokes - Database & GUI

- Database creation
- Display of transmitter location to User
- Error calculation through GPS



Major Project Changes for 404

Original Goal:

Search area of minimum 500 meters

Now:

Due to the higher frequency of the XBEE's used, the maximum distance will now be 100m

Original Subsystems:

Kathleen had been tasked with programming the Pycom (LTE Module) for the database connection

Now:

Brandon will take over programming the Pycom (LTE Module)

Project Timeline

(Currently)
The team will finalize and order parts/PCB

Finalize realistic goals with sponsor

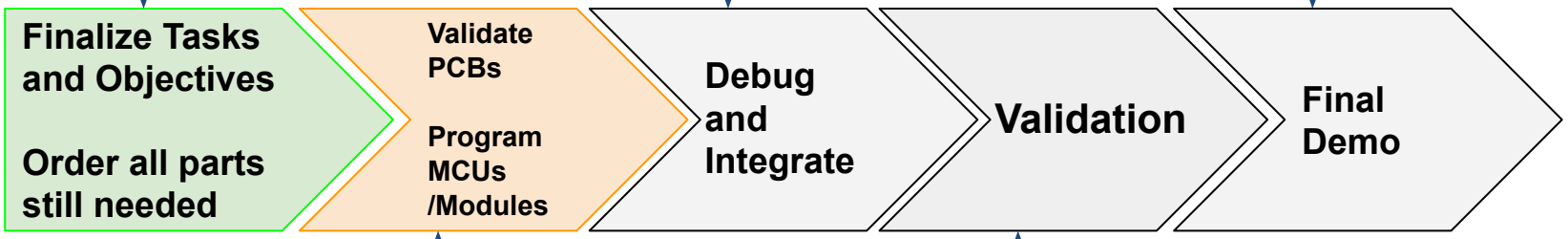
[Complete before February]

The team will debug any problems with code, power, etc. and begin integration

[March]

Once validation is complete with a working project, the team will complete a final demonstration

[Late April]



The team will finalize individual subsystems

[February]

Once fully integrated with all parts working, the team will begin validation testing.

[Late March through Mid February]

Transmitter

Josh Broyles

Accomplishments since 403 14 hrs of effort	Ongoing progress/problems and plans until the next presentation
PCB fabricated PCB rung out and validated Radio communication established Radio distance test (reaches up to 150m)	Set up GPS on PCB Update MCU code for GPS input

Transmitter

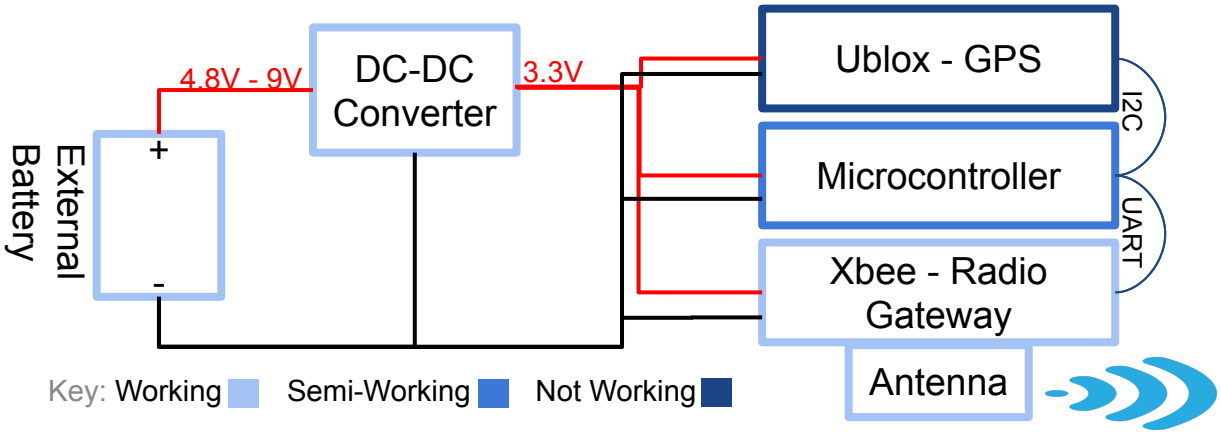
Josh Broyles

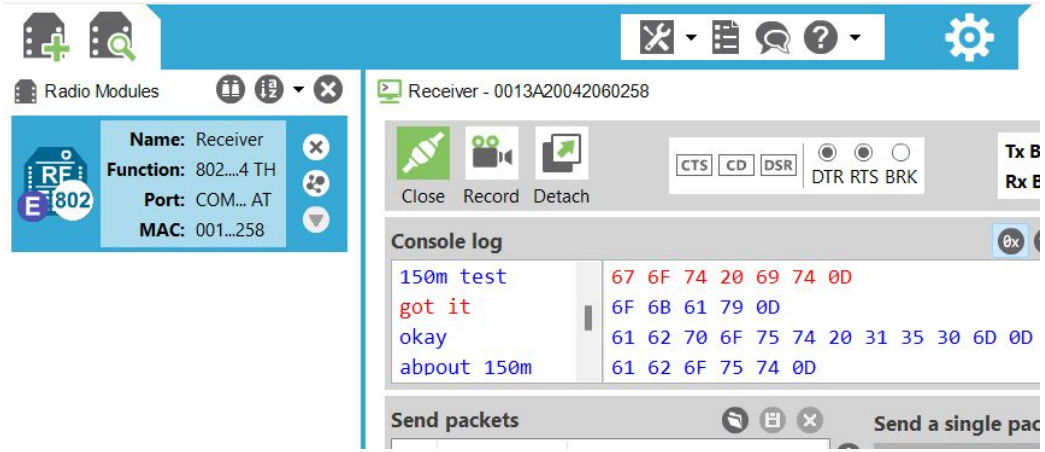
Working:
- Power system
- Radio

Not Working:
- GPS module
  - Never communicated with in 403
- Code
  - Needs to be updated to communicate with gps module

Changes:
- Focus on assisting the receiver side of the team
  - Figure out the magnetometer

Subsystem Overview





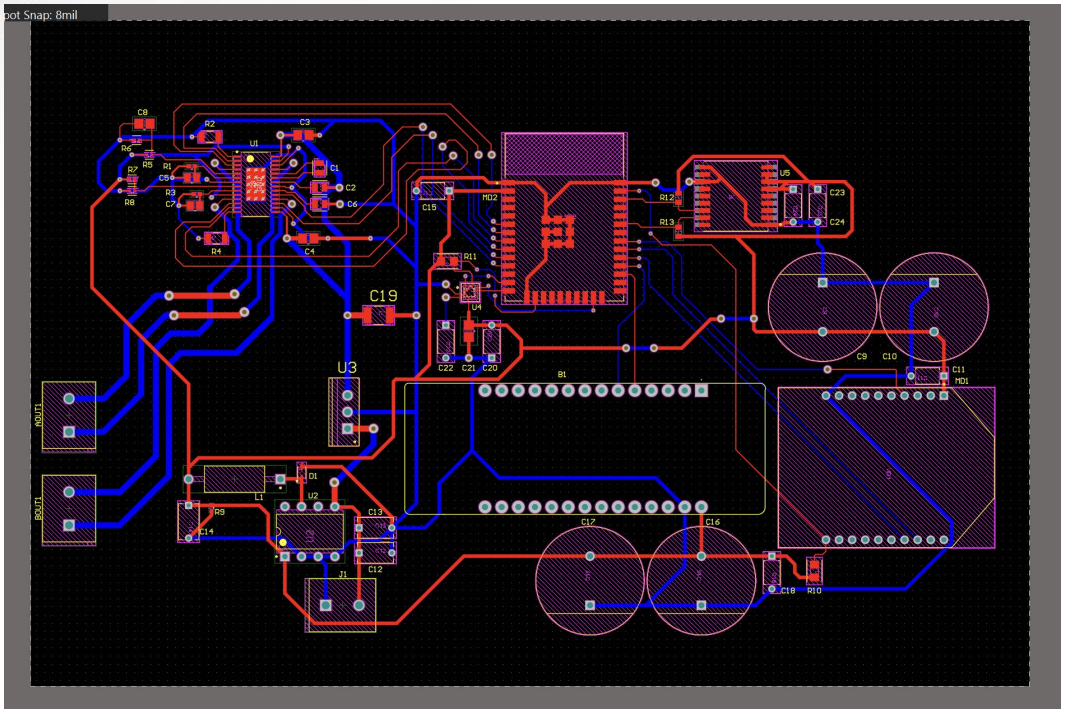
Receiver: Antenna & Motor

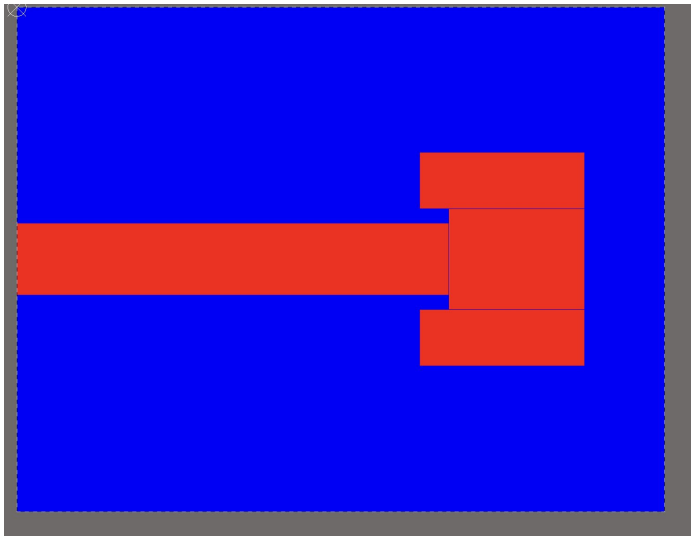
Jack Parkinson

Accomplishments since 403 12hrs of Effort	Ongoing progress/problems and plans until the next presentation
Made a contingency plan with sponsor for the future of the antenna	1. Working on antenna simulation and design 2. Helping with PCB finalization 3. Continue working on code to control the motor

Receiver: Antenna & Motor

Jack Parkinson





Receiver: ESP32 & Modules

Kathleen Hutchinson

Accomplishments since 403 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
Radio distance test (reaches up to 150m) New Schematic for Receiver *(due to change in PCB Design discussed with Dr. Lusher)*	1. PCB Design **Finalization** & confirm with Dr. Lusher 2. **Order** PCB & required parts 3. Continue to **program** ESP32 for XBee & verify *(while waiting for PCB to be printed)* 4. Work with Brandon on **LTE**

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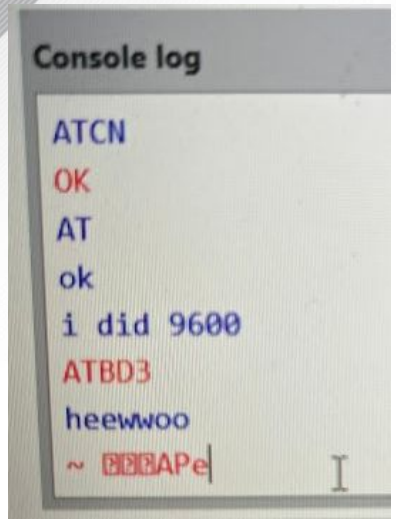
Receiver: ESP32 & Modules

Kathleen Hutchinson



Working:

- Schematic
- Pseudo Code

Not Working:

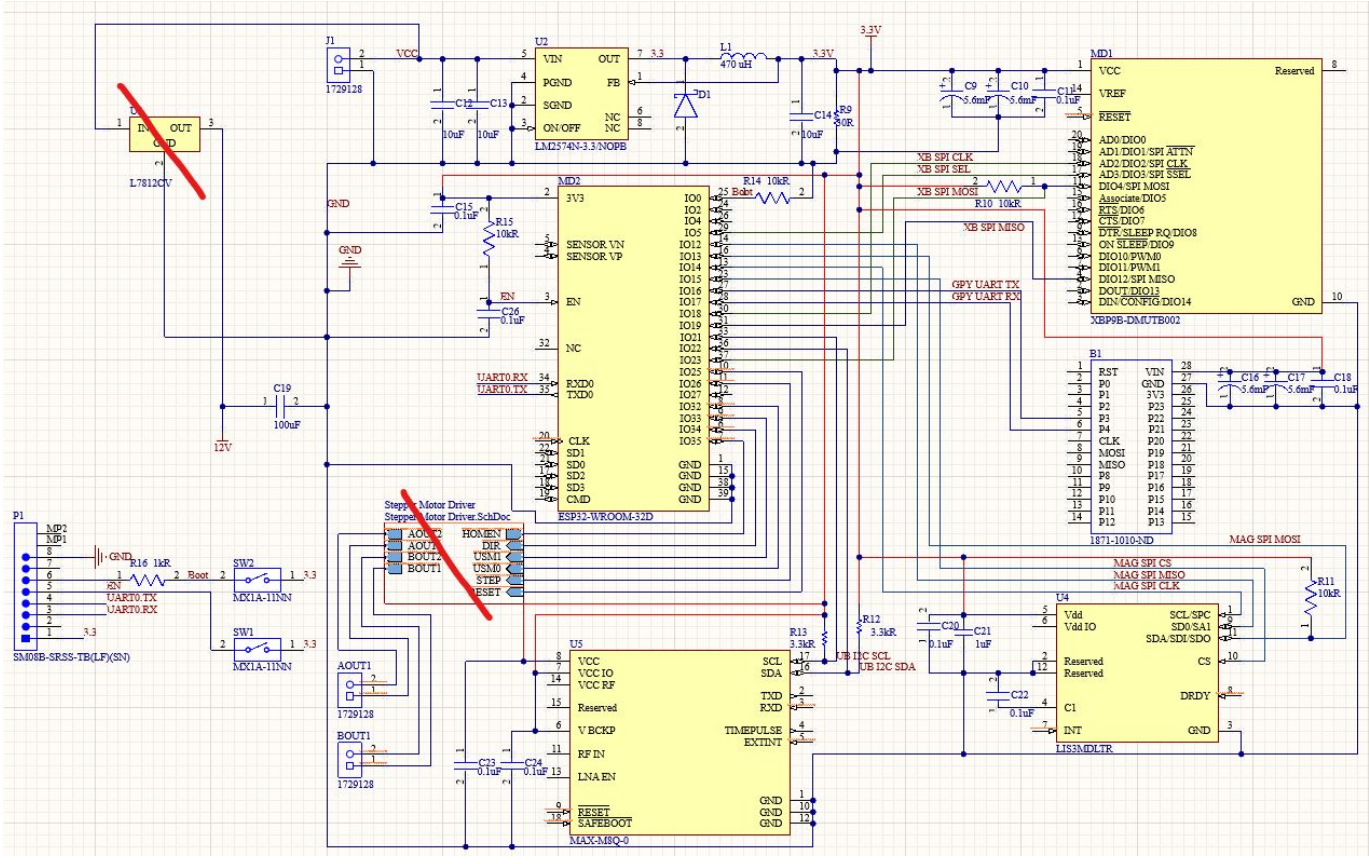
- PCB Design

-adding required features through Dr. Lusher's input

- Code

-in progress of validating XBee code for ESP32

-unable to test surface mount modules (compass & magnetometer)



Database & GUI

Brandon Stokes

Accomplishments since 403 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
Added some extra functionality to allow the receivers data to come in at different times	-Data Validation to ensure data is correct before beginning process -Rework the database schema to handle successive runs -General error checking to pinpoint if one receiver is not incorrect -Fixing where you do not need to press start again if its outside the bound

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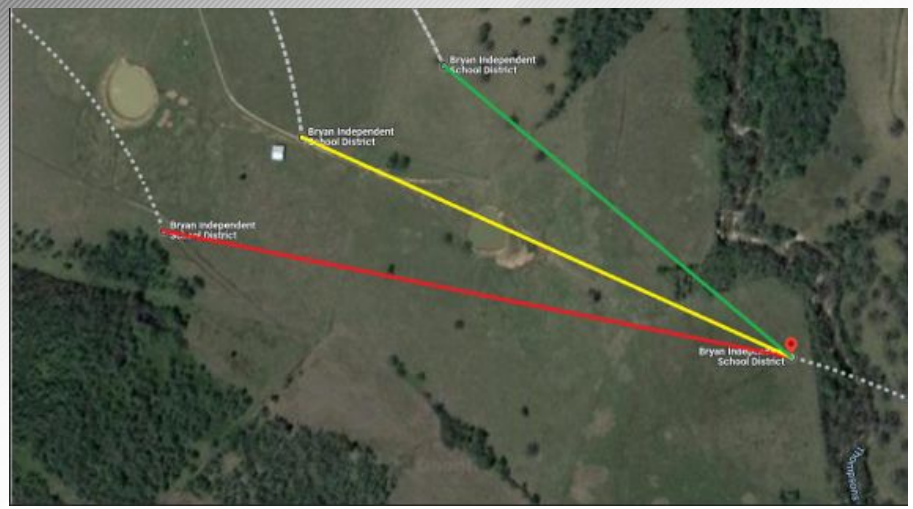
Database & GUI

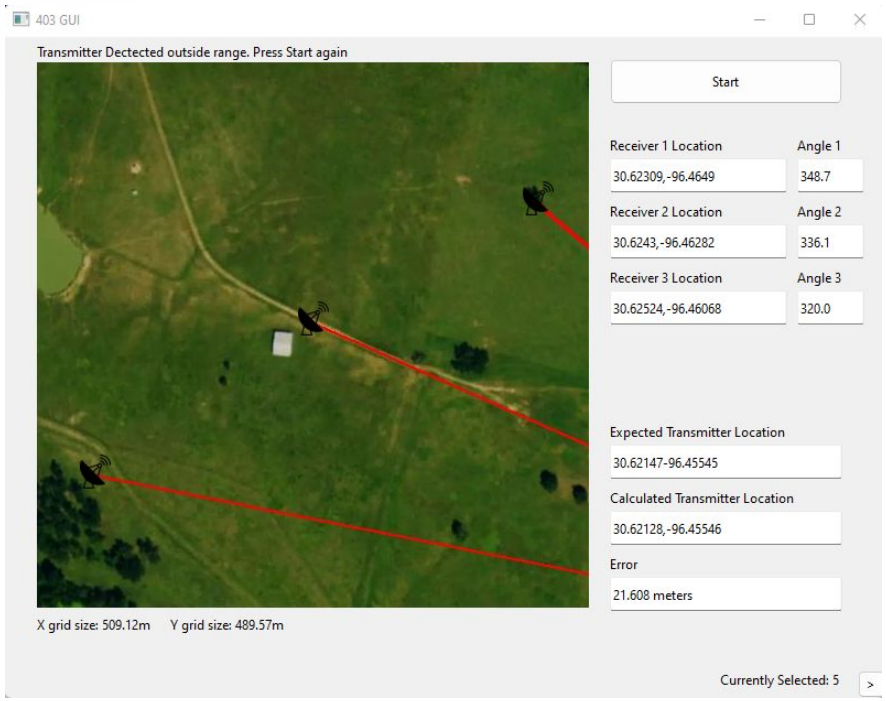
Brandon Stokes

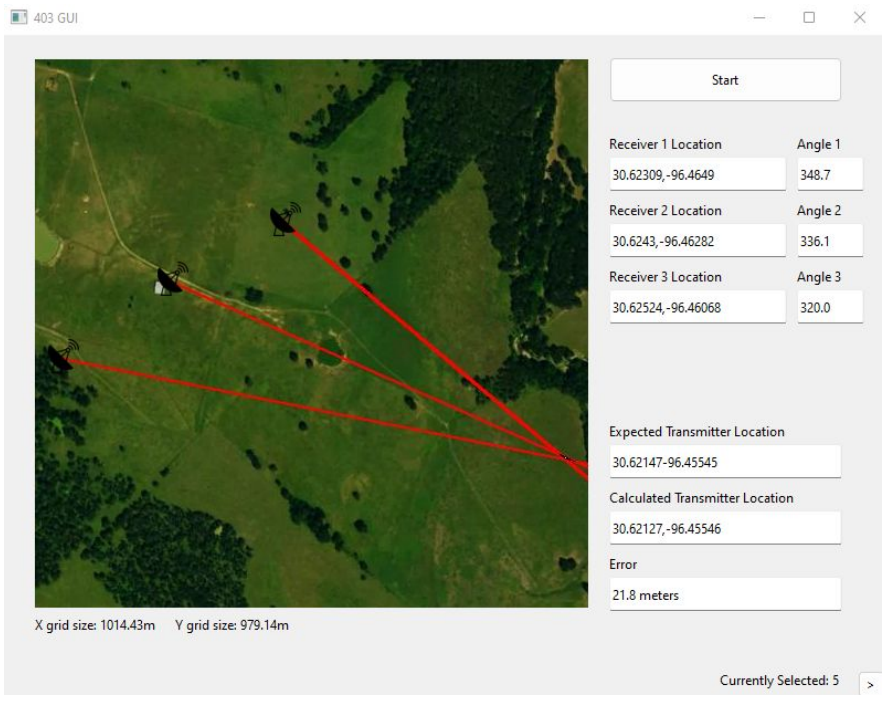


The main functionality of the database and GUI is all working

Changes:

Not needing to press start again if it is outside the original bound





Parts Ordering Status

Transmitter:

- All parts received, including printed PCB

Receiver:

ESP32/Modules

- Informed recently from Dr. Lusher that PCB design was missing parts
- Parts will be ordered within the week:
  - New Inductor
  - More Resistors
  - Push Buttons
  - USB Connector
  - LTE Antenna & Chip
  - Stepper Motor Controller IC
- PCB will be ordered within the week

Antenna:

- Antenna Design is still being worked on but should be ordered by next week

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Execution & Plan

	1/24/23	1/31/23	2/7/23	2/14/23	2/21/23	2/28/23	3/7/23	3/14/23	3/21/23	3/28/23	4/4/23	4/11/23	4/18/23	4/23/23	4/29/23
Ring out PCB															
Test Radio Distance															
3D Print Housing															
Get GPS Working															
Finish Programing MCU															
Assemble PCB															
Re - Validate PCB Power															
Combine Housing & PCB															
Validate Messages to Receivers															
Finalize Schematic/PCB Design															
Order/Print PCB															
Program Through-Hole Modules															
Assemble PCB															
Validate PCB Design/Power/etc.															
Finish Programing ESP32															
Connect Antenna															
Validate with Receiver															
Finalize Antenna Design/ Simulation															
Order/ Build Antenna															
Test Antenna Gain/Directionality															
Test Motor Controller															
Rework Database to use a single table															
Rework out of bounds situation															
Connect Pycom to Database															
Finish Programming Pycom															
Validate each receiver and add resetability															
Add Error checking to data															
Integrate Reciever Modules															
Test Transmitter/Reciever Communication															
Test Receiver/Database Communication															
Complete System Validation															
Final Demo															
Final Report															

Thank you for your attention!

Feel free to ask us questions