



Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 05: Smart Luggage

Final Presentation

Assem Ahmed, Angus Mckellar, Tien Le

Sponsor: Prof. Stavros Kalafatis

TA: Eric Robles

Project Summary

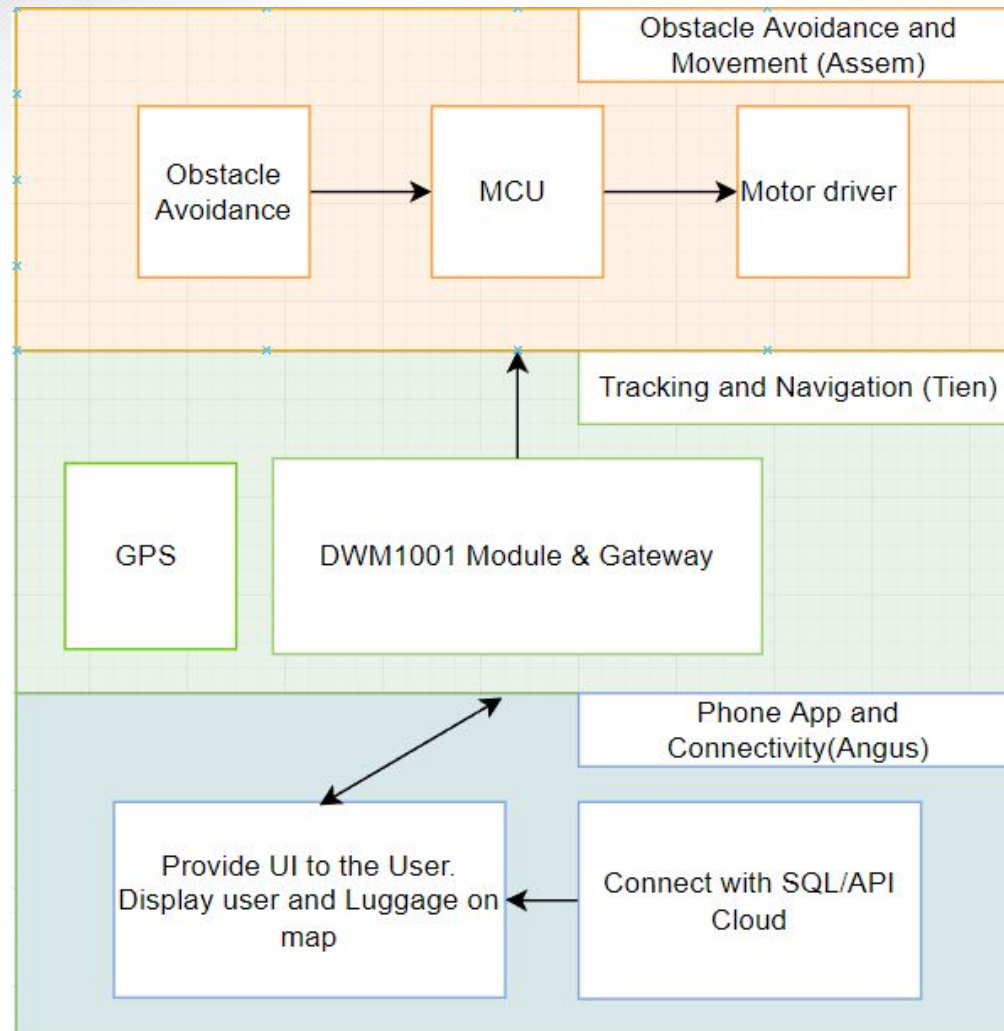
Problem statement:

- Luggage can be a challenge for elderly and disabled people due to the luggage weight.
- Luggage are subject to theft or loss.

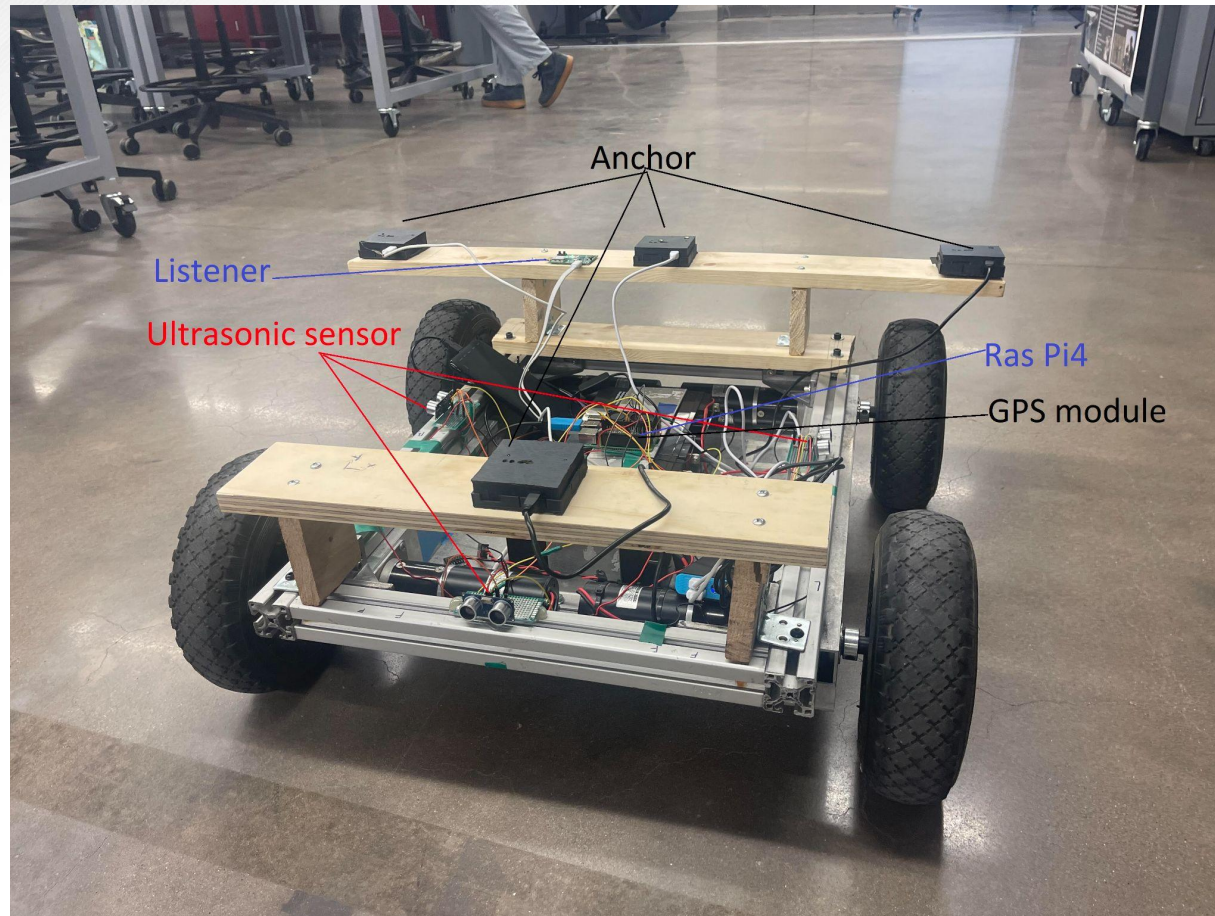
Smart Luggage will:

- Follow the user and alert them if the luggage is out of range.
- Avoid Obstacles.
- Allow the user to locate their luggage in the event of theft or loss using a phone application.

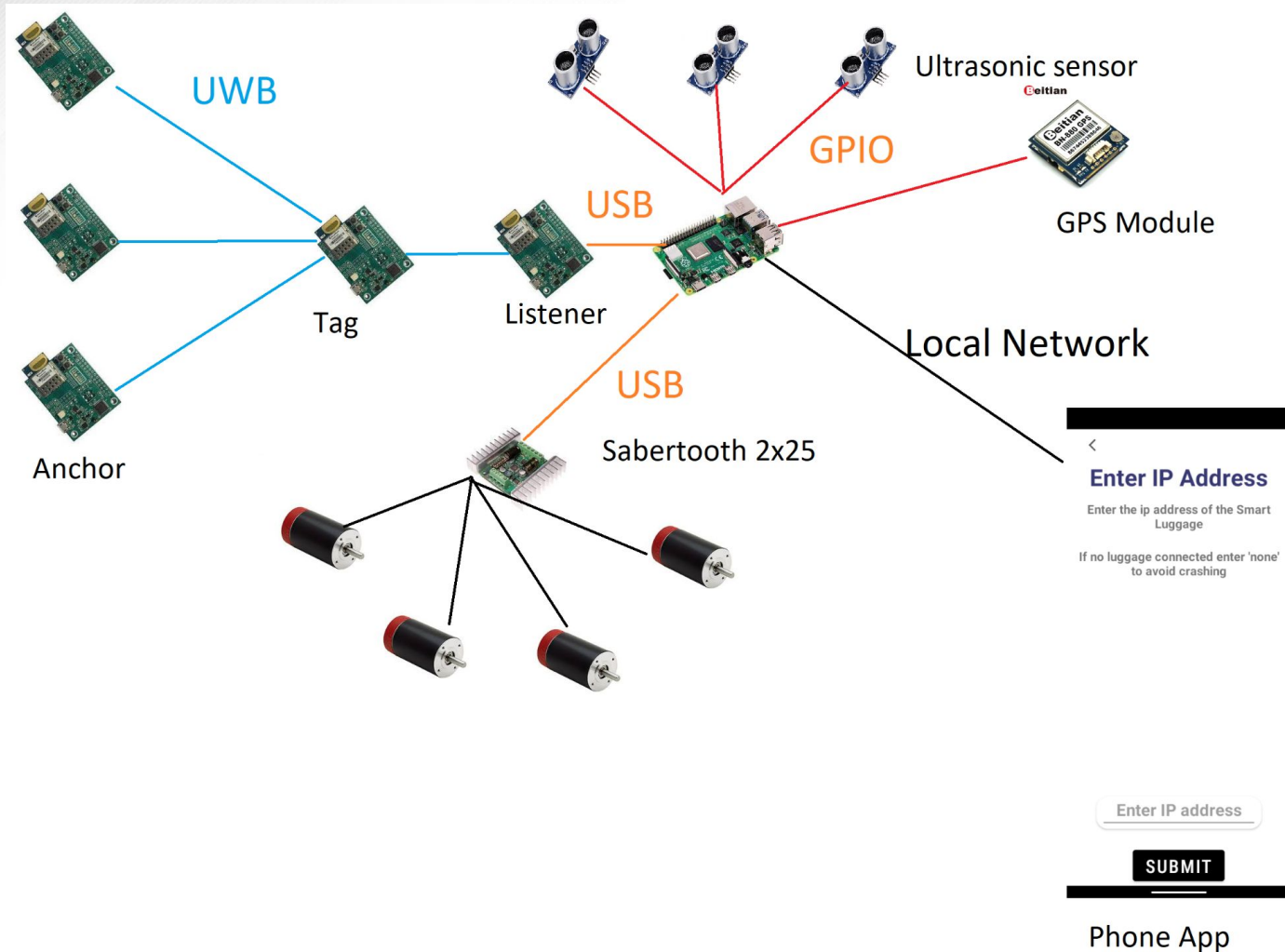
Project/Subsystem Overview



Integrated Project Diagram



Integrated Project Diagram



Engineering Design Accomplishments

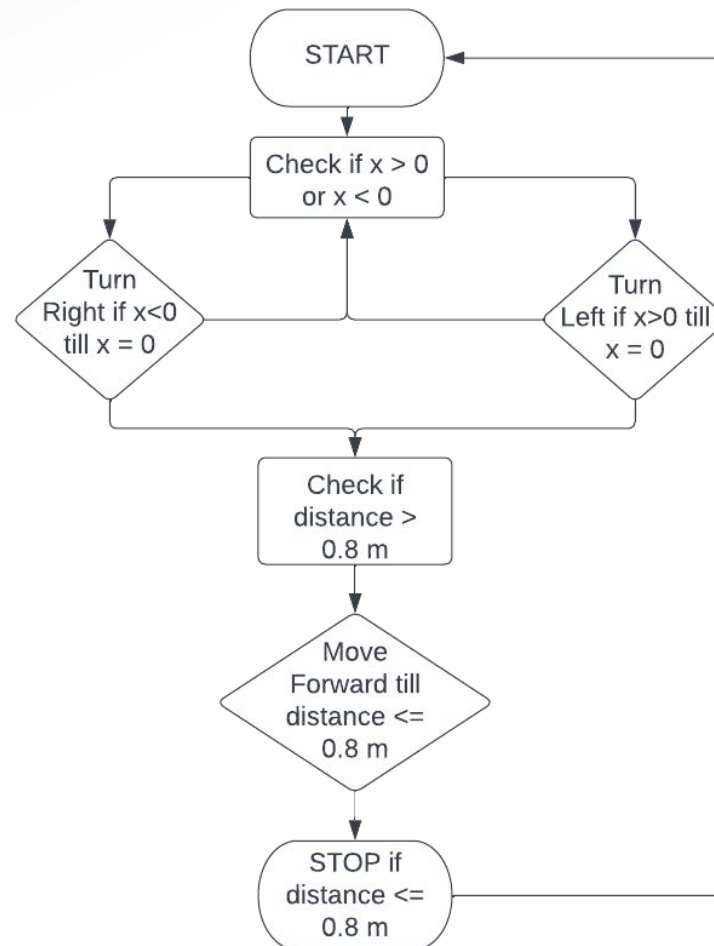
Assem Ahmed

- Configured motor driver with Raspberry Pi.
- Created and tested python library for the motor driver for movement control.
- Configured and tested ultrasonic sensors with Raspberry Pi to get the correct distances.
- Created a top module that receives the (x, y) coordinates of the user and outputs the commands for the rover to follow the user.
- Integrated obstacle avoidance with the top module.
- Added a buzzer to alarm the user when the rover fails to follow him or is lost.

Engineering Design Accomplishments

Assem Ahmed

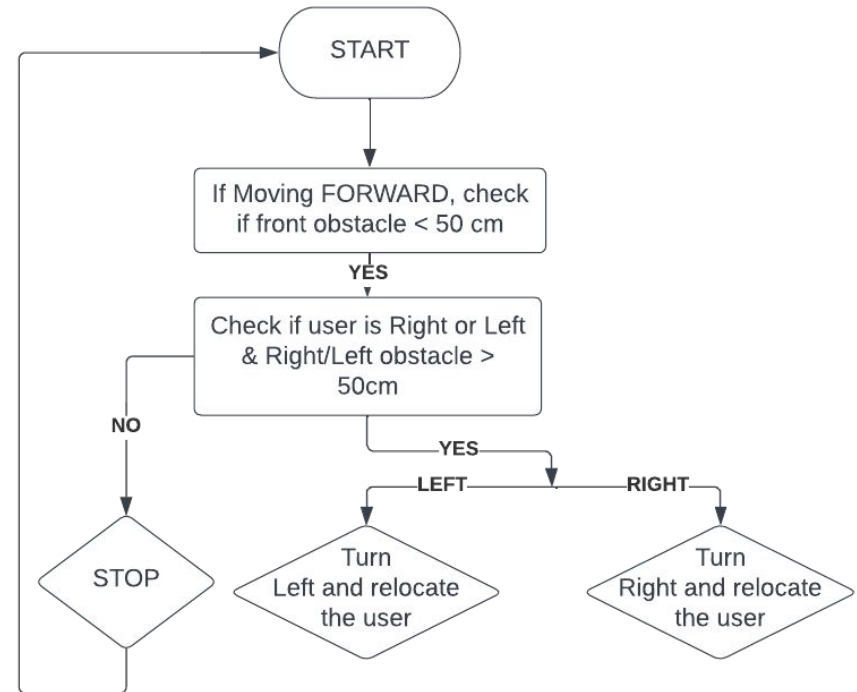
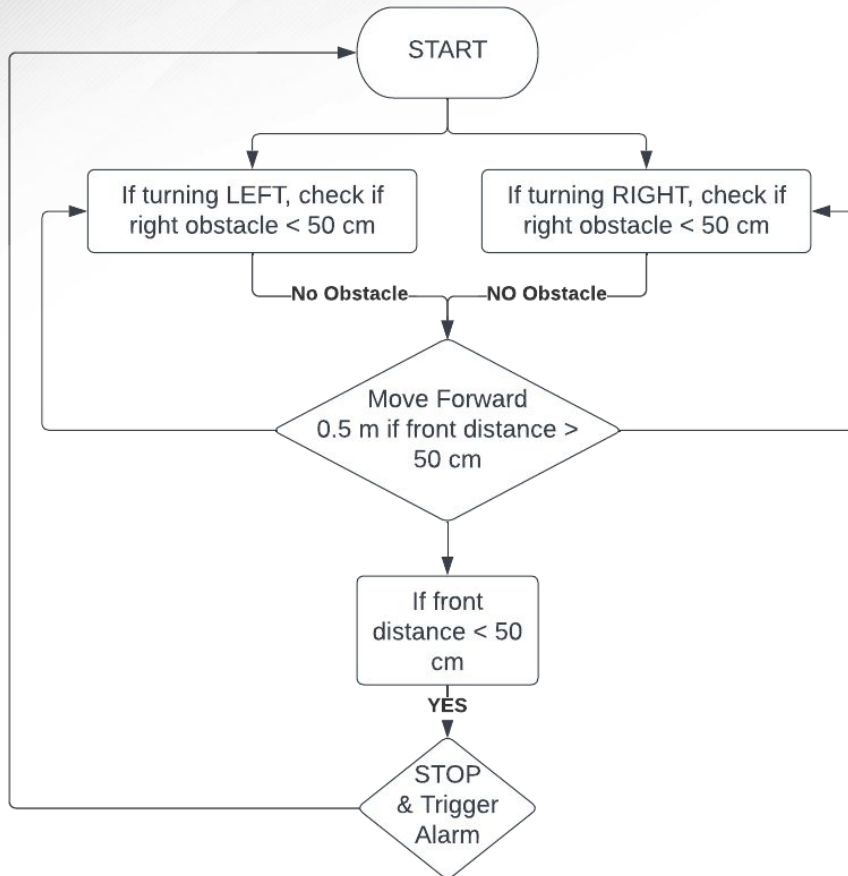
Movement Flowchart



Engineering Design Accomplishments

Assem Ahmed

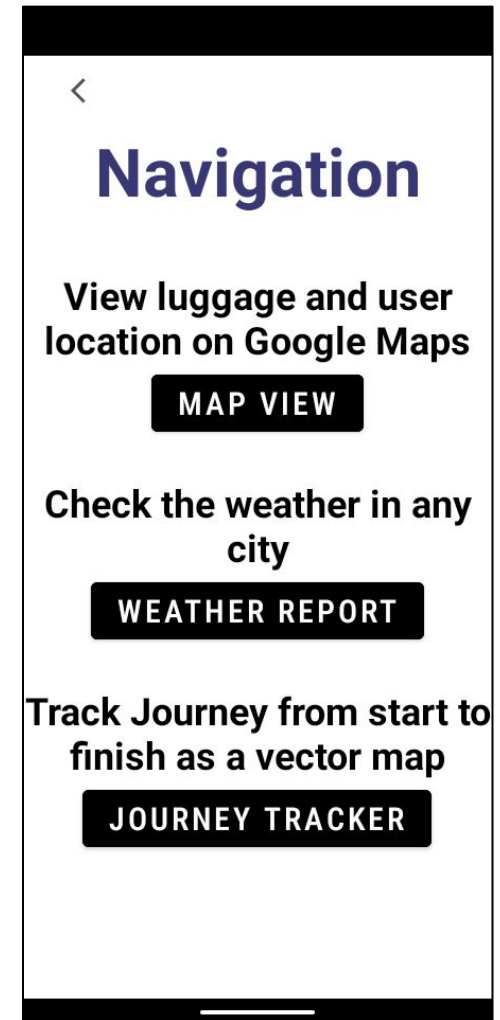
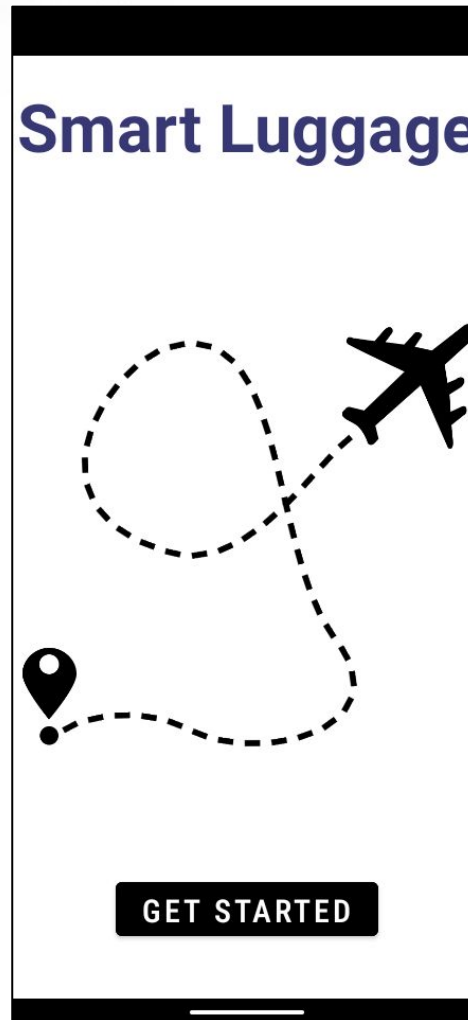
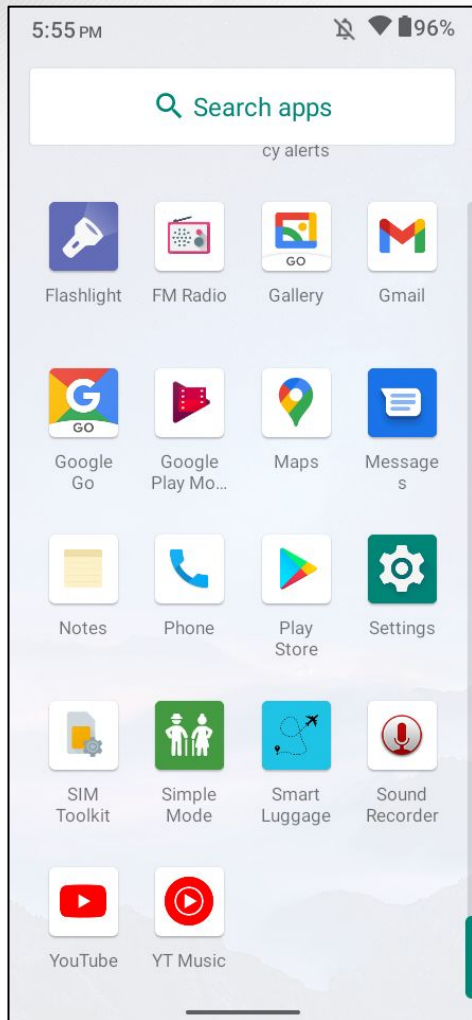
Obstacle Avoidance Flowchart






Engineering Design Accomplishments

Angus Mckellar



Engineering Design Accomplishments

Angus Mckellar

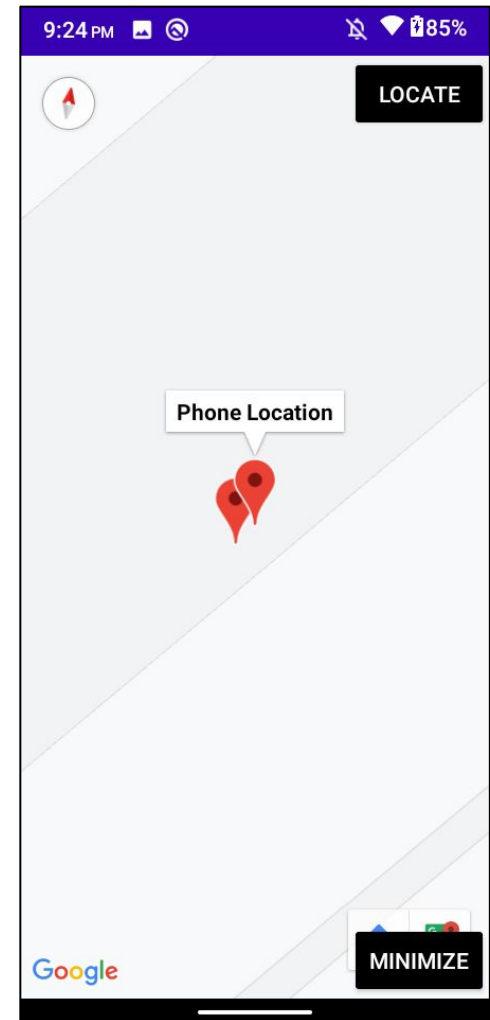
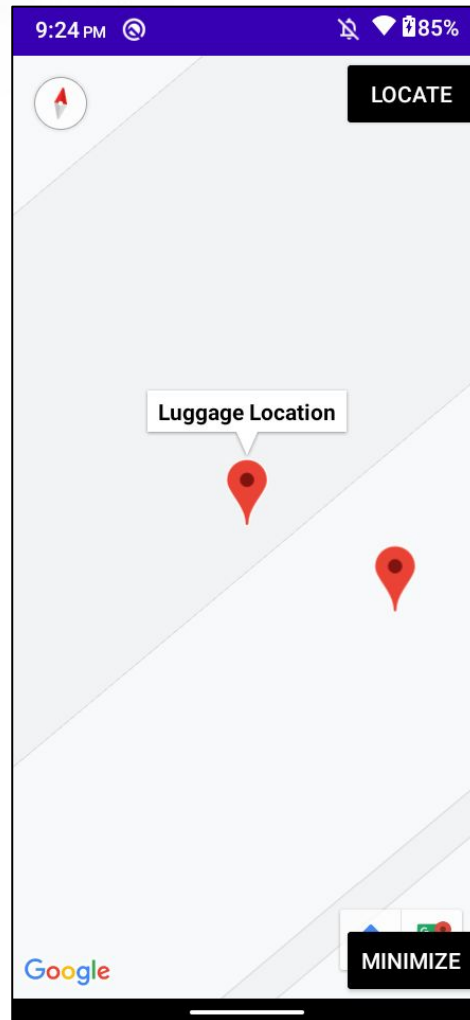


Enter IP Address

Enter the ip address of the Smart Luggage

If no luggage connected enter 'none' to avoid crashing

SUBMIT





Engineering Design Accomplishments

Angus Mckellar

<

Choose a City

State is optional but may be required to get specific city

Enter city name

Enter state name

SUBMIT

< **Weather Report**

College Station
TX, US

68F
Clear sky

Precipitation
0.0mm


UV index
1.77

Feels Like
67.4F

Humidity
62.0%

< **Journey Tracker**

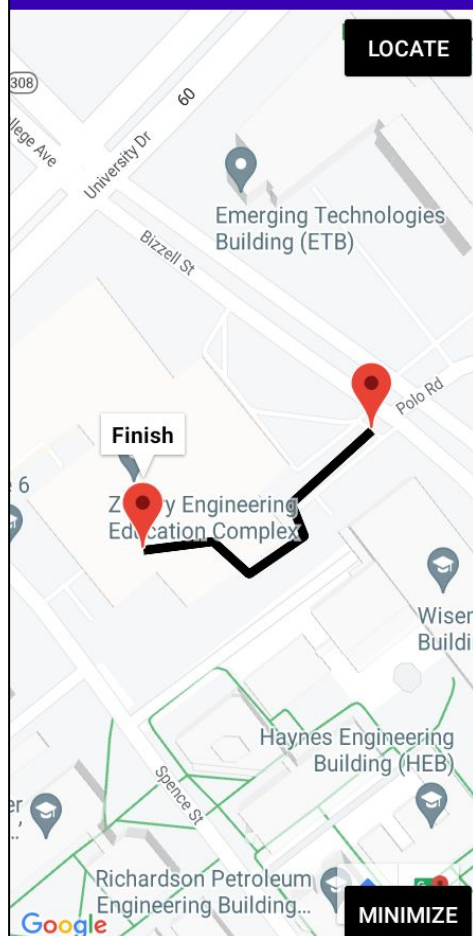
Tracking Journey!



STOP

10:18 AM

LOCATE



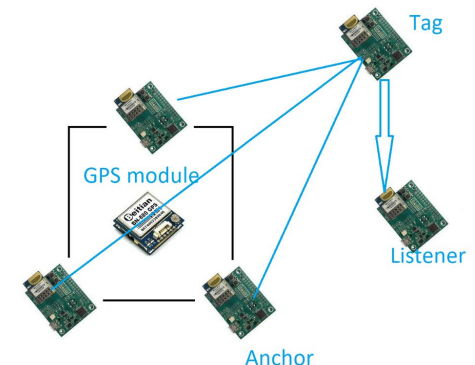
Finish

MINIMIZE

Engineering Design Accomplishments

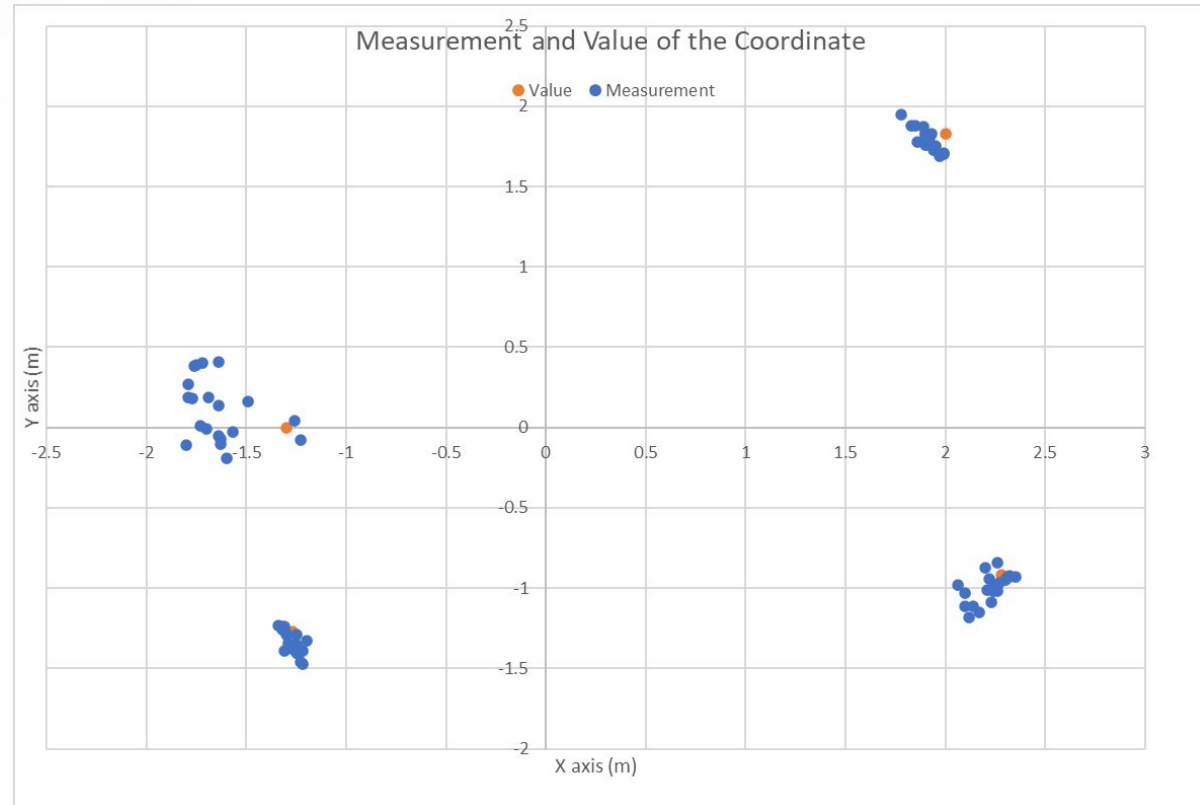
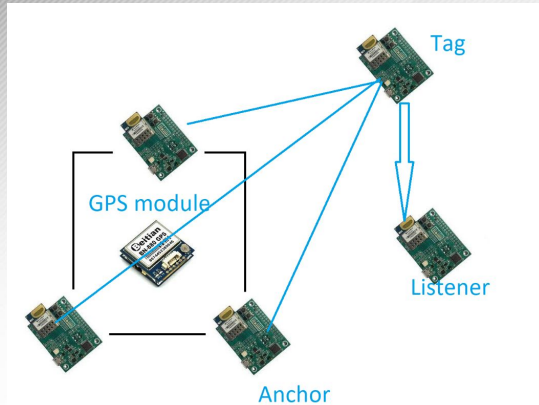
Tien Le

- Limited technology in indoor navigation.
- Configured the DWM1001 module with Raspberry Pi4.
- Testing and Validation the distance between the Tag and the Anchor.
- Configured the GPS module with the Raspberry Pi4.



Engineering Design Accomplishments

Tien Le



```
192.168.1.24 - - [11/Oct/2022 14:06:32] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391442, lat = 30.5844344
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391442, lat = 30.5844344
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
Your position: lon = -96.339144, lat = 30.584436
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391434, lat = 30.5844392
192.168.1.24 - - [11/Oct/2022 14:06:33] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:35] "GET / HTTP/1.1" 200 -
Your position: lon = -96.339143, lat = 30.5844405
192.168.1.24 - - [11/Oct/2022 14:06:35] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391423, lat = 30.5844424
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391422, lat = 30.5844428
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391415, lat = 30.5844453
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:36] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391408, lat = 30.5844473
192.168.1.24 - - [11/Oct/2022 14:06:37] "GET / HTTP/1.1" 200 -
192.168.1.24 - - [11/Oct/2022 14:06:37] "GET / HTTP/1.1" 200 -
Your position: lon = -96.3391403, lat = 30.5844481
192.168.1.24 - - [11/Oct/2022 14:06:37] "GET / HTTP/1.1" 200 -
```

Integrated System Results

- The rover is able to follow the user smoothly.
- The rover is able to detect and avoid obstacles while following the user.
- The rover keeps a distance of 0.8 m from the user.
- The rover stops and triggers a buzzer when the distance from the user is greater than 3 m.
- The rover stops and triggers a buzzer if it's stuck.



Integrated System Results

- Phone app successfully connects to raspberry pi.
- Phone app accurately displays location of user and luggage.
- Weather report and journey tracker work as expected.



Conclusions

- DWM1001 has an uncertainty range around 40 cm while testing.
- Integration between subsystems is successfully completed.
- Validation of the integrated system is on-going.



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Thank you!
Questions?