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**ENGINEERING**  
TEXAS A&M UNIVERSITY

# **Team 05: Smart Luggage**

## **Bi-Weekly Update 2**

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**Sponsor: Prof. Stavros Kalafatis**

**TA: Eric Robles**

# Project Summary

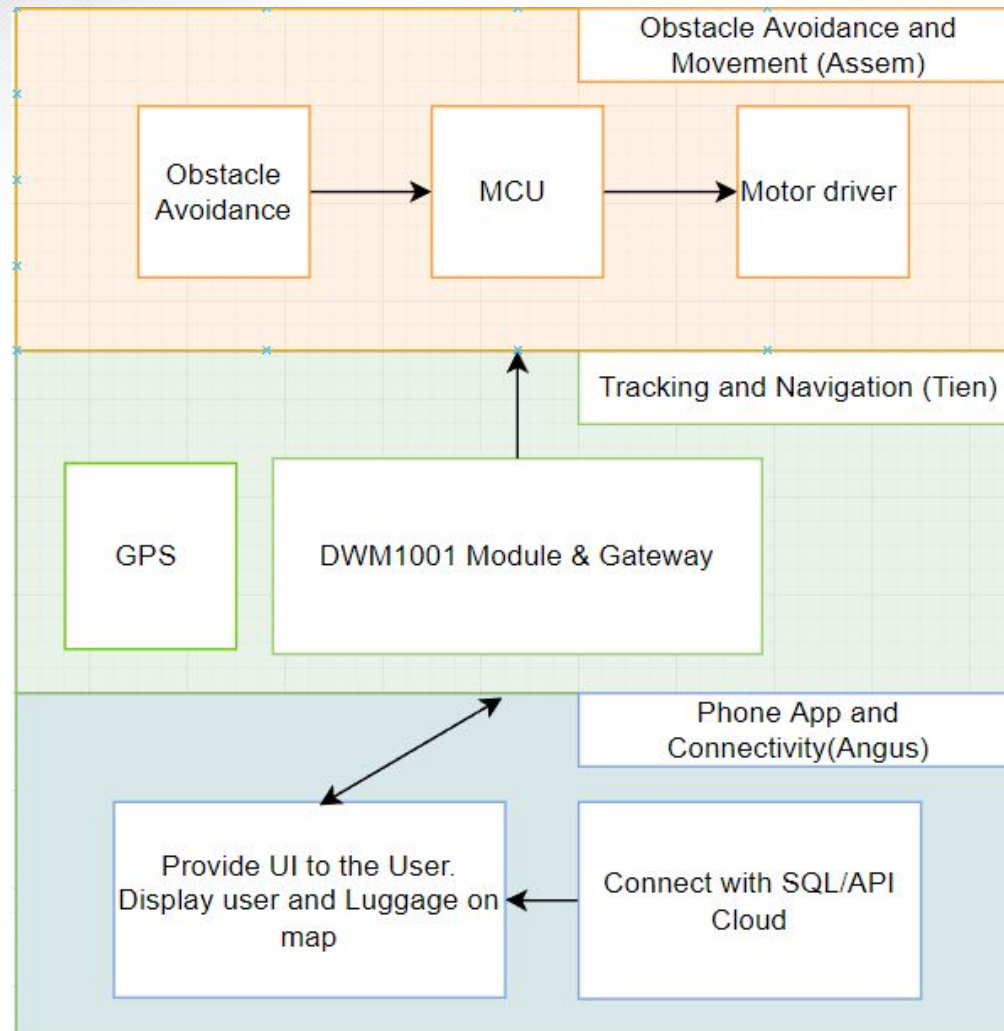
## Problem statement:

- 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



# Project Timeline

## Completed

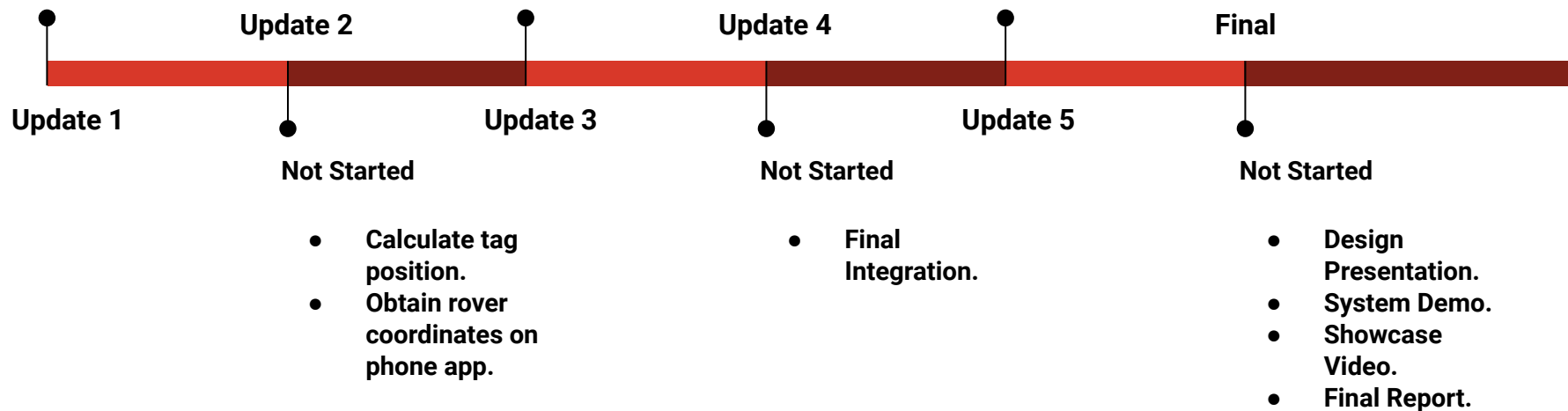
- Movement and Obstacle avoidance 90% complete.
- Phone App 95% complete.
- Tracking and navigation 85% complete.

## Not Started

- Command rover based on (x,y) values.
- Transfer tag position.
- Update rover location on phone app.

## Not Started

- System Validation.



# Movement and Obstacle Avoidance

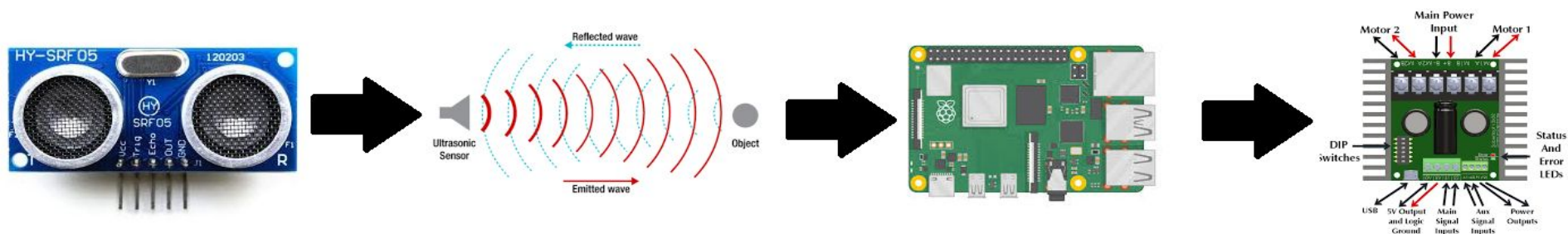
Assem Abdelkhalek

Accomplishments since Status Update 1  
**6 hrs of effort**

- Found out that IMU is not a good fit to measure the rotational angle of the rover due to inaccuracy.
- Replaced the rover's batteries and tested it.

Ongoing progress/problems and plans until the next presentation

- Testing the obstacle avoidance from 403.
- Recalibrating the movement system with the new batteries.
- Soldering the ultrasonic sensors circuits on Perf Boards.





# Phone App

Angus Mckellar

Accomplishments since status update 1 8 hrs of effort	Ongoing progress/problems and plans until the next presentation
<ul style="list-style-type: none"><li>• Added journey tracker to app.</li><li>• Able to display vector line between coordinates of users journey.</li><li>• Obtained raspberry pi, GPS module and necessary code in order to begin integration with phone app.</li></ul>	<ul style="list-style-type: none"><li>• Further test the journey tracker function of the phone app.</li><li>• Establish communication of phone and raspberry pi.</li><li>• Receive raspberry pi coordinates on phone.</li></ul>



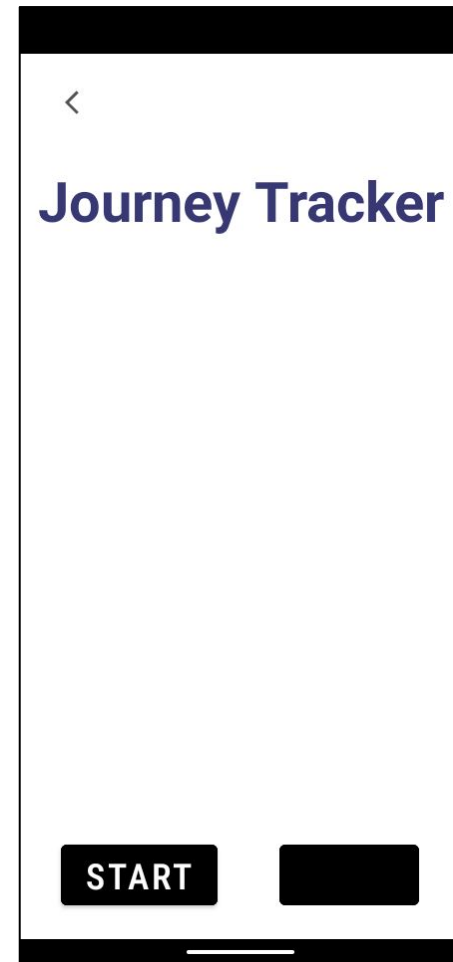
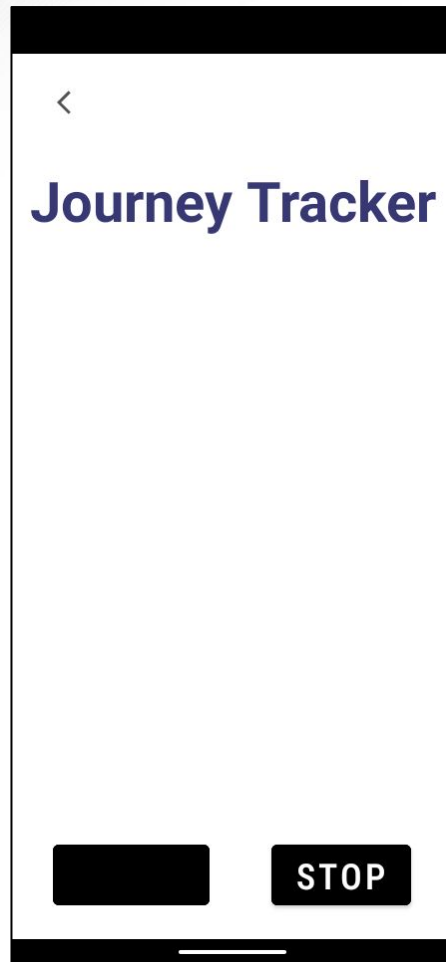


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# Phone App

Angus Mckellar



# Tracking and Navigation

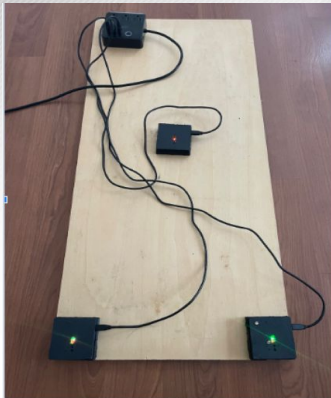
Tien Le

Accomplishments since status update 1	Ongoing progress/problems and plans until the next presentation
<ul style="list-style-type: none"> <li>• Finished setting the hardware with anchors, tag &amp; gateway.</li> <li>• Collecting and calculating the distance between the tag to each anchors and tag position as x, y coordinate.</li> </ul>	<ul style="list-style-type: none"> <li>• Verify the correct distance and clean the data.</li> <li>• Sending data to Movement subsystem.</li> </ul>



# Tracking and Navigation

Tien Le



3 Anchors



1 Tag



Gateway

```
Line1 is b'POS,0,D3A8,-0.92,-0.46,1.14,99,x04\r\n'
22:34:26 ('-0.92', '-0.46', '1.14')
Xpos -0.92 Type <class 'str'>
New x -0.92 Type <class 'float'>
Ypos -0.46 Type <class 'str'>
New y -0.46 Type <class 'float'>
Distance is 1.0285912696499033

Line1 is b'POS,0,D3A8,-0.83,-0.71,1.10,99,x04\r\n'
22:34:29 ('-0.83', '-0.71', '1.10')
Xpos -0.83 Type <class 'str'>
New x -0.83 Type <class 'float'>
Ypos -0.71 Type <class 'str'>
New y -0.71 Type <class 'float'>
Distance is 1.0922453936730518

Line1 is b'POS,0,D3A8,-0.81,-0.86,1.12,99,x04\r\n'
22:34:32 ('-0.81', '-0.86', '1.12')
Xpos -0.81 Type <class 'str'>
New x -0.81 Type <class 'float'>
Ypos -0.86 Type <class 'str'>
New y -0.86 Type <class 'float'>
Distance is 1.1813974775662932

Line1 is b'POS,0,D3A8,-0.83,-0.86,1.15,99,x04\r\n'
22:34:35 ('-0.83', '-0.86', '1.15')
Xpos -0.83 Type <class 'str'>
New x -0.83 Type <class 'float'>
Ypos -0.86 Type <class 'str'>
New y -0.86 Type <class 'float'>
Distance is 1.195198728245042

Line1 is b'POS,0,D3A8,-0.85,-0.83,1.21,99,x04\r\n'
22:34:38 ('-0.85', '-0.83', '1.21')
Xpos -0.85 Type <class 'str'>
New x -0.85 Type <class 'float'>
Ypos -0.83 Type <class 'str'>
New y -0.83 Type <class 'float'>
Distance is 1.1880235687897778

Line1 is b'POS,0,D3A8,-0.86,-0.70,1.28,99,x04\r\n'
22:34:41 ('-0.86', '-0.70', '1.28')
Xpos -0.86 Type <class 'str'>
New x -0.86 Type <class 'float'>
Ypos -0.70 Type <class 'str'>
New y -0.70 Type <class 'float'>
Distance is 1.1088733020503287
```



# Execution Plan





# Validation Plan

Test Name	Success Criteria	Methodology	Status	Passed/Failed	Responsibility
Retest the movement system with the new batteries	Consistent movements of the rover given the same commands	Send different commands to the motor driver and observe the response of the rover	Tested	Passed	Assem Abdelkhalek
Test the re-calibration of the movement and obstacle avoidance with new batteries	Getting the desirable speed and rotational angle of the rover	Change the timing and speed of the rover and observe for consistency	In Progress	In Progress	Assem Abdelkhalek
Test the ultrasonic sensors after being soldered on Perf Boards	Circuit is functioning	Check for shorts and discontinuities & check that I receive the correct distances from the sensors by RPI	Untested		Assem Abdelkhalek
Test the response to the (x, y) coordinates	The program shall be able to give the right command depending on the coordinates	Test and debug until we get the desirable result	Untested		Assem Abdelkhalek



# Validation Plan

Test Name	Success Criteria	Methodology	Status	Passed/Failed	Responsibility
Vector Map	Successfully display users journey as a vector map	Walk around a large area on campus with wifi coverage in order to see if map display a polyline of the journey	Untested	In Progress	Angus Mckellar
Phone and Raspberry pi communication	Successfully connect with the raspberry pi from the phone	Utilize wifi in order to connect with each device and attempt to send data across the connection	Untested		Team
Coordinates	Obtain the coordinates of the raspberry pi on the phone	Successfully obtain the raspberry pi coordinates and save them in a variable on the phone app	Untested		Team
Luggage on map	Display both the user and luggage location on map	Upon launching phone app be able to see a marker representing both the user and luggage	Untested		Team





# Validation Plan

Test Name	Success Criteria	Methodology	Status	Passed/Failed	Responsibility
Collecting the data from tag and anchor	Showing the tag location with x,y,z coordinate	Moving the tag around the anchors	In Progress	In Progress	Team
Processing the data and calculating the distance from tag to the anchor	Get the right distance and the position of the tag compare to the robot	Changing location of the tag, verifying the distance with real measurement	Untested		Team



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# Parts Ordering Status

Part Description	Status (order approved/order placed/part received)
Rover Batteries	Received





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**Thank you!**  
**Questions?**