



CONNECTED VEHICLES SM6035

LAB ASSIGNMENT

Dr. James Sayer
Director and Research Scientist, UMTRI

Soumen Sarkar
CS22MTECH11011

K. Saravanan
CS22MTECH12007

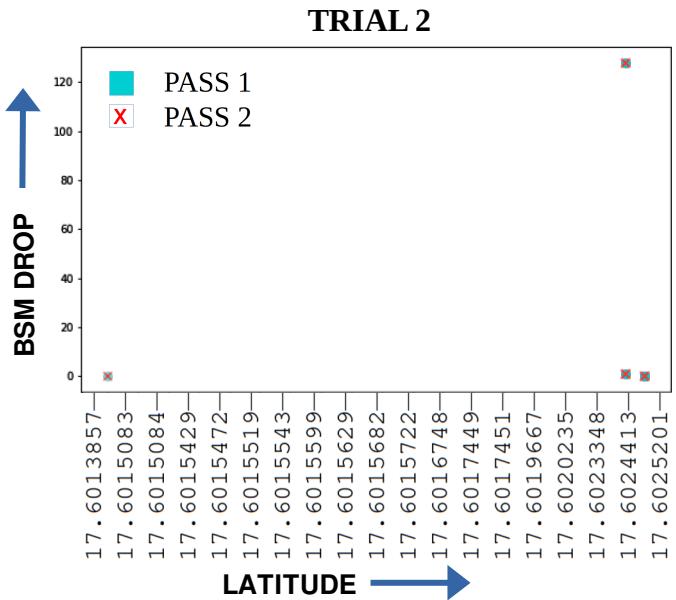
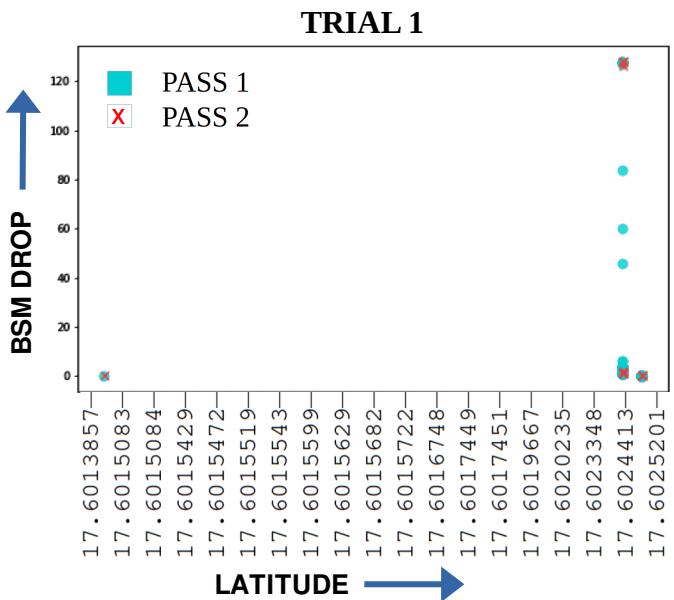
Manisha Mahapatra
CS22MTECH14009

INDEX

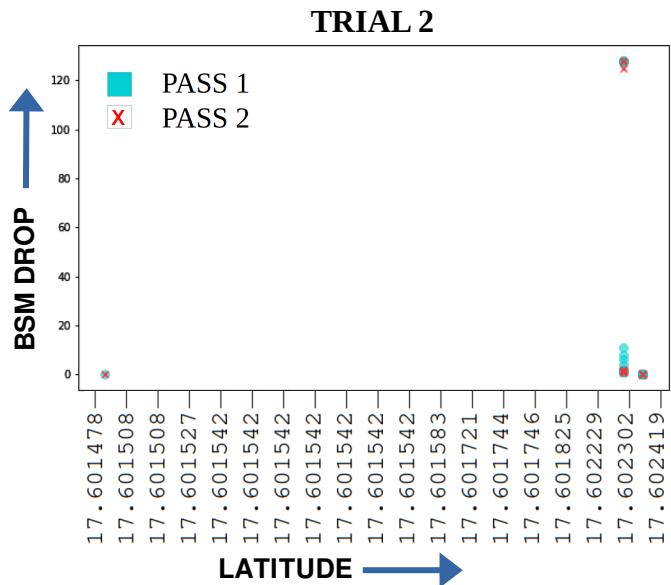
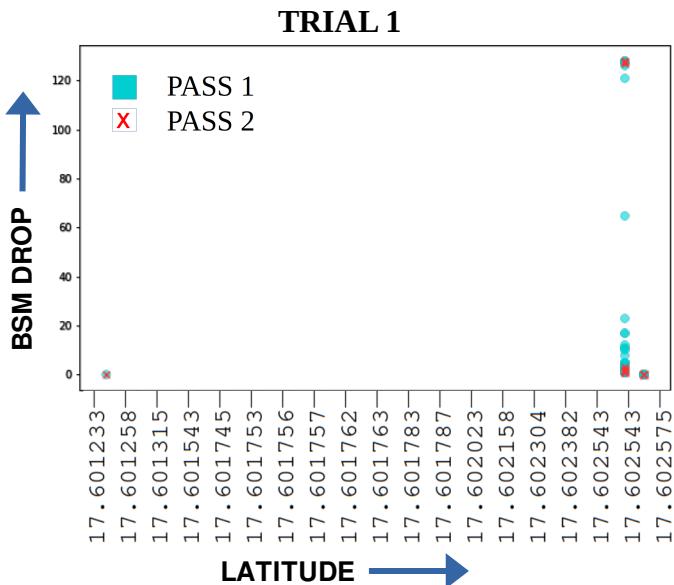
1. **TASK 1** : Graph Plots
2. **TASK 2** : Lat/Long Overlay
3. **TASK 3** : Data Analysis
 - 3a : Position Accuracy Comparision
 - 3a(i) : Separate Lanes vs Standard Lanes
 - 3a(ii) : Lane Width and Vehicle Width
 - 3b : Missing packets
4. **TASK 4** : Antenna positioning
 - 4a : Accuracy associated with antenna positioning
 - 4b : Message reception associated with antenna positioning
5. **TASK 5** : Sensor position for different road users
6. **REFERENCES**

TASK 1

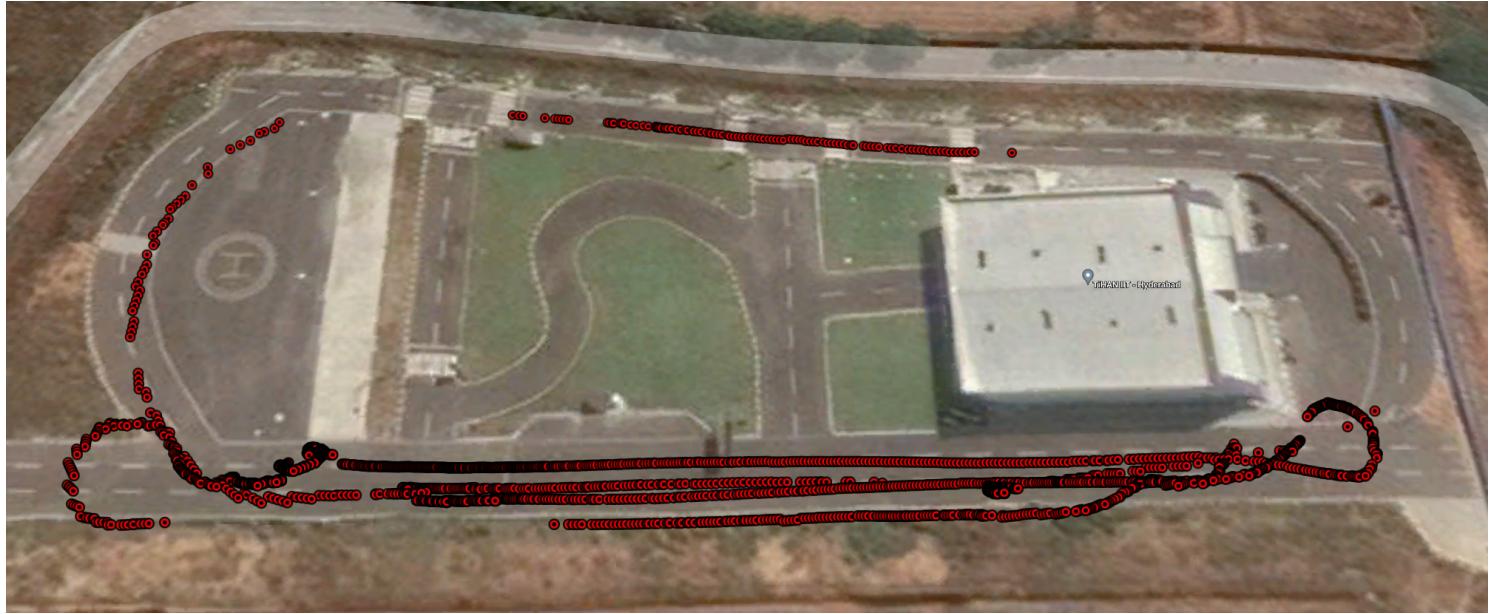
VEHICLE 1000



VEHICLE 3000



TASK 2



Path followed by **VEHICLE 1000 (RED)**



Path followed by **VEHICLE 3000 (BLUE)**

TASK 3

Data Analysis

a) Position accuracy compared between vehicles

Description : For Vehicle 1000 initially at the starting some BSM loss was seen, which stabalised quickly, however when the distance between the vehicles was at maximum significant packet drop was seen.

Vehicle 3000 had better signal reception as compared to Vehicle 1000. This is probably due to the fact that Vehicle 1000 had its DSRC mounter on top.

(ii) Does the data look consistent across passes or directions of travel ?

Yes, the data looks consistent most of the time, however a noteworth packet loss occoured when the vehicles were facing their backs and farthest appart.

(b) Are there any missed message packets?

Yes, there were missing message packets in both the trials. The loss was very little when the vehicle were face to face, however when they were farther apart, back to back a significant packet loss was observed.

TASK 4

Antenna Positioning

(a) Is there a difference in accuracy associated with position based on antenna location ?

Yes, based on antenna positioning there is a significant difference in accuracy. Trial 1 has comparatively more BSM loss as compared to Trial 2.

(b) Is there a difference in the messages received based on antenna location ?

Yes, there is a difference in messages received based on antenna location.

For Example, In **Trial 1** the antenna was fixed inside the car which resulted to a lot of wave absorbtion by the driver.

However in **Trial 2**, all sensors were out the vehivle and one of the sensors being behind had direct line of sight resulting in very low BSM drops.

TASK 5

(a) How would accuracy and antenna location impact different types of connected vehicle applications ?

Accuracy is a function of antenna placement, placing the sensor inside the vehicle results in lots of absorption by the car body and passengers resulting in high packet loss, however placing it outside the vehicle gives better signal transmission and reception.

For pedestrians and bicyclists a higher accuracy is expected due to their small size as compared to bigger road vehicles such as car or truck.

REFERENCES

1. GITHUB CODE

https://github.com/delta-hunk/Connected_Vehicles_SM6035.git

2. Matplotlib Documentation

<https://matplotlib.org/stable/index.html>

3. Google Earth Pro

<https://www.google.com/earth/outreach/learn/visualize-your-data-on-a-custom-map-using-google-my-maps/>