

# LAB #1 GPS Lab

## Analysis of Stationary GPS data:

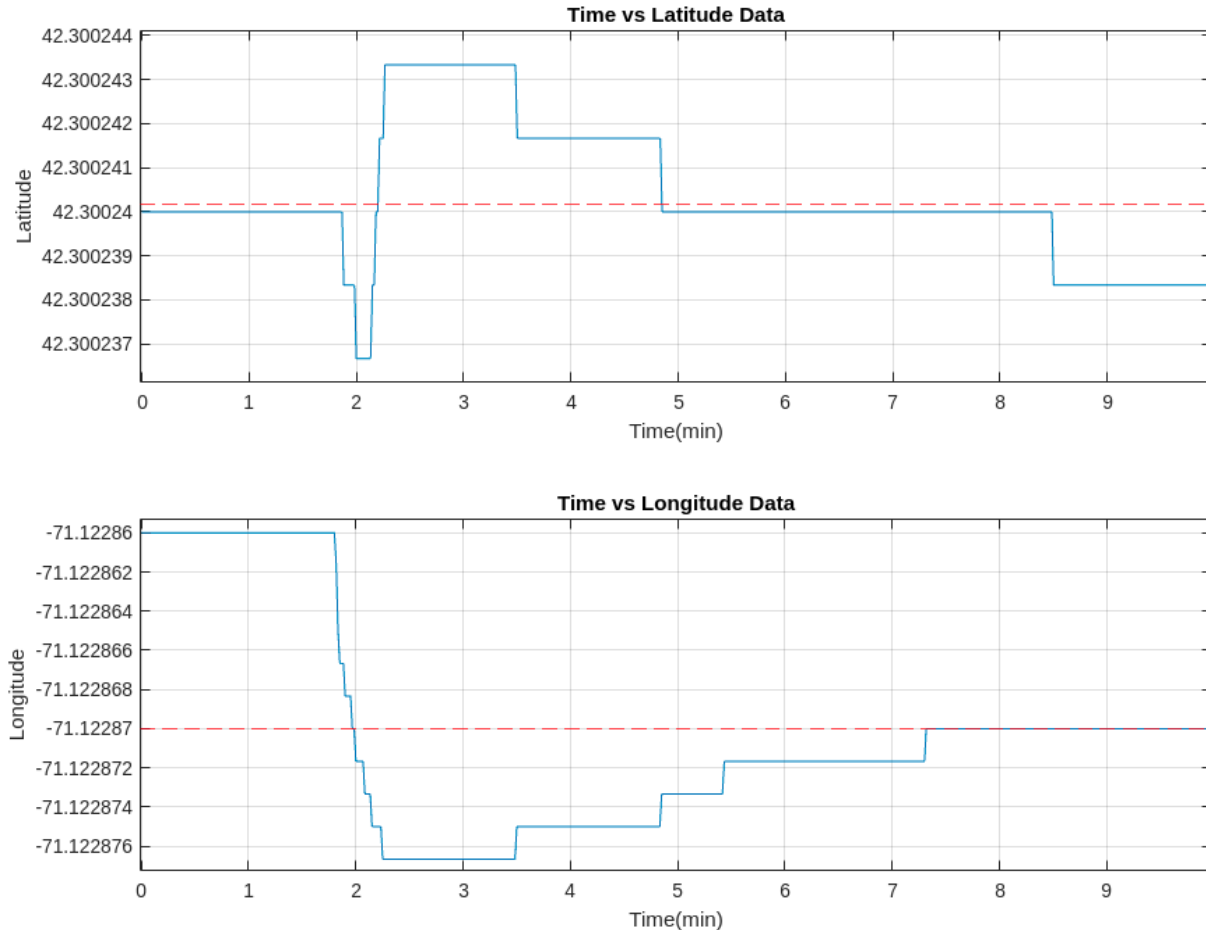
In this lab, GPS data was collected and analyzed to observe patterns and calculate statistics.

A GPS Puck was used to collect location data while being in a stationary position. This data was collected at Bussey Hill which is the second highest point in the Emerald Necklace.

A total of 360 data points were collected in a duration of 10 min. The latitude ranged from 42.30023666 to 42.30024333 and the longitude ranged from -71.12286 to -71.12287 and the altitude ranged from 63.6 to 60.6

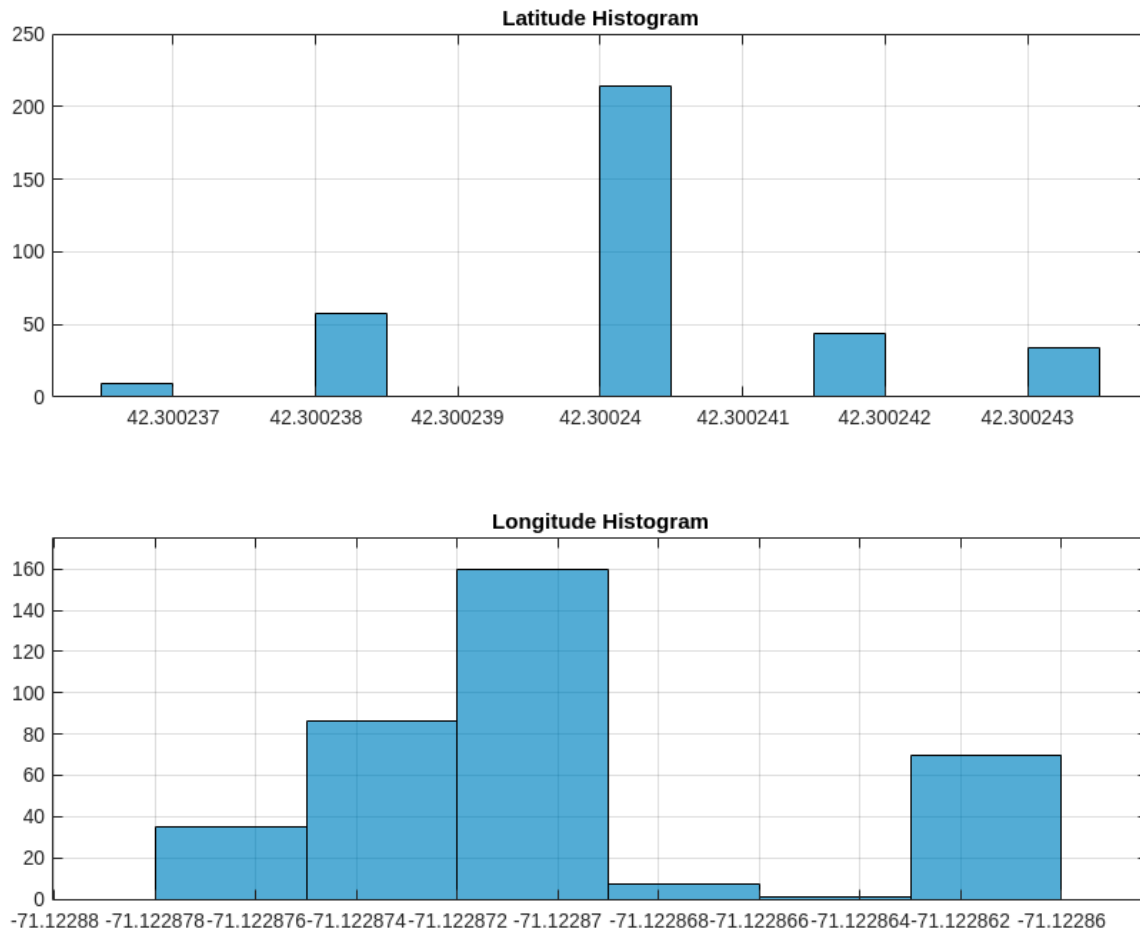
The following graphs were plotted in matlab to analyze the data.

Graph #1:



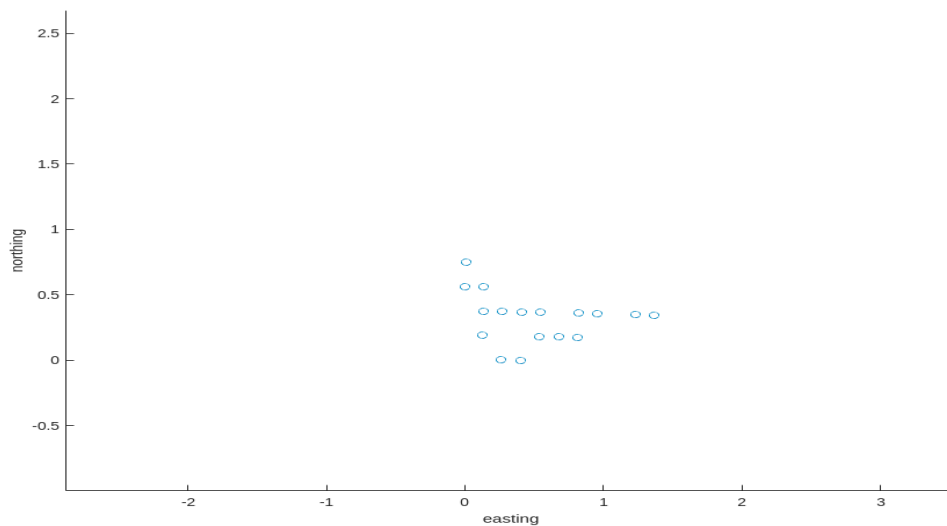
The graph is a Time vs Latitude/Longitude and the center line is the mean.  
We can observe that the data is distributed along the mean line.

Graph #2:



The data points in the graph follow a normal distribution, as indicated by the classic bell-shaped curve. The bulk of the data is clustered symmetrically around the mean, with fewer data points towards the tails.

Graph #3



The scatter graph suggests that the data is precise and accurate.

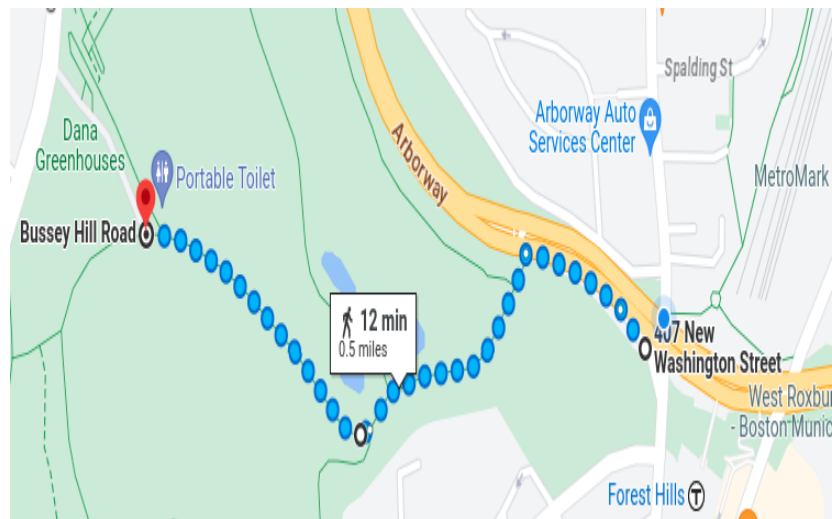
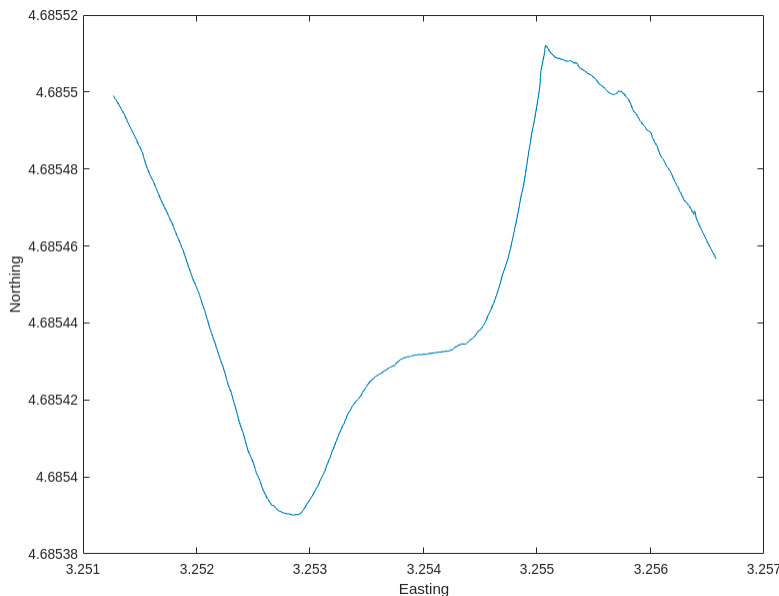
## Analysis of walking GPS data:

The GPS data was collected while walking in a predetermined path around the Arnold Arboretum of Harvard University and a total of 533 data points were collected and the latitude ranged from 42.30116 to 42.3023 and the longitude ranged from -71.12156 to -71.1151

The GPS data allowed tracking of the walking path around the arboretum. The latitude and longitude generally increased then decreased as expected based on the route. Elevation changes corresponded to climb.

The following graphs were plotted to analyze the data:

Graph



The following graph shows the path taken along the Arnold Arboretum, while walking in a straight line the graph gradually increases.

### Conclusion:

The GPS Puck relies on satellites continuously orbiting the earth and as you stand still, the satellites are moving through their orbits in sky, constantly changing their distance and angles to your GPS. The GPS puck calculates your position over and over all the time. Every time it recalculates it, the moving satellites change the accuracy of the result, so the triangulation calculation gives a slightly different result each time. Thus the error can distribution can be found in the stationary data and the data is mostly normally distributed.

The error in the gps data while walking can be observed very less when compared to being in a stationary position and only in a certain path in the graph can be seen deviating from the actual path.