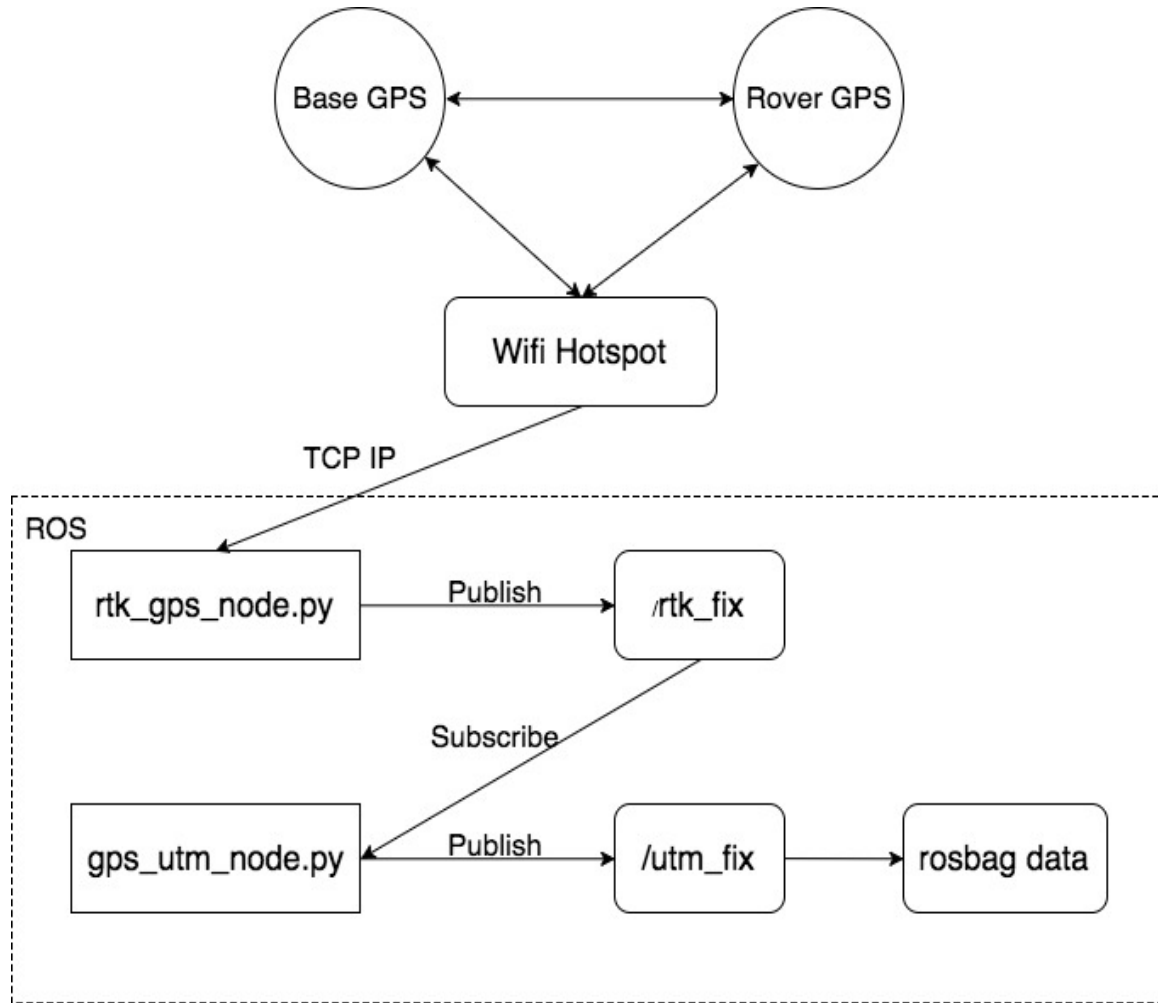


GPS Data Measurement Procedure

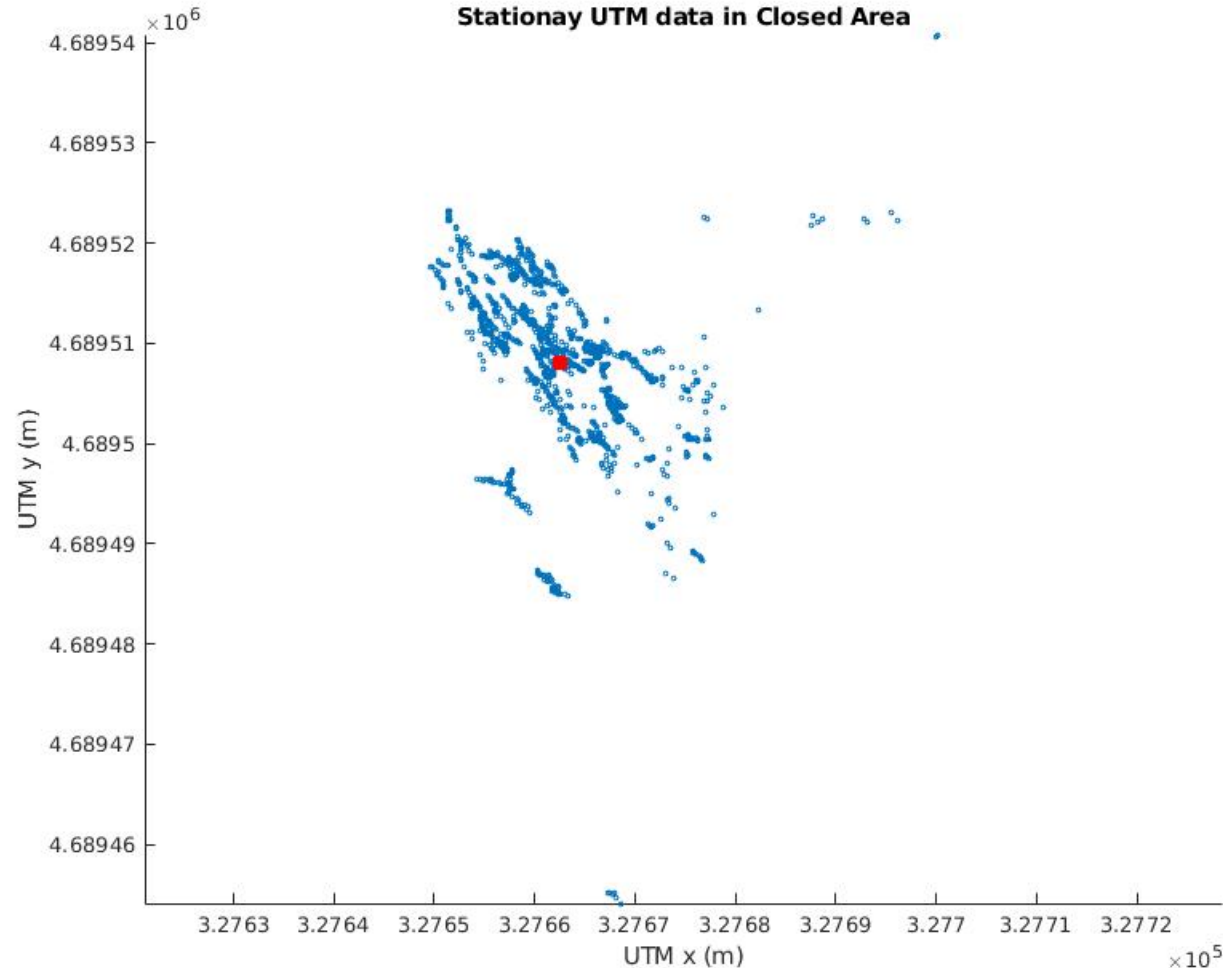
With RTK Reach Emild boards



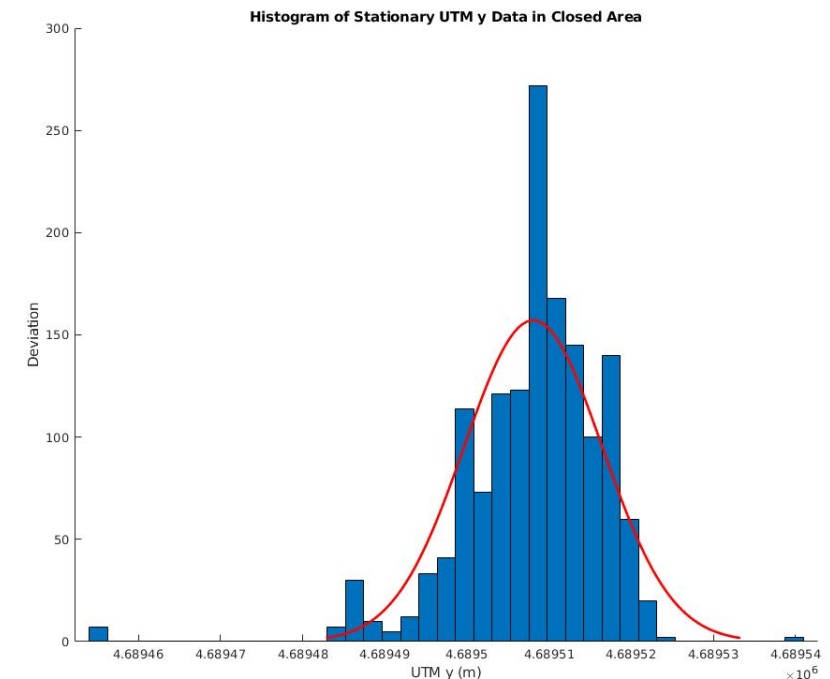
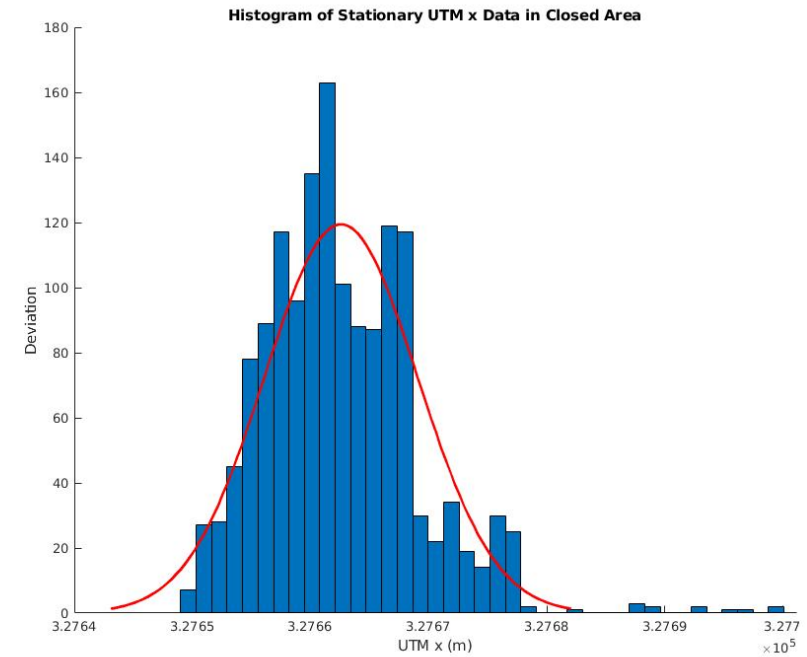
Stationary and Mobile GPS Data Collection:

- Location with partial occlusion and reflections nearby: In between West Village G and H
 - Date: Feb 7th 2018
 - Weather: 28 °F, wind 14 mph, passing clouds.
- Location that is completely clear: On the top floor of Columbus Garage
 - Date: Feb 8th 2018
 - Weather: 32 °F, wind 12 mph, mostly cloudy.

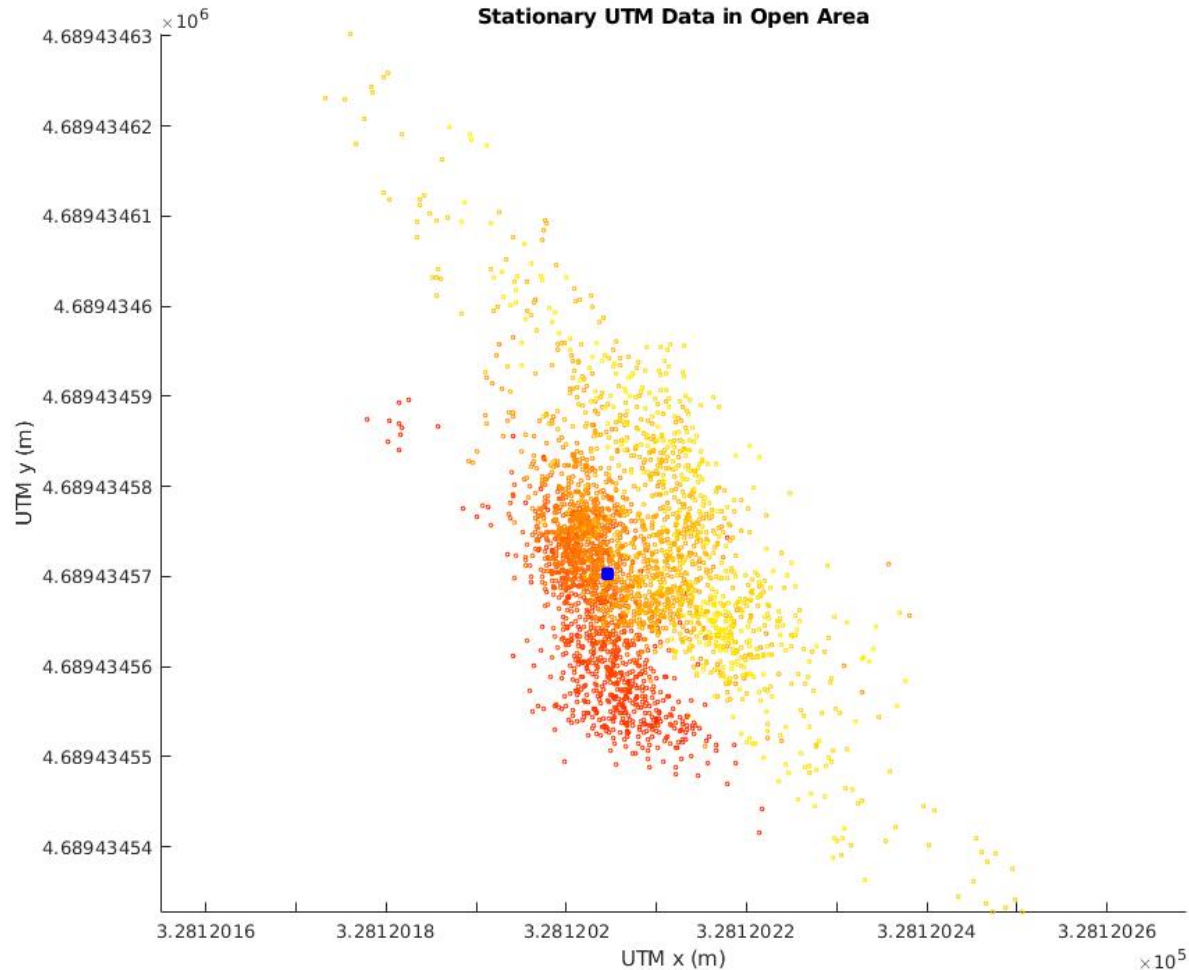
UTM Closed Area Stationary Data Analysis



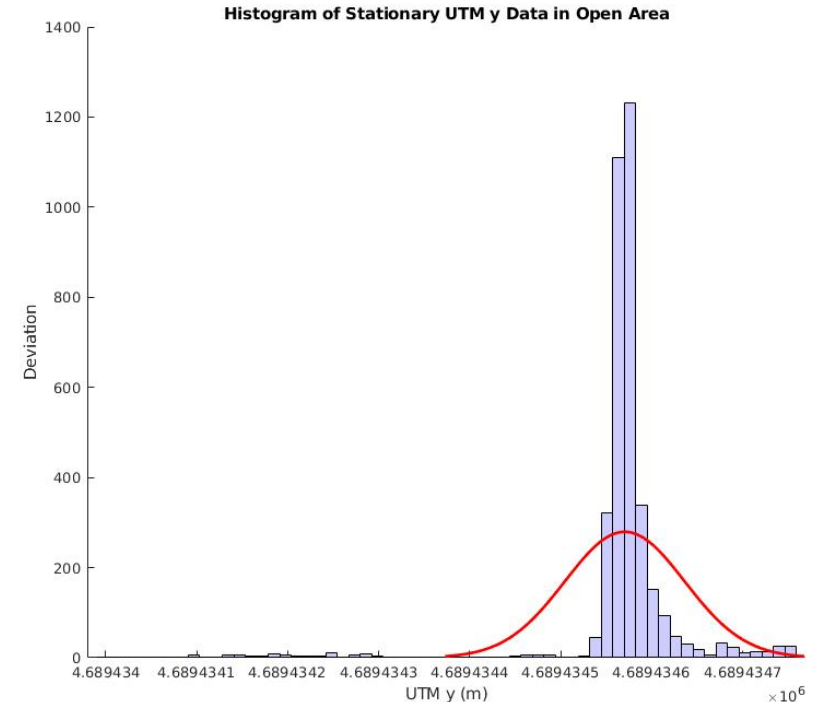
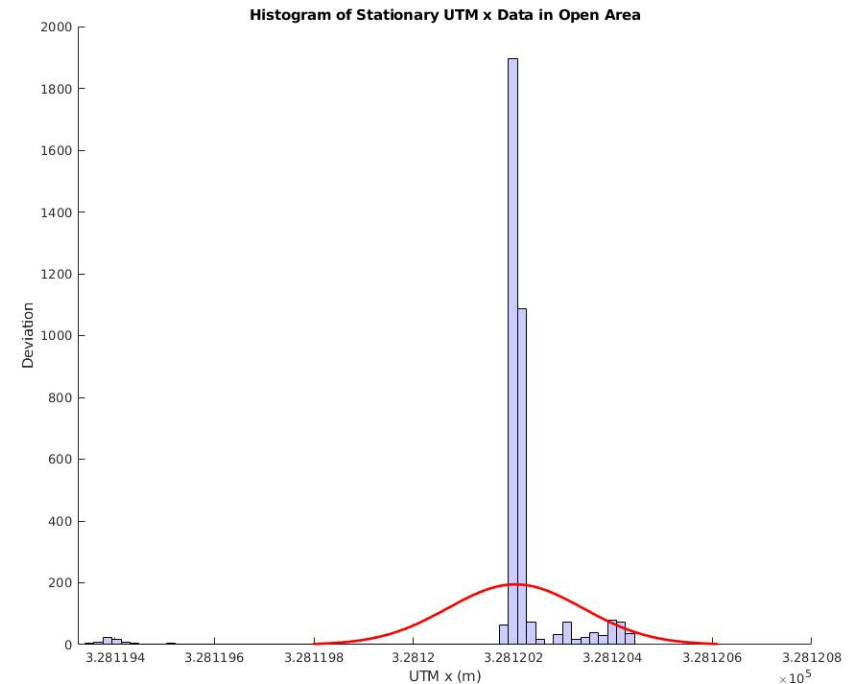
Red dot represents the mean $(utm_x, utm_y) = (3.2766e+06, 4.6895e+06)$. By observing the histograms for the collected utm_x and utm_y data, we see a wide range of variation, indicating the instability of the GPS, which results mainly from the the GPS signals bouncing between buildings.



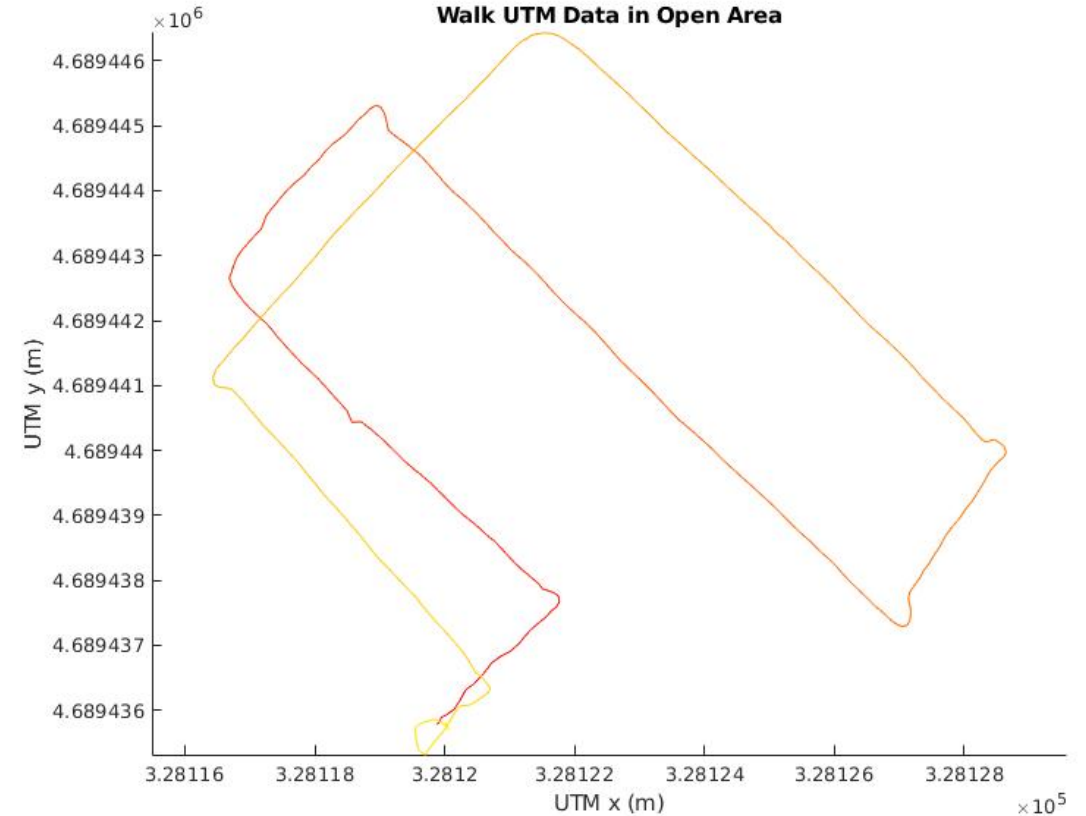
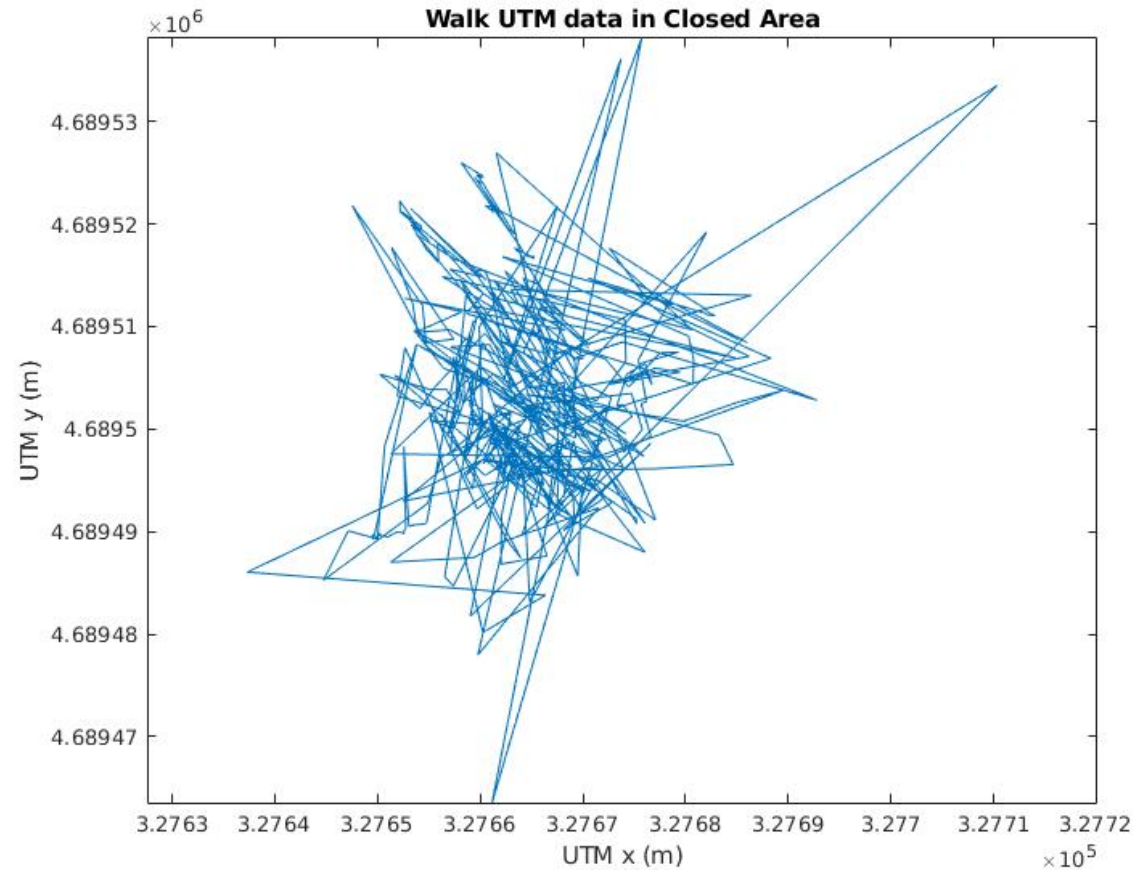
UTM Open Area Stationary Data Analysis



Blue dot represents the mean (utm_x, utm_y) = (3.2812e+06, 4.6894e+06). By observing and comparing the histograms for the utm data acquired both from closed and open areas, we see less amounts of variations, more stable GPS data.



UTM Closed/Open Area Mobile Data Analysis



The route walked for acquiring utm data in open/closed areas are similar, but the results can be exponentially distorted in the closed area. This comparison, together with the difference in accuracy for the open/closed area stationary utm data, we can safely conclude that the idea situation for more accurate GPS data would be in open, clear areas, instead of closed up areas surrounded by buildings.