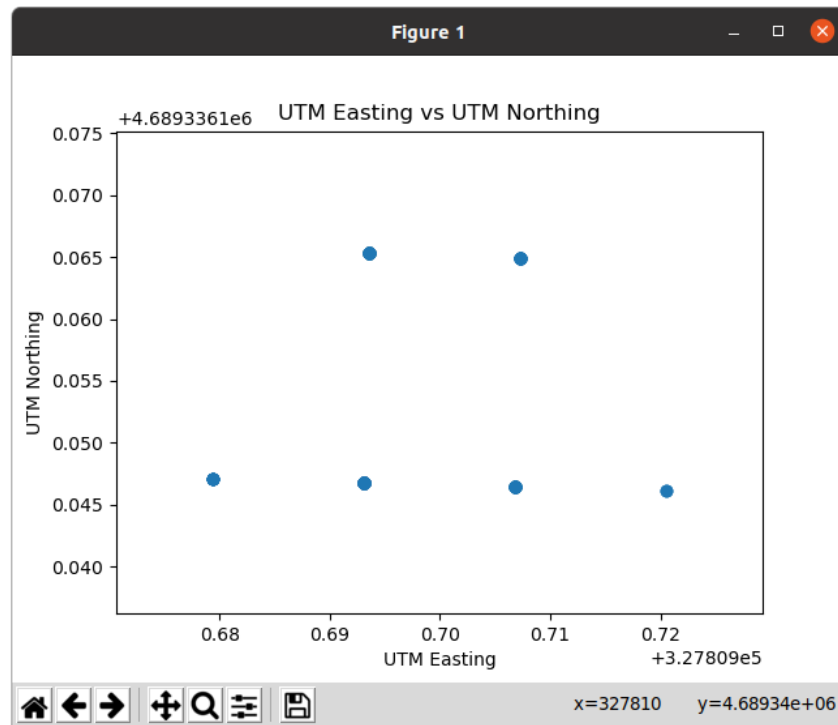# LAB 2

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Data was collected at the top of the Columbus Parking lot (an almost open space with minimal interference), and Centennial Commons Ground (a location that has some interference).

## STATIONARY DATA

    a.  Centennial Commons Ground:



*Graph of UTM Easting Vs UTM Northing at Centennial Commons*

Centennial Commons is surrounded by a lot of buildings and trees. In such areas, the error increases slightly due to the reflection caused by these objects. The error estimation is - UTM Easting : 0.04119 meter which is approximately **4.2 cm**, and UTM Northing : 0.01918 meters, approximately **1.92cm.** The standard deviation of UTM Easting and Northing is **0.007642** and **0.009102.**

b.  Columbus Parking Lot:
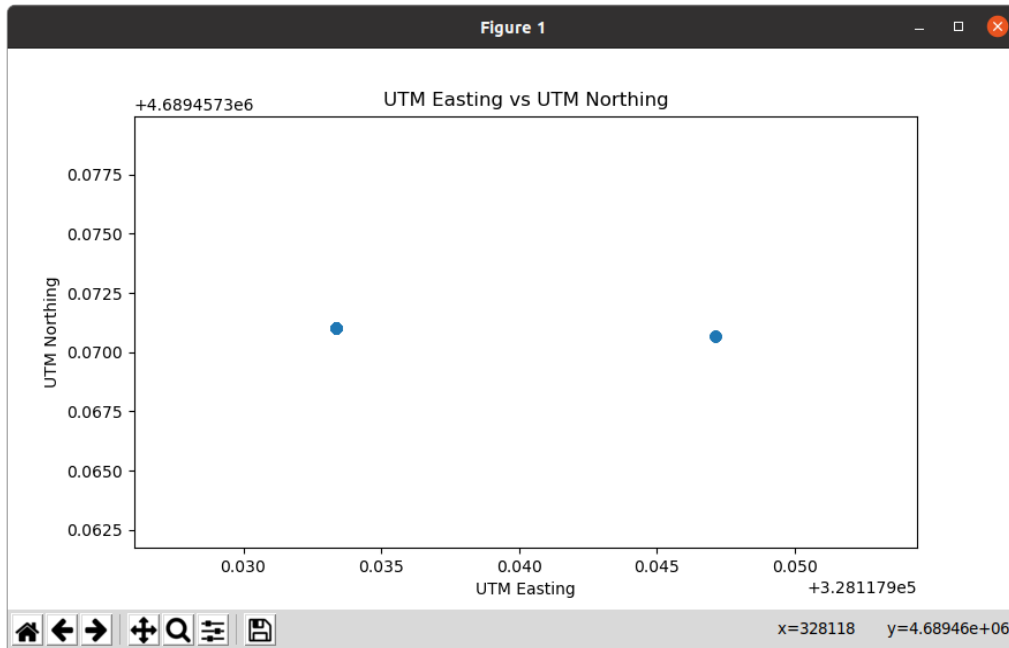


*Graph of UTM Easting Vs UTM Northing at Columbus Parking Lot*

The Columbus Parking lot has minimal interference with no major buildings, therefore the environmental conditions were ideal for less error prone data. The error estimation is - UTM Easting : 0.01373 meters which is approximately **1.37 cm**, and UTM Northing : 0.0003369 meters, approximately **0.0337 cm.** The standard deviation for UTM Easting and Northing is **0.0051829** and **0.000127**.

## CONCLUSIONS

- From the values of error estimates and the graph, we can observe that the accuracy of the RTK GPS drops for stationary data when data is collected at locations with interference.
- Comparing standard deviation values for UTM Easting and Northing at both locations, we can confirm the data collected at the top of the Columbus Parking lot is a lot more accurate.

|  | Columbus parking lot | Centennial Commons |
|---|---|---|
| **UTM Easting** | 0.0051829 | 0.007642 |
| **UTM Northing** | 0.000127. | 0.009102 |

- Comparing Error Estimate values for UTM Easting and Northing at both locations, the accuracy is higher at Columbus parking lot.

|  | Columbus parking lot | Centennial Commons |
|---|---|---|
| **UTM Easting** | 1.37 cm | 4.2 cm |
| **UTM Northing** | 0.0337 cm | 1.92 cm |

## WALKING DATA

The walking data was collected by walking in a rectangular path at Columbus Parking lot and Centennial Commons ground.

a. Centennial Commons
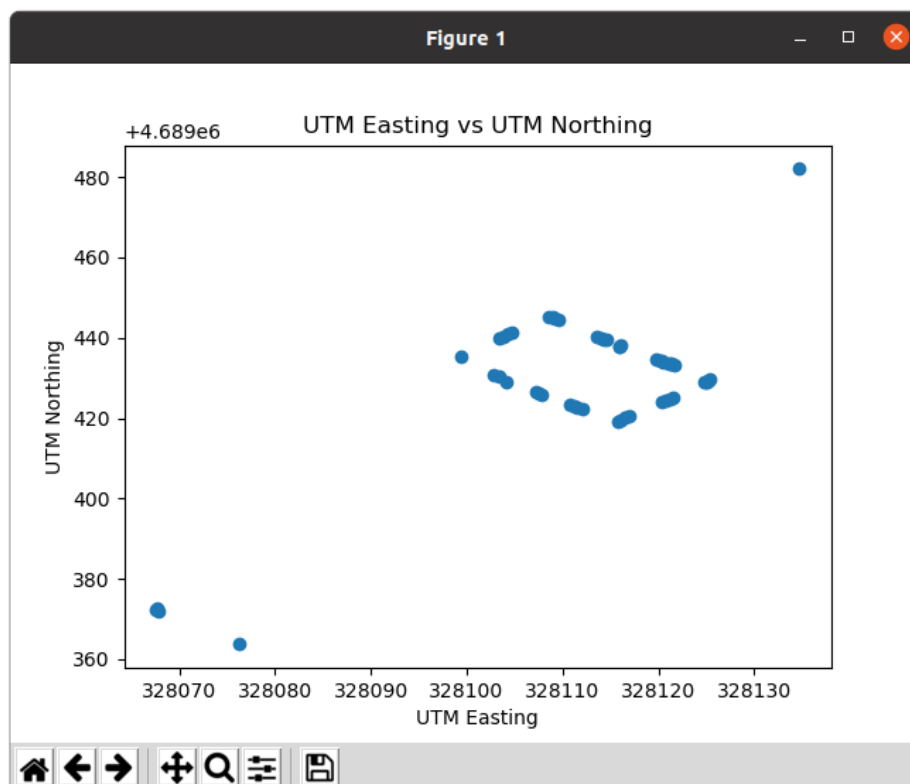


*Graph of UTM Easting Vs UTM Northing at Centennial Commons*

As Centennial Commons has more buildings and reflective surfaces, the path followed while walking can be observed on the graph. However, there are deviations found in the data that can

be observed in the graph as well. While recording the data, there were instances where the fix fluctuated from 5 or 4 to 2. The presence of buildings such as Ryder Hall and Shillman Hall and the trees may have caused the multipath effect which ultimately resulted in slightly more errors in the data as compared to Columbus Parking Lot.

b. Columbus Parking Lot
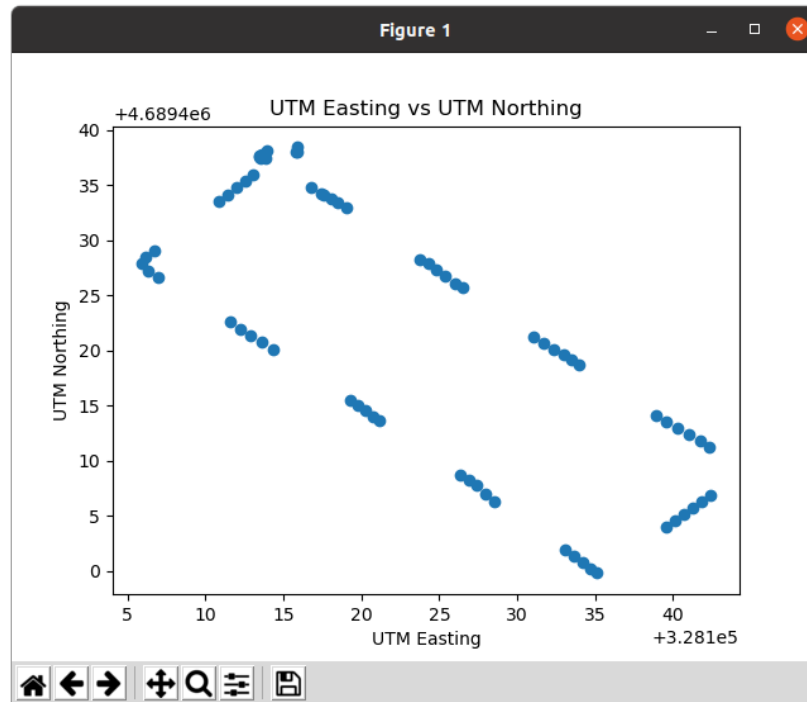


*Graph of UTM Easting Vs UTM Northing at Columbus Parking Lot*

The path followed can be observed almost exactly on the graph as well. There seems to be almost no errors or deviations observed in the dataset. The fix was constant throughout the data collection and only fluctuated once or twice to 2.

**CONCLUSIONS**

- From the graph, we can observe that the accuracy of the RTK GPS drops for walking data, when data is collected at locations with interference.
- It is also observed from both the graphs that the datapoints are not evenly spaced along the path and are kind of clustered. This may be due to a delay caused by the combination of walking and communication between the base and the radio.