ME226 Homework 2

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Measured Quantity – Average speed taken to get to main gate from Hostel 2 on a bicycle

Reason for selecting this quantity – Being an avid cyclist, I’d like to know the speed I can ride a bicycle.

Measuring Procedure – At first, I tired measuring the distance using a smartwatch, but that ended up giving very varied results as the device has been calibrated to measure the distance while walking. On tweaking the settings, I managed to find a GPS setting that accurately measured the distance from my hostel to main gate. On comparing the results with the ground truth (using Google Maps) it was reasonably accurate.

For measuring the time, I used a stopwatch on my phone to measure the times taken. This would introduce an error of at most ∓ 0.5s

Possible Problems - An issue while using GPS to measure distance is that it might not be very accurate. Cover can obstruct signals from the geolocating satellites bringing an error of about ∓ 3 metres.

Improvement - The method can be improved by manually counting the steps and multiplying it by the average length of my stride.

An alternative would be to use a measuring tape, which might provide a more accurate measurement as humans naturally change their stride over a long distance. However, this method would be more cumbersome and time consuming.

Obtaining Average Speed - The average speed is obtained by simply dividing the total distance by the total time taken.

Readings: Total Distance = 1600 m (Averaged over 6 readings to reduce error)

Total Time Taken = 8 min 46 s (Averaged over 6 readings to reduce error)

Therefore, Average Speed = 1600/ (8 \* 60 + 46) = 3.041 m/s

The maximum percentage error would be 5/1600 + 0.5/526 = 0.4% which is negligible