

MECH6970 GPS Lab #1

Due Tuesday October 3, 2006

The purpose of this first lab is just to get you familiar with the GPS Garmin receiver and looking at GPS data (if you have never looked at GPS data). Additionally, it is expected that you will utilize the navigation utilities on the CD from the textbook to perform transformation from ECEF to LLA and ENU/NED coordinate frames. Time plots are plots of position vs. time where scatter plots refer to position vs. position (East vs. North).

Note that we will just use the NMEA messages for this first lab. Information on the NMEA messages see: <http://www.gpsinformation.org/dale/nmea.htm>

Important NMEA messages:

GGA - essential fix data which provide 3D location and accuracy data.

GSA - GPS DOP and active satellites.

GSV - Satellites in View

RMC - Recommended Minimum Data (GPS PVT)

1. Static Data: For this first assignment find a place you want to be your point of reference for logging static data this semester. Select an appropriate amount of static data to record.

- a) How long did you decide to log? Why?
- b) What were the DOP values at the time of your recording? How much did they vary over your logging period?
- c) Plot the position. Provide both time and scatter plots in ECEF, LLA, and ENU. Do the errors appear to match expected values
- d) Plot the velocity. Plot East and North velocity, course, and magnitude versus time. Also plot a scatter plot of East Velocity vs. North Velocity. Are the errors symmetric? How do they relate to the covariance matrix?

2. Moving Data: Select a motion that you would like to record. This could be walking, biking, driving your car.

- a) Perform a test to evaluate the “dynamic” characteristics of GPS
- b) Is the motion correctly predicted by changing GPS position? What about with GPS Velocity?