Lab 4 Navigation with IMU and Magnetometer

- Niket Purohit

The lab focused upon navigation stack using two different sensors. The sensor fusion of GPS and IMU was used in this lab to find the adequate outputs required and to find various analysis in different fields.

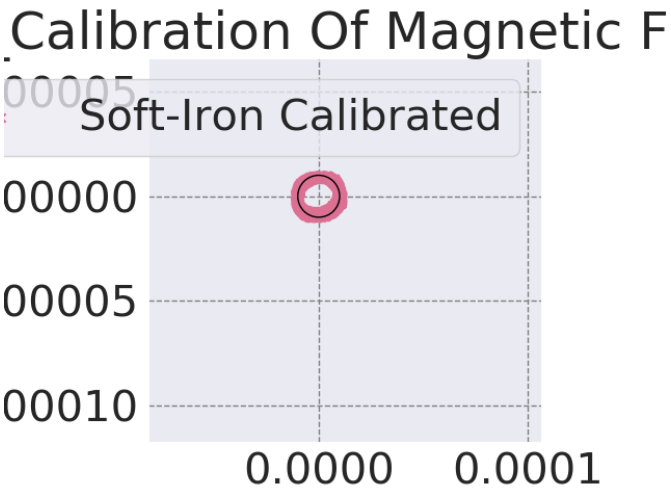
Following are the graphs and answers to the questions mentioned in LAB4.

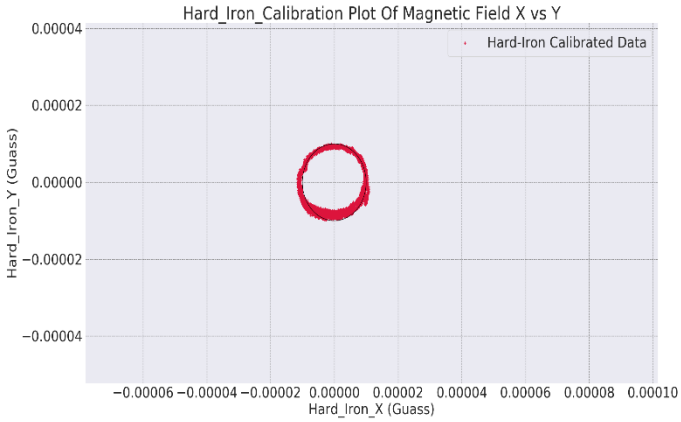
1. A magnetometer is a sensor that analyzes a system's local magnetic field to determine its direction and intensity. The heading of a system regarding magnetic North can then be calculated by comparing this magnetic field measurement to models of the Earth's magnetic field. The magnetic field observed in most practical situations, though, will be a combination of the Earth's magnetic field and magnetic fields produced by nearby objects, also known as magnetic disturbances. The effect of nearby magnetic disturbances must be reduced to get a precise heading approximation. An HSI calibration can be used to account for internal magnetic disruptions that are not time-varying.

   For our lab, the work with magnetometer is bifurcated in two major distortion caused. These two categories are –

   Hard Iron - Distortions in hard iron are caused by things that generate magnetic fields. For instance, a speaker or fragment of magnetized iron will produce a hard iron distortion. This kind of hard iron distortion will result in a persistent bias in the sensor output if the magnetic component is physically connected to the same reference frame as the sensor.

   Soft Iron - They are regarded as deflections or modifications to the current magnetic field and are known as soft iron distortions. Depending on how the magnetic field behaves in relation to the sensor, these distortions will extend or distort the field. Metals like nickel and iron are frequently responsible for this kind of deformation. In most instances, hard iron distortions will contribute significantly more than soft iron to the total uncorrected error.





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