Engineering Document on Calibration

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# Main:

In the main script ,first of all Raw data is stored in the file. The raw data consists of the raw acceleration and gyroscope data of each phase of icosahedron.

# Board Settings:

In this script settings for the sensor being calibrated are stored. These settings are command, a matrix and total number of IMUs in that sensor. This file return settings for specific sensors.

1. Get the board from input
2. Return the command for raw data, matrix and number of IMUs

# Mimu\_parse\_bin:

This is a basic parser which extracts the inertial data, time data, and raw data of each IMU in the sensor. For doing this there is a simple parser which works the following way

1. Read a pkt from the file
2. Extract all the accleeration and gyroscope values in inertial data list
3. Extract all the time\_stamps in time\_stamp list
4. Extract all the values including inertial and time in raw data lis
5. Repeat 1, 2, 3, 4 until all the packets from the file are read.
6. Return inertial data, time data and raw data

# Extract\_staionary\_segments:

Previous:

This script is used to get the number of phases detected successfully in shifting the icosahedron. It return the calculated calibration measurement and the number if sides detected. This file takes out the data of each phase of icosahedron when the phase is stable for some time. Using this stationary data it tells the number of sides detected in the process.

Updated:

Script also checks whether the side #n data recorded is valid or invalid.

# Mimu\_calib\_param\_est:

The curve fitting which gives the bias and other values required for calibration happens here. In the function costFunctioInertialMisalignment there are equations which are used to get the bias values using the least\_square scipy.optimize function. It gives the solution in a n dimension array.

# Calibration Matrix:

This script generates the calibration matrix and other important values to be used for calibration

# Code\_generation:

This file generates a .h file containing the calibration matrix and other important values. This is the file which will be uploaded to the sensor for calibration

# Mimu\_plot\_calib:

This file plots the calibration measurement of accelerometer and gyroscope.