Attitude Estimation Exam

Auto Steering

Intro

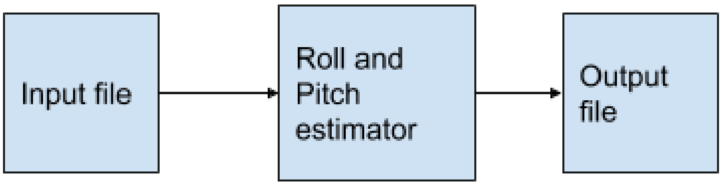
One of the most important features of the Auto Steering system is the ability to determinate the vehicle's attitude. This data is used to determinate the terrain inclination and compensate the information provided by the GNSS system and estimate the correct position of the vehicle. In the future, we want to use this data to do a full integration of the inertial sensors allowing us to estimate the vehicle's position in an environment with poor GNSS signal/coverage.

This exam has the goal to test the skills of our future developer, and see an implementation of a simple roll and pitch estimator, using a dataset of raw readings of the accelerometer.

You can find informations about the attitude estimation using accelerometer in this application note.

Task

You have to implement an algorithm (a c++ program) capable of opening the data source provided by us, parse the data, estimate the roll and pitch angles and save the result in an output file (if you find this problem easy, don't worry we have much more challenges here):



The desirable results are:

1. A file with the estimated roll and pitch;
2. Access to the public git repository
3. A *readme* file , including:

a. How was this task performed.

b. How to compile and run the software.

It would be nice to:

1. Use good coding practices;
2. Use a version control software/service;
3. Provide relevant information for the user about the execution of the program (exceptions while opening/writing the file, output variables and units, etc);

About the log file

The log file is available on this link.

The log file contains the timestamp in milliseconds and all 3 axis data from MMA8451 accelerometer configured with full scale set to 8g.

The log file lines are as the example line below:

54741; 27; -22; -982

Following the pattern:

<time_stamp_ms; accel_x_axis; accel_y_axis; accel_z_axis>

Beware:

- Use the ‘aerospace rotation sequence’ to estimate roll and pitch.
- *(accel_x_axis; accel_y_axis; accel_z_axis)* are already converted to millig-unit.

Note

This exam is individual, you may not seek anyone’s help to complete it.

You got 48h, counting from the moment you received the email with these instructions, get to work!

The contents of this document may contain confidential and/or privileged information and may be legally protected from disclosure. You are hereby notified that any use, dissemination or copying of this document is strictly prohibited.

Good luck! Have fun! :D