Institute of Robotics, University of Innopolis

Sensors and Sensing
Home Work 03
Ilya Afanasyev (Primary Instructor), Geesara Prathap (Teaching Assistant)

September 30, 2020

1 Attention

This is valid for the each and every lab class, you can do your lab tasks with the most preferred language but these standards need to be fulfilled.

- JAVA 8

- C++ 11

- C 99

- Python 2.7.x or 3.6.x

- Matlab 17a onwards

You need to submit your source code along with a clear description of how to run your implementation.

2 Task One

To get started your homework 03, it is needed to place a 3d object(e.g., cube, cylinder, etc) in an appropriate way with respect to depth camera (`https://www.intelrealsense.com/depth-camera-d435i/`). Associate depth map with RGB information in order to isolate the object, which is to be extracted from the ground plane and other foreground objects if there are. You may have to use RANSAC or some other algorithms to extract the object and find the center point of the object in the 3D space relative to the depth camera.

3 Task Two

Take your smart phone and run for about 100 meters with a constant speed approximately. Your task is to estimate the trajectory where you ran with your phone. To estimate the trajectory, you are asked to incorporate sensor measurements that are available in your mobile phone (e.g., accelerometer, gyroscope, GPS sensor, etc). You need to implement **Multidimensional Kalman filter with sensor fusion** in order to solve this task. In the report clearly explain all the assumptions you made.

4   Submit

Please upload the single zip file which includes your source code, report (valid for both tasks), dataset you collected in task 1 and 2. Besides, include what you did and why you did it in the report.

5   Deadline

The deadline: October 11th, 23:59:59 GMT+3.