Sensor Fusion for Enterprise Syllabus

Contact Info

While going through the program, if you have questions about anything, you can reach us at support@udacity.com. For help from Udacity Mentors and your peers visit the Udacity Classroom.

Nanodegree Program Info

Version: 1.0.0

Length of Program: 84 Days*

** This is a self-paced program and the length is an estimation of total hours the average student may take to complete all required coursework, including lecture and project time. Actual hours may vary.*

Part 1: Welcome to the Nanodegree Program

Part 2: Lidar Obstacle Detection

Project: Lidar Obstacle Detection

In this lesson, students will submit the project that they have developed over the previous lessons.

Supporting Lessons

Lesson	Summary
Introduction to Lidar and Point Clouds	Learn about lidar and point clouds. Use a simulation highway environment to explore lidar sensing and generate point clouds.
Point Cloud Segmentation	In this lesson, you will be using Ransac with a plane model to segment point cloud data and separate it into points that are part of the road and points that are not.
Clustering Obstacles	Perform Euclidean clustering, and learn how to build KD-Trees to use them to do efficient nearest neighbor search for clustering.
Working with Real PCD	Take what you have learned in the previous lessons and apply it to real pcd being played back in a video.

Part 3: Camera

Project: Camera Based 2D Feature Tracking

Supporting Lessons

Lesson	Summary
Introduction	
Autonomous Vehicles and Computer Vision	
Engineering a Collision Detection System	
Tracking Image Features	

Project: Track an Object in 3D Space

Supporting Lessons

Lesson	Summary
Combining Camera and Lidar	

Part 4: Radar

Project: Radar Target Generation and Detection

Supporting Lessons

Lesson	Summary
Introduction	
Radar Principles	Review Radar functionality, FMCW waveform, Radar Hardware, Schematic and the Radar Equation
Range-Doppler Estimation	Estimate the range and velocity of the target using the FMCW radar
Clutter, CFAR, AoA	Discuss - Clutter formation and then its removal using CFAR technique. After that
Clustering and Tracking	

Part 5: Kalman Filters

Project: Unscented Kalman Filter Highway Project

In this lesson, students will submit the project that they have developed over the previous lessons.

Supporting Lessons

Lesson	Summary
Introduction and Sensors	Meet the team at Mercedes who will help you track objects in real-time with Sensor Fusion.
Kalman Filters	Learn from the best! Sebastian Thrun will walk you through the usage and concepts of a Kalman Filter using Python.
Lidar and Radar Fusion with Kalman Filters in C++	In this lesson, you'll build a Kalman Filter in C++ that's capable of handling data from multiple sources. Why C++? Its performance enables the application of object tracking with a Kalman Filter in real-time.
Unscented Kalman Filters	While Extended Kalman Filters work great for linear motion, real objects rarely move linearly. With Unscented Kalman Filters, you'll be able to accurately track non-linear motion!