Instruction for Assignment 4 for Term Project

Path Planning in a Dynamic Environment

Introduction

Now, you have all the ingredients for the final goal of this project, path planning in a dynamic environment. Combine your path extraction algorithm (RRT/RRT*) with Kinect sensing algorithm and make your robot move from the starting point to the goal point in a dynamic environment.

Project Goal

There are a few waypoints a robot must visit. The ground-truth map is given. However, the actual map is slightly different from the ground- truth map. It is a dynamic environment that obstacles can appear or disappear unexpectedly. The goal of the project is to visit all the waypoints and reach the goal location under a dynamic environment using a re-planning algorithm to avoid unexpected obstacles instantly.

Dynamic Environment

There are two scenarios in the dynamic environment. One is the appearance of an obstacle in an obstacle-free region and another is the disappearance of an obstacle so that shortcut to the goal comes out.

Available Components

- ✓ Kinect Depth Image

- ✓ Kinect Point Cloud Data

- ✓ Robot Position

- ✓ Original Map

Using other information (i.e., gazebo world) is prohibited.

Code

You can use previous assignment format. You can modify it for your own purpose. Any programming skill is permitted without cheating.

Precaution

- ✓ Marking way points

  The marking area of a waypoint is circle of 0.2m radius. Your robot should pass this area in order to mark waypoint. Otherwise you won't get score.

- ✓ Sensing floor

  The robot may tilt forward when there is an abrupt stop motion. In this situation, the Kinect sense the floor and your algorithm may misunderstand obstacle free region for obstructed region.

- ✓ Synchronization of measurements

  There is a time difference between robot position information and Kinect sensor information. Since their update rate is different and are not synchronized. To reduce the error caused by asynchronous information, process the data when a low-rate information is updated.

- ✓ Sensor noise

  There is a noise in Kinect sensor data.

Submission Format

Compress your project folder including all your project files and upload it on the eTL. The name of the compressed file should be **"IS_Project_04_[TeamName].tar.gz"**.