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282.758 - Simulation, Modeling and Optimization

ROS based SLAM for a Gazebo Simulated Robot (20%)

The problem that SLAM attempts to solve is "How can a robot create a map of its surroundings and localize itself in the map it's created by itself?" The solutions for this problem will allow a robot to navigate a terrain autonomously, without the use of external navigation sources, such as GPS.

Using appropriate sensor model (laser scanner or RGB-D camera) mounted on the robot in Gazebo, you will create an optimized system that can do SLAM in a robust manner. If an obstacle or object is added to the environment of the robot, it should be able to update the map and navigate from point to point in an autonomous mode.

Due date: 15/09/2017 by 5:00PM.

Report Requirements:

1. Not more than 15 pages in total including references and figures.
2. Details of the robot model with screenshots and sdf snippets (particularly for the laser scanner).
3. A brief discussion on the components of navigation stack in ROS (no more than 5 pages). Append references to literature sources that describe the methods similar to those used in ROS.
4. Create a ROS catkin package to move the robot using *move_base* and *gmapping*. The robot should be able to navigate to goal points provided by the user in the map (in rviz). This package can be a modified version of code taken from repositories or websites but you will need to cleanly adopt it to your needs and show your contribution clearly.
5. Describe important parts of your package (from #4).
6. Submit your ROS catkin package with all necessary launch files. This code will be tested with a map and depending on the working of your robot you will get marks for this part of the report.