1 Dates

Assigned: October 11, 2005
Due: October 24, 2005

2 Notice

You must meet with cjenkins individually or in groups to discuss your potential final project by 10/14. Send cjenkins mail to schedule an appointment.

3 Introduction

In the previous project, you implemented a robot clients for robot localization and navigation. You will extend these routines for exploration of unknown environments.

4 Assignment

For this lab, you are expected to develop a client program that performs simultaneous localization and mapping. That is, the clients should automatically build a map and localize itself from driving in an unknown Gazebo world. The goal of this project will be to uncover the entire map of an environment without knowing anything about the environment beforehand except for the size of the boundary.

This assignment involves the following tasks:

- Create a gazebo world for your robot to wander around in
  - This map should be sufficiently interesting for this assignment
- Implement an occupancy grid, and fill it in using your robot sensor data.
  - Again, your computation must use only robot sensor data. More specifically, global and absolute truth information, such as position→px, **cannot be used for your computations**. However, absolute truth information can be used for recording the performance of the robot and evaluating offline.
  - The robot should wander the environment in some smart way to effectively uncover the whole environment.
  - the robot client must provide a command line parameter to specify time allowed for execution in milliseconds. When this parameter is specified, the robot client must terminate after the specified time has elapsed.
- This should build on both of your previous projects, using localization and path planning to accomplish your goal

5 Handin

Once completing this implementation, you will turnin the following:

1. the **commented** source code and compiled executable for your client program
   - usage for the client must be obtainable from the command line and the source file header
   - build instructions should be available from the source file header
2. directions, scripts, or source for displaying coverage after client execution
3. world files, images, and other necessary files for your Stage and Gazebo worlds
4. a project writeup (refer to course missive)
5. refer to the course missive for the format of the electronic submission

6 References

1 PSG User Documentation, http://playerstage.sourceforge.net/doc/doc.html

2 Some info on occupancy grids, http://www.cs.ubc.ca/spider/jennings/icra/node7.html