

AUTONOMOUS ROBOTICS

Term Project

Due: Tuesday, December 6, 2011 4:30pm



Objective: To design and implement an adaptive controller for a LEGO Mindstorms NXT robot to map out an environment and to locate and identify three objects that will be randomly located in the environment. The intention is to use SLAM and ML methods to perform the mapping, localization and identification challenges.

Scope: A standard tri-bot robot configuration is to be used. Sensors are limited to ultrasonic, light, touch, sound, and motor feedback. The focus is on the smarts inside the robot software.

Method: The project will end in a competition to be held on December 2 from 9am-12noon. In addition, each person must submit a report that covers the analysis, design and implementation of their solution and the results of preliminary testing. Students can collaborate but should employ their own final touches to software in an effort to do their best and to distinguish their work.

Project Grading:

Project Report (in form of conference paper)(70%)

- Analysis of the problem
- Technical design
- Implementation notes
- Testing methods and results
- Evidence of additional research (ref, URLs, etc)
- Depth of understanding based on all of the above

Robot performance in Competition (30%)

- Are the different objects identified correctly
- How accurate are the locations identified
- How robust is the system
- How fast is the tasks solved

The Competition:

The environment is meant to be simple and repeatable at Acadia and Dalhousie. It consists an area of approximately 4' x 8' with border of 8" height. Three objects of sizes with each dimension in the range of 2"-4" are placed in the environment. autonomously until the trial is aborted. The controller has then to report the identity number and the relative location of the three objects. Objects have to remain a placed by the organizers.

The start position of the robot will be given and should be used as reference point for the map. There will be a 30min initial setup time that can be used to train the robots. Each robot will have three trials with a 5min window each to identify and map the objects. The robots will be placed on the initial position and have to act