Class Project Requirements

Each student is required to complete the design project. The purpose of the project for testing your overall skills in microcontroller-based system design and programming. You need to apply what you learned in the course to complete the project: an autonomous robot that is able to explore a course. In the last class of the semester, you will present and demo your robot in the course. We will have a mini-competition. A final report is required for the project.

Robot Task and Requirements:

An example of the course is as shown in Figure 1.

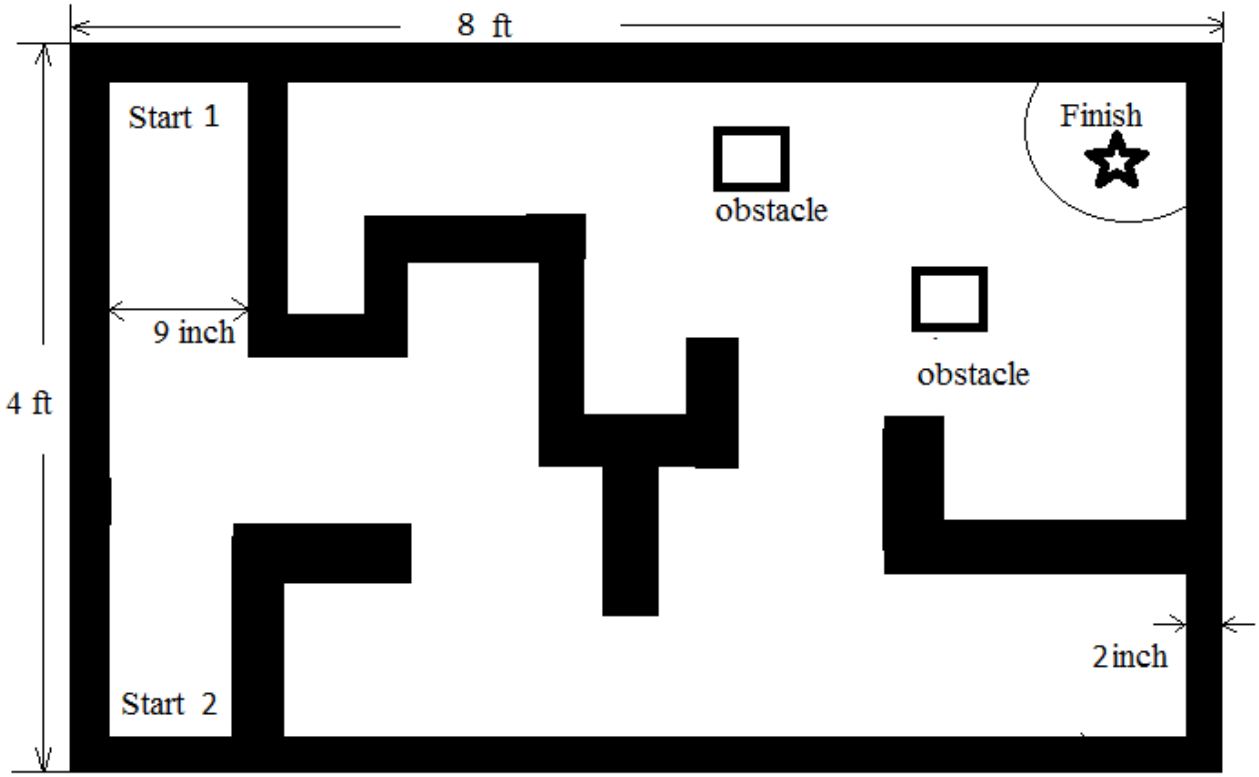

Figure 1 An example of the robot course.

The border of the course is made of electrical tape or black tempera paint with at least 2 inches. The robot will be placed in one of the start points randomly. Each robot will have a maximum 3 minutes to explore the course and completes the task. The tasks are as follows:

1) The robot should be placed in the start point in the beginning and should wait till a pushbutton (start button) is pressed. After the pushbutton is pressed, a piezo speaker should beep a sound to indicate the start of the robot actions.
2) The robot should be award of the boundary of the course and does go out of the border.
3) The robot should be able to follow the path given at the start part of the course (does not cross the black tape)

4) There are several obstacles placed in the course and the robot should be able to avoid the obstacles.
5) In the finish area, one light bulb will be placed. Once the robot reach the finish area, it should stop moving and indicate so by beeping.

You may use any parts in the robot kit (additional parts if you would like) to implement the project. You may find some useful tips in the following link:
http://learn.parallax.com/ShieldRobot

You will be able to test your robot in the example course during the classes for the project design.

Evaluation of the Project:

The project will be evaluated based on both the creativity of the design, the effectiveness of the implementation, and the quality of the final report.

Project functionality and class demonstration (40%): The more tasks it complements within 3 minutes, the more effective of the demonstration. Each student will be given at least two runs and the better score of the two runs will be counted as your project functionality score.

The first three students who complete all the tasks with the shortest time within 3-minute will be awarded extra credits (up to 3 points) towards to your final grade.

Technical report (60%): the final report will be evaluated based on both technical contents, writing and organization. The final report should describe the project entirely, at least including the following:

1) Project objectives and robot function description;
2) A description of your design process and methodology;
3) A diagram showing the implemented system architecture
4) Parts list and schematics/wiring diagram for hardware;
5) All software with appropriate comments (including flowchart for the main program);
6) A description of your test process, any major bugs/issues found;
7) Conclusions for the project, any lesson learned from this project;
8) A list of references if applies.

The report submission requirements:
You need to submit the final report via email. Please use "TECH 3157 Project Final Report" as the subject. You must name your file to include your last name and the initial of your first name according to the following rules:
InitialofFirstNameLastName_3157ProjFinalReport

The file should be in .doc or .rtf format. The final report is due on 11:59 PM, Sunday, Dec. 13, 2015.