Assignments

General Guidelines & Requirements

Each group will have to complete **ALL** assignments as required. From here on, your grade will be comprised of these lab assignments. You and your group are **strongly encouraged** to work outside of our regular lab hours. The 2 hour lab that you have WILL NOT be enough for the assignment preparation. **When you come to the lab for check off, we expect that your entire team is present and that your robot is working according to the requirements.**

If your robot is working properly, you will be graded on its performance, based on a letter grade. The judges evaluating your project will be your TA and your class instructor (Prof. Shafai). If it is not working for some reason, either because some part failed or because you couldn't finish the assignment, we will check your code and the actual robot and based on that, we will assign a grade. By default you will not be able to receive full credit if your robot is not working as required.

Your first assignment will be due on March 14th, 2014. The following assignment will be due on March 21st, 2014. The last assignment, or final competition, will be due on April 4th, 2014.

You might find it useful to first make a well-built robot, and then make modifications to it for the different assignments. If you begin with a well-built robot, it will be much easier to add a couple of sensors and buttons, rather than rebuild it. You can use any part of code you find useful from the book or from any other resource. However, you might be required to give the judges a brief explanation of how your code works. You may find techniques for building a robot, in "Robotic Explorations" from Martin or any other reference you have available. Parts such as sensors, faster motors, buttons etc. can be purchased from RadioShack or digikey.com or parallax.com. You are encouraged to buy a Lego kit or robot kit on your own in order to speed up the process of building a robot. Finally, standard parts such as resistors or capacitors are available at the equipment room.

Assignment 1 – Line Following Robot

Your robot is required to navigate a fairly complicated track of silver duct tape. This cannot be done with mechanical switches. You will need to build some kind of sensor circuit to measure the reflectance of the tape. In the past students have used IR emitter-detector pairs and they have worked very well. Extra credit will be given to robots that maneuver quickly and finish the track fastest. The assignment is due on March 14th, 2014.

Assignment 2 – Wall Following Robot

Build a robot that is capable of following a wall. You can use any means to sense the wall. This includes, but is not limited to, switches, buttons, IR sensors, photodiodes etc. You choose what you need to use. That means that you might have to try a couple of different techniques before you find the one that is optimal. You will be judged on speed, efficiency and creativity. Be prepared to have your robot follow any track. This means that you will not know beforehand how the path will look like. You are required to have sensors on one side of your robot only. However, if you decide to prepare a robot that could follow a wall in both directions, either from its right or from its left side, then you will be given extra credit. The assignment is due on March 21st, 2014.

Assignment 3 – The Following Robot

Your robot is required to be able to track and follow anything moving. In this challenging assignment we expect you to modify your robot so as to navigate appropriately on its own and follow an RC car in any direction it goes. This project is fairly complicated and will require a significant amount of time. Please ask as many questions as you need to fully understand the project, the specifications and what we expect from you. You can use any combination of sensors to get optimal results. You cannot touch the moving object or attach to it. The assignment is due on April 4th, 2014.

- The faster your robot responds, the more credit you get!
- The more the crashes in the moving object, the less credit you get.
- Bells and whistles, such as beeping or flashing lights, are always welcome for extra credit.