ECGR4161/5196, Spring 2009: Lab 6

Assembling a system – robotic vehicle, power, and computer control – Version 1.0

Learning Objectives

This lab will have students assemble a system – robotic vehicle, power, and computer control – and demonstrate a working autonomous vehicle.

General Information

The general steps for this lab are:

1. Bring motor wires into the unit – make sure they are protected from cutting.
2. Attach H-bridge board to your assigned robot using aluminum angle metal
3. Make power harnesses (from battery, through fuse, to switch, red)
   Make power harness (from switch, to board and to a 15" red wire – 18 gauge)
   Make power harness (from 15" black wire – 18 gauge and from board to battery)
4. Attach motor wires to motor driver wires.
5. Test the connections with a bench power supply, ONE motor side at a time. You will need to control the control wires with a enable signal (manually)
6. Use a voltage regulator to drop 12 v down to 5 v (note: I have a DC to DC converter on order that would be a better device, but it will arrive Monday. Use a Voltage regulator for now).
7. Write the software and attach your Renesas board to the control lines.
8. Test your software on the bench.
9. Test your software with the vehicle on the ground.
10. Demonstrate to Dr. Conrad and turn in a lab report.

Laboratory Assignments

You may use the PCs in Woodward 203 or your own PC to do this lab experiment. The machines in Woodward 203 already have the software tools loaded. In this lab you will be utilizing onboard timers and I/O ports of the Renesas board to control the H-bridge (and thus the motors).

1. Assemble the vehicle.
2. Identify which ports on the Renesas board will serve as your control pins.
3. Design your connector/circuit and acquire the parts.
4. Write code for the Renesas board which controls the H-bridge. Verify that the new functionality works as specified.
5. Complete your lab report.
6. Demonstrate the vehicle to Dr. Conrad. He will also take your lab report. You **will not** need to include a printout or soft copy all of the code – just "snippets".

Requirements

Req. 1 – The code generated is written in C for the QSK62P.
Req. 2 – The code is well commented and easy to follow
Req. 3 – Your lab report should include the final build output from the builder.
Req. 4 – When you press SW1, the vehicle will travel forward at a 10% rate for 5 seconds and then backward at a 10% rate for 5 seconds. The vehicle should start and stop at the same point.
Req. 5 – When you press SW2, the vehicle will travel forward at a 20% rate for 5 seconds and then backward at a 20% rate for 5 seconds. The vehicle should start and stop at the same point.
Req. 6 – When you press SW3, the vehicle will travel forward at a 20% rate for 5 seconds, turn in place 180 degrees, and then forward again at a 20% rate for 5 seconds. The vehicle should start and stop at the same point.

Lab Report

Include in the checkout part of your lab report the lines:

1. SW1 functionality (and feet from starting point) _____/_____
2. SW2 functionality (and feet from starting point) _____/_____
3. SW3 functionality (and feet from starting point) _____/_____

Include in your lab report observations and procedure like the following:

The general learning objectives of this lab were . . .

The general steps needed to complete this lab were . . .

Some detailed steps to complete this lab were . . . .
1. Step one
2. Step two
3. . . . .
Code generated or modified to complete this lab...
No need to include all the files for the lab. Just include the modified code.

Some important observations while completing/testing this lab were . . .
***Here include the memory report given at the end of the compile process**.*

In this lab we learned . . . .

Attach the final build output at the end