

ECGR4161/5196, Spring 2009: Lab 4

DC motor control – Version 1.1

Learning Objectives

This lab will have students control a DC motor with feedback. This will be done using the Renesas board.

General Information

The general steps for this lab are:

1. Identify the hardware interfacing needed for the DC motor.
2. Create the connector for the device
3. Build the project and load onto your board. Run the program and observe the operation.
4. Demonstrate for a TA 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 a DC motor.

1. Identify which ports on the Renesas board will serve as your control pin and your input pin.
2. Design your connector/circuit and acquire the parts.
3. Write code for the Renesas board which control the dc motor. Verify that the new functionality works as specified.
4. Complete your lab report.
5. Bring the new board to the lab TA and demonstrate the new code. When the TA checks your board, she 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 – A transistor suitable to drive the motor (see the spec sheet) shall drive the motor. The motor shall not source/sink current from the microcontroller.
- Req. 5 – The motor will be driven by one of two means: either the output from the DAC will drive the transistor, or a Pulse Width Modulation will drive the transistor.
- Req. 6 – The general operation of the system is that the dc motor will remain rotating at **2000 rpm** despite any load applied to the motor. This will be verified by reading the sense device with an oscilloscope.
- Req. 7 – The system will start out running and always run in a clockwise direction.
- Req. 8 – To maintain the speed of the motor, you should use an optical device and light source and read the clocking inputs.

Req. 9 – The system will be powered by a 5v bench power supply. DO NOT power the dc motor with a PC's power supply (through the USB Cable). Failure to satisfy this requirement will result in a grade of "0" for the lab.

Lab Report

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

1. The physical load connected to the motor runs at **2000** rpm _____
2. The motor runs at **2000** when a additional physical load is put on the system

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