

UNC Charlotte, ECGR 6185, Spring 2007: Lab 2

Ultrasound distance sensor

Learning Objectives

This lab will have students control a ultrasonic sensor to measure a distance from the board to the closest object (i.e. a wall). This will be done using the Renesas board.

General Information

The general steps for this lab are:

1. Generate a new project for the Renesas Board. Name your new project Lab2.
2. Open and edit your main.c file to perform the lab functions.
3. Program the lab. Don't forget the necessary include files to get the correct functionality.
4. Compile the code into an .x30 file, and load onto the board.
5. Test the program and repeat steps 2, 3, and 4 until the program works as required.
6. Write your lab report.
7. Demonstrate for the professor and turn in your report and files.

Prelab Activity

None.

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 an ultrasonic sensor.

Steps

1. Modify the main.c file and include the appropriate files. Include commenting along the way.
2. Build your program slowly, testing along the way. Perform compiles and solve each requirement one at a time. Make sure comments are written as you progress.
3. Continue to build and test the program until all of the requirements have been met. Did we mention you should write your comments as you progress, not at the end?
4. If you run into problems, use the break point functionality of KD30 to step through the code until you find the problem.
5. Once all the requirements have been met, ensure that everything works.
6. Finish lab write-up and demonstrate for the professor.
7. Submit your report, C code (*.c) and .map files on a floppy disk, CD ROM, or email.

Requirements

Req. 1 – The code generated is written in C for the MSV30626-SKP

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 – The main objective is to use the SRF-04 (05) ultrasonic device to create a distance measuring device.

Req. 5 – Follow the guidelines for using the device found on the class webpage.

Req. 6 – When SW1 is pressed, take a measurement and display the results on the LCD.

Req. 7 – Display the distance in meters on the LCD in the form x.xxx. If the measurement is out of bounds, display 9.999.

Req. 8 – If the watchdog times out, the processor should reboot to the initial state.

Req. 9 – The software for this lab should use a state machine.

Req. 10 –Do not use floating point numbers for this lab.

Req. 11 – The device shall be a hand held, mobile device. Therefore, use the 9v to 5v regulator and 9v battery from Lab1.

Lab Report

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

The general learning objectives of this lab were . . .

Pre-lab question answers

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 for this lab...

Some important observations while completing/testing this lab were . . .

In this lab we learned