

## ECGR4161/5196, Summer 2011: Lab 7

### Computer Control of a Robot

### Learning Objectives

This lab will have students control a vehicle using any microcontroller or FPGA board.

### 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 some software tools loaded. In this lab you will need to utilize onboard timers and I/O ports of the evaluation/controller board to control the DC motors. You will need to mount a PING ultrasonic sensor in order to determine when to stop.

The vehicle shall move in a 1m by 1m square. The vehicle is the Digilent Robotic Starter Kit <http://www.digilentinc.com/Products/Detail.cfm?NavPath=2,403,543&Prod=RSK>

### Requirements

- Req. 1 – The code generated is written in C for any FPGA or controller board.
- 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 – Digilent robot kit shall be used as the Robotic base.
- Req. 5 – The vehicle shall run in a 1m by 1m square once when a button (i.e. SW1 button) is pressed OR the ultrasound detects something 10cm from the front.
- Req. 6 – The vehicle shall run in a straight line for each of the sides of the square.
- Req. 7 –The vehicle shall make 90 degree turns.
- Req. 8 – The vehicle will continually run until a PING sensor on the robot detects something 10cm away from the front of the robot.
- Req. 9 – You may add any

### Lab Report

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

- 1. The vehicle makes 90 degree turns \_\_\_\_\_
- 2. The vehicle moves in a straight line \_\_\_\_\_
- 3. The vehicle returns to its original starting point \_\_\_\_\_
- 4. The vehicle continues to run \_\_\_\_\_
- 5. The vehicle stops when something is 10cm from the front \_\_\_\_\_

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 main code.*

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

*In this lab we learned . . . .*