Laboratory #08 ENEE 148A Fall 2016

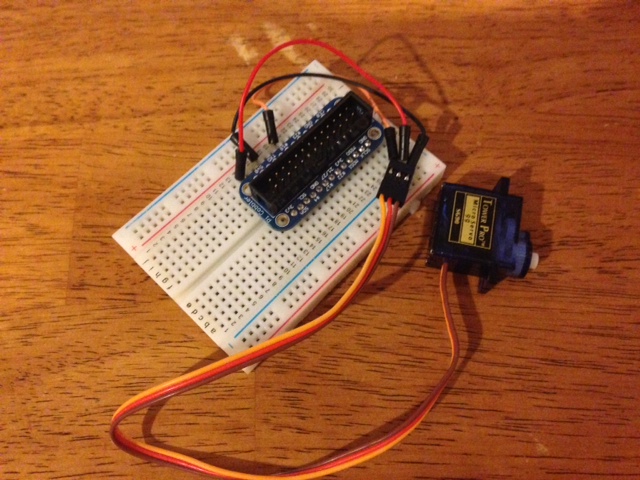
In this lab you will work in pairs. You must divide up the code work and each of you indicate which routines you wrote or co-wrote. Complete the following tasks:

Complete the following tasks (This is a TWO-WEEK lab):

1. Download and run the code “pwm\_test.c”. Have your instructor verify operation.
2. Build a circuit that uses the HMC5883L magnetic sensor and the tower pro sg90 servo motor. The sensor must be mounted on the servo; the sensor center of mass may or may not translate as servo rotates (that is for you to decide).
3. Write a code that will scan 180ºcontinuously looking for magnets.
   1. As long as the detected field is no more than 150% of the earth’s magnetic field, the servo/sensor should continuously scan.
   2. When an increase of more than 50% occurs, the servo should point in the direction of the magnet that is causing the change in the magnetic field.
   3. If the magnet moves, the servo must move to point correctly.
   4. If the magnet is removed, the servo should resume its scan.
   5. The code must print an output line each time that a magnet is found indicating the time, the field strength, the angle toward the magnet.
   6. Anytime the magnetic strength changes by 50% or the location changes by more than 5º, the code must print a new output line.
4. Have your instructor verify successful operation.

EXTRA CREDIT – 30% - if you complete all four tasks above, you can try to use a second magnetic sensor and a multiplexor to cancel out the earth’s magnetic field and improve your device performance (this arrangement is called a gradiometer).

For the write-up of this lab, due 18 November 2016, you need to submit (1) a paper copy of the codes that you wrote and (2) an electronic copy of the codes that you wrote. You also need to draw a diagram of the circuit that you built. Write a summary document of your lab procedure and results of your codes (present and evaluate your results).



Wire connections:

Red – Vcc – goes to 5V (pin 2)

Brown – ground – goes to pin 6

Orange – PWM control – goes to pin 12