Lab 6 – Servo Motor
October 8, 2015

In this lab you use the HCS12 microcontroller on the SSMI board to drive a servo motor using the pulse width modulation (PWM) system.

1 Prelab Questions (complete prior to coming to lab)

Read this handout before coming to lab and answer the following questions:

1. On the attached drawing of the SSMI board, identify connector J3 and label pin 1 on that connector.
2. What color wire on the servo motor should be connected to pin 1 of J3?
3. Which pin of Port T is hardwired to pin 1 of J3?
4. Which pin of connector J3 is Vservo?

2 Connections

Make the following connections and show the instructor:
- Connect the servo motor to connector J3.
Then connect the power supply to the SSMI board. Check the voltage “Vservo” to make sure it is about 6 volts.

3 PWM system

Write a C program that uses the PWM system to output a PWM signal to the servo motor. The signal should have a 20 ms period. Verify the period on the oscilloscope.

- Find the duty cycle (in ms) that moves the servo to the middle or neutral position.
- Find the duty cycle (in ms) that moves the servo all the way to the left (about -90 deg) without overdriving it.
- Find the duty cycle (in ms) that moves the servo all the way to the left (about +90 deg) without overdriving it.

Sign-Off 1: Demonstrate your program to the instructor.

4 Wag the tail

Attach a “tail” to the servo motor gear (a short piece of wire will do). Write a C program that will “wag” the tail every second. Namely, it starts with the tail all the way to the left, then one
second later, moves it all the way to the right. Then one second later it moves it all the way to the left again, and repeats continuously.

**Sign-Off 2:** Demonstrate your program to the instructor.

### 5 Position control

Now drive the servo motor corresponding to the position of a potentiometer. As in Lab 5, attach the wiper of the 25 Kohm potentiometer to pin AN02 such that it can supply a variable voltage between 0..5V to that pin.

Change the program to continuously sense the potentiometer and control the position of the motor. If the potentiometer is turned all the way to the right, drive the servo motor all the way to the right. If the potentiometer is turned all the way to the left, drive the servo motor all the way to the left.

**Sign-Off 3:** Demonstrate your program to the instructor.

Include in your report:

1. The C language program, along with a corresponding flowchart or pseudo code. Highlight the code for each section. Explain the programs.
2. Schematic and an explanation of the circuit; scope traces.
Lab 6: Servo Motor

Name: ________________________________ Name: ________________________________

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