ME 511 Mechatronics @ UIC

Sensors and Actuators II

This lab is to be done individually, but in the lab.

1 Prelab (not graded)

1.1 Motivation

The goal of this lab is to introduce you to a sensors and actuators that can be interfaced using an Arduino

1.2 Assigned Reading

This part of the lab needs to be done before you come to the lab. Assigned reading is listed below

1. Read about joystick module: https://arduinogetstarted.com/tutorials/arduino-joystick
2. Read about the servomotor: https://howtomechatronics.com/how-it-works/how-servo-motors-work-how-to-control-servos-using-arduino/
3. Read about the stepper motor: https://lastminuteengineers.com/28byj48-stepper-motor-arduino-tutorial/

2 Labwork (graded)

2.1 Equipment list

1. Arduino UNO Rev 3 and USB A to B cable (commonly used on printers).
2. 1 Joystick module
3. 1 Photocell
4. 1 Servo motor
5. 1 Stepper motor
6. 1 ULN2003 stepper motor drive module
7. DC voltage supply (please return this back after the lab is done)

2.2 (20 pts) Servo motor

Use the sweep code to understand how to connect and program the servomotor. https://docs.arduino.cc/learn/electronics/servo-motors. Now demonstrate that you are able to move the servo to the desired position using a serial input. Show the circuit and demonstrate the results to the TA.

2.3 (25 pts) Joystick module

This webpage shows how to connect and program the Joystick module: https://arduinogetstarted.com/tutorials/arduino-joystick. Create two integers, "a" and "b" Demonstrate that you can increase and decrease the values of "a" and "b" when the up/down and left/right button buttons are pressed respectively. You should print the outputs continuously to the serial monitor as you do this. Create another variable "c" that toggles between 0 and 1 when you press the middle button on the joystick. Show the circuit and demonstrate the results to the TA

2.4 (25 pts) Stepper motor

This webpage show to interface and program the stepper motor using the AccelStepper library. https://create.arduino.cc/projecthub/debanshudas23/getting-started-with-stepper-motor-28byj-48-3de8c9. Demonstrate to the TA that you are able to move the stepper in small increments for 90 degrees clockwise and then 90 degrees counterclockwise.

2.5 (30 pts) Application Roulette wheel

You have to create a prototype of a roulette wheel for a casino. Mount an indicator on the shaft (e.g., an arrow made of paper). Use the joystick switch to initiate the spinning of the stepper or servo motor. Use the joystick left/right or up/down to set the speed. Use a random number generator to time the stop. Choose a quadrant $(0-90)$ where a red light should turn ON indicating a win else another colored LED should light up. Demonstrate the setup to the TA.