LAB 9 - PING-CONTROLLED MOTOR & LED
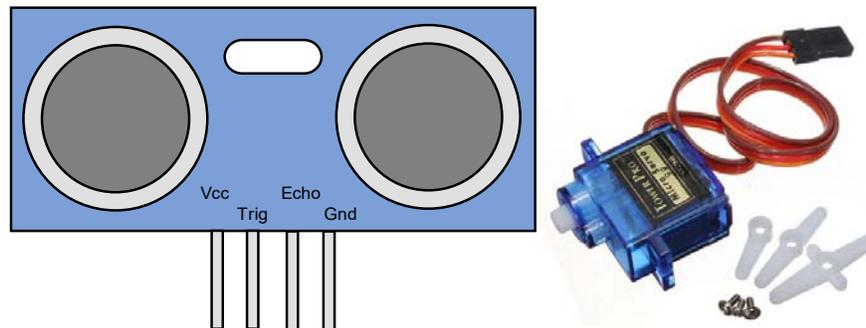

ITEM LIST:

1.) Arduino, cable, computer
2.) Solderless breadboard (or Bb shield)
3.) Ultra-sonic sensor (HC-SR04)
4.) Micro-servo motor (SG90)
5.) LED, 220-ohm resistor
6.) Piezo-speaker
6.) Wire

BACKGROUND

REFER to the ARDUINO GUIDE on using the ultra-sonic PING sensor (Chap 20) and the piezo-speaker.

EXERCISE

Use the ultra-sonic distance detector (PING sensor) as a trigger to initiate the movement of a servo motor and to change the lighting of an LED. The basic code for obtaining distance data from the sensor is on the ARDUINO GUIDE.

Exercise 1 - Get PING sensor working

First get the PING sensor to collect distance data and write it to the Serial Monitor. Run the serial plotter and move an "obstacle" in front of the sensor, changing the distance. Observe the plotter trace change as you change the distance to the sensor. Once that work, proceed to the next exercises.

Exercise 2 - PING sensor and speaker

Get the PING sensor to act as a trigger to have the speaker sound a single BEEP.

Exercise 3 - PING sensor and servo

Get the PING sensor to act as a trigger to toggle the motor between to angular positions. Each time you wave your hand in front of the PING sensor the motor should toggle between 2 angular positions.

Exercise 4 - PING sensor, servo, and LED brightness

Keep the motor circuit and ADD to it an LED (with 220-ohm resistor in series to limit current thru the LED). Wire the LED circuit to a PWM pin on Arduino. Each time you wave your hand in front of the PING sensor, get the LED to increase its brightness (try say 5 different brightness levels). After that, the LED turns off and cycles thru the same brightness levels again. All the while, the motor ALSO continues to toggle between 2 angular positions while the LED brightness changes.

Also - as before - each time you wave your hand in front of the PING sensor, the speaker sounds a single BEEP.

CODE

This time it is YOUR TURN! You must write the code for this exercise! The code for the PING sensor is in the ARDUINO GUIDE. You can also look back at the code for the servo and LED from prior exercises, but you'll need to make some changes to get this to work.