Robotic Sunflower Lesson 2: Controlling a Servo

Student Guide

Record all answers to questions, observations, and notes from the material in your engineering notebook. Proceed through each step per your instructor’s prompt.

Watch the video Circuit Skills: PWM (Pulse Width Modulation) http://www.youtube.com/watch?v=Lf7JJAAXxEU, the night prior to attempting this lesson and answer the following questions.

Why is it better to use a PWM to control motor speed as opposed to using a resistor?
Ans. The resistor will dissipate a lot of power through heat thereby making the circuit less efficient. PWM delivers an applied voltage over a duty cycle to control speed so no power gets wasted.

If a PWM has a duty cycle of 60% with a high voltage of 10V, what voltage gets to the motor?
Ans. 6V

Draw the circuit diagram for a servo in your engineering notebook. Remember to label each lead.

In your notebook record the information for the following table. To make measuring the angles easier tape a straw to the servo horn and place the servo on top of a protractor.

<table>
<thead>
<tr>
<th>PWM Position</th>
<th>Servo Position</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0°</td>
</tr>
<tr>
<td></td>
<td>10°</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>180°</td>
</tr>
</tbody>
</table>

Watch the video Servo controller with a potentiometer (http://www.youtube.com/watch?v=P3iQENGL6il)

Draw the new circuit in combination with the servo circuit per your teacher instruction.

At this point you should have the following in your notebook.
- Photo-resistor characteristics in full/partial/no sun.
- RC values with average decay times.
- Servo minimum and maximum values for the range of motion.
- List of programming commands and their syntax.
Vocabulary:

PIN
VAR
Byte
Bit
Nib
Word
FOR ... TO...NEXT

FOR ... TO...NEXT
IF...THEN...ELSEIF...ENDIF
PULSOUT
INS