The Chinese University of Hong Kong

Department of Computer Science and Engineering

CENG2030 Fundamentals of Embedded System Design

Lab 8: Sensor and Actuator

Answer Sheet

Full Name:\_Hung Yiu Pan\_\_\_\_\_\_\_\_\_\_\_\_ SID:\_\_\_\_1155108381\_\_\_\_\_\_\_\_\_\_\_\_\_

**Demo Video [30%]**

1. **IR Sensor [40%]**
   1. Hardware Connections

What type of output signal is provided from OUT pin of the IR sensor, digital or analog?

\_Digital\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

IR frequencies range from about 300 GHz up to about 400 THz. Is the frequency of the visible Red light below or above this frequency range?

\_Above\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Software Programming

What is the voltage of OUT pin of the IR sensor if an obstacle is detected?

\_\_\_\_5V\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Based on the settings of this lab, can we measure the distance of the obstacle to control the brightness of the LED? Why?

\_\_\_No. The data from the IR sensor to the Arduino is digital, which is 0 or 1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Servo Motor [30%]**
   1. Hardware Connections

What PWM stands for?

\_Pulse Width Modulation\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Instead of connecting the PWM pin of the servo motor to pin 9 of the Arduino UNO board. Can we connect it to pin 3 of the Arduino UNO board? Why?

\_Yes. Pin 3 also supports the PWM output\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Software Programming

How can we rotate the servo motor faster?

\_\_Change the for loops. Change “pos += 1” to “pos +=n”, where n is the degree turned in each 15ms\_\_\_\_

THE END