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

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**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,because we use digial output,so we can only tell wheather there are obstacles (output 1) or not (output0)\_\_

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?

\_\_\_\_\_No,because the motor is attached to pin9 in the setup() function. Or you need to change the program\_\_\_\_\_

* 1. Software Programming

How can we rotate the servo motor faster?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_change delay(15)\_15 into a smaller value.\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

THE END