111 學年度上學期 11110EE 240100 Microprocessor system Lab7

- **Exp. Date：11/15 Tue.**
- **Please follow the instructions in each part, and ask the TAs to check and register after completing the check point(1.1~3.1)**
- **If you have any question in experiment, you can ask TAs or discuss with classmates.**
- **Please refer to lecture slides of Lab7, or you can also check the information online.**

- **Part1 Question**

Please refer to the content of the lecture and answer the question down below.

1.1 : Why does an MCU8051 need to read the value of IR sensor through an ADC?

1.2 : How does the ADC transmit the result to MCU8051?

- **Part2 Example Project**

This lab is divided into 2 parts (IR sensor & Thermometer), please download the source codes on the google cloud and check the result after execution.

2.1：Please accomplish the circuit based on the wiring diagram. Connecting MCU8051, MCP3020 (ADC), GP2Y0A51SK0F (IR Sensor) and MAX7219 (7-segment display). Putting an object in front of the IR sensor in different distance and showing the voltage value (single digit for integer, 3 digits after decimal point). The LED will show the MSB 8 bits of the output voltage of the ADC's variable resistance on the board.

2.2 : Please follow the wiring diagram A.2 to complete the circuit wiring. Connect the 8051, MLX90614 (IR Thermometer) and OLED. The current ambient temperature and item temperature are displayed on the OLED. The item temperature is the temperature of the object close to the IR Thermometer. The item does not have to be touched with IR Thermometer.

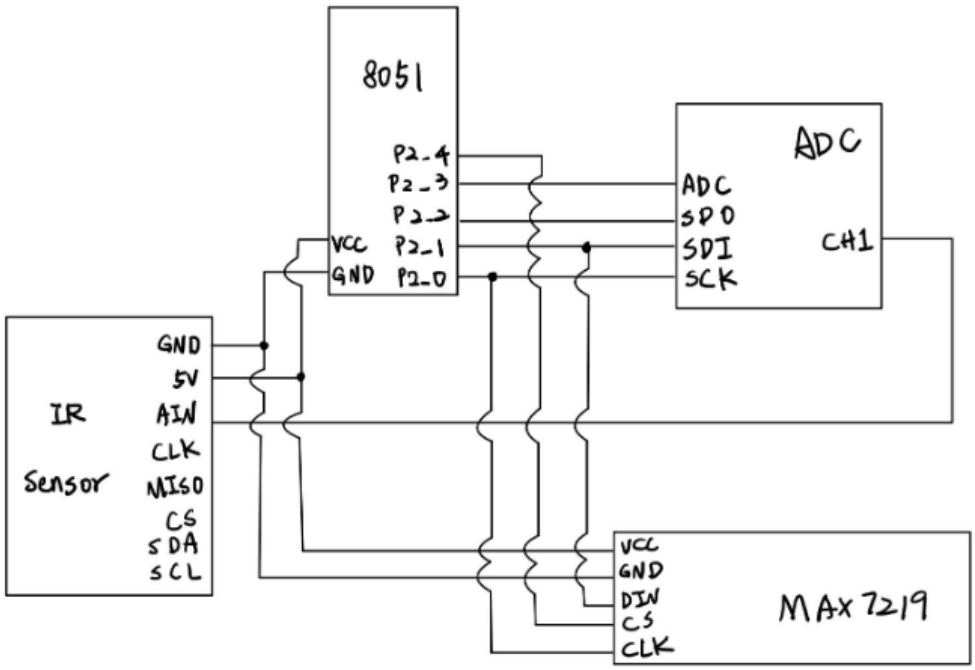
- **Part3 Practice**

Please reference the sessions and source code of Part2. Try to design and implement the asking of Practice. (You can check the executed result from google cloud)

3.1 : The voltage output of the GP2Y0A51SK0F is roughly inversely proportional to the inverse of the distance. The excel figure below is the best fit linear relationship diagram made by TAs. Please convert the output voltage to distance according to this formula. Then write a firmware, display the distance (unit: cm) and voltage (unit: volts)detected by the IR Sensor on the seven-segment display respectively, each with four digits. The distance is from the tens digits to two decimal digits (xx.xx), and the voltage is from the single digits to three decimal digits(x.xxx).

- **Appendix--Wiring Diagram**

A.1



A.2