Control & Automation Engineering Department

KON309E Microcontroller Systems - Experiment 4

Aim: Measuring temperature and sending data to PC via UART.

Materials:

- LM75A Temperature Sensor
- CH340 UART Module
- 1 Button
- 1 LED

Preliminaries:

1. Construct a circuit consisting of an LED, a potentiometer, a button, LM75A temperature sensor and CH340G UART module.

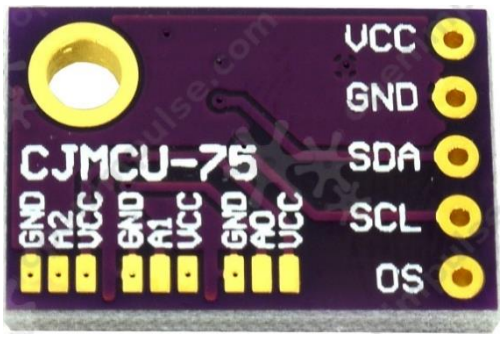

Figure 1: LM75A temperature sensor.

2. To use the LM75A temperature sensor (Figure 1),
    - Connect SDA and SCL pins of the sensor to related pins of the microcontroller.
    - Connect sensor's VCC pin to 3.3V and GND pin to ground of microcontroller.
    - Also, on the temperature sensor, solder A0, A1 and A2 to GNDs next to them to set the address value. You can obtain 8 different address values by soldering them to GND or VCC.
    - You can find the codes related to configuration of I2C and reading data from the sensor in your lecture notes.
    - You can find the datasheet of the sensor on Ninova.

3. To use the CH340 UART module (Figure 2),
    - Connect UART module's Tx, Rx and GND pins to related pins of microcontroller.
    - Download the device driver.
    - You can find the codes related to configuration of UART and sending/receiving data on your lecture notes.
    - You can find the datasheet of the UART module on Ninova.

Figure 2: CH340 USB to TTL converter.

4. To see the data on PC,
    - Download any terminal program.
    - Make sure to adjust COM port, baud rate, stop bits etc. accurately.

Task:

In this experiment, participants are expected to achieve tasks given below.

1. Use the temperature sensor to measure the temperature with $\mathbf{0.5\ °C}$ **resolution**.
2. Set a temperature threshold between $0 - 50\ °C$ using the potentiometer and use the button to read the potentiometer (The threshold will not be set until the button is pressed).

3. Send the temperature value to the terminal program running on PC with **one second intervals** via UART.
4. If a '**1**' is sent **from the computer** to the microcontroller via UART **AND** the temperature is above the threshold, the LED will be **ON**.
5. If a '**0**' is sent **from the computer** to the microcontroller via UART **OR** the temperature is below the threshold, the LED will be **OFF**.

Note: You can use a hair dryer to heat your temperature sensor.