In this lab, we learn serial communication: SPI, I2C and UART.

(1) Lab7_1 SPI

In this part, we learned how to use SPI protocol.

MOSI, MISO, SCLK, CS are used in interface. Also we use both master and slave in our system.

In this part, the master will send out a signal "handshaking" to ensure that slave have response correctly and readily, then it will transmit a number to slave, slave received it and will transmit back the number + 10. More interesting to me is that for master to receive signal we need to use deviece.write() which is kind of weird to me.

```
Send handshaking codes.
First Read from master: v = aa
First response from slave = 0
Send number = 0
Second Read from master: v = 0
Second response from slave = 10
Send handshaking codes.
First Read from master: v = aa
First response from slave = 0
Send number = 1
Second Read from master: v = 1
Second response from slave = 11
Send handshaking codes.
First Read from master: v = aa
First response from slave = 0
Send number = 2
Second Read from master: v = 2
Second response from slave = 12
```
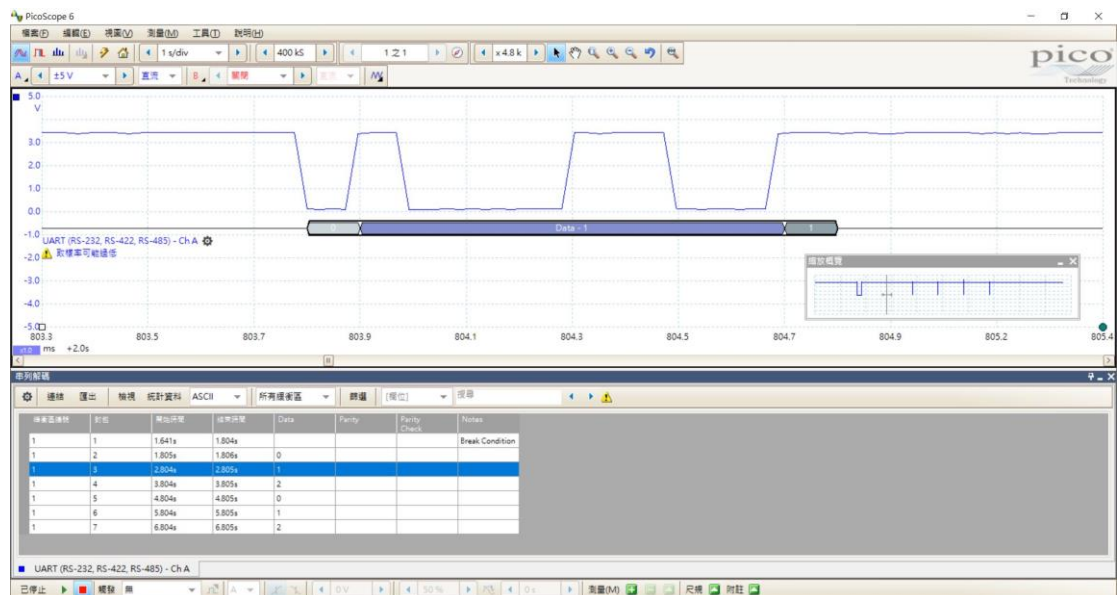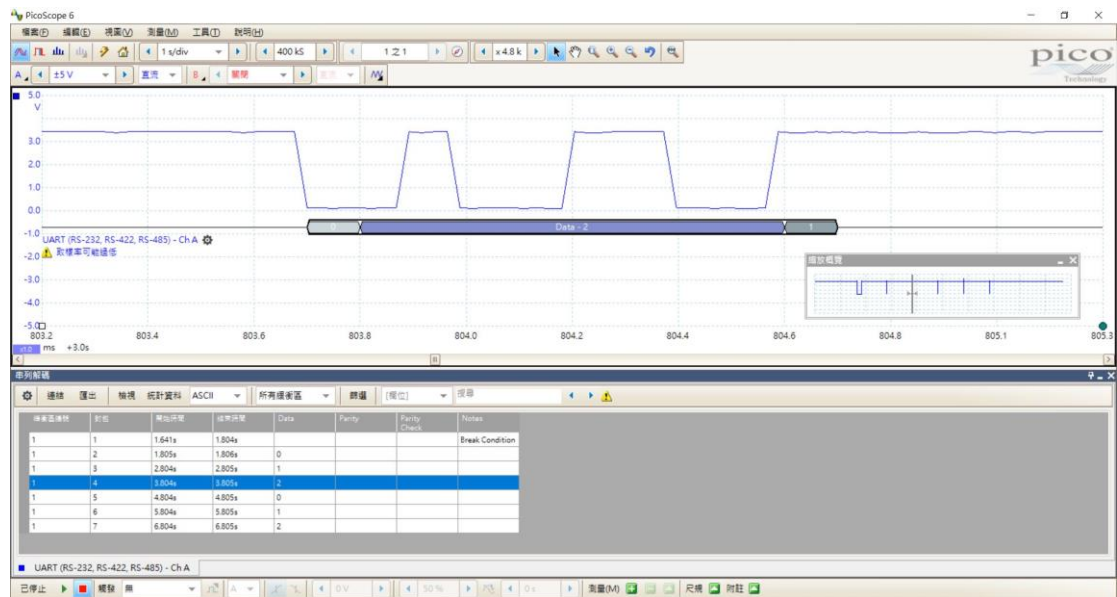
(2) Lab7_2_UART_loopback

In this part we use UART protocol, we need to check both side of transmitter and receiver are setting in same baud rate and data format (bits , parity bits and stop bits). And remember that TX <-> RX.
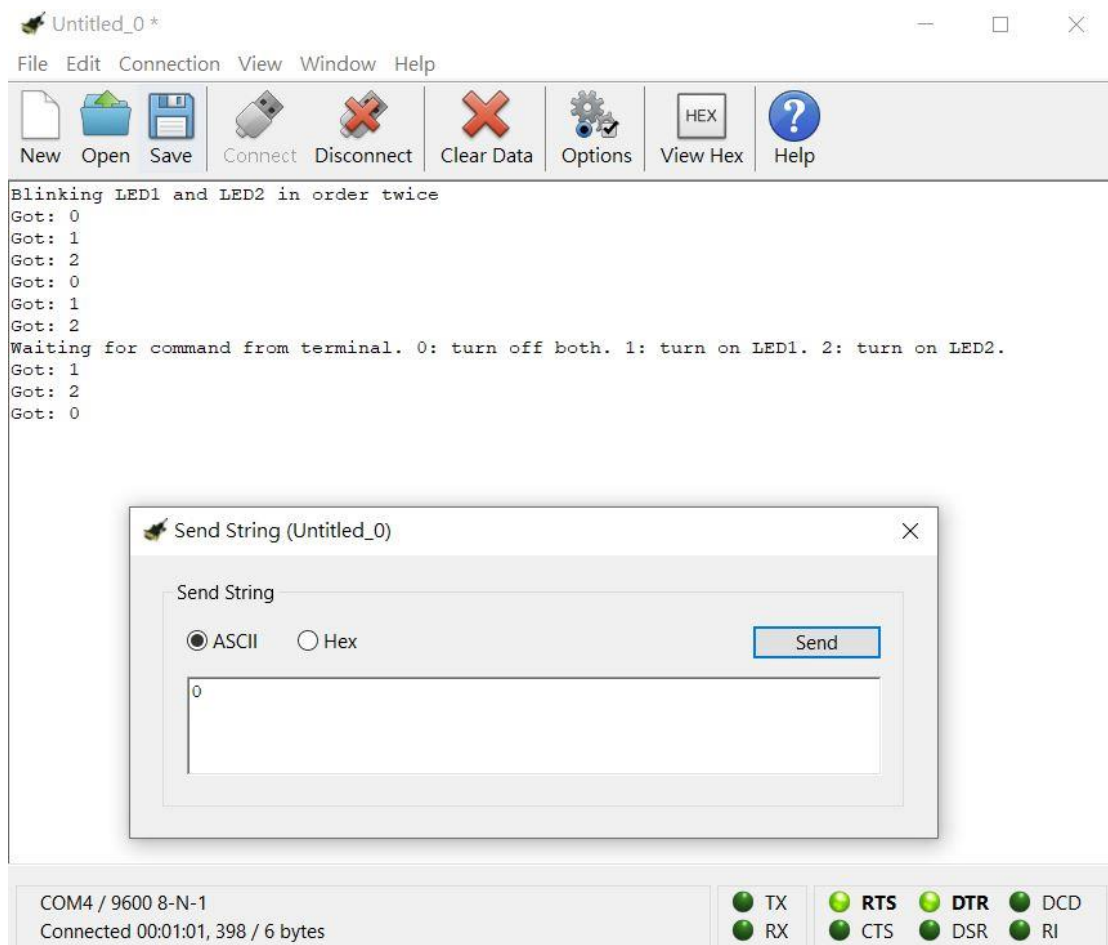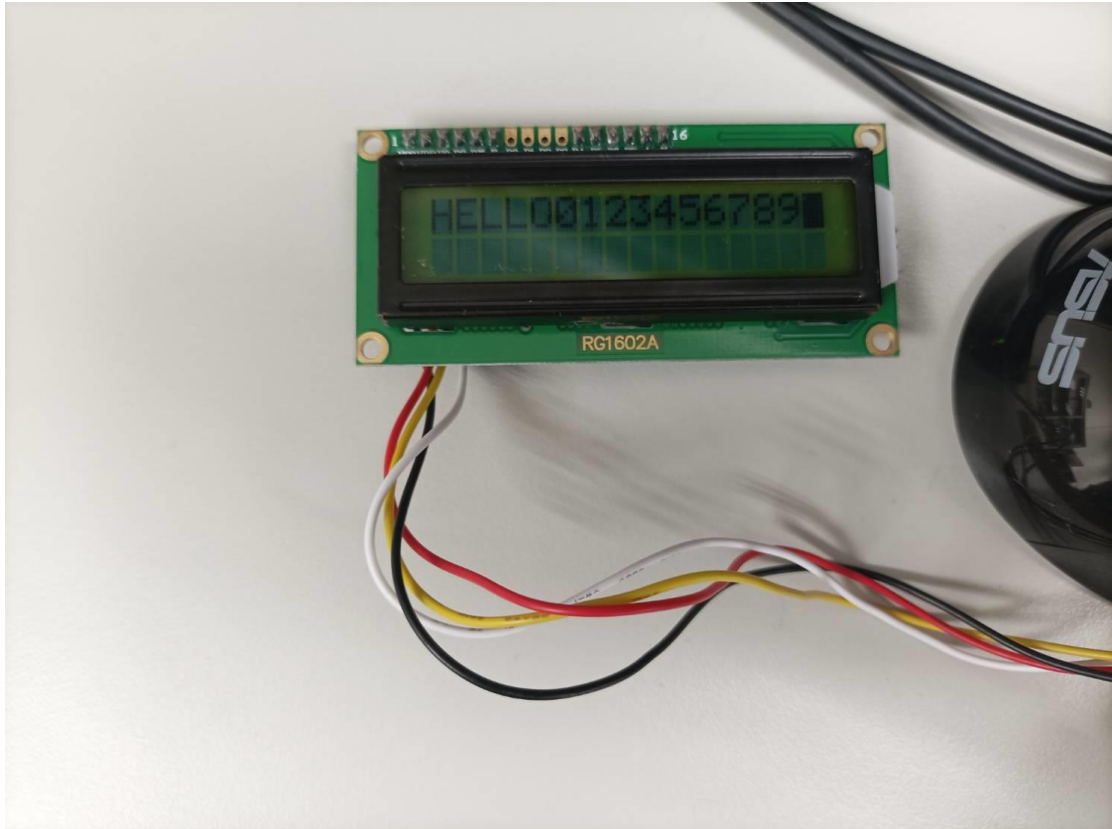
And here's result what we see from scope
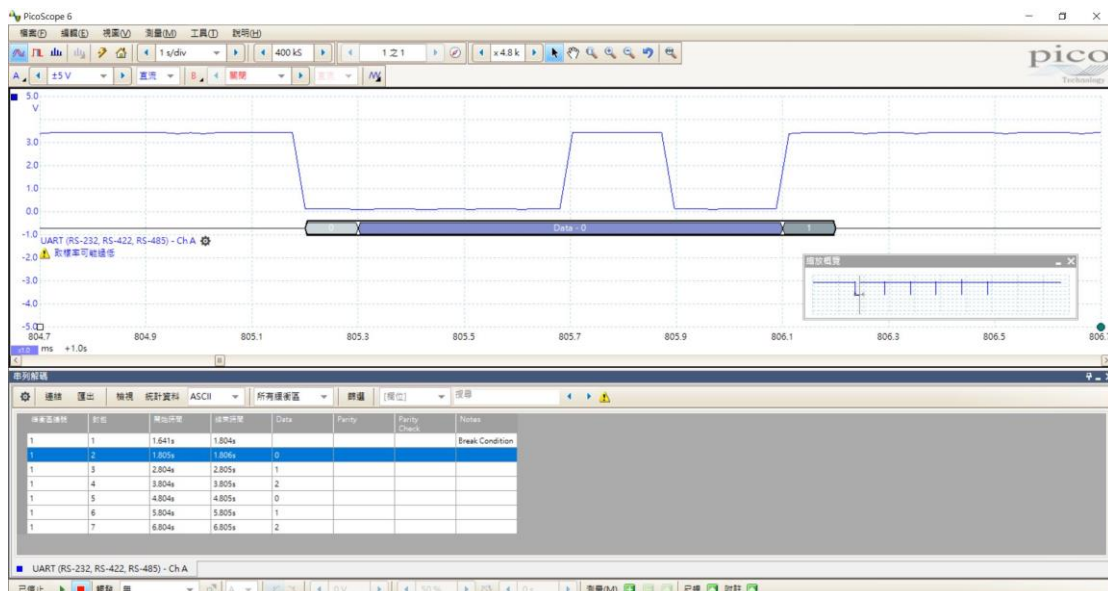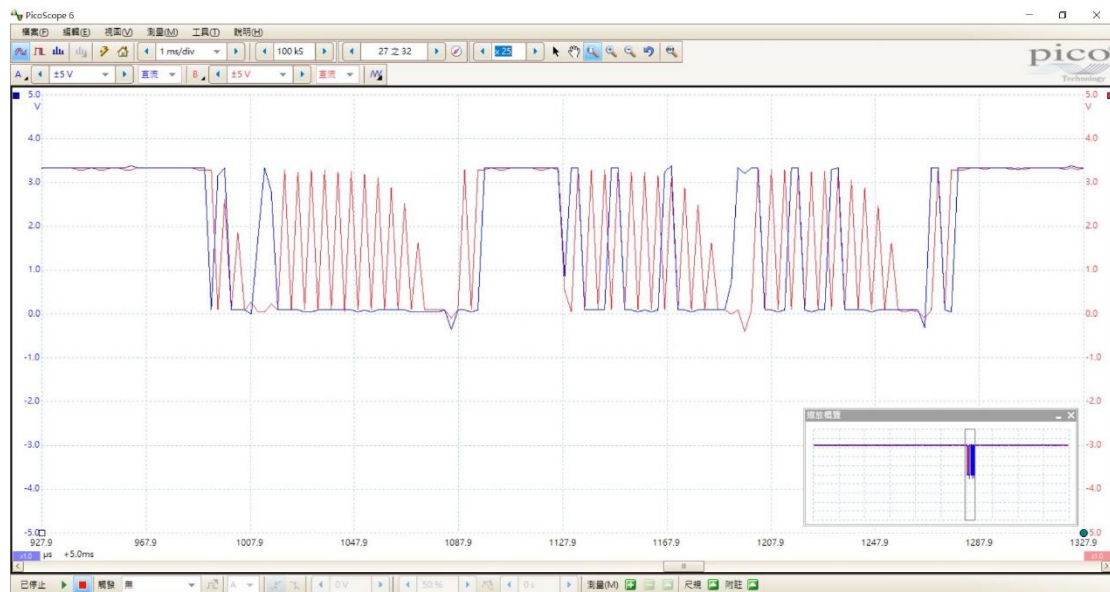
(3) Lab7_3 _textLCD_I2C

In this part we use I2C to manipulate LCD display, which use less pin that we used in lab5, quite convenient.

(4) Lab7_4_textLCD_Library

In this part we use I2C to manipulate LCD display but import other LCD library.

Maybe I should take some time to figure out function in library if we try to use it.

(5) <u>Lab7_5</u> <u>TMP102</u>

In this part we use TMP102, which is a temperature sensor with I2C interface. We also use scope to see the I2C signal.

```
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 128)
Temp = 25.500000.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
Temp code=(25, 112)
Temp = 25.437500.
```

(6) <u>Discussion</u>

Communication in Serial is quite convenient, but they are also difficult to apply and match with each other. I remember that when I use I2C protocol in Logic Design lab, I look for datasheet and figure out how it works, which took me quite a lot of time. But it's no doubt that serial communications do a lot of effort to nowadays tech. Also, I may take some time to read for documentation how to use I2C LCD library, I thinks it's kind of hard …