Lab2

Outline

▶ Target 1 – Set the BC20 module with AT command

▶ Target 2 – Send packet with AT command

▶ Target 3 – Read DHT22 sensor

▶ Homework

Target 1

▶ Connect BC20 with Arduino

▶ Check the module state

    ▶ Use Arduino to send AT command to BC20

    ▶ Com port setting hint: Baud rate: 9600 / NL & CR

    ▶ Enter "AT" and it should return "OK"
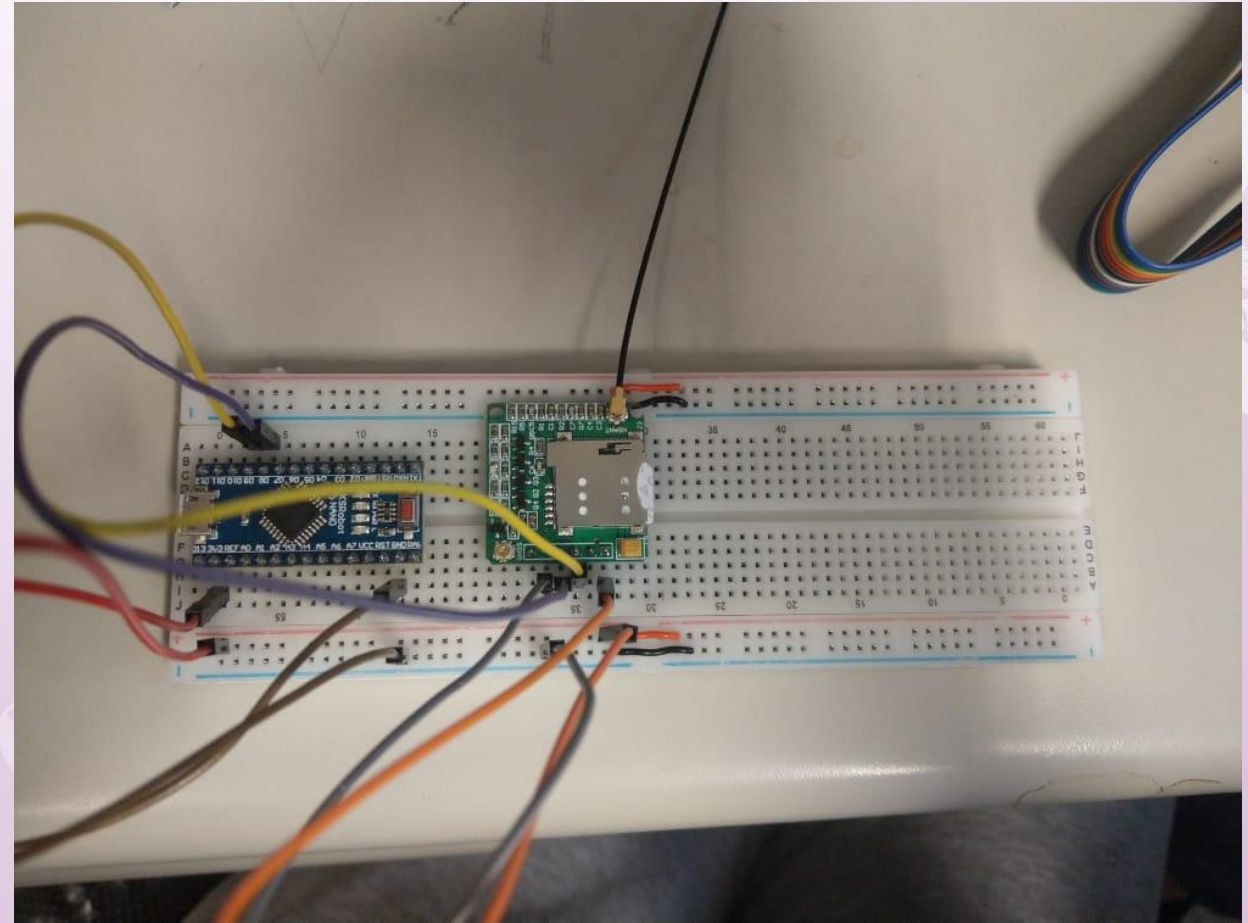
    ▶ Setup module parameters

    ▶ Check IMEI and IMSI

Target 1

▶ Attach the antenna

▶ Insert SIM card

    ▶ Follow the direction
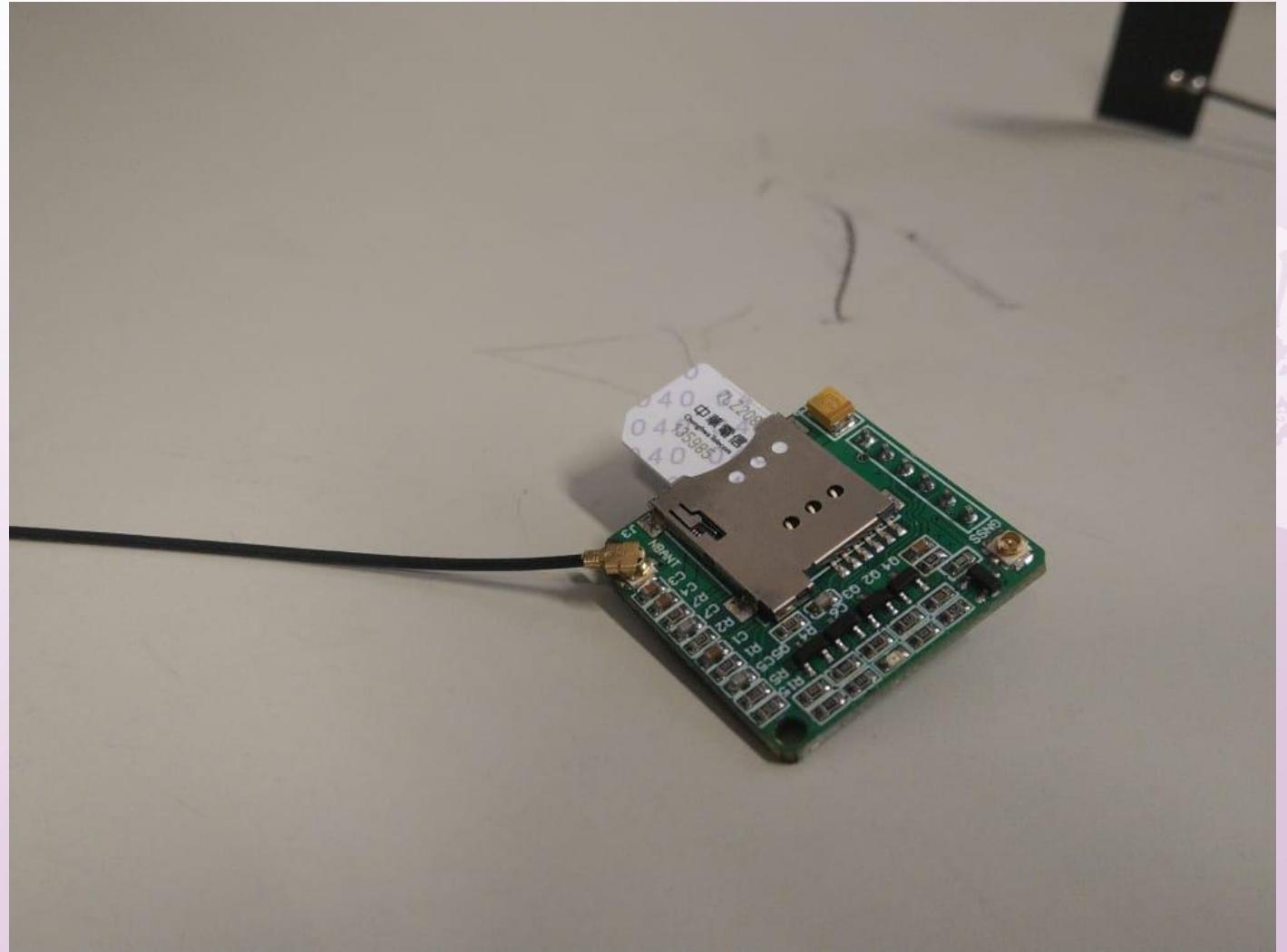
Target 1

► Wire to the board

 ► BC20 Tx to pin 8

 ► BC20 Rx to pin 9

 ► G to GND

 ► 3.3 to 3.3V

Target 1

► Code for Arduino

  ► Set your Tx, Rx pin.

  ► Tx should connect to Rx of BC20 and Rx should connect to Tx of BC20.

  ► Do not set the buadrate between Arduino and BC20 too high.

```cpp
#include <SoftwareSerial.h>

SoftwareSerial AT(8, 9); // Rx, Tx
char val;

void setup() {
  Serial.begin(9600);    // set buadrate between IDE and arduino
  Serial.println("AT is ready!");

  // set the buadrate of module
  // if NB-IoT 4553 set to 115200
  AT.begin(9600);
}


void loop() {
  // If receive messege from IDE, send it to module
  if (Serial.available()) {
    val = Serial.read();
    Serial.flush();
    AT.print(val);
  }

  // If receive messege from module, display on IDE
  if (AT.available()) {
    val = AT.read();
    Serial.print(val);
    Serial.flush();
  }
}
```

Target 1

▶ Format of AT command

  ▶ Dump available parameters: AT+<cmd>=?

  ▶ Dump current parameters: AT+<cmd>?

  ▶ Set parameters: AT+<cmd>=<p1> ,<p2>,<p3>…

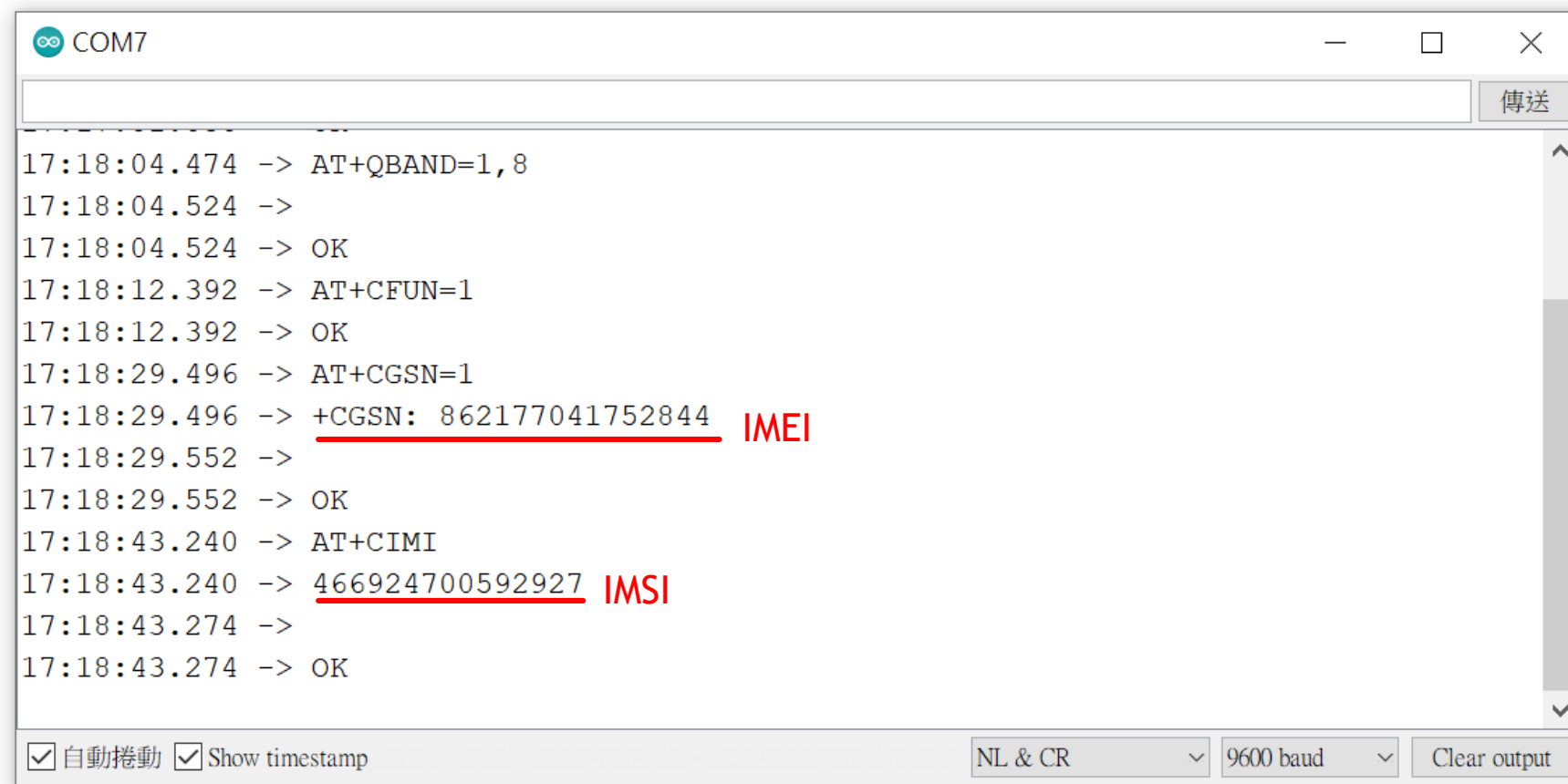*Do not add any space key between the words.

Target 1

*MT = Mobile Terminal

*CIMI can be used after enabled

Instruction	Usage
QSCLK	Set / Inquire MT sleep mode
QBAND	Set / Inquire bands
CFUN	Set / Inquire MT enabled status
CGSN	Inquire MT IMEI
CIMI	Inquire SIM card number(IMSI)
CSQ	Inquire signal quality *return value should not lower than 15

Target 1

Instruction	Usage
AT+QSCLK=0	Disable deep sleep
AT+QBAND=1,8	Set one band: 8
AT+CFUN=1	Enable the module
AT+CGSN=1	Inquire MT IMEI
AT+CIMI	Inquire SIM card number(IMSI)

Target 1

▶ Now, you can access the base station.

▶ The next target would guide you to sent packets with this module.

Target 2

▶ Transmit and receive data through **AT-CMD**

   ▶ **Enabled** NB module (See target 1)

   ▶ Set **IPV4 / IPV6** transmitting address

   ▶ **Attach to**(**Join**) NB network

   ▶ **Create** TCP Socket

   ▶ **Transmit** TCP data

   ▶ **Receive** TCP data

Target 2

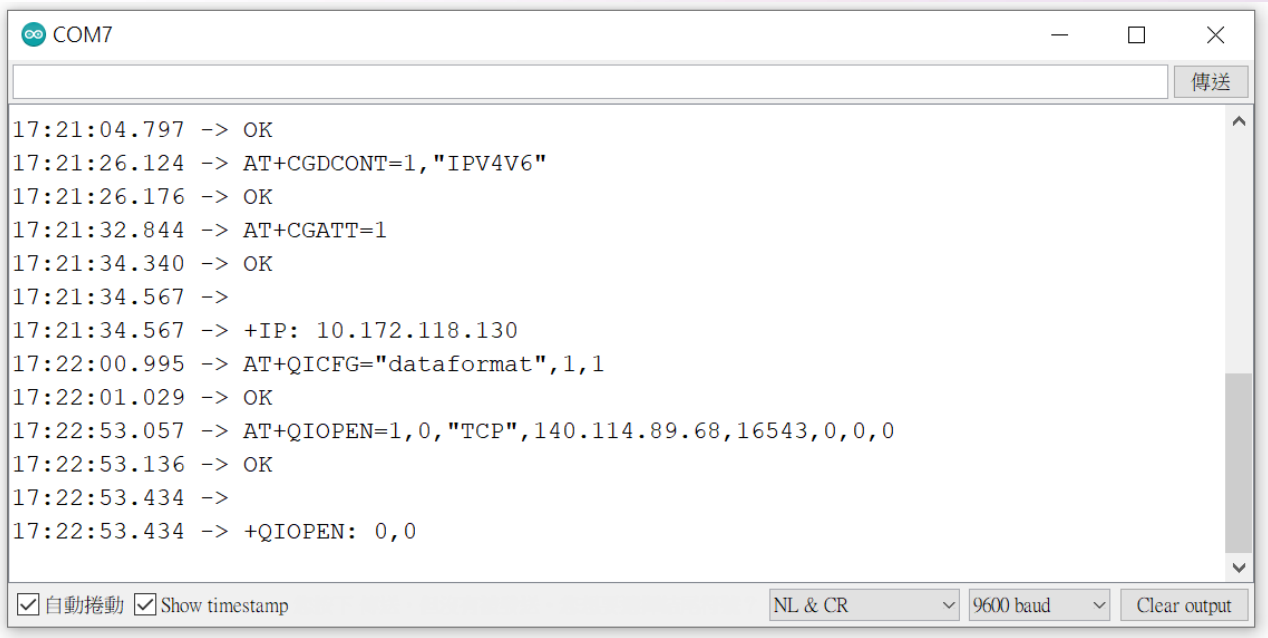| Instruction	Usage
CFUN	Set / Inquire MT enabled status
CGDCONT	Set / Inquire transmission type
CGATT	Set / Inquire MT attached status
QICFG	Set sending and receiving format

CGDCONT must be set before attaching to network

Target 2

Instruction	Usage
AT+CFUN=1	Enable Module
AT+CGATT=0	Detach to NB-IoT (recommend)
AT+CGDCONT=1,"IPV4V6"	Set IPV4/ IPV6
AT+CGATT=1	Attach to NB-IoT
AT+QICFG="dataformat",1,1	Set sending and receiving format to HEX

Target 2

Instruction	Usage
AT+QIOPEN=1,0,"TCP",<Addr/Domain Name>, <DstPort>,0,0,0	Create Socket

```
COM7                                               —   □   ×

                                                        傳送
17:21:04.797 -> OK
17:21:26.124 -> AT+CGDCONT=1,"IPV4V6"
17:21:26.176 -> OK
17:21:32.844 -> AT+CGATT=1
17:21:34.340 -> OK
17:21:34.567 ->
17:21:34.567 -> +IP: 10.172.118.130
17:22:00.995 -> AT+QICFG="dataformat",1,1
17:22:01.029 -> OK
17:22:53.057 -> AT+QIOPEN=1,0,"TCP",140.114.89.68,16543,0,0,0
17:22:53.136 -> OK
17:22:53.434 ->
17:22:53.434 -> +QIOPEN: 0,0

☑ 自動捲動  ☑ Show timestamp          NL & CR  ∨   9600 baud  ∨   Clear output
```
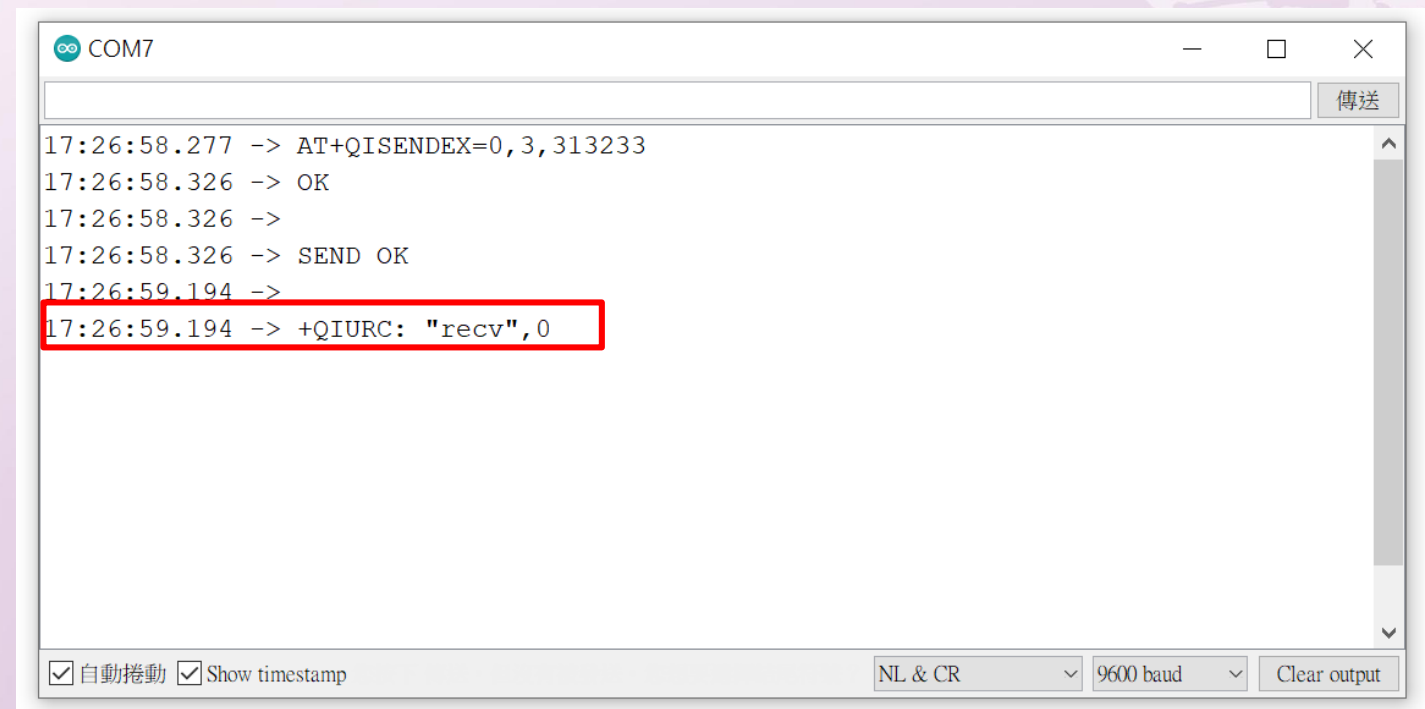
Addr → 140.114.89.68 (TCP address)
DstPort → 16543 (TCP Port)

Target 2

Instruction	Usage
AT+QISENDEX = 0,<length>,<data>	Send data to TCP

length → data length (in bytes)
data → content (Hex String)

AT+QISENDEX=0,3,313233
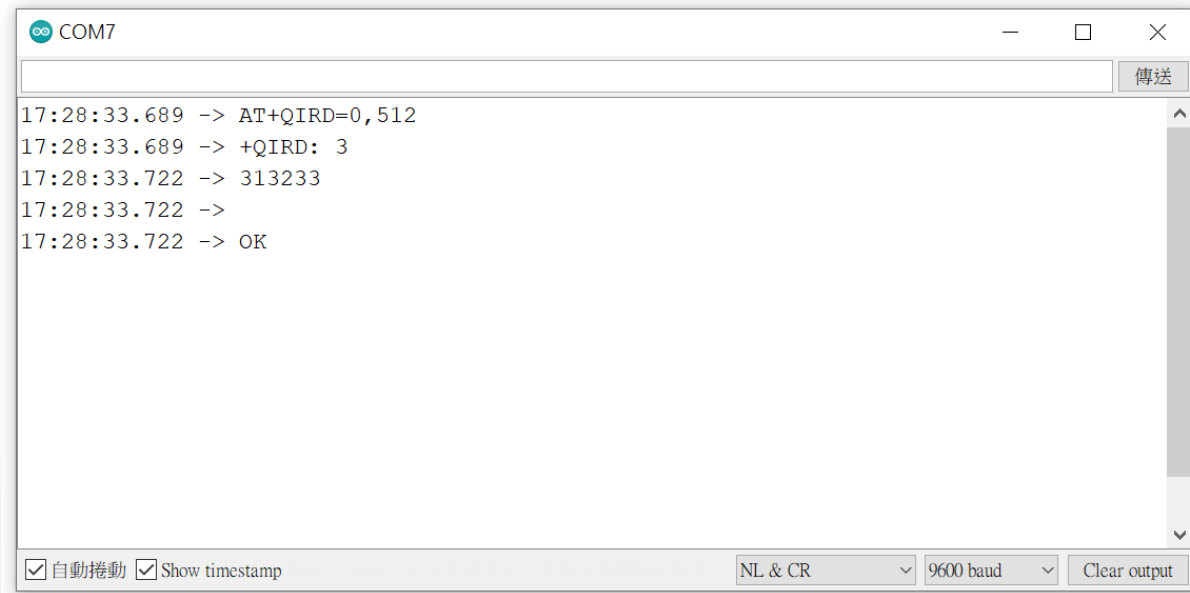Send "313233"(Hex) to Server


```
COM7

17:26:58.277 -> AT+QISENDEX=0,3,313233
17:26:58.326 -> OK
17:26:58.326 ->
17:26:58.326 -> SEND OK
17:26:59.194 ->
17:26:59.194 -> +QIURC: "recv",0

自動捲動  Show timestamp          NL & CR    9600 baud    Clear output
```

Target 2

Instruction	Usage
AT+QIRD=0, <Len>	Receive data from TCP

Len → assign reading data lengths (in bytes) maximum = 512


```
17:28:33.689 -> AT+QIRD=0,512
17:28:33.689 -> +QIRD: 3
17:28:33.722 -> 313233
17:28:33.722 ->
17:28:33.722 -> OK
```
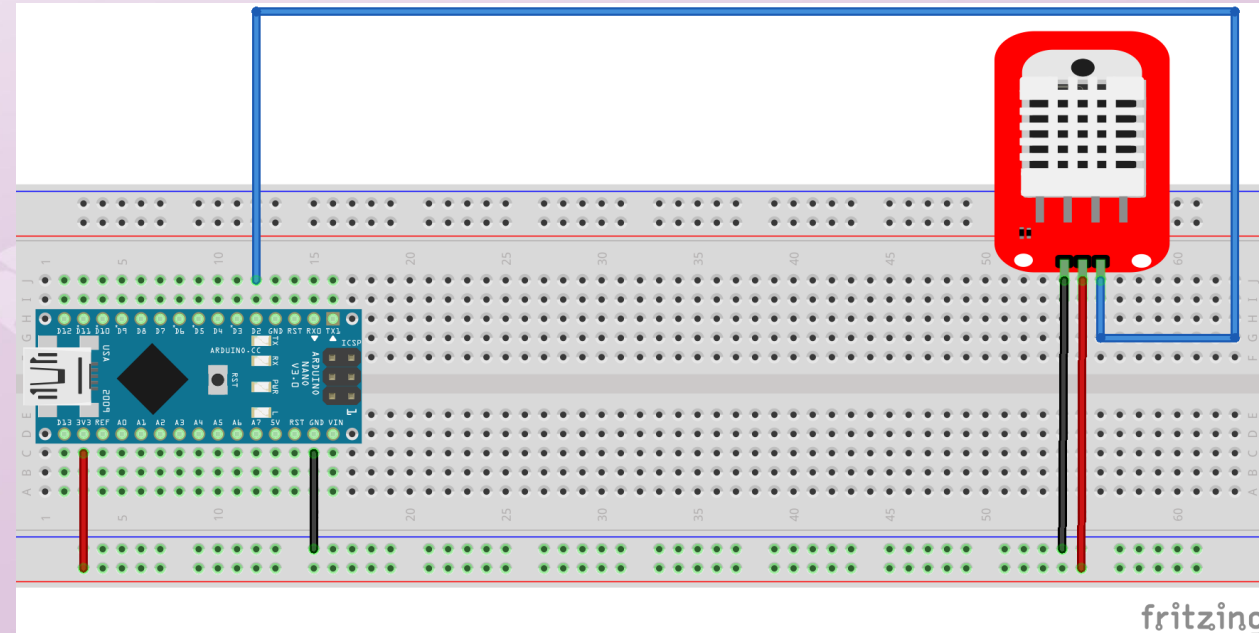
Target 2

▶ **Lab**

  ▶ Send the hex number to 140.114.89.68:16543

  ▶ Receive the data from the TCP Server

  ▶ Find the relationship between sent and received messages

Target 3

▶ Sense environment temperature and humidity

    ▶ Wiring

    ▶ Install library

    ▶ Show result on IDE
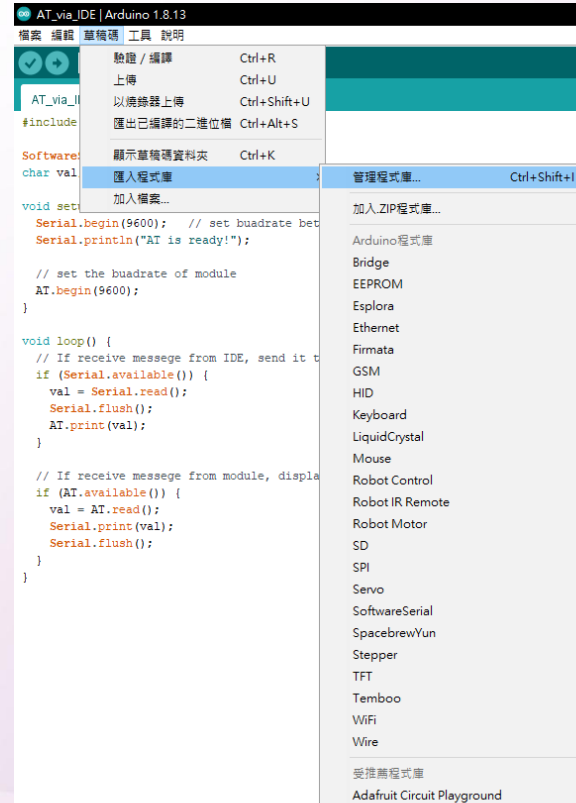
Target 3

► Wire the DHT sensor to the board

  ► + (or VCC) to the 3.3v.

  ► - (or GND) to the GND.

  ► Out (or DATA) to the pin you would like to read.

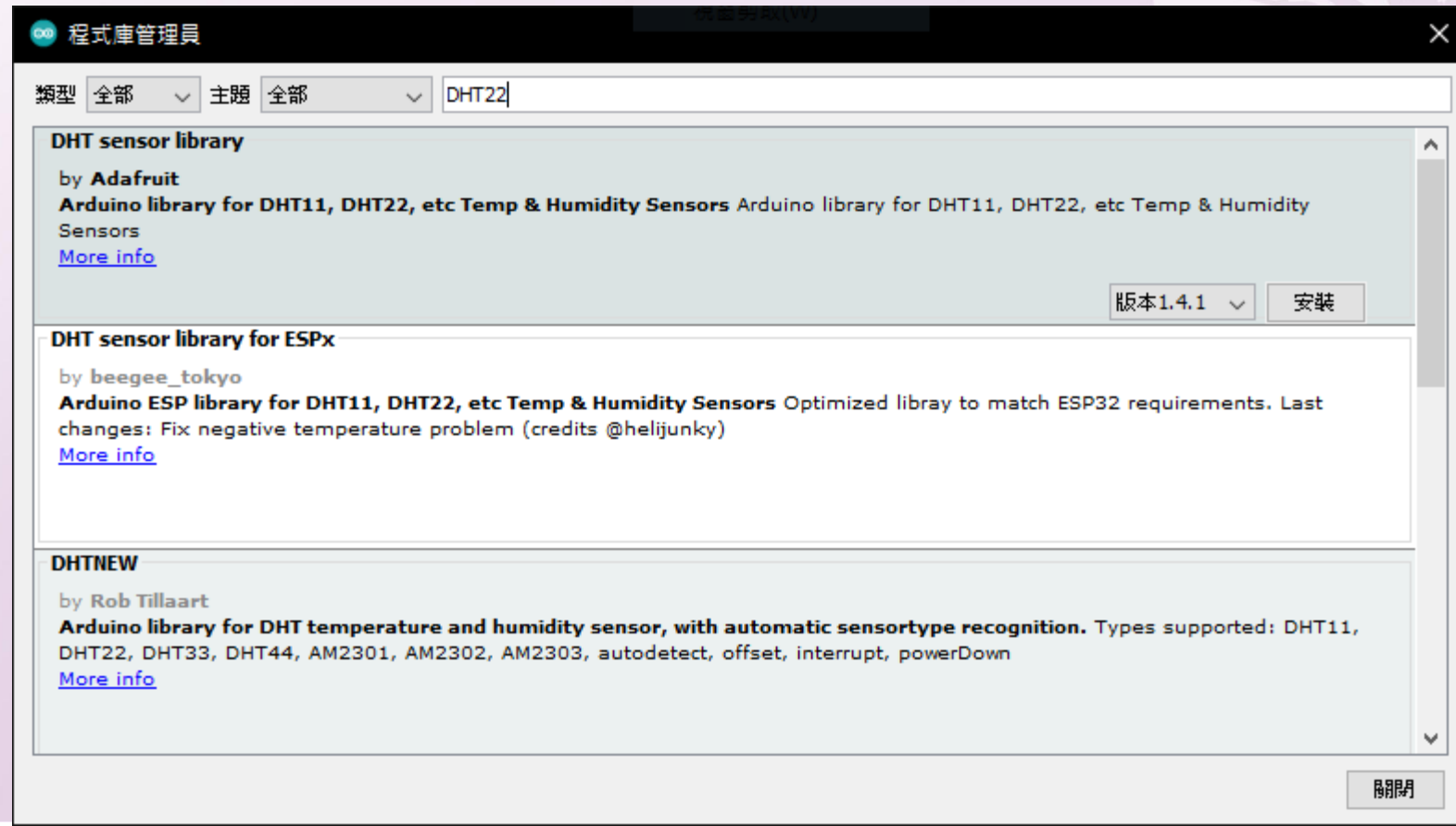 ► Note that some of you may get sensor with different pin order from the graph.

Target 3

▶ Sketch -> include library->manage libraries

Target 3

▶ Search for "DHT22".

▶ Install the DHT sensor library.
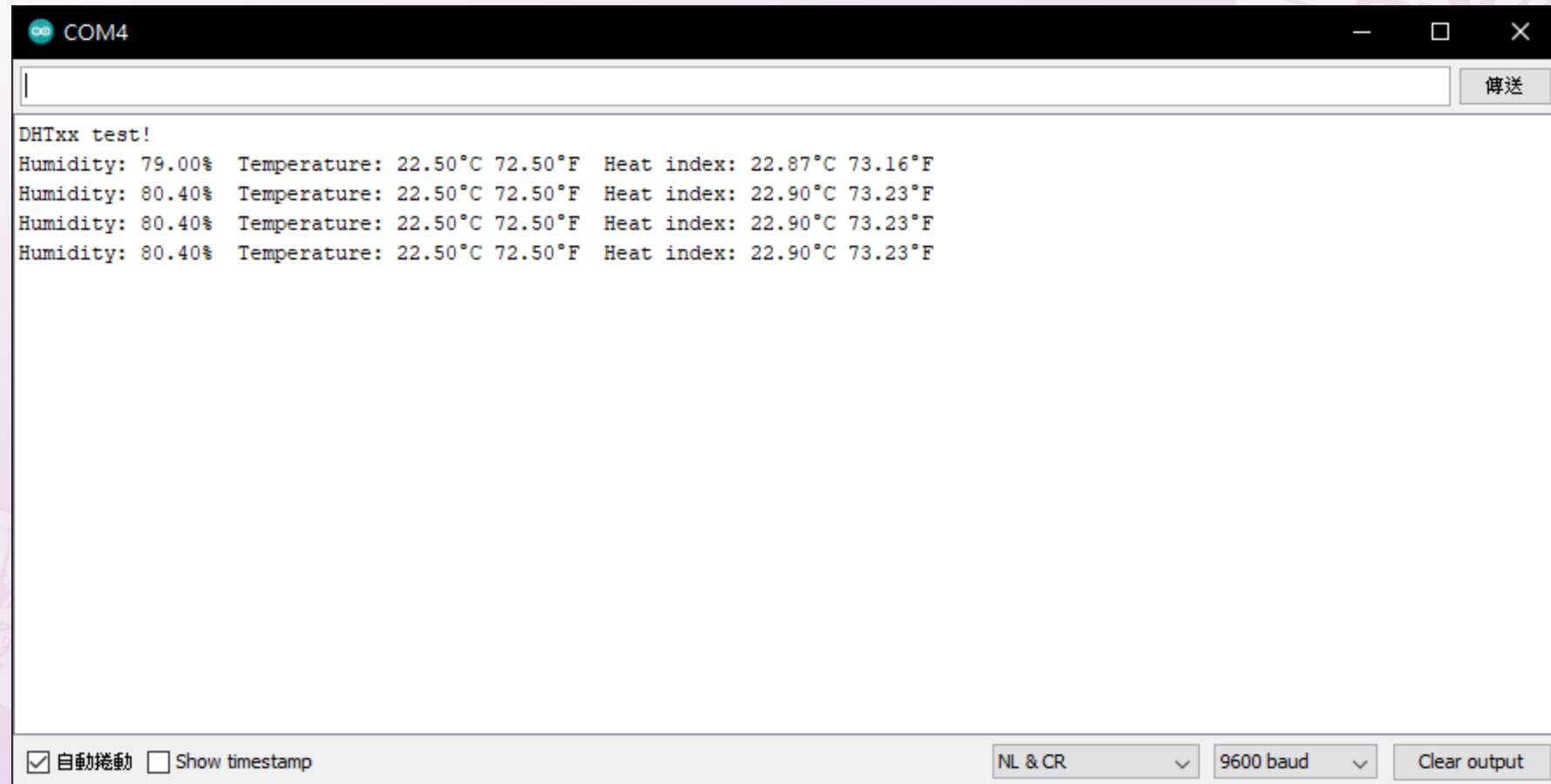
▶ Select install all if asked for Adafruit Unified Sensor.

Target 3

▶ Open example file

    ▶ File -> Example -> DHT Sensor Library -> DHTtester

    ▶ And you will see the result like:

Homework

► Combine labs above

► Auto config, sense DHT value, and send to server (All by code no typing is needed)

► HOST

  ► 140.114.89.68

► PORT

  ► 16542

► Payload format

  ► StudentID,temperature,humidity

  ► Ex: 108065536,27.4,65.5

Homework

▶ If transmission done you will receive OK from server.(Check with QIRD).

▶ Go to 140.114.89.68/lab2/ID.html to check

    ▶ Ex: 140.114.89.68/lab2/108065536.html

Student ID: 108065536
Temprature: 26.7°C
Humidity: 76.4%
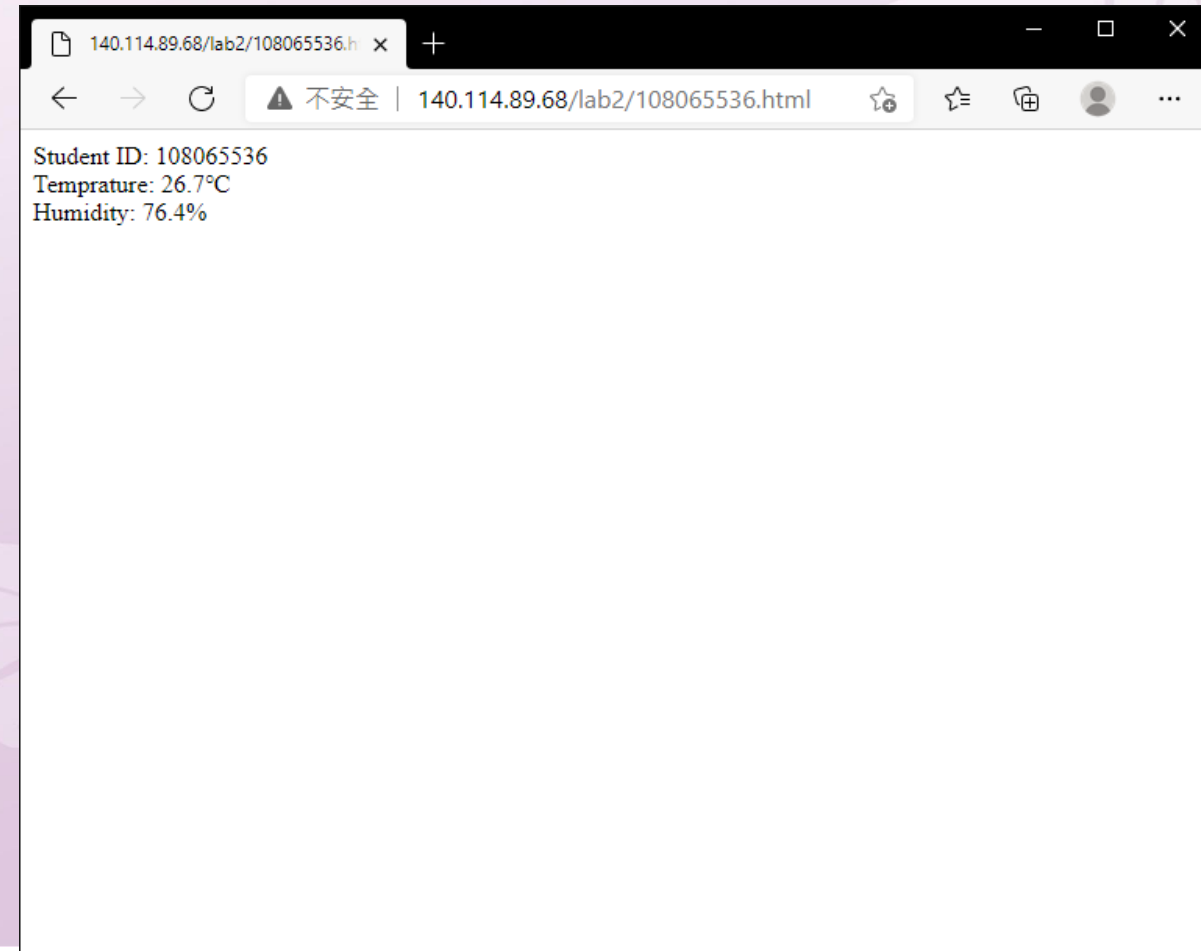
Homework

► Hint:

- ► You may need some waiting time for response from base station or server.

- ► Encode and decode with hex.

- ► Follow the payload format.(Otherwise, you'll get error response from server.)

- ► Feel free to ask question on elearn.

Ref.

- Quectel_BC26&BC20&BC030x系列_AT命令手冊_V1.0.pdf

- https://www.quectel.com/UploadImage/Downlad/Quectel_BC26&BC20_TCP%28IP%29_AT命令手冊_V1.0.pdf