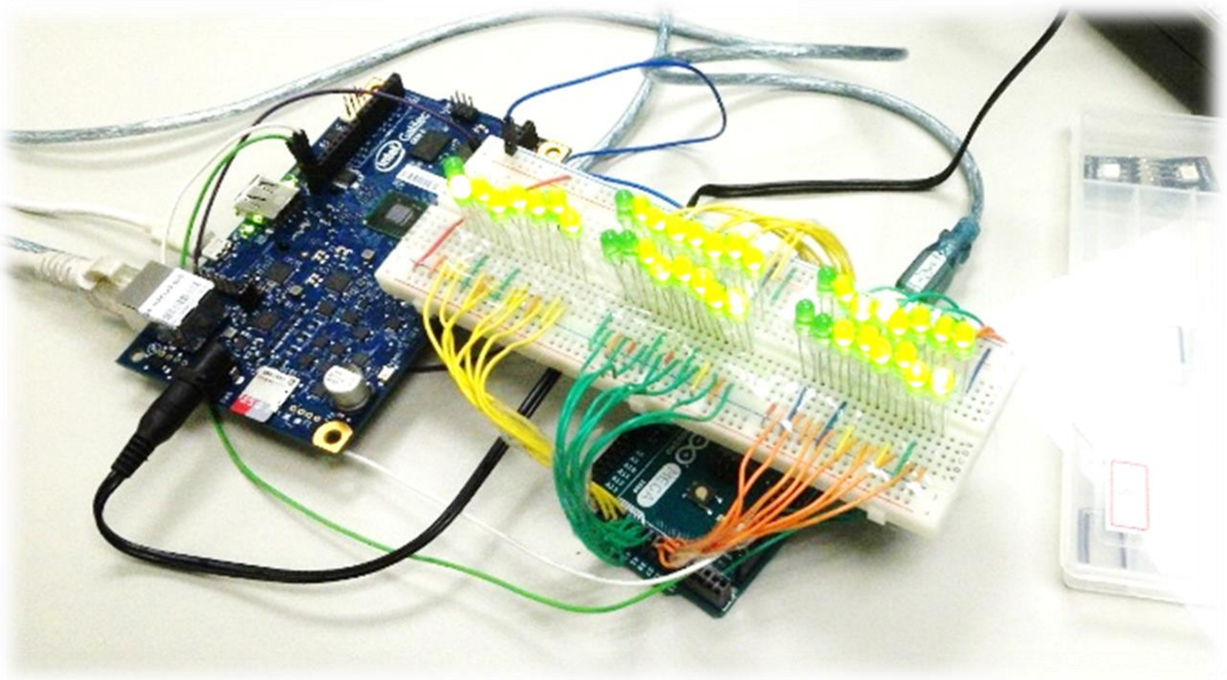


NASA final project #15

NA--LED 實體監測系統

B03902024 資工一 鄭筱樺

B03902108 資工一 盧承億

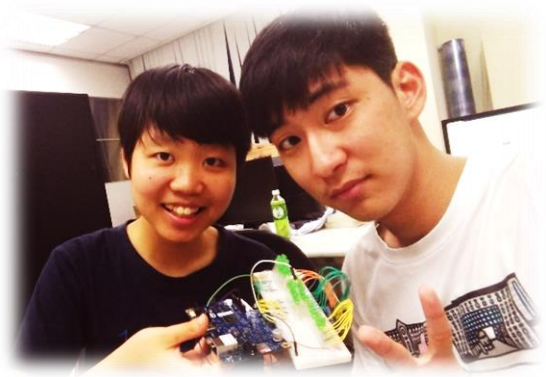
B03902122 資工一 方家豐

2015-06-15

◆ Content

Member and distribution of tasks:

- B03902024 資工一 鄭筱樺
  Work: read write SD card + transmit data + report
- B03902108 資工一 盧承億
  Work: mapping ping time + wire library + led display
- B03902122 資工一 方家豐
  Work: Internet and telnet + solve problems



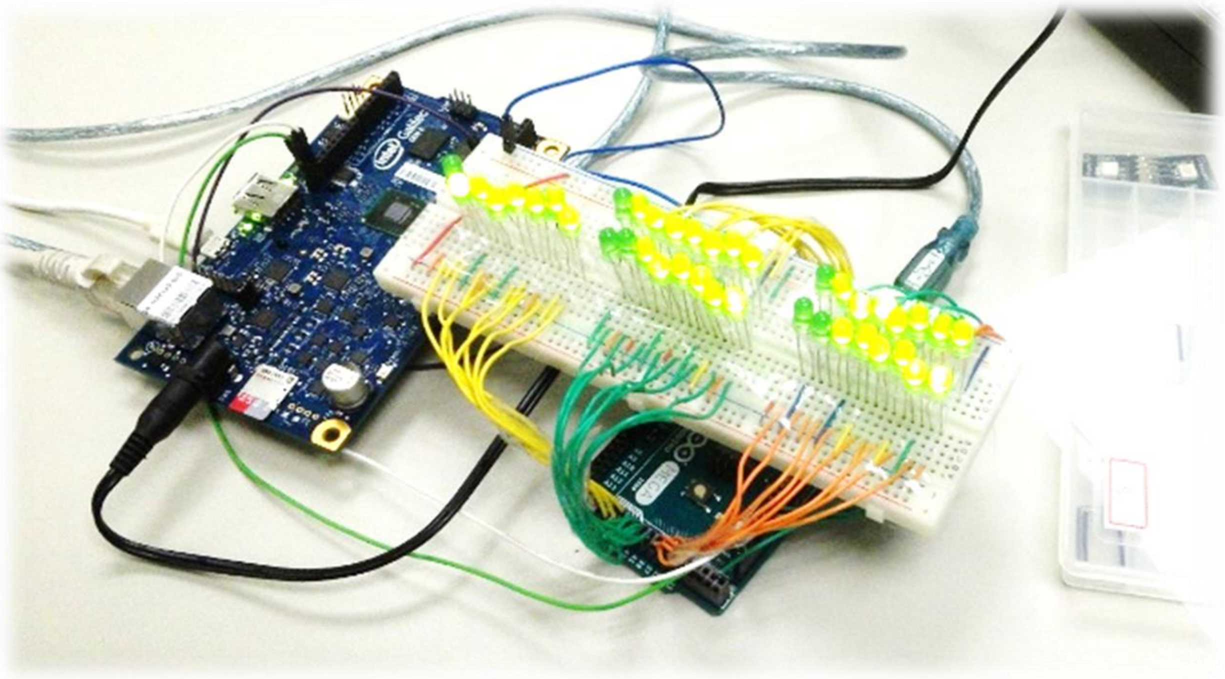
Aim:

- Use ping time to determine the flowing of the internet for each device and display it by LEDs.

Materials:

- Arduino Galileo + SD card
- Arduino Mega
- Breadboard
- LED
- Wire

◆ Display



1. The Arduino on the left is Galileo. It’s the one we use to connect to the internet and ping the workstations.

2. The Arduino under the breadboard is MEGA. We use its ports with wires to connect to our LEDs.

3. We use eight LEDs to represent the flowing of internet of each CSIE workstation. We choose five workstations, which are workstation 1, 4, 7, 10 and 13. Therefore, there are totally forty LEDs. If Galileo doesn’t connect to the internet or fail to connect, then it won’t ping any workstations and the first LED will blink.

◆ Problems and solutions:

1. Arduino Uno doesn’t have an Ethernet shield.
   Use Galileo, another Arduino which has an Ethernet shield, and Ethernet library.

2. How to get the result from Linux command in Galileo?
   Telnet to inside of MEGA, but fail.
   Instead, we use file library and SD card.

3. The ports on Galileo is not enough.
   Use peggy2 from evil mad scientist, but fail.
   Instead, we use Mega, another Arduino which has more ports.

4. How to transmit data between two Arduinos?
   Use RX TX, but fail.
   Instead, we use wire library with SCL and SDA.

5. Galileo make errors often.
   Our solution is to cut off the power and reboot it.

◆ Discover:

1. In Arduino IDE, we can’t cd to the folders under root. In other words, we are always at the root.

2. Linux command in Arduino IDE

```
system ("……");
```

3. In Linux command, we use the following command to print to the screen

```
…… > /dev/ttyGS0
```

4. In Linux command, we use the following command to print to SD card

```
…… > /media/mmcblk0p1
```

   - we find this route from the following command

```
find / -name [filename]
```

◆ How to make it?

Internet:

- Code

```
//Set the MAC address(get this from the sticker on the Ethernet shield)
byte mac[] = { 0x98, 0x4F, 0xEE, 0x01, 0x9D, 0xEA };

//Active eth0 and setup ip address by DHCP
system("ifdown eth0");
system("ifup eth0");
```

Ping (write to SD card):

- Code

```
system("ping -c 5 140.112.30.36 | awk 'NR>=2 && NR<=6 {print $7}' | cut -d '=' -f2 >
/media/mmcblk0p1/result.txt");
```

Read from a file in SD card

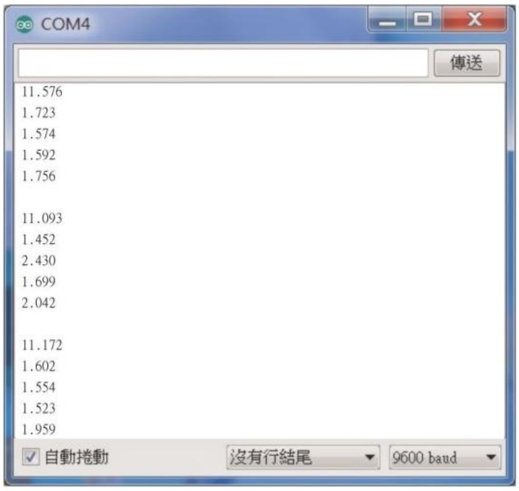
- Code

```
//open
myFile = SD.open("result.txt");
if (myFile) {
// read from the file
while (myFile.available()) {
            resultT[i][j] = myFile.parseFloat();
            j++; }
// close the file:
myFile.close(); }
```

Map ping time to number of led

We ping 5 workstations and the flow of each workstation is displayed by 8 LEDs. The first ping time is always much longer than the other four, so we neglect it.

Considering the second to fifth ping time, we calculate the root-mean-square deviation (donated by S) of these four numbers and do the following operation to produce the number of LED.

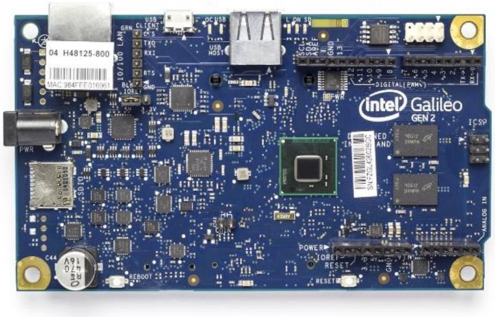


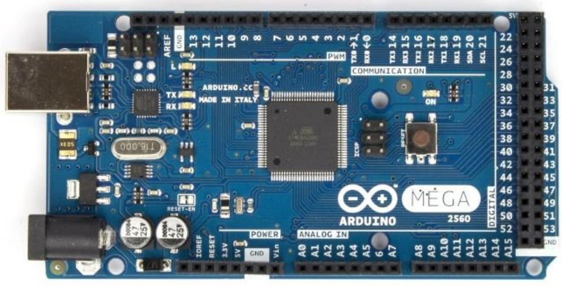
```
11.576
1.723
1.574
1.592
1.756

11.093
1.452
2.430
1.699
2.042

11.172
1.602
1.554
1.523
1.959
```

☑ 自動捲動 沒有行結尾 9600 baud

```
LED_NUM = 9 – int ( (S -3.8) * 4 + 7 )
```

Transmit data to Mega by wire





- Use wires to link the following ports(from Galileo to MEGA):

  SCL <-> SCL

  SDA <-> SDA

  Ground <-> Ground

- Code:

```
void setup(){
        Wire.begin(); // join i2c bus (address optional for master)
}
void loop() {
        Wire.beginTransmission(4); // transmit to device #4
        Wire.write(ans);
        Wire.endTransmission();     // stop transmitting
}
```

Receive data (in Mega)

- Code:

```
void setup(){
        Wire.begin(4);                  // join i2c bus with address #4
        Wire.onReceive(receiveEvent); // register event
}
void receiveEvent(int howMany)
{
        ans = Wire.read();
}
```

Make led bright

- Code

```
void setup(){
     pinMode(7, OUTPUT);
}
digitalWrite(7, HIGH);
digitalWrite(7, LOW);
```

◆ Put into practice

This can be an useful product. We can put it in the office of the network administrator. After setting the ip address we want to keep track of, we can just sit next to it and see the changes of the internet flow and will discover which internet is disconnected and which one becomes slower because of huge internet flow.