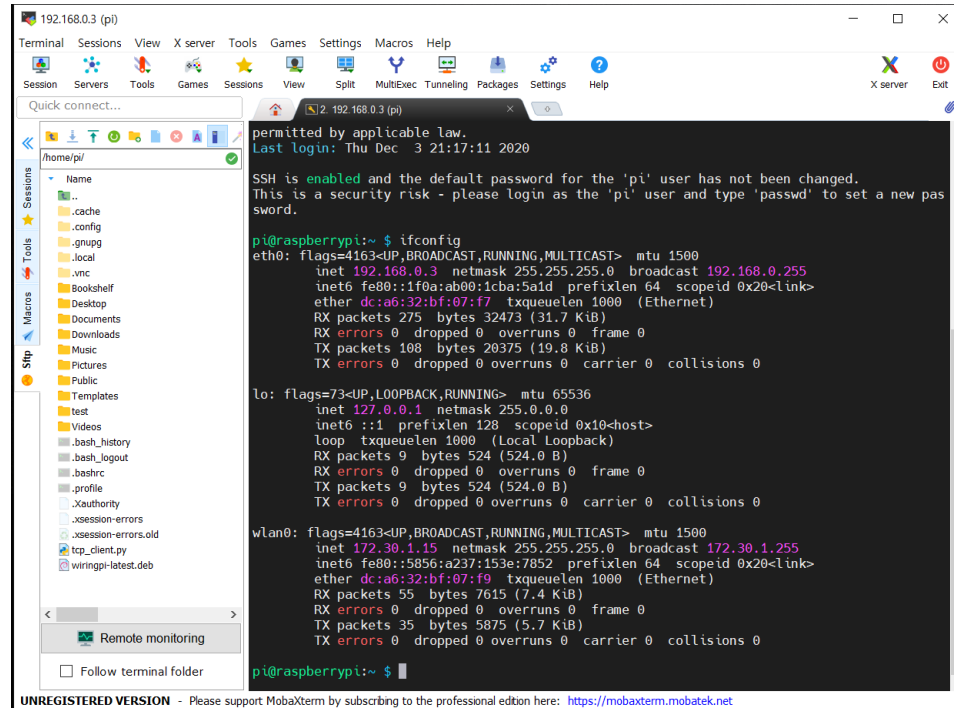


# 지능형 IoT 네트워크

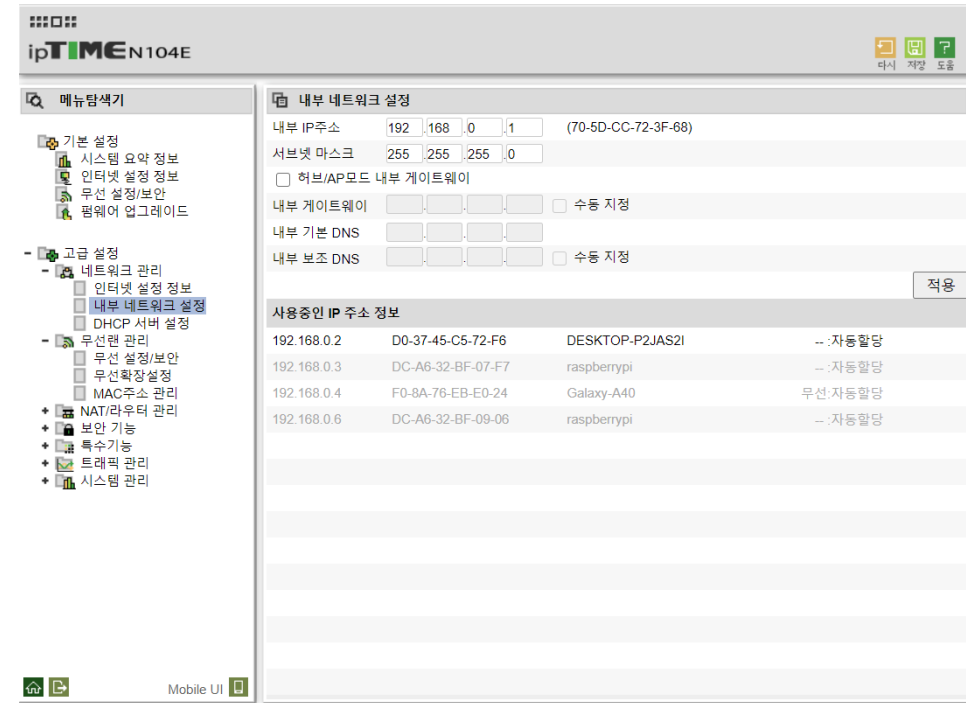
기말과제제출

제출자 : 안건호

# >> 1주차 실습

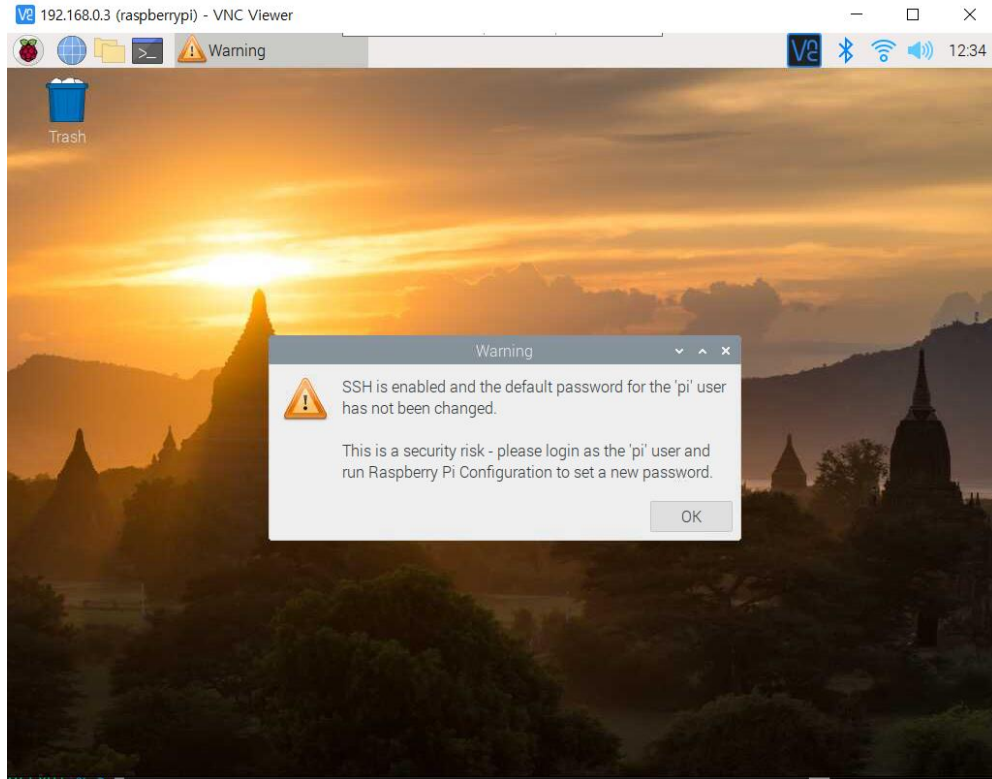


## 1) MobaXterm 설치 및 실행

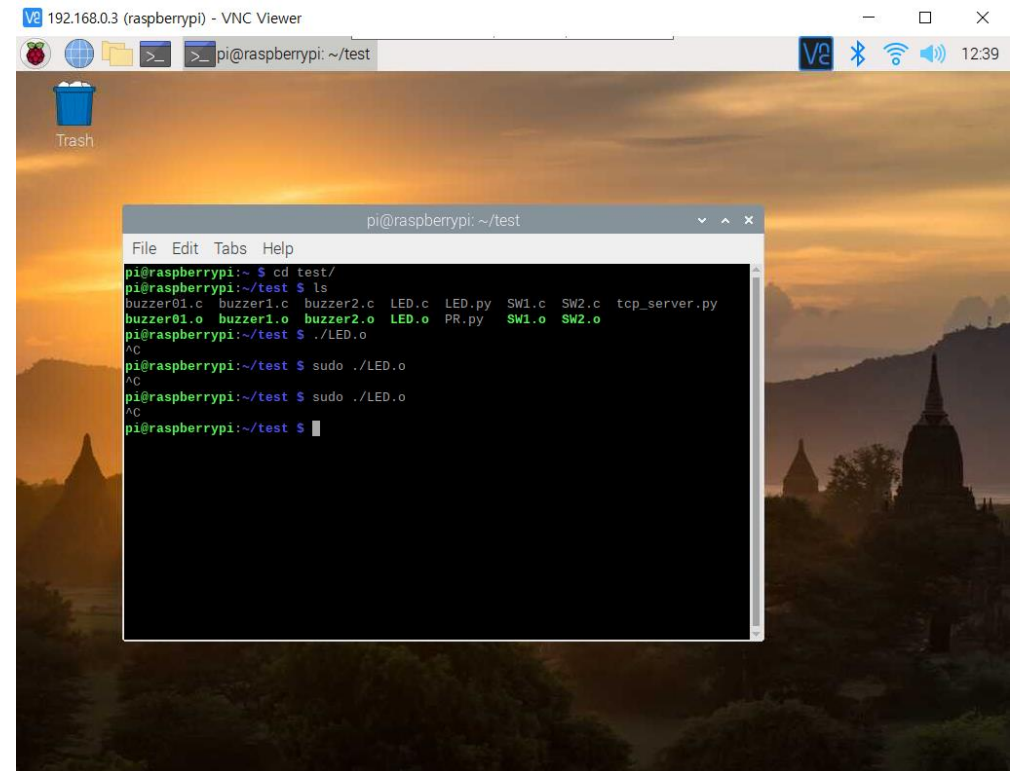


## 2) IPTIME 연결 및 라즈베리파이 설치

# >> 2주차 실습



1) VNC Viewer 설치



2) LED.c 실습

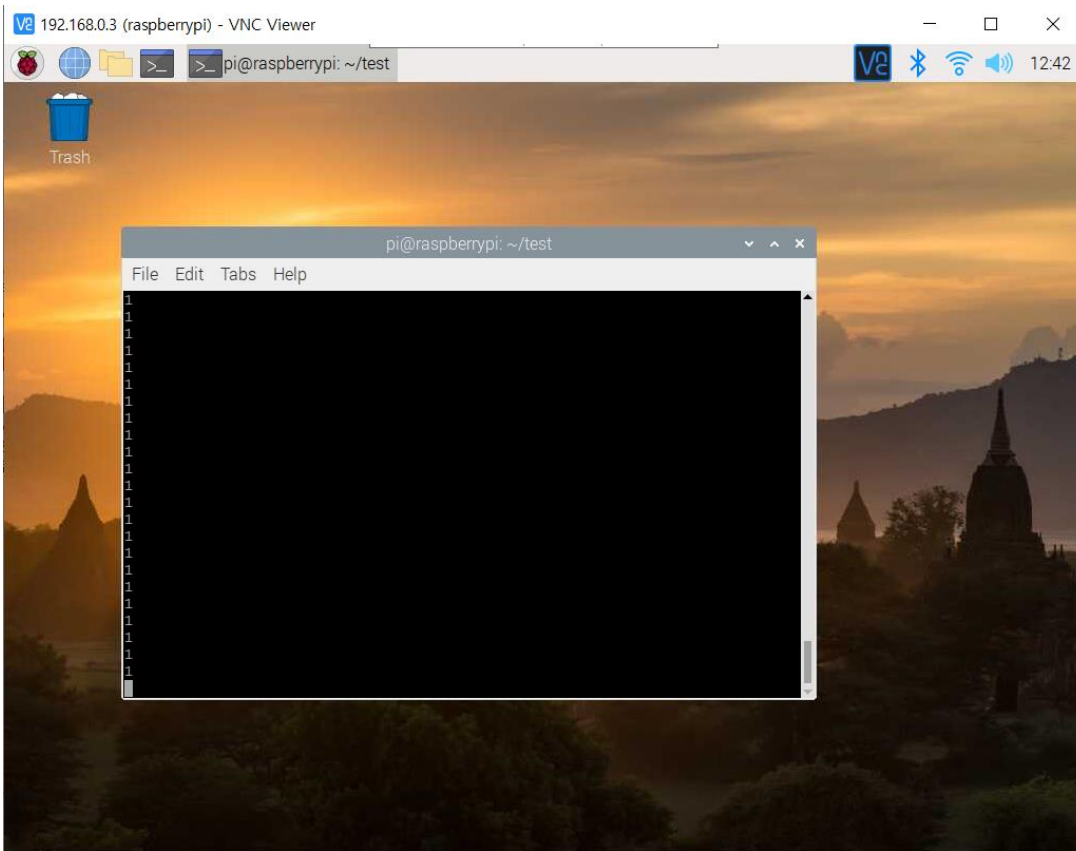


## » 2주차 실습

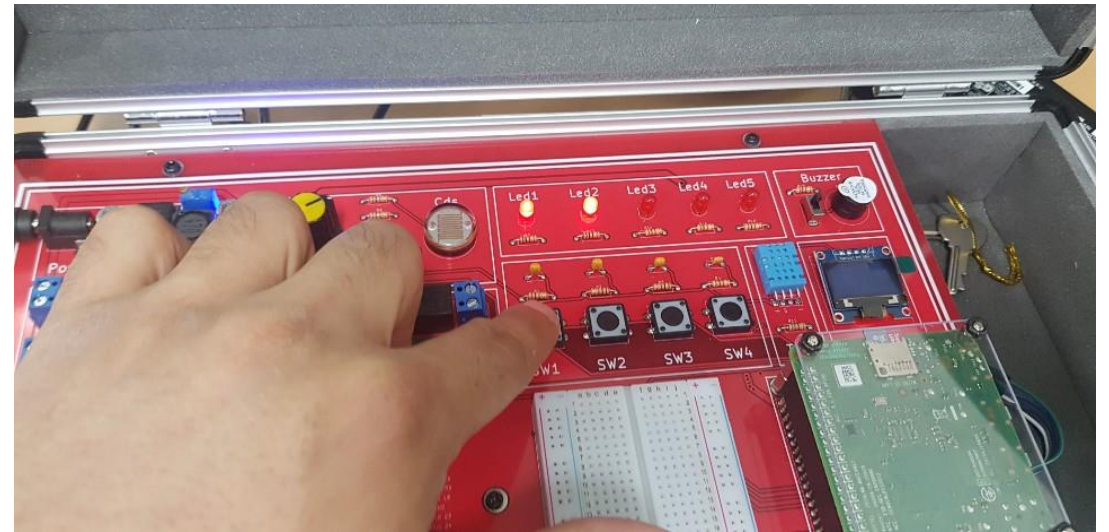


1) LED.c 결과

# >> 3주차 실습

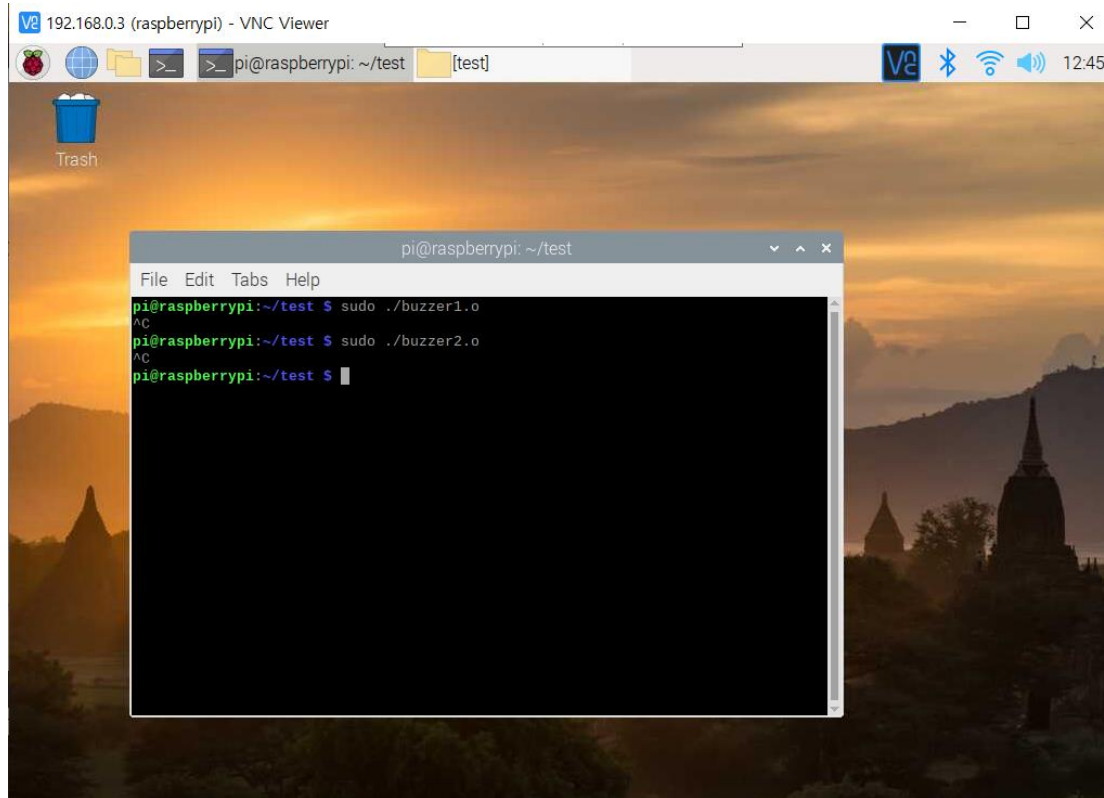


1) SW1.c 결과



2) SW2.c 결과

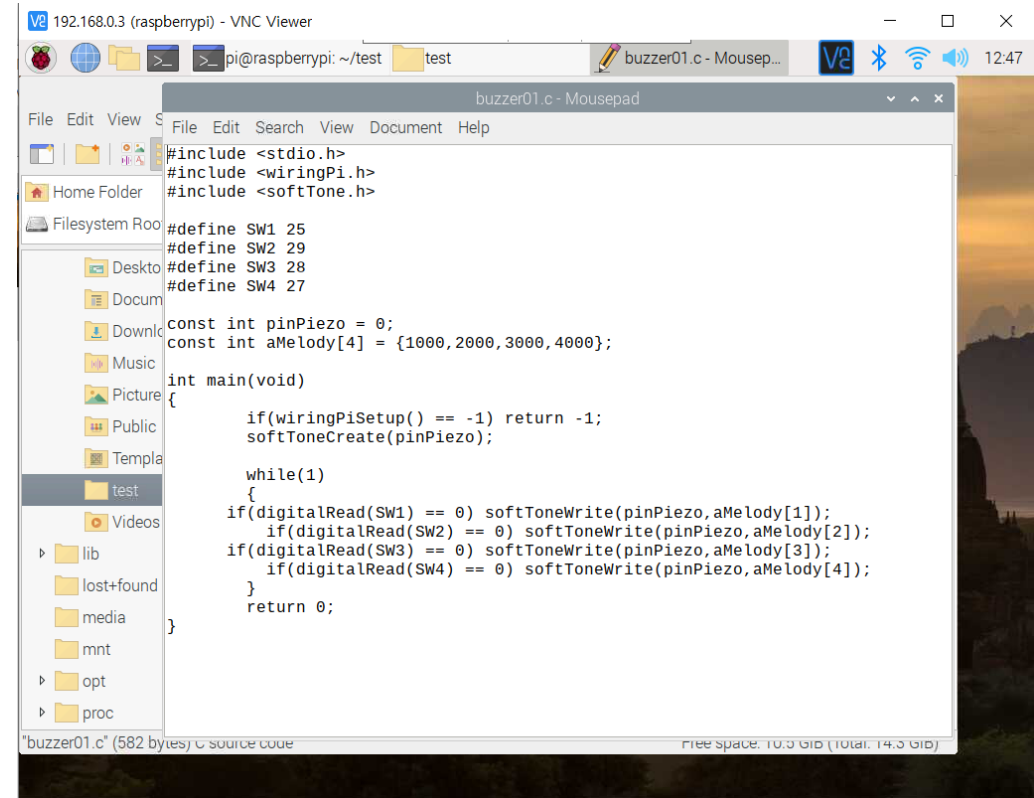
# >> 3주차 실습



192.168.0.3 (raspberrypi) - VNC Viewer

```
pi@raspberrypi: ~/test [test]
pi@raspberrypi: ~/test
File Edit Tabs Help
pi@raspberrypi:~/test $ sudo ./buzzer1.o
AC
pi@raspberrypi:~/test $ sudo ./buzzer2.o
AC
pi@raspberrypi:~/test $
```

1) buzzer1~2.c



192.168.0.3 (raspberrypi) - VNC Viewer

```
buzzer01.c - Mousepad
File Edit Search View Document Help
#include <stdio.h>
#include <wiringPi.h>
#include <softTone.h>

#define SW1 25
#define SW2 29
#define SW3 28
#define SW4 27

const int pinPiezo = 0;
const int aMelody[4] = {1000, 2000, 3000, 4000};

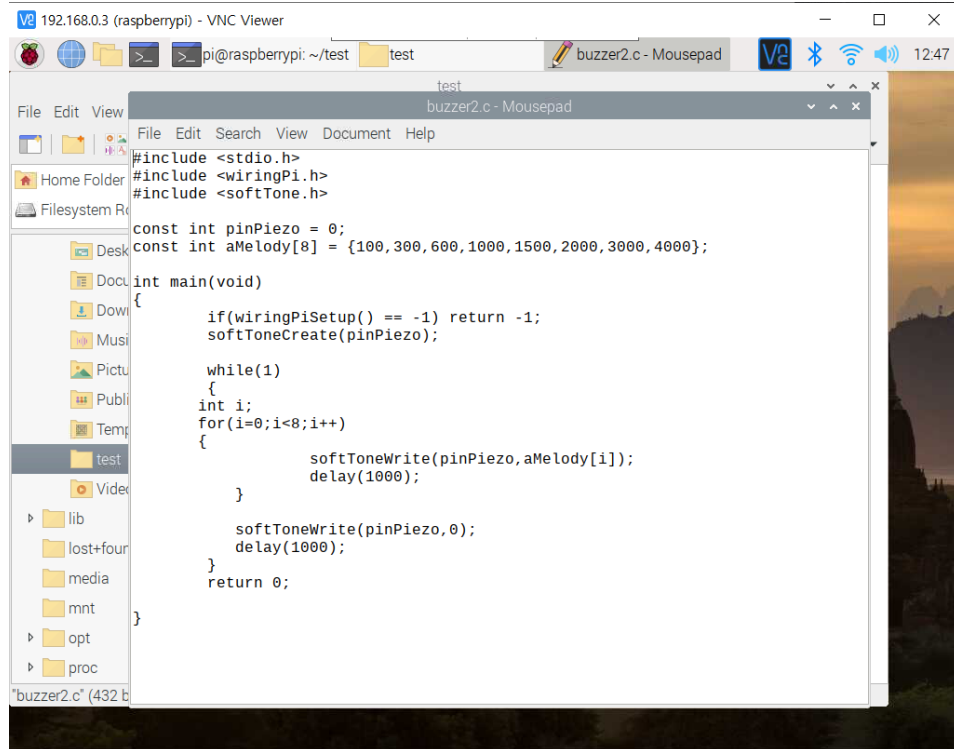
int main(void)
{
    if(wiringPiSetup() == -1) return -1;
    softToneCreate(pinPiezo);

    while(1)
    {
        if(digitalRead(SW1) == 0) softToneWrite(pinPiezo, aMelody[1]);
        if(digitalRead(SW2) == 0) softToneWrite(pinPiezo, aMelody[2]);
        if(digitalRead(SW3) == 0) softToneWrite(pinPiezo, aMelody[3]);
        if(digitalRead(SW4) == 0) softToneWrite(pinPiezo, aMelody[4]);
    }
    return 0;
}
```

"buzzer01.c" (582 bytes) C source code

2) buzzer1.c

# >> 3주차 실습



```
#include <stdio.h>
#include <wiringPi.h>
#include <softTone.h>

const int pinPiezo = 0;
const int aMelody[8] = {100, 300, 600, 1000, 1500, 2000, 3000, 4000};

int main(void)
{
    if(wiringPiSetup() == -1) return -1;
    softToneCreate(pinPiezo);

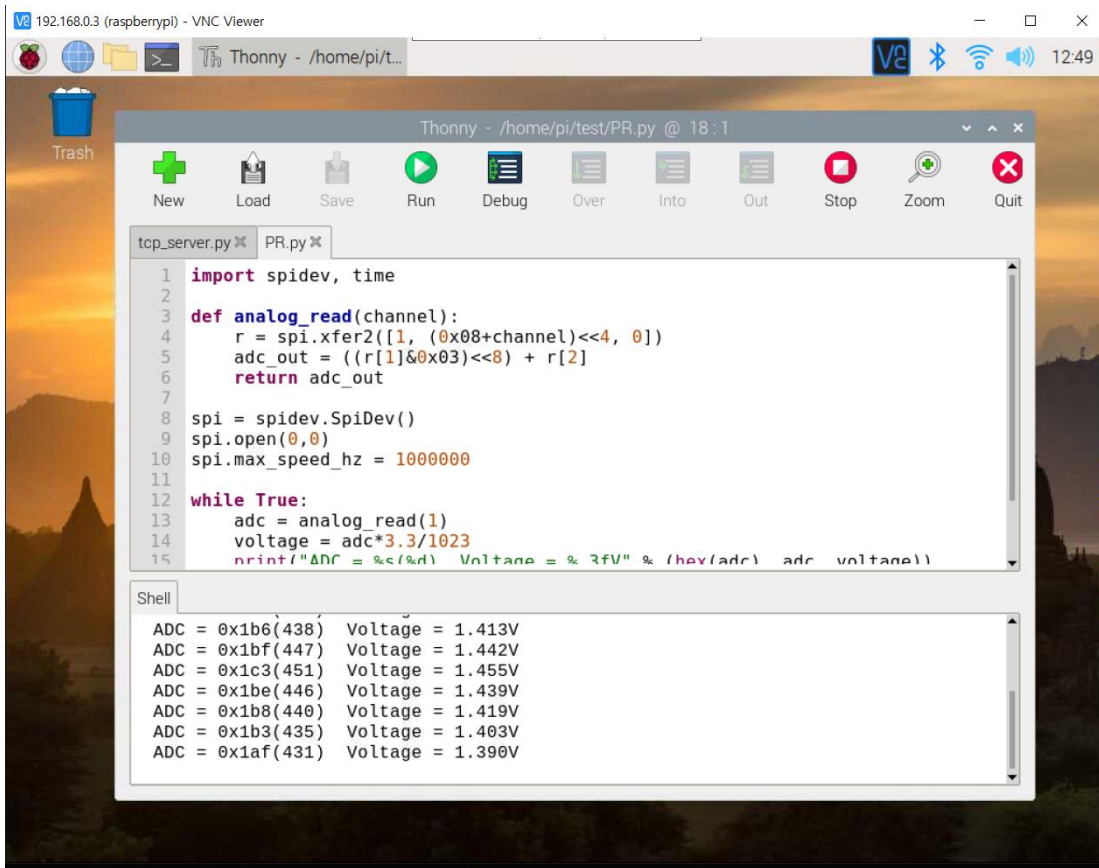
    while(1)
    {
        int i;
        for(i=0; i<8; i++)
        {
            softToneWrite(pinPiezo, aMelody[i]);
            delay(1000);
        }

        softToneWrite(pinPiezo, 0);
        delay(1000);
    }
    return 0;
}
```

1) buzzer2.c



# >> 4주차 실습



192.168.0.3 (raspberrypi) - VNC Viewer

Thonny - /home/pi/t...

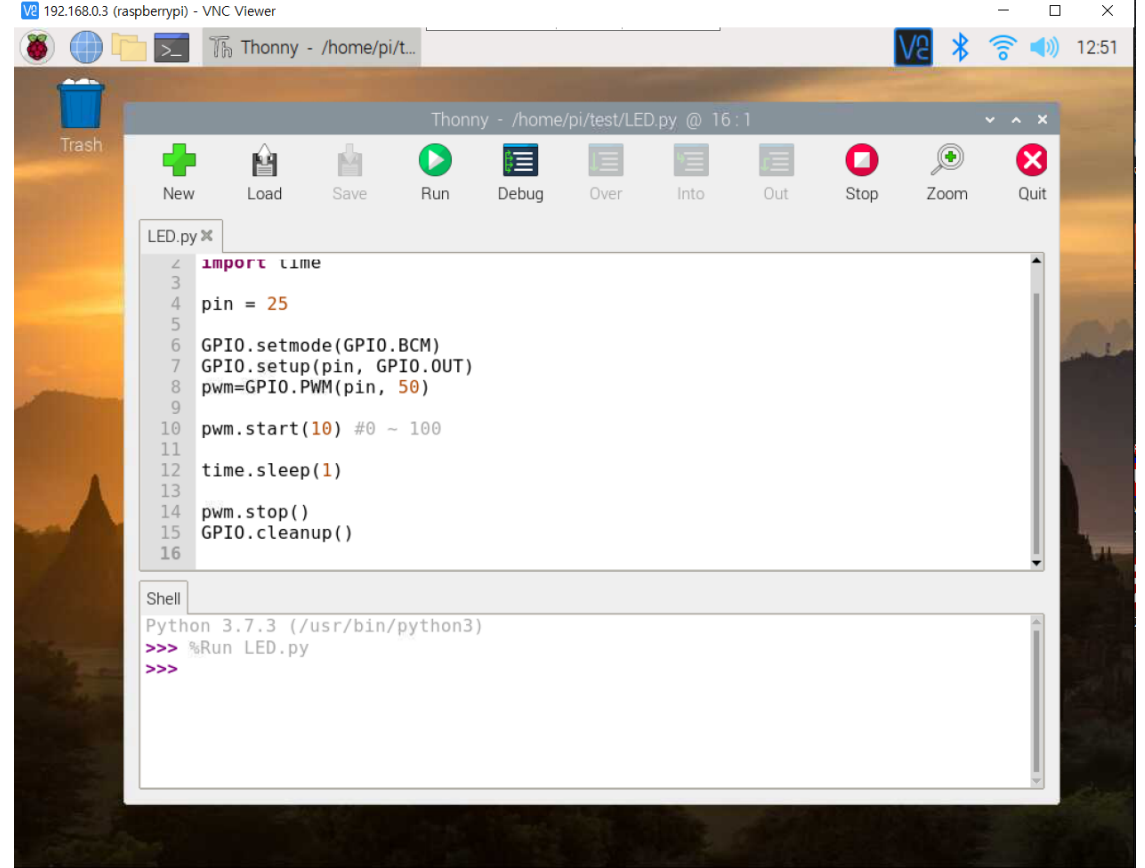
Thonny - /home/pi/test/PR.py @ 18:1

```
1 import spidev, time
2
3 def analog_read(channel):
4     r = spi.xfer2([1, (0x08+channel)<<4, 0])
5     adc_out = ((r[1]&0x03)<<8) + r[2]
6     return adc_out
7
8 spi = spidev.SpiDev()
9 spi.open(0,0)
10 spi.max_speed_hz = 1000000
11
12 while True:
13     adc = analog_read(1)
14     voltage = adc*3.3/1023
15     print("ADC = %s(%d) Voltage = % 3fV" % (hex(adc), adc, voltage))
```

Shell

```
ADC = 0x1b6(438) Voltage = 1.413V
ADC = 0x1bf(447) Voltage = 1.442V
ADC = 0x1c3(451) Voltage = 1.455V
ADC = 0x1be(446) Voltage = 1.439V
ADC = 0x1b8(440) Voltage = 1.419V
ADC = 0x1b3(435) Voltage = 1.403V
ADC = 0x1af(431) Voltage = 1.390V
```

1) PR.py



192.168.0.3 (raspberrypi) - VNC Viewer

Thonny - /home/pi/t...

Thonny - /home/pi/test/LED.py @ 16:1

```
1 import time
2
3 pin = 25
4
5 GPIO.setmode(GPIO.BCM)
6 GPIO.setup(pin, GPIO.OUT)
7 pwm=GPIO.PWM(pin, 50)
8
9 pwm.start(10) #0 ~ 100
10
11 time.sleep(1)
12
13 pwm.stop()
14 GPIO.cleanup()
15
16
```

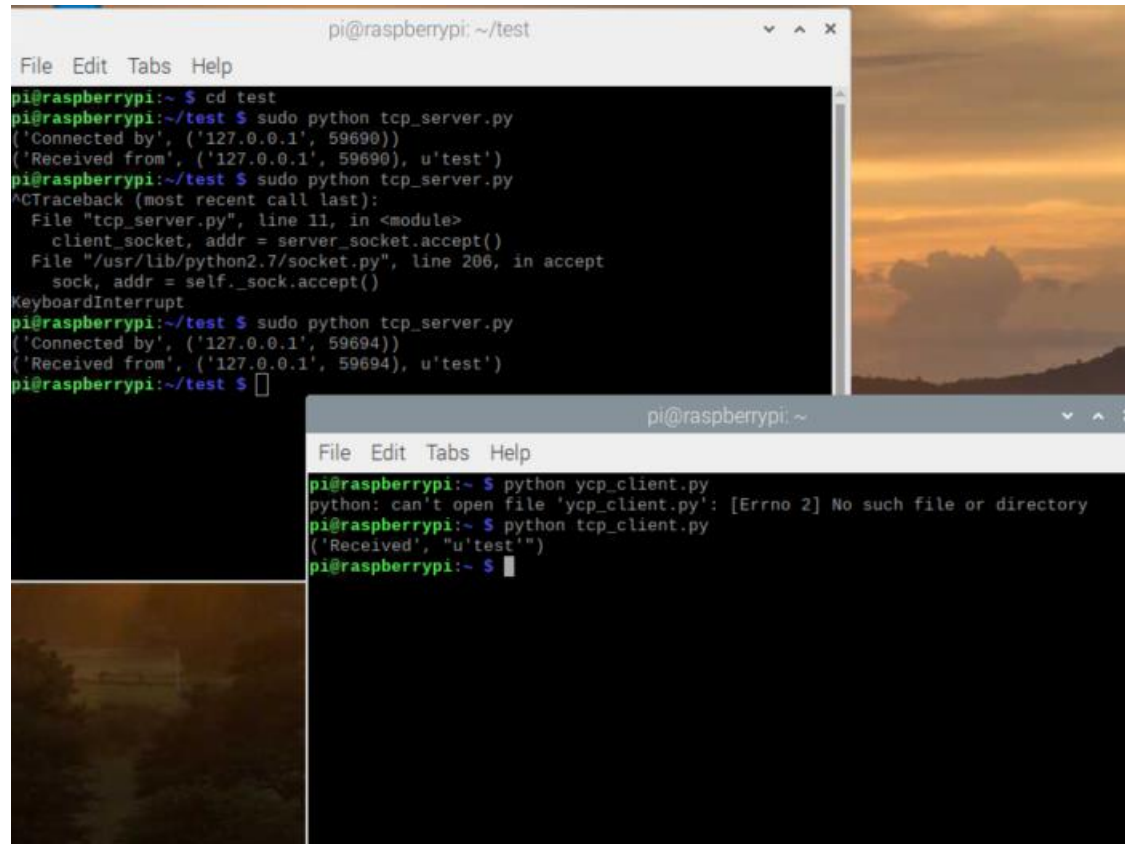
Shell

```
Python 3.7.3 (/usr/bin/python3)
>>> %Run LED.py
>>>
```

2) LED.py



# » 5주차 실습



The screenshot shows a Raspberry Pi terminal window with the title bar 'pi@raspberrypi: ~/test'. The terminal displays the following commands and output:

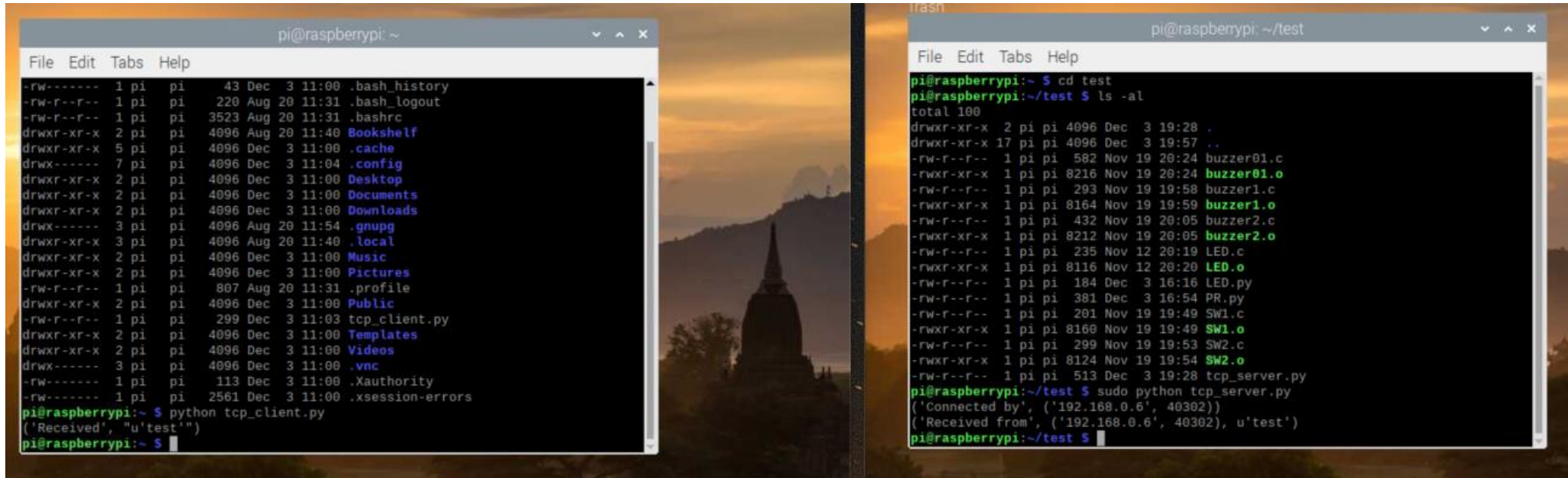
```
pi@raspberrypi:~$ cd test
pi@raspberrypi:~/test$ sudo python tcp_server.py
('Connected by', ('127.0.0.1', 59690))
('Received from', ('127.0.0.1', 59690), u'test')
pi@raspberrypi:~/test$ sudo python tcp_server.py
^CTraceback (most recent call last):
  File "tcp_server.py", line 11, in <module>
    client_socket, addr = server_socket.accept()
  File "/usr/lib/python2.7/socket.py", line 206, in accept
    sock, addr = self._sock.accept()
KeyboardInterrupt
pi@raspberrypi:~/test$ sudo python tcp_server.py
('Connected by', ('127.0.0.1', 59694))
('Received from', ('127.0.0.1', 59694), u'test')
pi@raspberrypi:~/test$
```

A second terminal window is open below the first, with the title bar 'pi@raspberrypi: ~'. It shows the following commands and output:

```
pi@raspberrypi:~$ python ycp_client.py
python: can't open file 'ycp_client.py': [Errno 2] No such file or directory
pi@raspberrypi:~$ python tcp_client.py
('Received', "u'test'")
pi@raspberrypi:~$
```

1) tcp\_server.py / client\_server.py

# » 5주차 실습



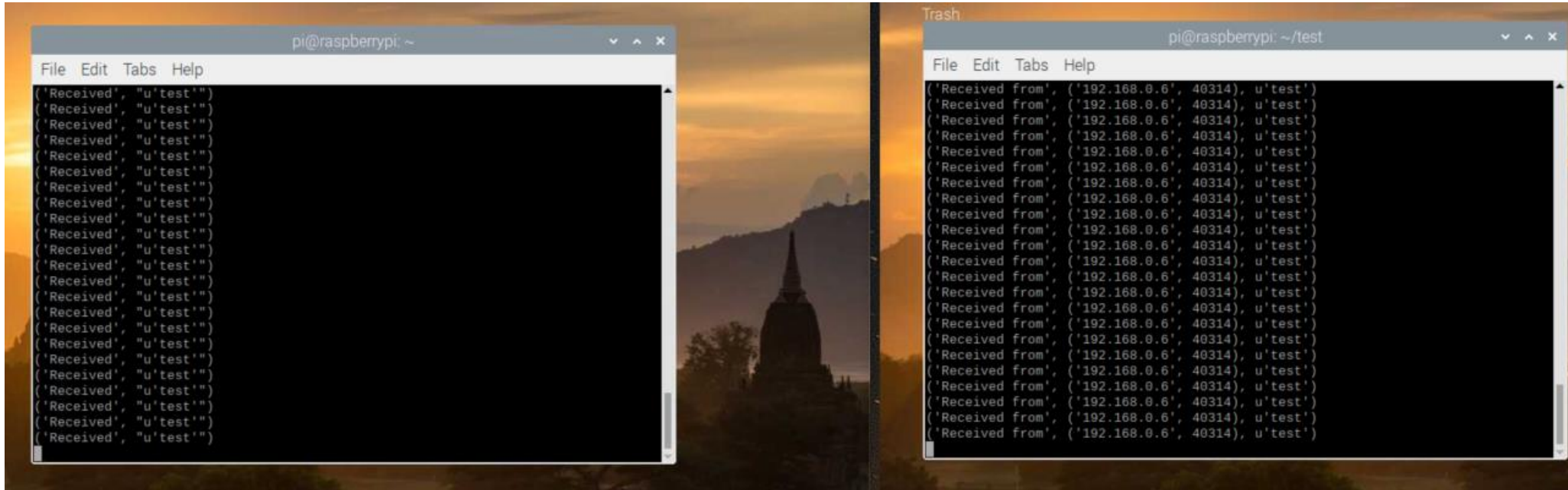
The image shows two terminal windows on a Raspberry Pi desktop. The left window displays the output of the `ls -la` command in the home directory, listing files like `.bash_history`, `.bash_logout`, `.bashrc`, `Bookshelf`, `.cache`, `.config`, `Desktop`, `Documents`, `Downloads`, `.gnupg`, `.local`, `Music`, `Pictures`, `.profile`, `Public`, `tcp_client.py`, `Templates`, `Videos`, `.vnc`, `.Xauthority`, and `.xsession-errors`. The right window shows the output of `ls -al` in the `/test` directory, listing files like `buzzer01.c`, `buzzer01.o`, `buzzer1.c`, `buzzer1.o`, `buzzer2.c`, `buzzer2.o`, `LED.c`, `LED.o`, `LED.py`, `PR.py`, `SW1.c`, `SW1.o`, `SW2.c`, `SW2.o`, and `tcp_server.py`. Below the file listings, the right window shows the output of `python tcp_client.py`, which prints `('Received', "u'test'")`.

```
pi@raspberrypi: ~  
File Edit Tabs Help  
-rw-r--r-- 1 pi pi 43 Dec 3 11:00 .bash_history  
-rw-r--r-- 1 pi pi 220 Aug 20 11:31 .bash_logout  
-rw-r--r-- 1 pi pi 3523 Aug 20 11:31 .bashrc  
drwxr-xr-x 2 pi pi 4096 Aug 20 11:40 Bookshelf  
drwxr-xr-x 5 pi pi 4096 Dec 3 11:00 .cache  
drwx----- 7 pi pi 4096 Dec 3 11:04 .config  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Desktop  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Documents  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Downloads  
drwx----- 3 pi pi 4096 Aug 20 11:54 .gnupg  
drwxr-xr-x 3 pi pi 4096 Aug 20 11:40 .local  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Music  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Pictures  
-rw-r--r-- 1 pi pi 807 Aug 20 11:31 .profile  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Public  
-rw-r--r-- 1 pi pi 299 Dec 3 11:03 tcp_client.py  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Templates  
drwxr-xr-x 2 pi pi 4096 Dec 3 11:00 Videos  
drwx----- 3 pi pi 4096 Dec 3 11:00 .vnc  
-rw-r--r-- 1 pi pi 113 Dec 3 11:00 .Xauthority  
-rw-r--r-- 1 pi pi 2561 Dec 3 11:00 .xsession-errors  
pi@raspberrypi:~ $ python tcp_client.py  
('Received', "u'test'")  
pi@raspberrypi:~ $
```

```
pi@raspberrypi: ~/test  
File Edit Tabs Help  
pi@raspberrypi:~ $ cd test  
pi@raspberrypi:~/test $ ls -al  
total 100  
drwxr-xr-x 2 pi pi 4096 Dec 3 19:28 .  
drwxr-xr-x 17 pi pi 4096 Dec 3 19:57 ..  
-rw-r--r-- 1 pi pi 582 Nov 19 20:24 buzzer01.c  
-rw-r-xr-x 1 pi pi 8216 Nov 19 20:24 buzzer01.o  
-rw-r--r-- 1 pi pi 293 Nov 19 19:58 buzzer1.c  
-rw-r-xr-x 1 pi pi 8164 Nov 19 19:59 buzzer1.o  
-rw-r--r-- 1 pi pi 432 Nov 19 20:05 buzzer2.c  
-rw-r-xr-x 1 pi pi 8212 Nov 19 20:05 buzzer2.o  
-rw-r--r-- 1 pi pi 235 Nov 12 20:19 LED.c  
-rw-r-xr-x 1 pi pi 8116 Nov 12 20:20 LED.o  
-rw-r--r-- 1 pi pi 184 Dec 3 16:16 LED.py  
-rw-r--r-- 1 pi pi 381 Dec 3 16:54 PR.py  
-rw-r--r-- 1 pi pi 201 Nov 19 19:49 SW1.c  
-rw-r-xr-x 1 pi pi 8160 Nov 19 19:49 SW1.o  
-rw-r--r-- 1 pi pi 299 Nov 19 19:53 SW2.c  
-rw-r-xr-x 1 pi pi 8124 Nov 19 19:54 SW2.o  
-rw-r--r-- 1 pi pi 513 Dec 3 19:28 tcp_server.py  
pi@raspberrypi:~/test $ sudo python tcp_server.py  
('Connected by', ('192.168.0.6', 40302))  
('Received from', ('192.168.0.6', 40302), u'test')  
pi@raspberrypi:~/test $
```

1) 실행결과1

## 5주차 실습



## 1) 실행결과2