

## 토양수분센서 (soil moisture sensor)

1. SPI 통신 활성화를 위해 `sudo raspi-config`
  - 5번 Interfacing Options 선택

```
Raspberry Pi Software Configuration Tool (raspi-config)

1 Change User Password Change password for the 'pi' user
2 Network Options      Configure network settings
3 Boot Options         Configure options for start-up
4 Localisation Options Set up language and regional settings to match your location
5 Interfacing Options  Configure connections to peripherals
6 Overclock            Configure overclocking for your Pi
7 Advanced Options     Configure advanced settings
8 Update               Update this tool to the latest version
9 About raspi-config   Information about this configuration tool

<Select> <Finish>
```

- P4 SPI 선택

```
Raspberry Pi Software Configuration Tool (raspi-config)

P1 Camera      Enable/Disable connection to the Raspberry Pi Camera
P2 SSH         Enable/Disable remote command line access to your Pi using SSH
P3 VNC         Enable/Disable graphical remote access to your Pi using RealVNC
P4 SPI         Enable/Disable automatic loading of SPI kernel module
P5 I2C         Enable/Disable automatic loading of I2C kernel module
P6 Serial      Enable/Disable shell and kernel messages on the serial connection
P7 1-Wire      Enable/Disable one-wire interface
P8 Remote GPIO Enable/Disable remote access to GPIO pins

<Select> <Back>
```

- `sudo nano /etc/modules` 치고 마지막에 `spidev` 추가작성

```
/etc/modules: kernel modules to load at boot time.
#
# This file contains the names of kernel modules that should be loaded
# at boot time, one per line. Lines beginning with "#" are ignored.

i2c-dev
spidev
```

2. sudo apt-get install python-dev
3. git clone git://github.com/Gadgetoid/py-spidev.git
4. cd py-spidev/
5. sudo python setup.py install
6. cd ~
7. nano.water.py 작성

```
1 import spidev, time
3
4 spi = spidev.SpiDev()
5 spi.open(0, 0)
6 spi.max_speed_hz = 1350000
7
8 def analog_read(channel):
9     r = spi.xfer2([1, (8 + channel) << 4, 0])
10    adc_out = ((r[1]&3) << 8) + r[2]
11    return adc_out
20
21 while True:
22     reading = analog_read(0)
23     print("Reading=%d" %(reading))
25     time.sleep(15)
```

8. python3 water.py 확인
9. <https://thingspeak.com/>
  - New Channel 생성
  - API Keys 선택
  - Write API Key 복사

## 10. nano.water.py 수정

```
1 import spidev, time
2 import urllib.request
3
4 spi = spidev.SpiDev()
5 spi.open(0, 0)
6 spi.max_speed_hz = 1350000
7
8 def analog_read(channel):
9     r = spi.xfer2([1, (8 + channel) << 4, 0])
10    adc_out = ((r[1]&3) << 8) + r[2]
11    return adc_out
12
13 def insertCloud(reading):
14     api_key = 'P7XCLD0JDIMBK9S3'
15     url = 'https://api.thingspeak.com/update'
16     url = url + '?api_key=%s' % api_key
17     url = url + '&field1=%s' % reading
18
19     urllib.request.urlopen(url)
20
21 while True:
22     reading = analog_read(0)
23     print("Reading=%d" % (reading))
24     insertCloud(reading)
25     time.sleep(15)
```

- api\_key = '#####' #대신 Write API Key 복사값 입력

## 11. python3 water.py 실행 후 <https://thingspeak.com/> 확인



## 12. mariaDB 사용하는 법.

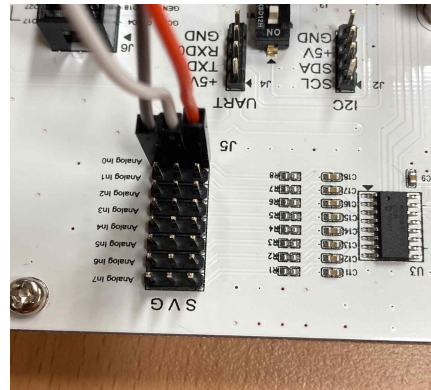
water.py 수정하여 빨간색 글씨 추가

```
1 import spidev, time
2 import urllib.request
3 import pymysql
4
5 spi = spidev.SpiDev()
6 spi.open(0, 0)
7 spi.max_speed_hz = 1350000
8
9 def analog_read(channel):
10     r = spi.xfer2([1, (8 + channel) << 4, 0])
11     adc_out = ((r[1]&3) << 8) + r[2]
12     return adc_out
13
14 def insertCloud(reading):
15     api_key = '#####'
16     url = 'https://api.thingspeak.com/update'
17     url = url + '?api_key=%s' % api_key
18     url = url + '&field1=%s' % reading
19
20     urllib.request.urlopen(url)
21
22 def insertDB(reading):
23     conn = pymysql.connect(host='localhost', user= 'water', password='123',
24                             db='waterdb', charset='utf8')
25
26     with conn.cursor() as cursor:
27         sql = 'insert into watertb(wt) values(%s);'
28         cnt = cursor.execute(sql, (reading))
29         r = conn.commit()
30
31     if r == 0:
32         print("Failed")
33     else:
34         print("Save Ok")
35
36     conn.close()
37
38 while True:
39     reading = analog_read(0)
40     print("Reading=%d" %(reading))
41     insertCloud(reading)
42     insertDB(reading)
43     time.sleep(15)
```

### 13. 확인

```
pi@raspberrypi: ~  
MariaDB [waterdb]> desc watertb;  
+-----+-----+-----+-----+-----+-----+  
| Field | Type | Null | Key | Default | Extra |  
+-----+-----+-----+-----+-----+-----+  
| _id   | int(11) | NO   | PRI | NULL    | auto_increment |  
| wt    | int(11) | NO   |     | NULL    |                 |  
+-----+-----+-----+-----+-----+-----+  
2 rows in set (0.004 sec)  
  
MariaDB [waterdb]> SELECT * FROM waterdb;  
ERROR 1146 (42S02): Table 'waterdb.waterdb' doesn't exist  
MariaDB [waterdb]> SELECT * FROM watertb;  
+-----+-----+  
| _id | wt |  
+-----+-----+  
| 1   | 1023 |  
| 2   | 1023 |  
| 3   | 1023 |  
| 4   | 1023 |  
| 5   | 1023 |  
+-----+-----+  
5 rows in set (0.001 sec)  
  
MariaDB [waterdb]>
```

### - 사진



VCC → 3.3V 또는 5V  
GND → GND  
DO → 디지털 출력 인터페이스  
AO → 아날로그 출력 인터페이스

### - 참고

<http://blog.naver.com/PostView.nhn?blogId=icbanq&logNo=221812355193&redirect=Dlog&widgetTypeCall=true&directAccess=false>

<https://m.blog.naver.com/PostView.nhn?blogId=roboholic84&logNo=220367321777&proxyReferer=https:%2F%2Fwww.google.com%2F>