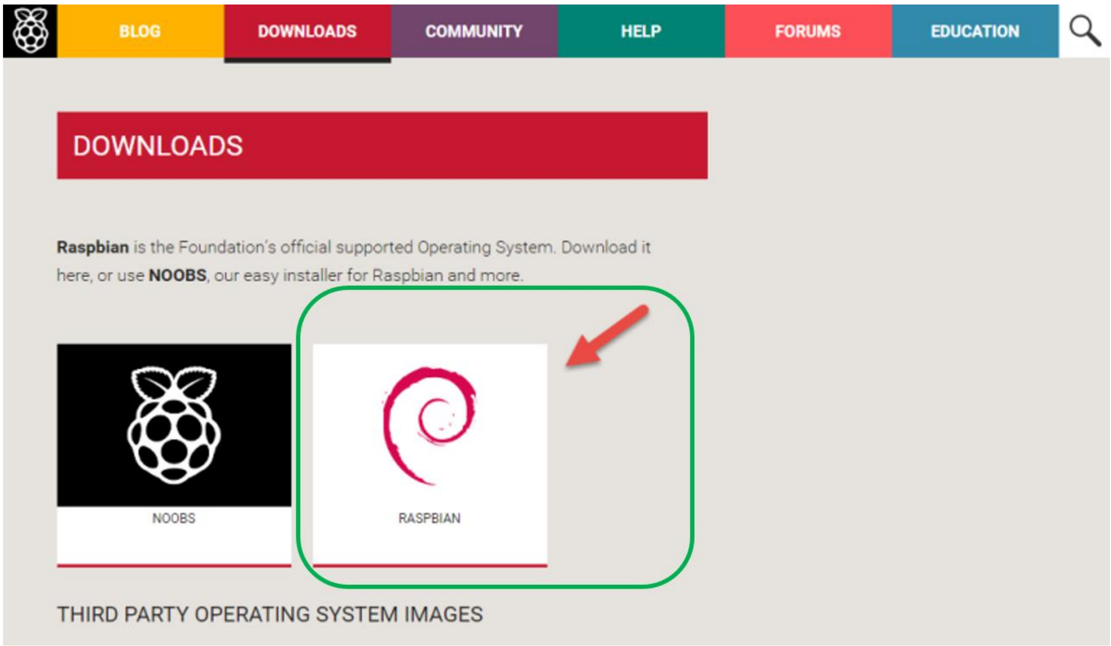
Installation guide

Step1. Install the OS for Raspberry Pi 3

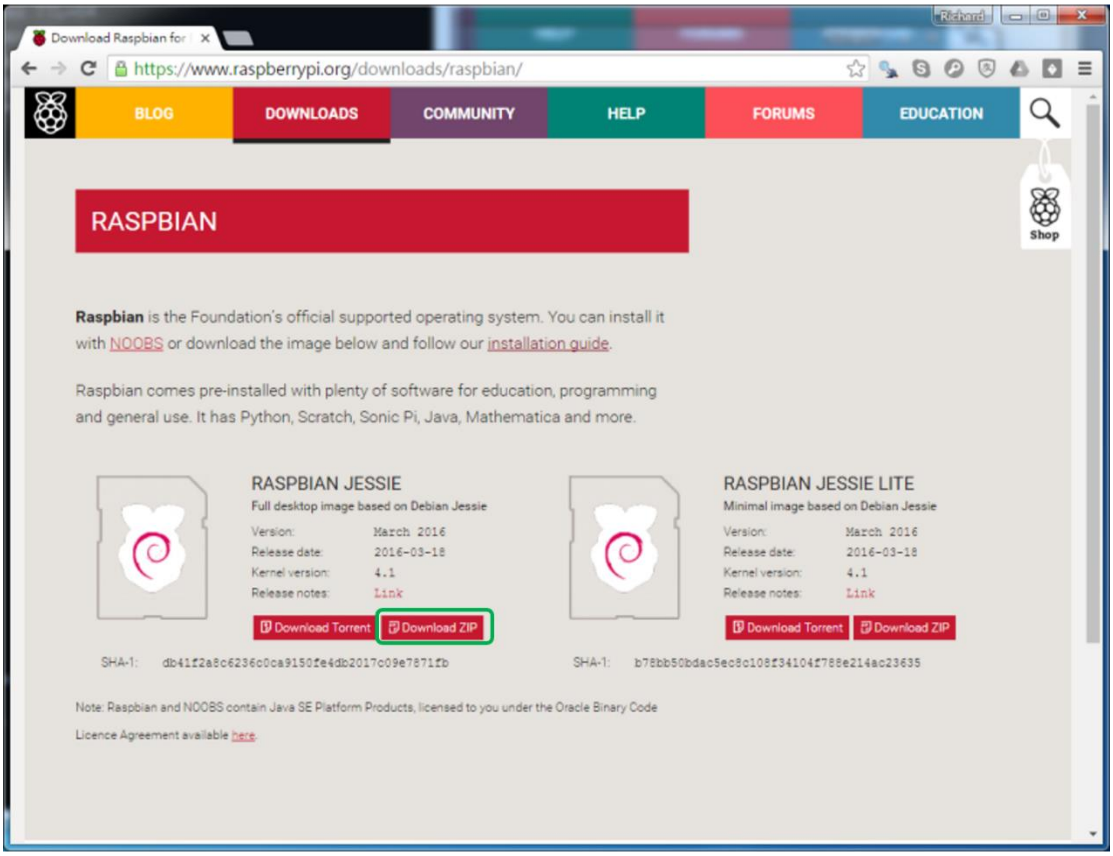
Go to https://www.raspberrypi.org/downloads/ to download **Raspbian** to the PC.



DOWNLOADS

Raspbian is the Foundation's official supported Operating System. Download it here, or use **NOOBS**, our easy installer for Raspbian and more.

THIRD PARTY OPERATING SYSTEM IMAGES



RASPBIAN

Raspbian is the Foundation's official supported operating system. You can install it with NOOBS or download the image below and follow our installation guide.

Raspbian comes pre-installed with plenty of software for education, programming and general use. It has Python, Scratch, Sonic Pi, Java, Mathematica and more.

RASPBIAN JESSIE

Full desktop image based on Debian Jessie

Version: March 2016
Release date: 2016-03-18
Kernel version: 4.1
Release notes: Link

SHA-1: db41f2a8c6236c0ca9150fe4db2017c09e7871fb

RASPBIAN JESSIE LITE

Minimal image based on Debian Jessie

Version: March 2016
Release date: 2016-03-18
Kernel version: 4.1
Release notes: Link

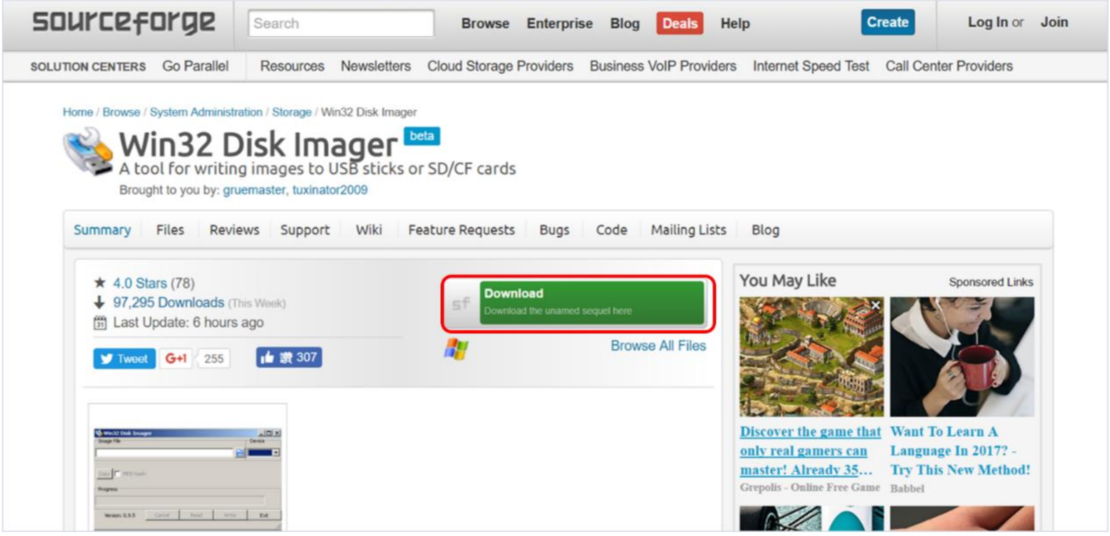
SHA-1: b78bb50bdac5ec8c108f34104f788e214ac23635

Note: Raspbian and NOOBS contain Java SE Platform Products, licensed to you under the Oracle Binary Code Licence Agreement available here.

Unzip 2017-01-11-raspbian-jessie.zip

and you will get a disc image file (.img) (namely Linux OS required for Raspberry) You need to use Win32 Disk Imager to write this image file to the Micro SD card. Therefore, this disk can be used for booting.

https://sourceforge.net/projects/win32diskimager/



Win32 Disk Imager
A tool for writing images to USB sticks or SD/CF cards
Brought to you by: gruemaster, tuxinator2009

★ 4.0 Stars (78)
97,295 Downloads (This Week)
Last Update: 6 hours ago

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Open Win 32 Disk Imager and insert the Micro SD card into the PC.

1. For the Image File, select the disc image file downloaded earlier (.img).
2. For the Device, select the location corresponding to the Micro SD card inserted to the PC.

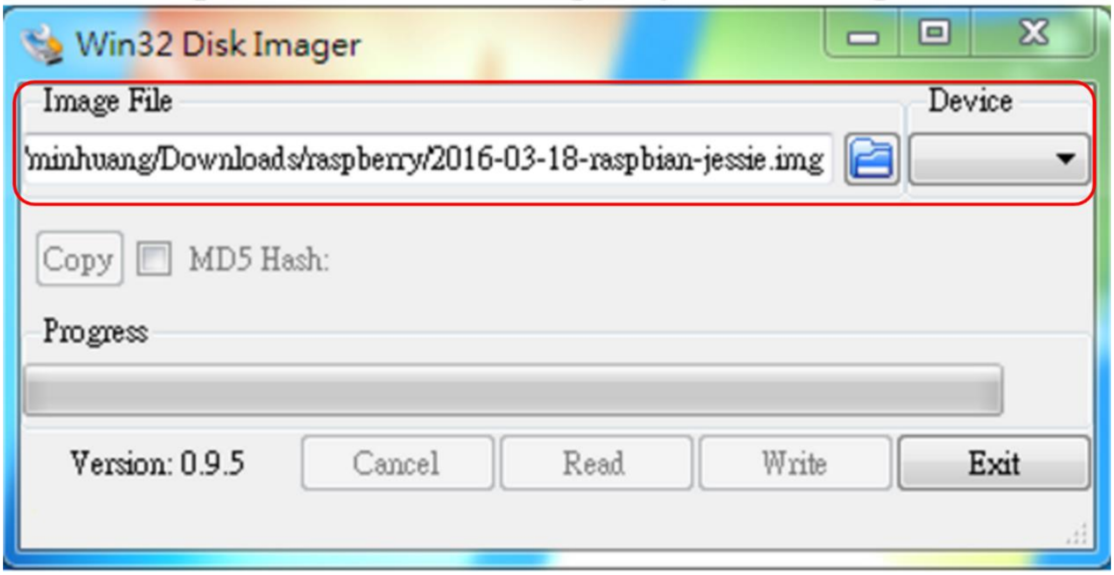


Image File: \minhuang/Downloads/raspberry/2016-03-18-raspbian-jessie.img
Device:
Version: 0.9.5

After the selection, click "Write" to start writing, which takes a few minutes.
(PS: If the writing fails, please try to change the way to read the Micro SD card (e.g. card reader, built-in SD card slot of the PC...etc.)
After writing, connect the equipment below to the Raspberry and connect it to the

power supply to set the **network.**

1. Micro SD card
2. USB keyboard
3. USB mouse
4. HDMI
5. HDMI-Supported monitor

(Raspberry Pi has no power switch. Just connect it to the power supply and the system will start.)

After installation, you should see a main page similar to Linux.

Step2. Install Python for Raspberry Pi 3.

Open the Terminal to enter commands. If you need to enter the account and password, use the default **account “pi” and password “raspberry”.**

(PS: Please note that you can add “sudo” in front of the command if you have any problem with the privilege when executing any command.)

1. Update the system
   ```
   $ sudo apt-get update
   $ sudo apt-get upgrade
   ```

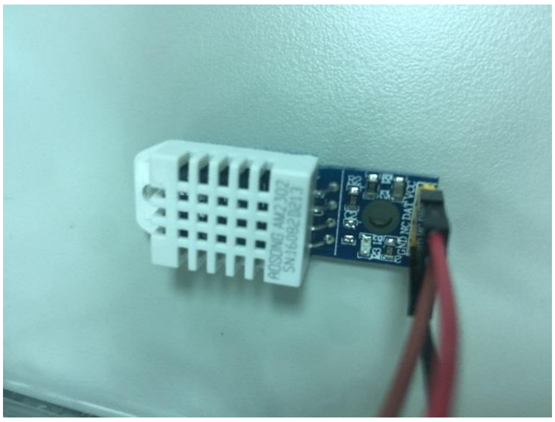
2. Install Python
   ```
   $ sudo apt-get install python2.7
   ```

3. Lookup the Python version
   ```
   $python –version
   ```

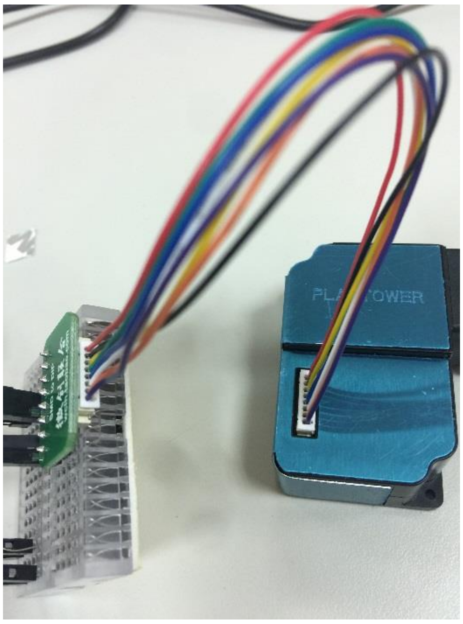
4. Install relevant packages:
   ```
   $ sudo apt-get update
   $ sudo apt-get install build-essential python-dev
   ```

5. Download the PM2.5 example project
   ```
   git clone https://github.com/Thomas-Tsai/pms3003-g3.git
   apt-get install python-pip python-serial
   python g3.py
   ```

Step3. Wiring for the thermo-hygrometer (DHT22) and PM2.5 sensor



Thermo-Hygrometer

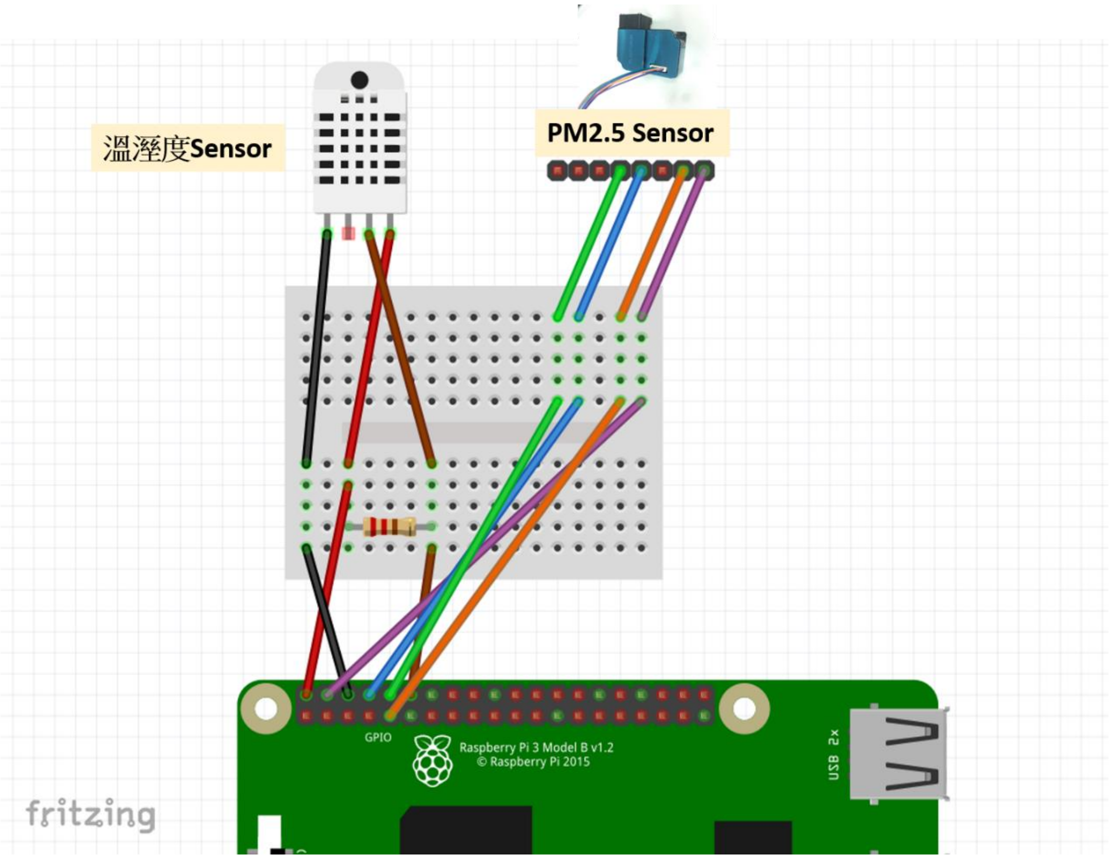


PM2.5 sensor

The **back** of the green board of the PM2.5 sensor has corresponding pins.
Please refer to the table below and connect the PM 2.5 sensor according to the top-right picture.

PIN1	VCC	Positive pole of power supply (5V)
PIN2	GND	Negative pole of power supply
PIN3	SET	Set the pin/TTL level at 3.3V
PIN4	RXD	Pin for receipt by the serial port/TTL level at 3.3V
PIN5	TXD	Pin for sending by the serial port/TTL level at 3.3V
PIN6	RESET	Block reset signal/TTL level at 3.3V
PIN7 and PIN8	NC	Suspension

Please conduct the wiring based on the diagram below patiently.



Step4. Function test for the thermo-hygrometer (DHT22)

The following commands are used to test the operation of thermo-hygrometer. Open the Terminal and enter the following.

```
git clone https://github.com/adafruit/Adafruit_Python_DHT.git
cd Adafruit_Python_DHT
sudo python setup.py install
cd examples
sudo ./AdafruitDHT.py 22 18
```

(PS: Parameter 22 represents DHT22. Parameter 18 indicates that you must connect DHT22 to GPIO 18 of Raspberry Pi.)

Step5. Function test for the PM2.5 sensor (PMS 3003)

Modify config.txt

sudo nano /boot/config.txt

Add the following to the bottom line.

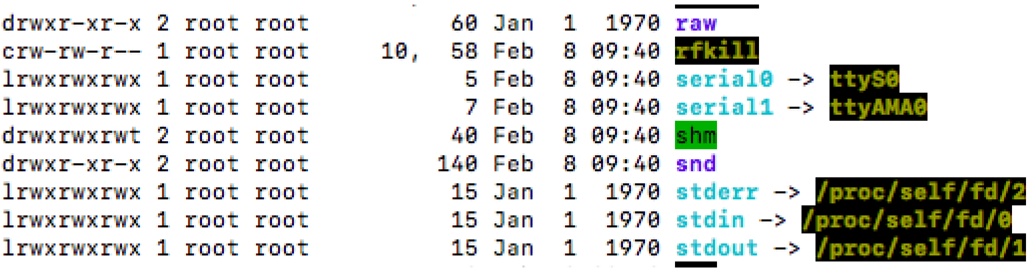
enable_uart=1

Reboot

sudo reboot

Make sure that “ttyS0” appears. (The snapshot is as follows.)

ls -l /dev



```
drwxr-xr-x 2 root root          60 Jan  1  1970 raw
crw-rw-r-- 1 root root     10,  58 Feb  8 09:40 rfkill
lrwxrwxrwx 1 root root           5 Feb  8 09:40 serial0 -> ttyS0
lrwxrwxrwx 1 root root           7 Feb  8 09:40 serial1 -> ttyAMA0
drwxrwxrwt 2 root root          40 Feb  8 09:40 shm
drwxr-xr-x 2 root root         140 Feb  8 09:40 snd
lrwxrwxrwx 1 root root          15 Jan  1  1970 stderr -> /proc/self/fd/2
lrwxrwxrwx 1 root root          15 Jan  1  1970 stdin -> /proc/self/fd/0
lrwxrwxrwx 1 root root          15 Jan  1  1970 stdout -> /proc/self/fd/1
```

Modify g3.py (cd this to the directory containing g3.py).

sudo nano g3.py

Find pmdata=air.read(“/dev/ttyAMA0”) and change it to pmdata=air.read(“dev/ttyS0”).

Execute g3.py (cd this to the directory containing g3.py).

sudo python g3.py

Step6. Download and test the IoT actual case

sudo pip install paho-mqtt

git clone https://github.com/yuzheng/iot-python-example

cd iot-python-example/

cd g3-dht/

nano **iot-lass.py**

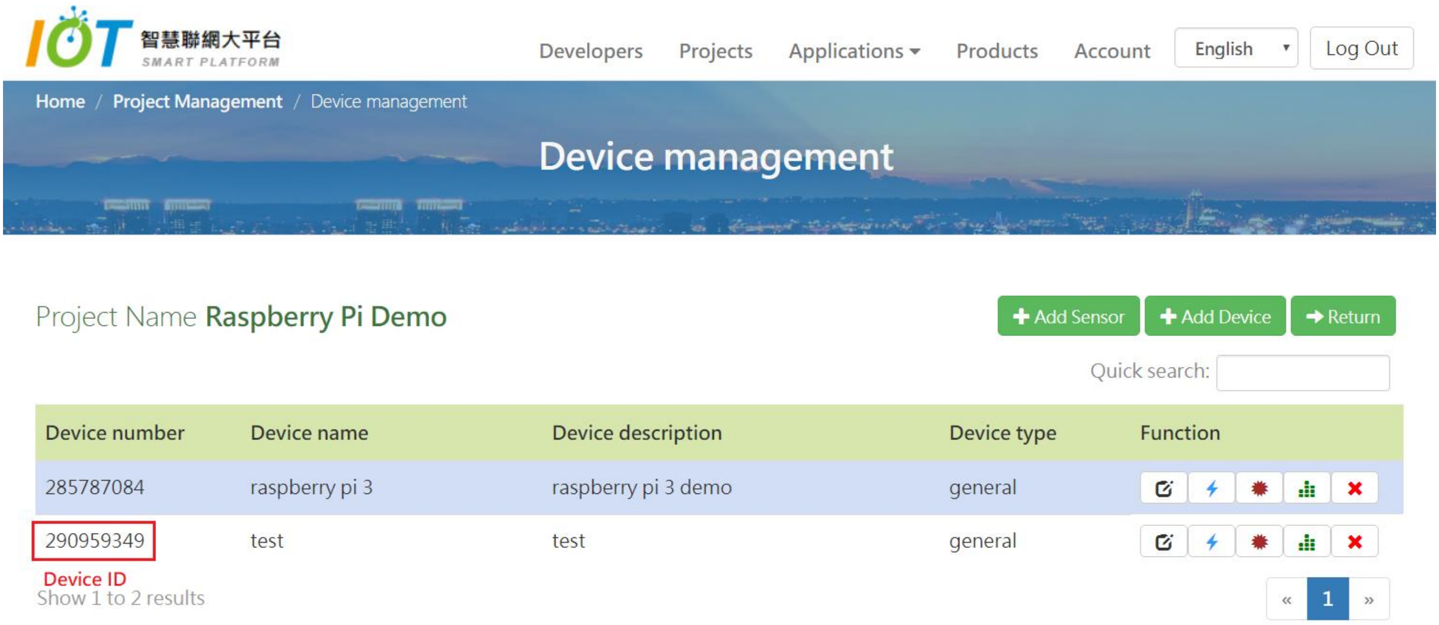
Modify Lines 21, 23 and 24.

Iothost=”iot.epa.gov.tw”

iotkey=”Refer to the diagram below and enter the device key of the IoT smart platform.”

device=”Refer to the diagram below and enter the device ID (number) of the IoT smart platform.”

You can acquire the device information via IoT smart Platform > Projects > Equipment List:



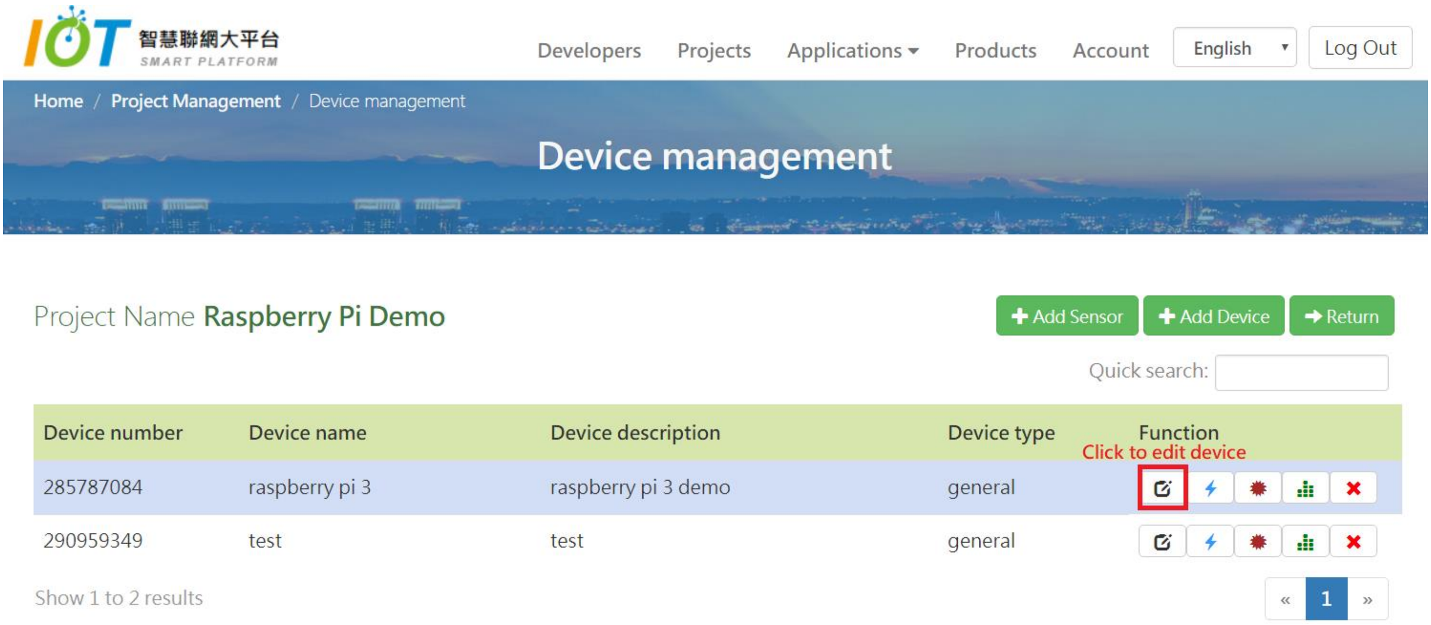
Project Name **Raspberry Pi Demo**

Device number	Device name	Device description	Device type	Function
285787084	raspberry pi 3	raspberry pi 3 demo	general	✎ ⚡ ✸ ▮ ✖
290959349	test	test	general	✎ ⚡ ✸ ▮ ✖

Device ID

Show 1 to 2 results

You can learn the IoT Key of Device from Device Edit. Refer to the following:



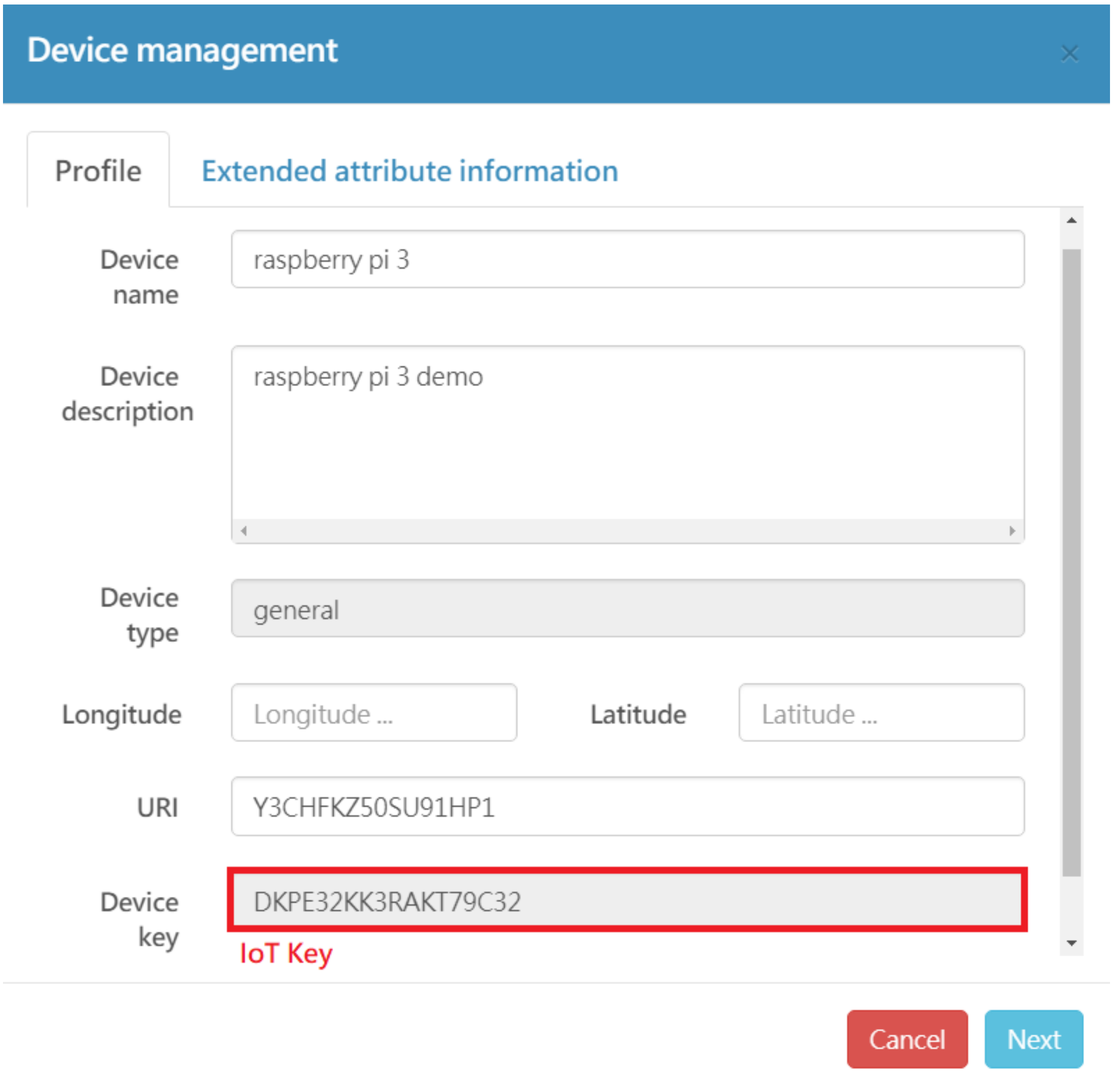
Project Name **Raspberry Pi Demo**

Device number	Device name	Device description	Device type	Function
285787084	raspberry pi 3	raspberry pi 3 demo	general	✎ ⚡ ✸ ▮ ✖
290959349	test	test	general	✎ ⚡ ✸ ▮ ✖

Click to edit device

Show 1 to 2 results

In the Equipment Management page, the device key at the bottom represents the IoT Key. Refer to the following:



Device management

Profile | Extended attribute information

Device name: raspberry pi 3

Device description: raspberry pi 3 demo

Device type: general

Longitude: Longitude ... Latitude: Latitude ...

URI: Y3CHFKZ50SU91HP1

Device key: DKPE32KK3RAKT79C32

IoT Key

```
sudo python iot-lass.py
```

When the operation is successful, you should be able to see the value in the command prompt.
The value will be updated under the project on the platform simultaneously!

To make sure that the execution may proceed after leaving ssh, please enter the command below:

```
nohup sudo python iot-lass.py &
```

You can check if the service is carried out via the command below.

```
ps aux
```