

How To: Raspberry Pi with Grove Pi+

Description

The Raspberry Pi is a credit card sized single-board computers that makes use of system on a chip (SoC) technology. This example will focus on a Python example running on the Raspberry Pi. Additionally, this example will make use of the Grove Pi+ sensor interface board.

This “How To” will provide the step-by-step details on how to assemble, configure, and load the Raspberry Pi to publish the following data:

- Information Log Messages
- Location Data (Latitude, Longitude, etc)
- Identification Attribute Data
- Temperature Property Data
- Analog Potentiometer (Rotary) Data

This example will also demonstrate cloud methods to turn on/off an LED and sound a buzzer for a defined period of time.

Software Prototyping Platform

Raspberry Pi’s Python development environment will be used in this example. You can refer to the link below for more information on the Raspberry Pi Python environment.

<https://www.raspberrypi.org/documentation/usage/python/>

Requirements

The following items are requirements for a working LaunchPad IoT:

- Raspberry Pi Generation 2 Model B
- SD Card (8 GB Class 4)
- HDMI Compatible Monitor, USB Keyboard & Mouse, and Ethernet cable
- Grove Pi+ Starter Kit from Seeed Studio
- Windows Compatible PC with Internet Access

Setup

Setup for the LaunchPad IoT consist of these steps:

1. Signup for an M2M Account on the Management Portal
2. Download the getting started file from the Management Portal
3. Create a new “Thing” Definition on the Management Portal
 1. Open the downloaded file and extract the ‘RPIThingDef.json’ file to your PC’s desktop
 2. Select ‘Developer’ from the Management Portal
 3. Click on ‘Thing definitions’ and then click the ‘Import’ button
 4. Click the ‘Attach File’ button and select the JSON file copied in the previous step
 5. Press the ‘Import’ to import the thing definition into the ORG
4. Create an Application token for your thing definition
 - Select ‘Developer’ from the Management Portal
 - Click on ‘Applications’ and then click the ‘New Application’ button
 - In the ‘Name’ field enter ‘RaspberryPiApp’
 - In the ‘Description’ field enter ‘RaspberryPi App’
 - In the ‘Auto Registration Thing Definition ID’ select ‘Raspberry Pi IoT’
 - Check the ‘Org Admin’ checkbox and press the ‘Add’ button
 - Record the ‘Token’ ID that is provided for a subsequent step – this is your Application token
5. Download and install FileZilla from [here](#).
6. Download and install the Win32DiskImager from Source forge using this [link](#).
7. From within the file downloaded in step 2
 - Copy all the files into the C:\deviceWISE folder
8. Download the Raspbian Operating System from [here](#) to your Windows computer
9. Unzip the .img file within the downloaded Raspbian file
10. Insert your SD card into your Windows PC using a card reader.
11. Open Win32DiskImager.exe, the application you just downloaded, by double-clicking on it. If you're running Windows 7 or 8, right click on it and choose "Run as Administrator" instead.
12. If your SD card isn't automatically detected by the application, click on the drop-down menu at the top right (labeled "Device") and choose it from the list.

13. In the image file section of the application, click the little folder icon and choose the Raspbian .img file you just downloaded and unzipped.
14. Click the Write button and wait for Win32DiskImager to complete. When it finishes, you can safely eject your SD card
15. Insert the SD card into your Raspberry Pi
16. Connect your USB Keyboard and Mouse into the Raspberry Pi's USB ports
17. Connect your active Ethernet cable into the Raspberry Pi's Ethernet port
18. Connect your Monitor's HDMI cable into the HDMI port on the Raspberry Pi



19. Connect the USB power cable to your Raspberry Pi and allow it to boot up (Check its progress on the HDMI monitor.)
20. When the Raspi-config window is displayed, do the following (Skip to step 21 if the Raspi-config window is not displayed):
 1. Select expand_rootfs (the second option) and press enter.
 2. Confirm that you want to expand the file system and let Raspbian do its thing.
 3. When you're returned to the configuration list, go all the way to the bottom and select the Finish option.
 4. It'll ask you if you want to reboot. Choose yes.
21. When the Raspberry Pi reboots, use the following credentials to log in: UserID: pi
Password: raspberry

22. Update the Raspberry Pi to ensure you are running the latest version of all files

- From the Linux command prompt type:
 1. `sudo apt-get update` (enter Yes if prompted)
 2. `sudo apt-get upgrade` (enter Yes if prompted)

23. Update the GrovePi+ Environment, from the Linux prompt enter:

- `cd /home/pi/Desktop`
- `sudo git clone https://github.com/DexterInd/GrovePi`
- `cd GrovePi/Script`
- `sudo chmod +x install.sh`
- `sudo ./install.sh` (enter Yes if prompted – the Raspberry Pi will be restarted when the installation is complete.)

24. Install the Paho Python Client for MQTT support

- `cd /home/pi/Desktop`
- `sudo git clone http://git.eclipse.org/gitroot/paho/org.eclipse.paho.mqtt.python.git`
- `cd org.eclipse.paho.mqtt.python.git`
- `sudo python setup.py install`

25. Power down the Raspberry Pi in order to install the additional hardware

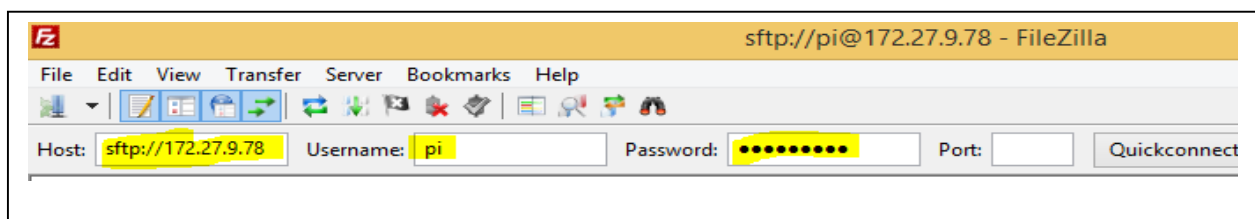
- From the Linux command prompt enter: `sudo shutdown -h now`
- Wait for the system to fully shutdown
- Remove the USB Power cable from the Raspberry Pi

26. Setup the GrovePi+ Board

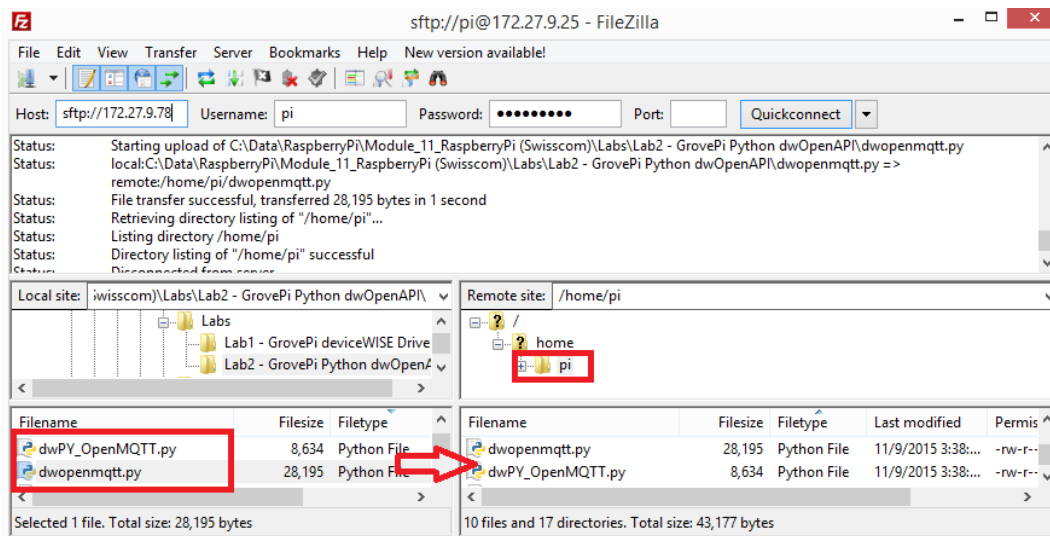
- Stack the GrovePi+ on top of the Raspberry Pi as shown in the picture below. Ensure that the pins are properly connected as shown in the picture.



27. Connect the USB power cable to your Raspberry Pi and allow it to boot up. (Note: The Green PWR indicator on the GrovePi+ will be glowing if the board is correctly connected. Please refer to <http://www.dexterindustries.com/GrovePi/get-started-with-the-grovepi/setting-software/> if errors are encountered.)
28. Record the IP Address of your Raspberry Pi – this is displayed as “My IP Address is xxx.xx.xx.xx” on the HDMI monitor when boot up is completed.
29. Start FileZilla, the file transfer program that was downloaded in the earlier step
30. Enter your Raspberry Pi details in FileZilla to allow it to connect to the Raspberry Pi
 - In the Host field enter: sftp://xxx.xx.xx.xx , where xxx.xx.xx.xx is the IP Address recorded in the earlier step
 - In the Username field enter: pi
 - In the Password field enter: raspberry
 - Press Enter, this will connect FileZilla to the Raspberry Pi



31. Using FileZilla, transfer the sample Python source files (from Step 7) to the Raspberry Pi



32. Log into the Raspberry Pi using the login credentials mentioned in the earlier steps

33. From the Raspberry Pi command prompt, enter the following command : nano

dwPY_OpenMQTT.py

34. Scroll down the file until you encounter the “dwAppToken” variable

35. Change the “????????” to your unique app token obtain in the first few steps

36. Save and Exit the file

37. The sample program will make use of various sensors and indicators – connect the Grove device to the GrovePi+ board connectors as specified below:

- Grove Rotary Sensor to: A0
- Grove Temperature Sensor to: A1
- Grove LED Socket to: D4
- Grove Buzzer to: D8

38. From the Raspberry Pi command prompt, enter the following command :

- python dwPY_OpenMQTT.py

39. The sample program should now start running - review the monitor for its progress

40. Open the “Things” page on the Management Portal to display your device

41. Open your ‘Thing’ device by clicking the ‘view’ icon (the eyeball) next to your device. The Grove Temperature and Grove Rotary sensor data will display accordingly.

42. Use the ‘Methods’ tab to turn ON and OFF LEDs

43. Use the ‘Methods’ tab to sound the buzzer for a defined period of time

