

# How To: Raspberry Pi with PiFace Digital 2

## Description

The Raspberry Pi is a credit card sized single-board computer that makes use of system on a chip (SoC) technology, has various digital inputs & outputs, and runs a version of Linux.

This “How To” will provide the step-by-step details on setting up the Raspberry Pi as a deviceWISE gateway using the element14 PiFace Digital 2 interface module.

## Software Prototyping Platform

Raspberry Pi’s development environment will be used in this example. The steps below will detail the required software

## 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
- Element 14 PiFace Digital 2
- 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. From within the file downloaded above, extract and copy all the files into the C:\deviceWISE folder

4. Download and install FileZilla from [here](#).
5. Download and install the Win32DiskImager from Source forge using this [link](#).
6. Download the Raspbian Operating System from [here](#) to your Windows computer
7. Unzip the .img file within the downloaded Raspbian file
8. Insert your SD card into your Windows PC using a card reader.
9. Open Win32DiskImager.exe, the application you just downloaded, by double-clicking on it.
10. 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.
11. In the image file section of the application, click the little folder icon and choose the Raspbian .img file you just downloaded and unzipped.
12. Click the Write button and wait for Win32DiskImager to complete. When it finishes, you can safely eject your SD card
13. Insert the SD card into your Raspberry Pi
14. Connect your USB Keyboard and Mouse into the Raspberry Pi's USB ports
15. Connect your active Ethernet cable into the Raspberry Pi's Ethernet port
16. Connect your Monitor's HDMI cable into the HDMI port on the Raspberry Pi



17. Connect the USB power cable to your Raspberry Pi and allow it to boot up (Check its progress on the HDMI monitor.)
18. When the Raspberry Pi boots, use the following credentials to log in:
  - **UserID:** pi     **Password:** raspberry
19. Open a terminal emulation window and enter: `sudo raspi-config`
  1. Select option 1 (Expand Filesystem) and press enter.
  2. Confirm that you want to expand the file system and let Raspbian do its thing. (System will reboot after this step, continue with Step 3 below upon reboot complete.)
  3. Open a terminal emulation session again and re-enter: `sudo raspi-config`
  4. Select option 9 (Advanced Options) and press enter
  5. Select option A6 (SPI) and press enter
  6. Select 'Yes' when prompted to enable the SPI interface
  7. When you're returned to the configuration list, press Finish
  8. It'll ask you if you want to reboot. Choose yes.
20. 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)
21. Install and configure the dependent libraries
  - `cd /home/pi`
  - `sudo apt-get install automake libtool git`
  - `git clone https://github.com/thomasmacpherson/piface.git`
  - `cd piface/c/`
  - `./autogen.sh && ./configure && make && sudo make install` (builds and copies dependent libs to: `/usr/local/lib`.)
22. 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

23. Attach the element 14 PiFace Digital 2 Board

- Stack the PiFace on top of the Raspberry Pi as shown in the picture below. Ensure that the pins are properly aligned as shown in the picture.



24. Download the required deviceWISE Gateway software

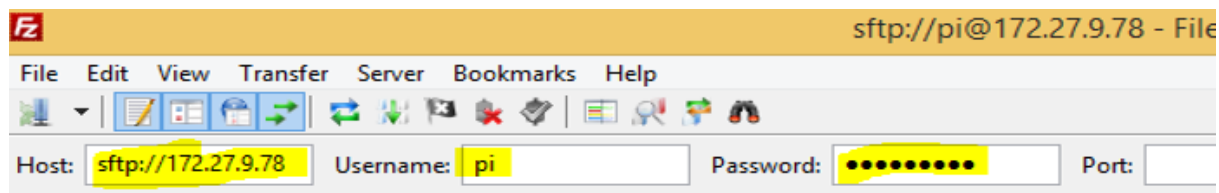
- From the Telit Portal, select Developer Resources (use this [link](#))
- Select the most current build (16.1.3-002 as of this writing)
- Select “Raspberry-Pi” and then “deviceWISE\_Gateway”
- Select DWGateway\_Install.Linux-ARM-Raspbian.xx\_x\_x-xxx.tar.gz  
(DWGateway\_Install.Linux-ARM-Raspbian.16\_1\_3-002.tar.gz as of this writing)
- The Gateway software will be downloaded to your PC

25. Connect the USB power cable to your Raspberry Pi and allow it to boot up.

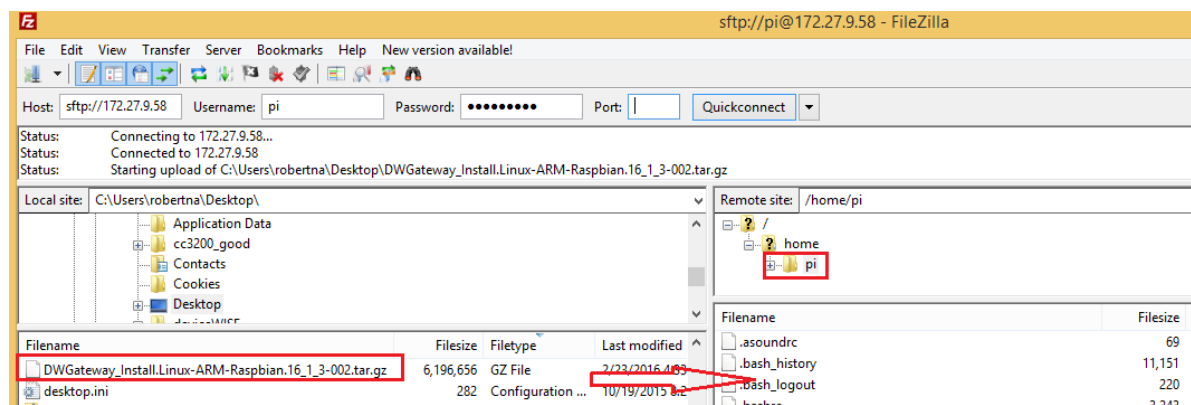
26. Record the IP Address of your Raspberry Pi – this is displayed as “My IP Address is xxx.xx.xx.xx” on the HDMI monitor when boot up is completed. (Alternatively enter “ifconfig” at the Linux prompt to display the Raspberry Pi’s IP address.)

27. Start FileZilla, the file transfer program that was downloaded in the earlier step

28. 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



29. Using FileZilla, transfer the deviceWISE Gateway software download in step 24



30. Install the deviceWISE gateway by entering the commands below from the Linux prompt:
- `cd`
  - `tar -xzf DWGateway_Install.Linux-ARM-Raspbian.16_1_3-002.tar.gz`
  - `cd dwgateway_raspbian`
  - `sudo ./dwwgateway_raspbian.install`
  - reboot the Raspberry Pi by issuing: `sudo reboot`
31. Open the deviceWISE Workbench (if needed, refer to this [link](#) for specific details) and connect to your Raspberry Pi from within the deviceWISE Workbench.

32. From the Workbench, Navigate to Administration and then select the 'Packages' tab
33. Add the deviceWISE PiFace package by pressing the 'Add' button and selecting the deviceWISE PiFace package (dw.dwpiface.Linux-ARM-Raspbian.1\_0\_1.pkg) that was obtained in Step 3.
34. From within the Workbench, navigate to "Devices" and select "PiFace". (Ensure that the PiFace device is 'Started'. If it's not started, press the Start button.)

Devices Variables Variable Groups			
Name	Type	State	Last State Changed
PiFace	Local IO	✓ Started	2016-02-29 15:16:29
System Monitor	System Monitor	✓ Started	2016-02-29 15:16:29

35. Select the "Variables" tab from within the "Devices" view.
36. Expand the PiFace's "Variables" tree to view the predefined variables
  - DIN = contains the digital input state
  - DOUT = allows setting the digital output state
  - DIN Register = 1 Byte Register containing digital input values
  - DOUT Register = 1 Byte Register with digital output values
37. Use the "Read" and "Write" buttons to read the digital inputs and write to the digital output