

ELEC 4511 Lecture 17

PYNQ-Z1 Setup Guide

1. Prerequisites for the Pynq-Z1

- PYNQ-Z1 board
- Computer with compatible browser (Chrome, Safari, Firefox)
- Ethernet cable
- Micro USB cable
- Micro-SD card with preloaded image, or blank card (Minimum 8GB recommend)

2. Writing the SD Card Image

Pynq image download link : <http://www.pynq.io/board.html> and choose [PYNO-Z1 v2.5 PYNQ image](#)

<https://pynq.readthedocs.io/en/latest/appendix.html#writing-the-sd-card-image>

Windows

- Insert the Micro SD card into your SD card reader and check which drive letter was assigned. You can find this by opening Computer/My Computer in Windows Explorer.
- Download the [Win32DiskImager utility from the Sourceforge Project page](#)
- Extract the *Win32DiskImager* executable from the zip file and run the Win32DiskImager utility as administrator. (Right-click on the file, and select Run as administrator.)
- Select the PYNQ-Z1 image file (.img).
- Select the drive letter of the SD card. Be careful to select the correct drive. If you select the wrong drive you can overwrite data on that drive. This could be another USB stick, or memory card connected to your computer, or your computer's hard disk.
- Click **Write** and wait for the write to complete.

MAC / OS X

On Mac OS, you can use dd, or the graphical tool ImageWriter to write to your Micro SD card.

- First open a terminal and unzip the image:
- `unzip pynq_z1_image_2016_09_14.zip -d ./`

ImageWriter

Note the Micro SD card must be formatted as FAT32.

- Insert the Micro SD card into your SD card reader
- From the Apple menu, choose “About This Mac”, then click on “More info...”; if you are using Mac OS X 10.8.x Mountain Lion or newer, then click on “System Report”.
- Click on “USB” (or “Card Reader” if using a built-in SD card reader) then search for your SD card in the upper-right section of the window. Click on it, then search for the BSD name in the lower-right section; it will look something like **diskn** where n is a number (for example, disk4). Make sure you take a note of this number.
- Unmount the partition so that you will be allowed to overwrite the disk. To do this, open Disk Utility and unmount it; do not eject it, or you will have to reconnect it. Note that on Mac OS X 10.8.x Mountain Lion, “Verify Disk” (before unmounting) will display the BSD name as `/dev/disk1s1` or similar, allowing you to skip the previous two steps.
- From the terminal, run the following command:

```
sudo dd bs=1m if=path_of_your_image.img of=/dev/rdiskn
```

Remember to replace n with the number that you noted before!

If this command fails, try using disk instead of rdisk:

```
sudo dd bs=1m if=path_of_your_image.img of=/dev/diskn
```

Wait for the card to be written. This may take some time.

Command Line

- Open a terminal, then run:

```
diskutil list
```

- Identify the disk (not partition) of your SD card e.g. disk4, not disk4s1.
- Unmount your SD card by using the disk identifier, to prepare for copying data to it:

```
diskutil unmountDisk /dev/disk<disk# from diskutil>
```

where disk is your BSD name e.g. `diskutil unmountDisk /dev/disk4`

- Copy the data to your SD card:

```
sudo dd bs=1m if=image.img of=/dev/rdisk<disk# from diskutil>
```

where disk is your BSD name e.g. `sudo dd bs=1m if=pynq_z1_image_2016_09_07.img of=/dev/rdisk4`

This may result in a dd: invalid number '1m' error if you have GNU coreutils installed. In that case, you need to use a block size of 1M in the bs= section, as follows:

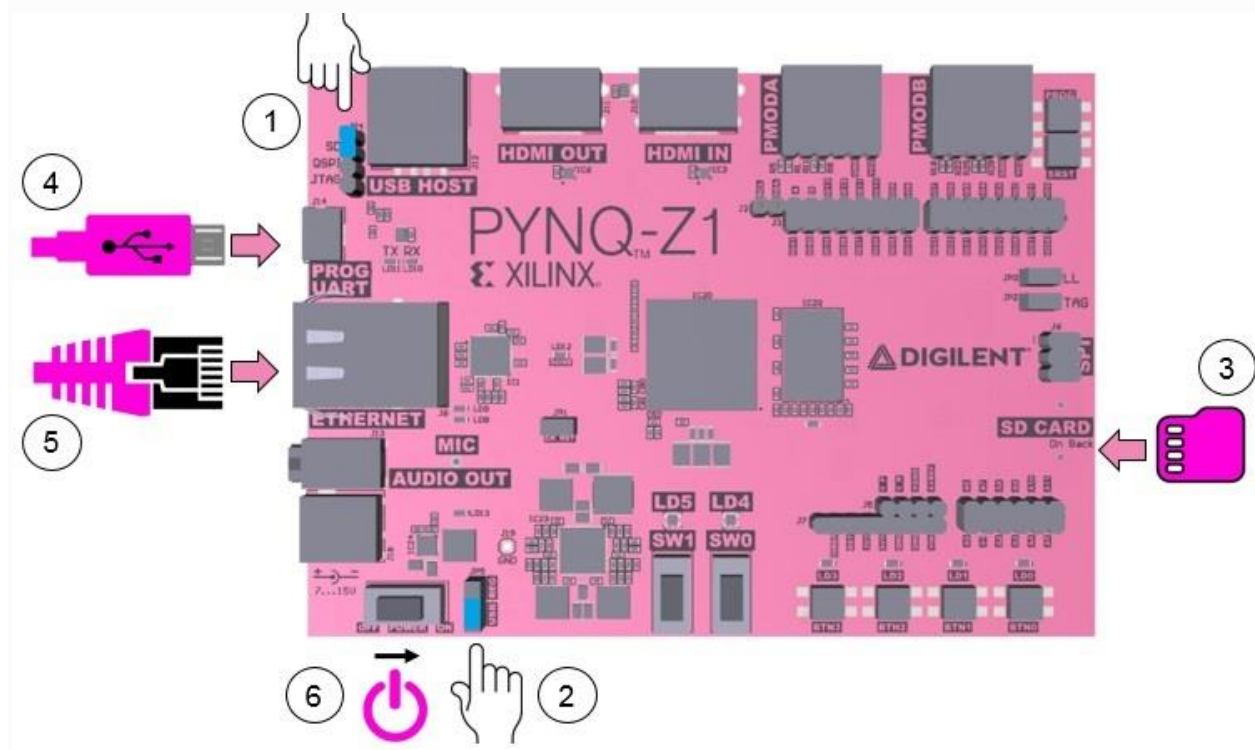
```
sudo dd bs=1M if=image.img of=/dev/rdisk<disk# from diskutil>
```

Wait for the card to be written. This may take some time. You can check the progress by sending a SIGINFO signal (press Ctrl+T).

If this command still fails, try using disk instead of rdisk, for example:

```
sudo dd bs=1m if=pynq_z1_image_2016_09_07.img of=/dev/disk4
```

3. Board Setup



- 1) Set the **JP4 / Boot** jumper to the *SD* position by placing the jumper over the top two pins of JP4 as shown in the image. (This sets the board to boot from the Micro-SD card)
- 2) To power the PYNQ-Z1 from the micro USB cable, set the **JP5 / Power** jumper to the *USB* position. (You can also power the board from an external 12V power regulator by setting the jumper to *REG.*)

- 3) Insert the Micro SD card loaded with the PYNQ-Z1 image into the **Micro SD** card slot underneath the board.
- 4) Connect the USB cable to your PC/Laptop, and to the **PROG - UART / J14** MicroUSB port on the board
- 5) Connect the board to Ethernet by following the instructions below
- 6) Turn on the PYNQ-Z1 and check the boot sequence by following the instructions below

4. Turning On the PYNQ-Z1

As indicated in step 6 of Board Setup, slide the power switch to the *ON* position to turn on the board. The **Red LD13** LED will come on immediately to confirm that the board has power. After a few seconds, the **Yellow/Green LD12 / Done** LED will light up to show that the Zynq® device is operational.

After a minute you should see two **Blue LD4 & LD5** LEDs and four **Yellow/Green LD0-LD3** LEDs flash simultaneously. The **Blue LD4-LD5** LEDs will then turn on and off while the **Yellow/Green LD0-LD3** LEDs remain on. The system is now booted and ready for use.

5. Assign your computer a static IP address

Instructions may vary slightly depending on the version of operating system you have. You can also search on google for instructions on how to change your network settings.

You need to set the IP address of your laptop/pc to be in the same range as the board. e.g. if the board is 192.168.2.99, the laptop/PC can be 192.168.2.x where x is 0-255 (excluding 99, as this is already taken by the board).

You should record your original settings, in case you need to revert to them when finished using PYNQ.

Windows

- Go to Control Panel -> Network and Internet -> Network Connections
- Find your Ethernet network interface, usually *Local Area Connection*
- Double click on the network interface to open it, and click on *Properties*
- Select Internet Protocol Version 4 (TCP/IPv4) and click *Properties*
- Select *Use the following IP address*
- Set the Ip address to 192.168.2.1 (or any other address in the same range as the board)
- Set the subnet mask to 255.255.255.0 and click **OK**

Mac OS

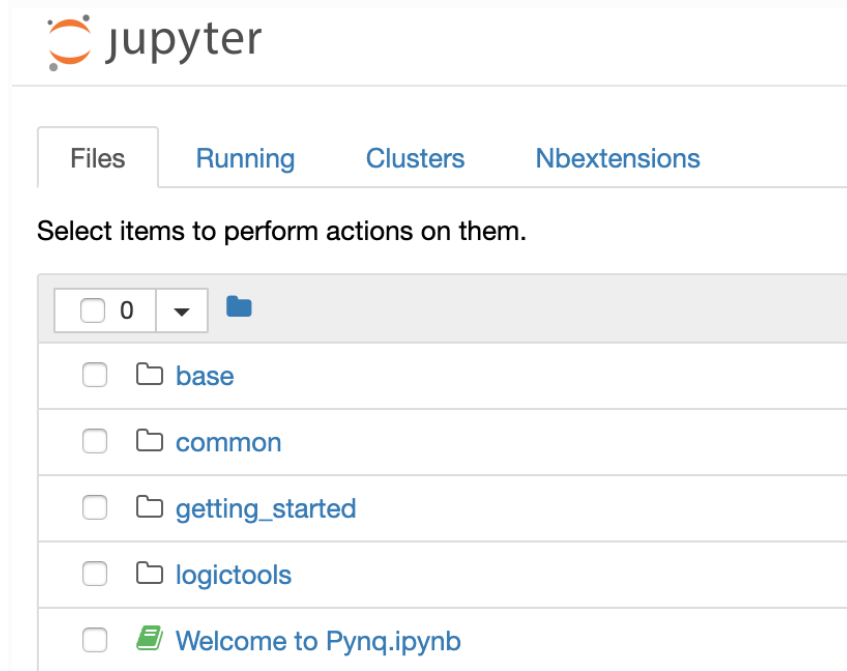
- Open *System Preferences* then open *Network*
- Click on the connection you want to set manually, usually *Ethernet*
- From the Configure IPv4 drop down choose *Manually*
- Set the IP address to 192.168.2.1 (or any other address in the same range as the board)
- Set the subnet mask to 255.255.255.0 and click **OK**

The other settings can be left blank.

6. Test your board

Connect your board with your computer via ethernet cable. Type 192.168.2.99 in your browser.

You should see the jupyter notebook interface like this: Password : xilinx



Go to base → board, open *board_btns_leds.ipynb* file and run each cell

This demo shows how to use push-buttons (BTN0-3), LEDs (LD0-3), and RGB LEDs (LD4-5) on the board.

You can do the following to control the LEDs or RGB LEDs:

Button 0 pressed: RGB LEDs change color.

Button 1 pressed: LEDs shift from right to left (LD0 -> LD3).

Button 2 pressed: LEDs shift from left to right (LD3 -> LD0).

Button 3 pressed: Turns off all the LEDS and ends this demo.

*Please buy this wifi dongle if you need

https://www.amazon.com/gp/product/B014HTNO52/ref=ppx_yo_dt_b_asin_title_o02_s00?ie=UTF8&psc=1