

Application Notes

By: Yushi Wang Partners: Shen Yue and Yubing Xu Group 6

How to Setup Pandaboard ES Software Environment for UAV Project

Installation of Ubuntu

Official tutorial can be found: http://omappedia.org/wiki/Ubuntu_Pre-built_Binaries_Guide

You can also check another tutorial:

http://pharos.ece.utexas.edu/wiki/index.php/How_to_Install_Ubuntu_on_the_Panda_Board

Step 1: Download Ubuntu for Pandaboard ES.

As the CPU of Pandaboard ES is OMAP A9, and GUI slows the operation, we choose Ubuntu 11.10 server version. The name is of the code is Oneiric.

<https://wiki.ubuntu.com/ARM/Server/Install?action=show&redirect=ARM%2FOMAPHeadlessInstall>

Step 2: Flash the OS into a SD card

In this step, we are going to put the Operating System on a SD card. This card will boost Pandaboard and loading the OS. You need:

- An SD card with at least 4GB capacity
- A card reader
- Workstation running Linux or Mac OS (I use Ubuntu on my desktop)

Then follow steps below:

1. Plug the SD card into your workstation
2. Open a terminal (ctrl + alt+ t in Ubuntu), identify the SD card using command:

```
$ df -h
```

Something like the following will be displayed:

```
jasper@jasper-Z68P-DS3:~/Desktop/Project$ gunzip -c ubuntu-11.10-preinstalled-server-armel+omap4.img.gz | sudo dd bs=4M of=/dev/sdc
sync
0+46853 records in
0+46853 records out
1548746752 bytes (1.5 GB) copied, 362.504 s, 4.3 MB/s
```

The best way of identifying the SD card is by finding its capacity. For example, the capacity of the SD card I use is 8 GB. So the last one listed above is what we are looking for.

3. Unmount the SD card with command:

```
$ sudo umount /dev/sdc2
```

where /dev/sdc2 is what we found in the first column in last step.

(Note that the SD card may still be seen in the HOME FOLDER, but it is OK)

4. Under terminal, cd to where the system image is stored. Use command below to flash the OS into the SD card:

```
$ gunzip -c ubuntu-11.10-preinstalled-server-armel+omap4.img.gz | sudo dd bs=4M of=/dev/sdc
$ sync
```

(Note that it is "/dev/sdc" instead of "/dev/sdc2" in last step)

After a while (about 10 minutes), the following screen will be displayed:


```

+-----+
| A -   Serial Device       : /dev/ttyUSB0
| B -   Lockfile Location   : /var/lock
| C -   Callin Program      :
| D -   Callout Program     :
| E -   Bps/Par/Bits        : 115200 8N1
| F -   Hardware Flow Control : Yes
| G -   Software Flow Control : No
|
|   Change which setting?
+-----+

```

When the screen is like the following, plug in the power to Pandaboard.

```

Welcome to minicom 2.5

OPTIONS: I18n
Compiled on May  2 2011, 10:05:24.
Port /dev/ttyUSB0

Press CTRL-A Z for help on special keys

```

Bunch of texts will come out. Wait for a while and after the board reboot, you can start setup the system:

```

System Configuration
+-----+
| Choose the language to be used for the installation process. The
| selected language will also be the default language for the installed
| system.
|
| Language:
|
| Bulgarian - Български
| Catalan - Català
| Chinese (Simplified) - 中文(简体)
| Chinese (Traditional) - 中文(繁體)
| Croatian - Hrvatski
| Czech - Čeština
| Danish - Dansk
| Dutch - Nederlands
| English - English
|
|                                     ↑
|                                     ↓
|
|                                     <Ok>          <Cancel>
+-----+

```

After everything is done, type command in the terminal running Minicom to shutdown the board:
\$ sudo poweroff

```

Ubuntu 11.10 localhost tty02

localhost login: ubuntu
Password:
Welcome to Ubuntu 11.10 (GNU/Linux 3.0.0-1205-omap4 armv7l)

 * Documentation:  https://help.ubuntu.com/

The programs included with the Ubuntu system are free software;
the exact distribution terms for each program are described in the
individual files in /usr/share/doc/*/copyright.

Ubuntu comes with ABSOLUTELY NO WARRANTY, to the extent permitted by
applicable law.

To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

ubuntu@localhost:~$ sudo poweroff

```

(In both tutorials, there is one more session to teach you how to install OMAP4 Add-Ons. We highly suggest not doing that. Based on our experience, after doing that, the Pandaboard can only boot through Minicom with workstation connected, but not by itself.)

Now, you can disconnect the board from workstation. Connect your keyboard, monitor and Internet to the board, and then boot. (Do this after unplug the power)

Check CPU Information

To check whether Pandaboard ES can fully operates with Ubuntu running on it. We use following command to check CPU information.

```
$ cat /proc/cpuinfo
```

```

ubuntu@localhost:~$ cat /proc/cpuinfo
Processor       : ARMv7 Processor rev 10 (v7l)
processor       : 0
BogoMIPS       : 1392.74

processor       : 1
BogoMIPS       : 1363.33

Features        : swp half thumb fastmult vfp edsp thumbee neon vfpv3
CPU implementer : 0x41
CPU architecture: 7
CPU variant     : 0x2
CPU part       : 0xc09
CPU revision    : 10

Hardware       : OMAP4 Panda board
Revision      : 0020
Serial        : 0000000000000000
ubuntu@localhost:~$

```

From the result, we can tell there are two working processors – processor 0 and 1. The speed of each is more than 1GB, which matches what Pandaboard user’s manual’s specifications. This

means the dual-core OMAP A9 CPU can fully operate with Ubuntu running on it. Therefore, we can use Ubuntu Oneiric as the operating system of software environment for UAV Imaging project.