Newton2 Developers Guide

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Newton2 Developers Guide

Release history

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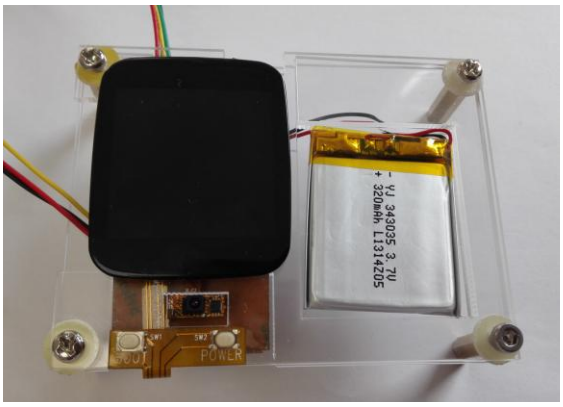
1 Newton2 Development Platform

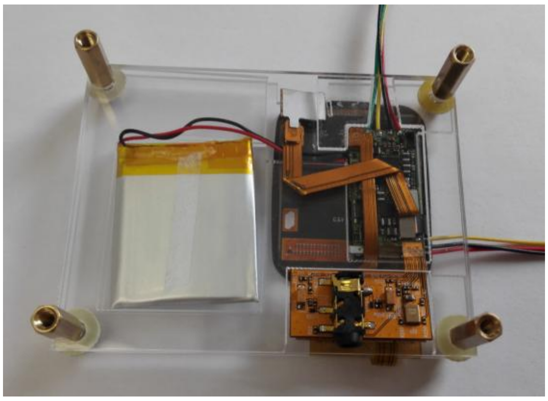
1.1 Overview

The Newton2 development platform looks like below.

Top Side of the development platform



Bottom Side of the development platform



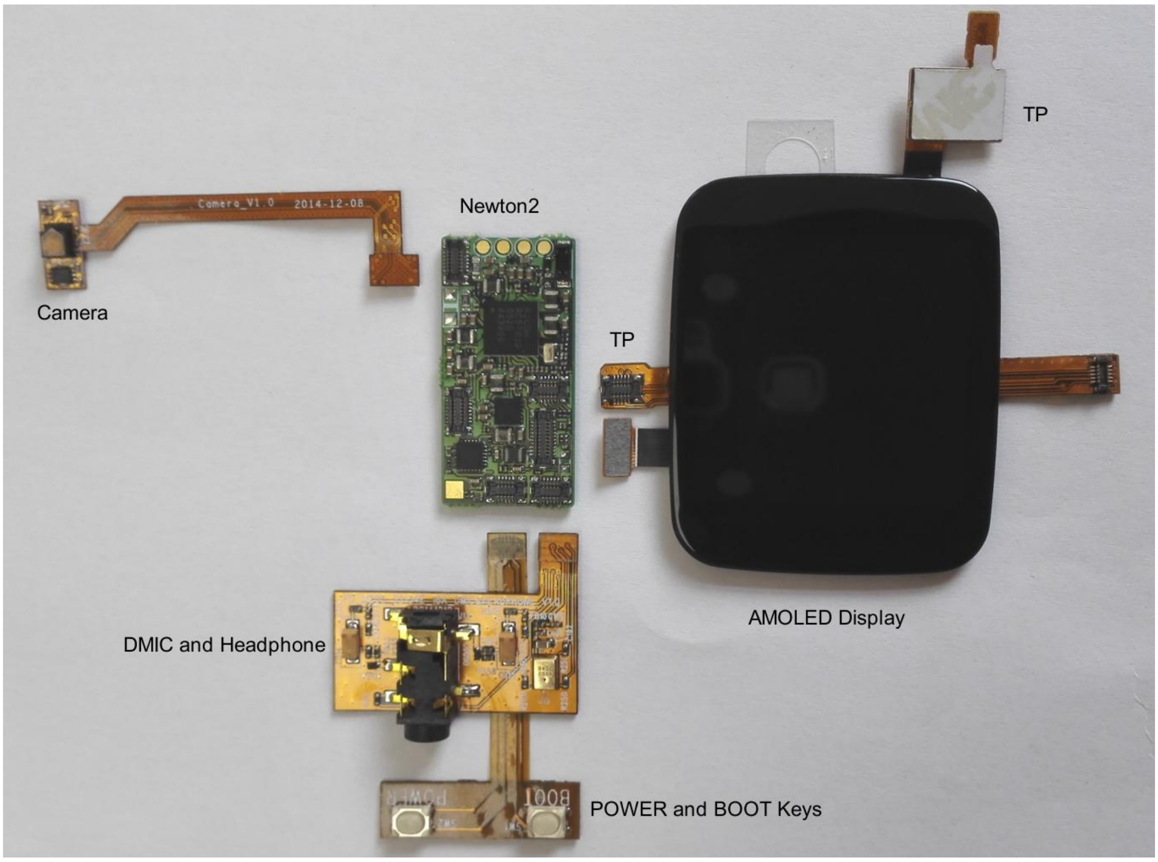


Figure 1.1 Newton2 Development Platform Component List

The Newton2 development platform includes:

- a Newton2 board
- an AMOLED display with capacitive touch screen
- an external board for POWER and BOOT buttons
- an external board for camera
- an external board for DMIC and headphone
- a debug board with UART and USB device interfaces

1.2 Getting Started

1.2.1 Getting All Things Connected

First connect Newton2 Development Platform to Debug Board via UART and USB wires. Then connect debug board to PC via USB Cable 1 and USB Cable 2. As illustrated in the picture below.

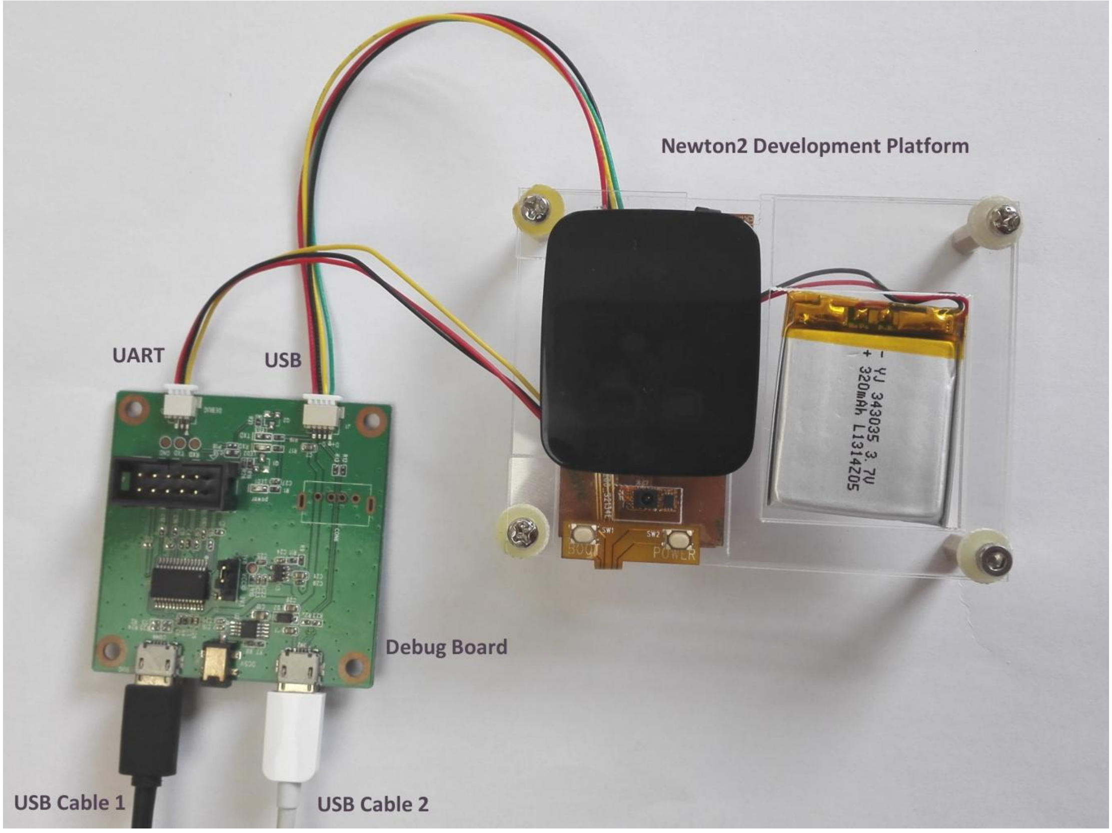


Figure 1.2 Getting All Things Connected

USB Cable 1 connects Newton2 UART port to host PC. When connect USB Cable 1 to PC, PC will detect a new USB serial converter device. You will be asked to install the new device driver. The driver provider and version is *FTDI FT232 USB Serial Converter Drivers*. This USB serial converter can be used as a monitor and can capture system log from the Newton2 UART port. The UART port parameter settings are:

57600 bps, 8 data bit, 1 stop bit, no parity, no flow control.

USB Cable 2 provides power supply to the platform and can charge the battery. It connects the Newton2 USB port to host PC.

1.2.2 Boot the Newton2 Board

Now press the POWER key down about 5 seconds to boot the Newton2 board. During booting, the display will show a logo, then an Android animation, and last an Android launcher. Also the UART port prints out the system running messages.

1.3 Hardware Components Summary

The main hardware components of the Newton2 development platform include:

- Ingenic M200: dual core, 1.2GHz + 300MHz, high performance and low power
- eMCP (4GB eMMC flash + 512MB LPDDR2)
- BCM43438 Wi-Fi IEEE 802.11 b/g/n and Bluetooth 4.1 combo chip, single-band 2.4GHz
- InvenSense MPU-9250: 3-axis gyroscope + 3-axis accelerometer + 3-axis magnetometer
- 1.63’’, 320 * 320 resolution, AMOLED display
- Capacitive touch screen
- OV9724 camera sensor

2 Using the Burning Tool

The burning tool can be run on several host operating systems listed as below.

- Windows 7 and above
- Ubuntu-12.04-32bit/64bit
- Ubuntu-14.04-32bit/64bit

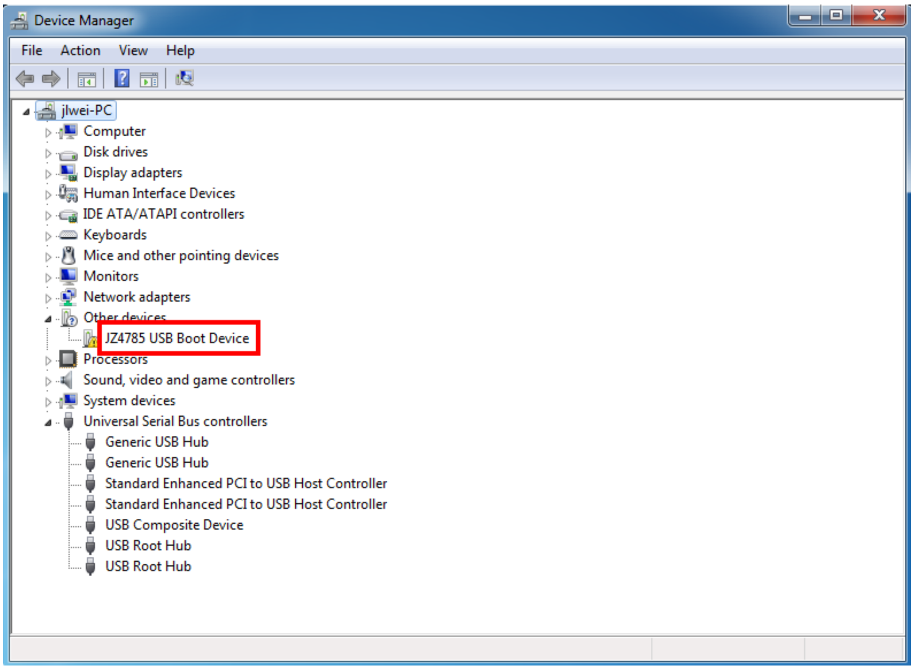
On Windows, you have to install the windows driver for the burning tool before using it. On Ubuntu, you can use the burning tool directly without requiring install any driver.

Now confirm that your Newton2 development platform has been connected to the debug board and the debug board has been connected to your host PC via USB Cable 1 and Cable 2.

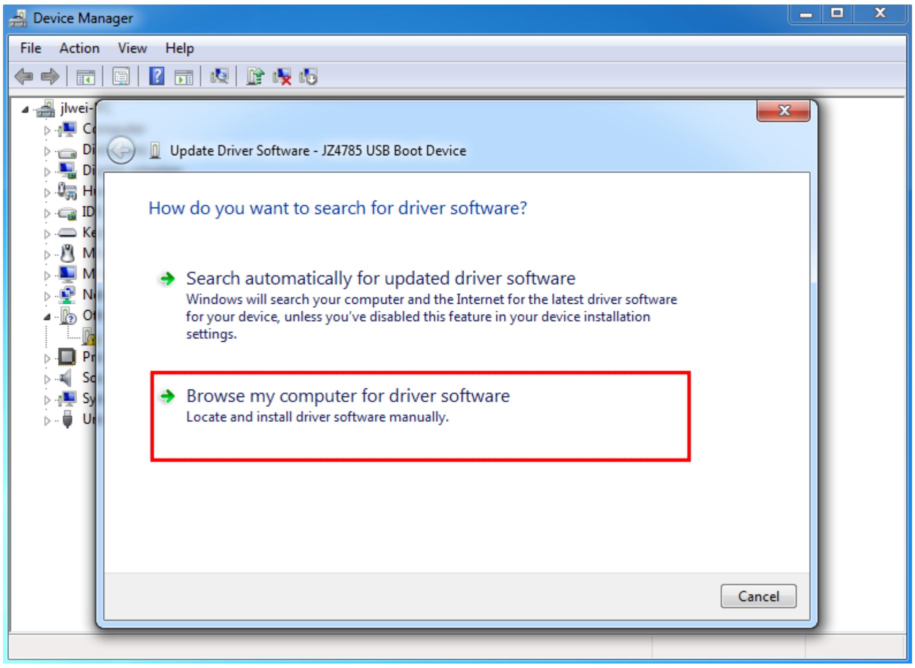
2.1 Installing Windows Driver

First, boot Newton2 to USB boot mode by pressing down both POWER and BOOT keys for about 5 seconds.

On the Windows host, open the Device Manager. A new USB device called “**JZ4780 USB Boot Device**” will be detected.



Then right click on the device and select “**Update Driver Software**”. On the next window select “**Browse my computer for driver software**”.

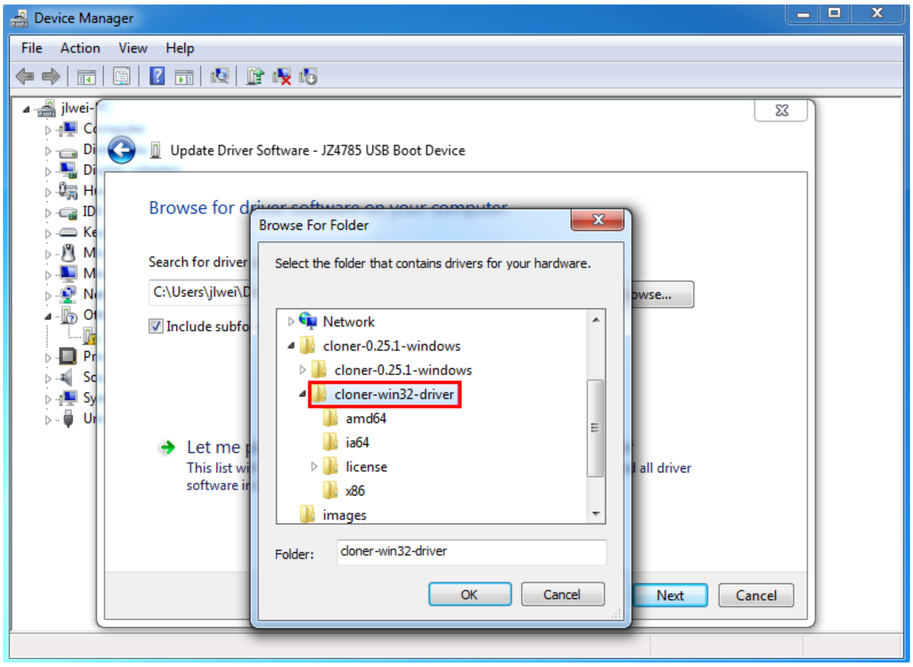


How do you want to search for driver software?

Search automatically for updated driver software
Windows will search your computer and the Internet for the latest driver software for your device, unless you've disabled this feature in your device installation settings.

Browse my computer for driver software
Locate and install driver software manually.

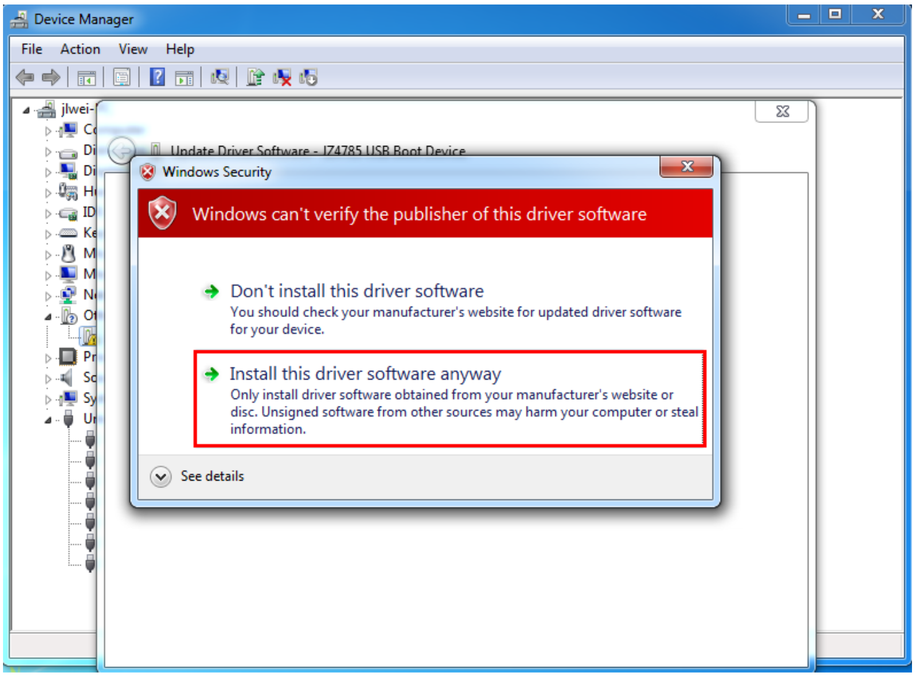
On the next window, click on “**Browse…**” button and select the folder that contains the driver. Click “**OK**” and then click “**Next**” to continue.



Select the folder that contains drivers for your hardware.

Folder: cloner-win32-driver

Then shows a “Windows Security” window will be shown. Ignore it and select “**Install this driver software anyway**” to continue.

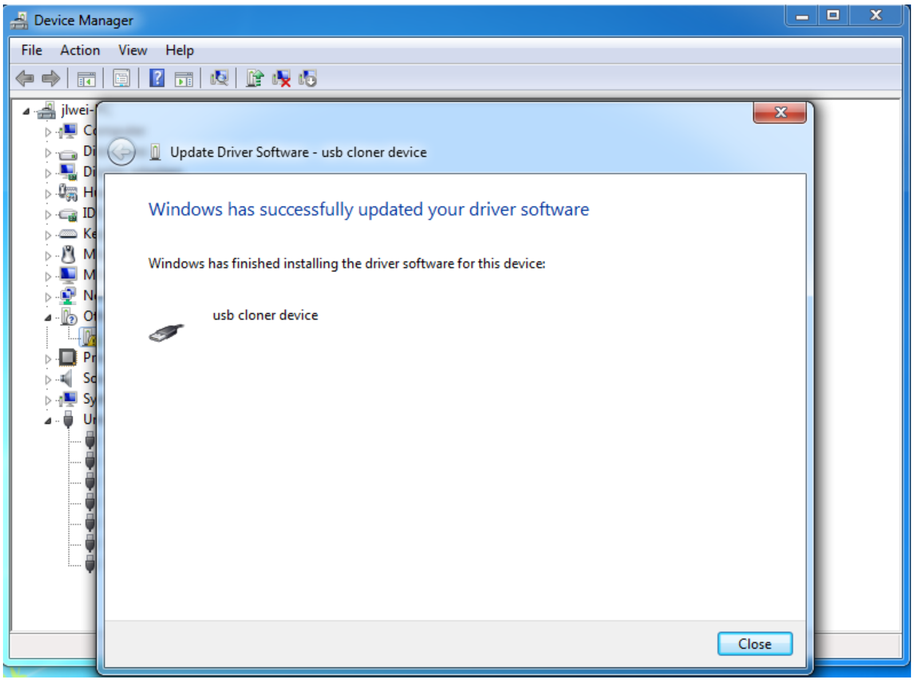


Windows can't verify the publisher of this driver software

Don't install this driver software
You should check your manufacturer's website for updated driver software for your device.

Install this driver software anyway
Only install driver software obtained from your manufacturer's website or disc. Unsigned software from other sources may harm your computer or steal information.

Then Windows start installing the driver and show a window as below when completing successfully.

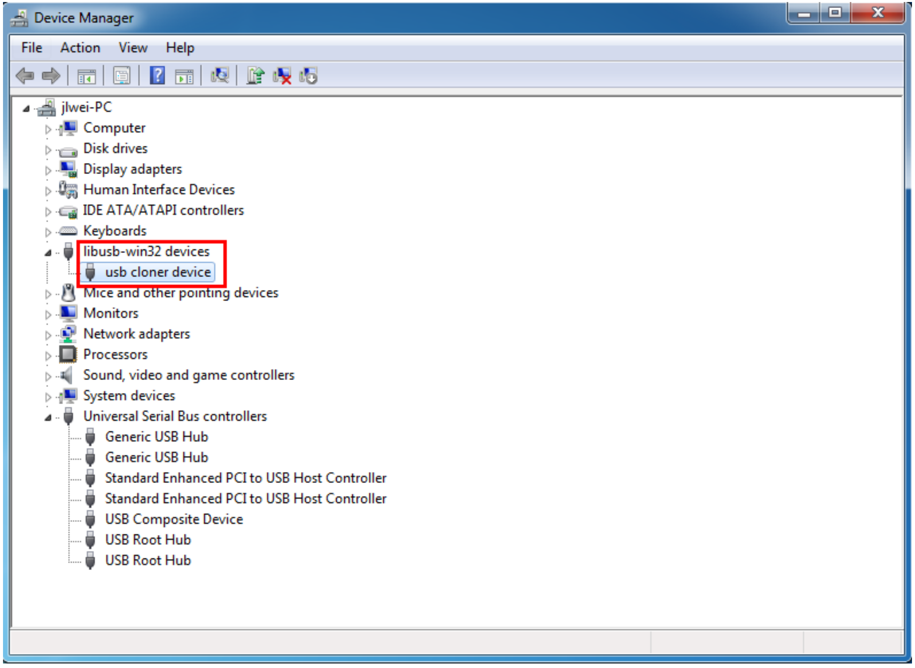


Windows has successfully updated your driver software

Windows has finished installing the driver software for this device:

usb cloner device

On the Windows Device Manager, a device called “**usb cloner device**” has been installed successfully.

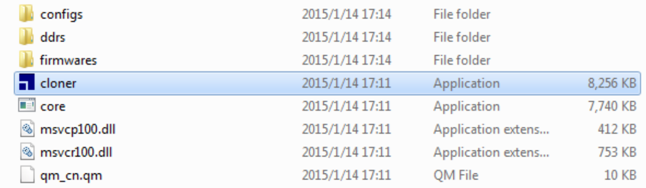


- jlwei-PC
  - Computer
  - Disk drives
  - Display adapters
  - Human Interface Devices
  - IDE ATA/ATAPI controllers
  - Keyboards
  - libusb-win32 devices
    - usb cloner device
  - Mice and other pointing devices
  - Monitors
  - Network adapters
  - Processors
  - Sound, video and game controllers
  - System devices
  - Universal Serial Bus controllers
    - Generic USB Hub
    - Generic USB Hub
    - Standard Enhanced PCI to USB Host Controller
    - Standard Enhanced PCI to USB Host Controller
    - USB Composite Device
    - USB Root Hub
    - USB Root Hub

2.2 Using the Burning Tool

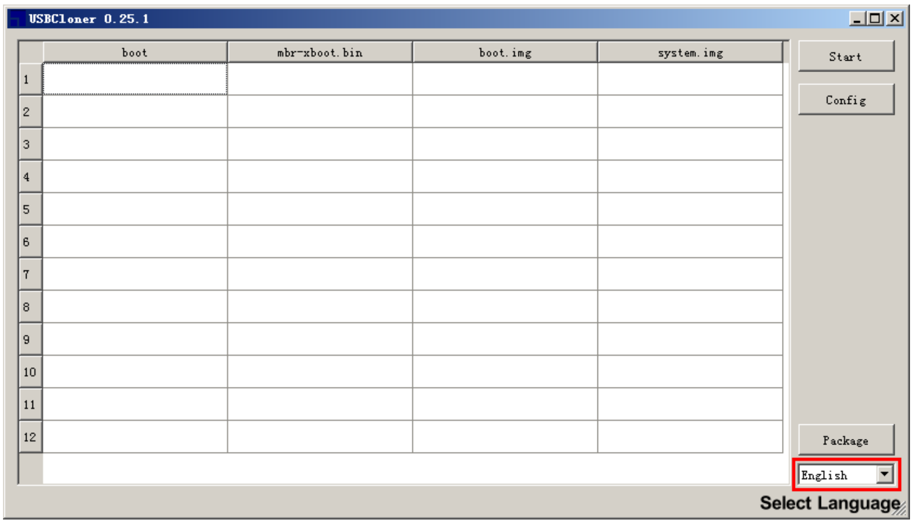
2.2.1 Running the Burning Tool

Confirm that the Windows driver software of the burning tool has been installed successfully. Now click cloner-0.25.1-windows/cloner.exe to start the burning tool.



configs	2015/1/14 17:14	File folder	
ddrs	2015/1/14 17:14	File folder	
firmwares	2015/1/14 17:14	File folder	
cloner	2015/1/14 17:11	Application	8,256 KB
core	2015/1/14 17:11	Application	7,740 KB
msvcp100.dll	2015/1/14 17:11	Application extens...	412 KB
msvcr100.dll	2015/1/14 17:11	Application extens...	753 KB
qm_cn.qm	2015/1/14 17:11	QM File	10 KB

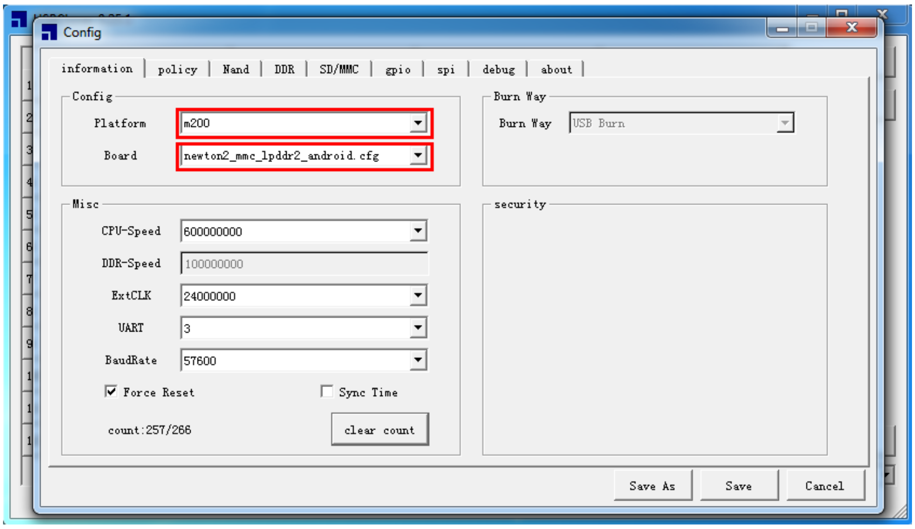
The main window looks like below. Click the right bottom box to select Language.



	boot	mbr-xboot.bin	boot.img	system.img
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

2.2.2 Configuring the Burning Tool

Then click the “**Config**” button. This will open the Config window. On the “**information**” page, confirm that “**Platform**” is “**m200**” and “**Board**” is “**newton2_mmc_lpddr2_android.cfg**”.



Config

information | policy | Nand | DDR | SD/MMC | gpio | spi | debug | about

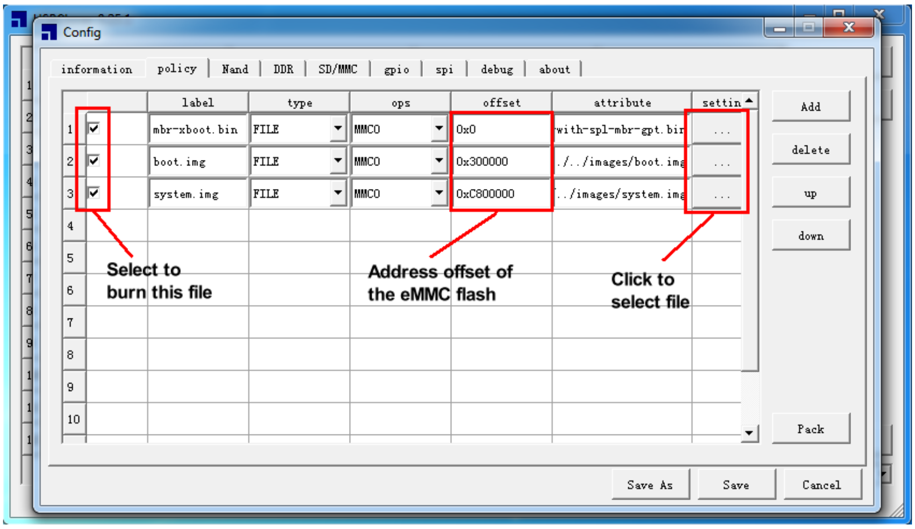
Config
Platform: m200
Board: newton2_mmc_lpddr2_android.cfg

Burn Way
Burn Way: USB Burn

Misc
CPU-Speed: 600000000
DDR-Speed: 100000000
ExtCLK: 24000000
UART: 3
BaudRate: 57600
☑ Force Reset
□ Sync Time
count:257/266

clear count
security
Save As
Save
Cancel

On the “**policy**” page, confirm that the three check boxes are selected. Then click the corresponding “**…**” button to select the file to be burned from your local directory. Then click “**Save**” button to save the configuration and return back to the main window.



Config

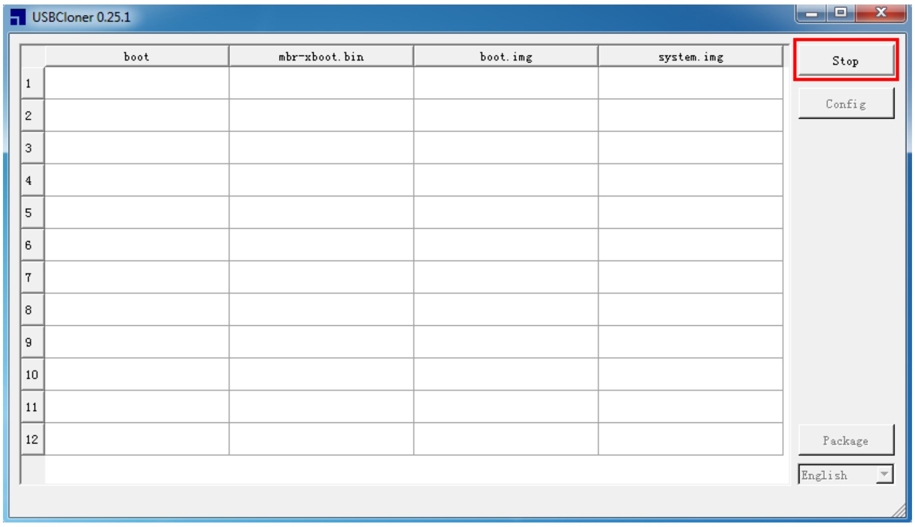
information | policy | Nand | DDR | SD/MMC | gpio | spi | debug | about

		label	type	ops	offset	attribute	settin
1	☑	mbr-xboot.bin	FILE	MMC0	0x0	with-spl-mbr-gpt.bin	...
2	☑	boot.img	FILE	MMC0	0x300000	./../images/boot.img	...
3	☑	system.img	FILE	MMC0	0xC800000	../images/system.img	...
4							
5							
6							
7							
8							
9							
10							

Select to burn this file
Address offset of the eMMC flash
Click to select file
Add
delete
up
down
Pack
Save As
Save
Cancel

2.2.3 Start to Burn

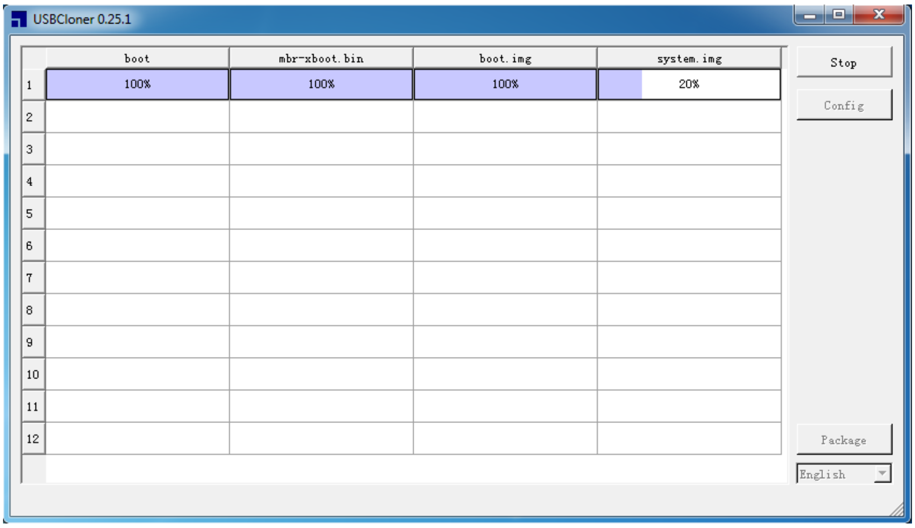
On the main window, click “**Start**” button. When the label of this button has been changed to “**Stop**”, the burning tool is ready to start burning.



	boot	mbr-xboot.bin	boot.img	system.img
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

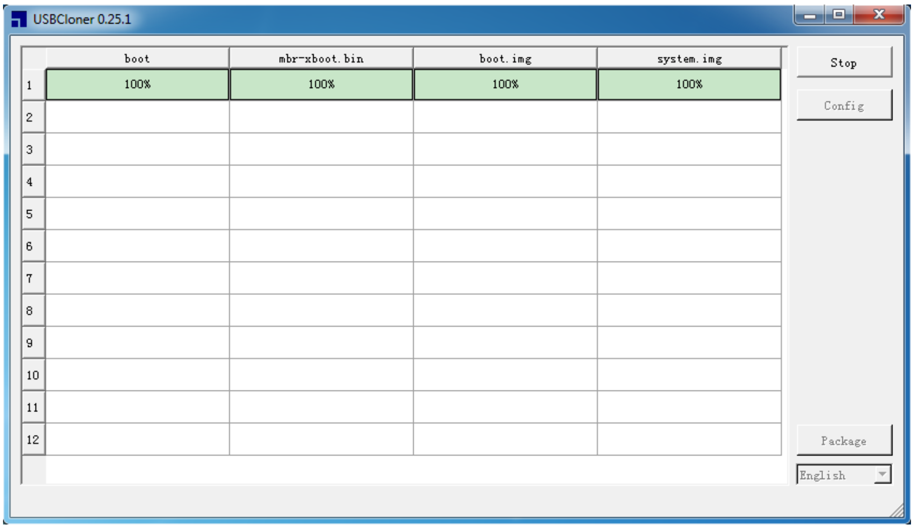
Now you can boot the Newton2 into USB boot mode again. Press both POWER and BOOT keys down for about 5 seconds. Check the Device Manager to confirm that the “usb cloner device” is detected and installed correctly. When Newton2 is booted into USB boot mode, the burning tool will start to burn.

When it is burning, the main window will show the progress for each file to be burned.



	boot	mbr-xboot.bin	boot.img	system.img
1	100%	100%	100%	20%
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

When it is finished successfully, the main window will show as below.



	boot	mbr-xboot.bin	boot.img	system.img
1	100%	100%	100%	100%
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

Then you can boot Newton2 by pressing down “POWER” key alone for about 5 seconds.

The burning tool usage of the Ubuntu version is similar to the Windows version.

3 Android Developers Guide

3.1 Setting up the Building Host

The requirements of the building host are:

- 64-bit Linux system (Ubuntu-12.04-64bit is recommended, 32-bit is not supported)
- Hard disk capacity at least 128GB.
- RAM size at least 4GB.

Follow next steps to setup your building system:

1. Download Ubuntu-12.04-64bit from www.ubuntu.com.
2. Install Ubuntu-12.04-64bit on your host PC.
3. After installing Ubuntu-12.04-64bit, install the following required packages:

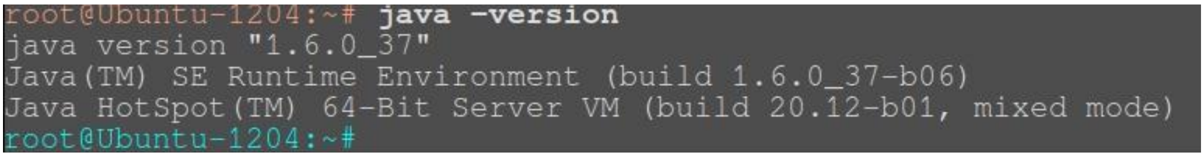
```
$ sudo apt-get install cpp-4.6 g++-4.6 gcc-4.6 gcc-4.6-multilib gcc g++ cpp gcc-multilib
g++-4.6-multilib git-core git gnupg flex bison gperf build-essential zip curl libc6-dev
libncurses5-dev:i386 x11proto-core-dev libx11-dev:i386 libreadline6-dev:i386 libgl1-mesa-glx:i386
libgl1-mesa-dev g++-multilib mingw32 tofrodos python-markdown libxml2-utils xsltproc
zlib1g-dev:i386 ia32-libs gawk qt4-dev-tools libgl1-mesa-dri:i386 libglapi-mesa:i386 libncurses5-dev
libqt3-mt-dev u-boot-tools
```

4. Then Install JDK. The recommended JDK version is jdk-6uXX-linux-x64.
5. After installing JDK, setup the environment variables for JDK.

```
export JAVA_HOME=/usr/java/jdk1.6.0_37
export JRE_HOME=/usr/java/jdk1.6.0_37/jre
export CLASSPATH=$CLASSPATH:$JAVA_HOME/lib:$JRE_HOME/lib
export PATH=$JAVA_HOME/bin:$JAVA_HOME/jre/bin:$PATH
```

Here we use jdk-6u37-linux-x64 as an example and install it to directory /usr/java/jdk1.6.0_37. Add the above lines to /etc/profile.

Use the following command to check whether the JDK was installed correctly.



```
root@Ubuntu-1204:~# java -version
java version "1.6.0_37"
Java(TM) SE Runtime Environment (build 1.6.0_37-b06)
Java HotSpot(TM) 64-Bit Server VM (build 20.12-b01, mixed mode)
root@Ubuntu-1204:~#
```

3.2 Getting Source

Follow next steps to get the Android source code:

1. Download repo tool:

```
$ mkdir newton-android
$ cd newton-android
$ wget http://git.ingenic.cn:8082/bj/repo
$ chmod +x repo
```

2. Use repo tool to download the latest source code, then synchronize to the latest stable version.

```
$ ./repo init -u http://git.ingenic.cn:8082/gerrit/AOSP/platform/manifest -b android-4.4.4_r2-newton2-master
$ ./repo sync
$ ./repo forall -c "git reset --hard ingenic-android4.4.4_r2-kernel3.10.14-newton2-v1.0-20150121"
```

"android-4.4.4_r2-newton2-master" is the branch name of the Newton2 development platform. "***ingenic-android4.4.4_r2-kernel3.10.14-newton2-v1.0-2015012****1"* is the tag name of the latest stable version. This may be changed when you start your first downloading. Use next commands to get the entire tag names.

```
$ cd kernel-3.10.14
$ git tag | grep newton2; cd ..
```

The downloading process will take about several hours according to your network conditions.

3.3 Compiling Android

Use next commands to compile bootloader, and generate u-boot-with-spl-mbr-gpt.bin.

```
$ source build/envsetup.sh
$ lunch newton-userdebug

$ cd bootable/bootloader/uboot
$ make newton2_android_msc0
$ make
```

Use next commands to compile kernel, and generate boot.img.

```
$ cd ../../..
$ cd kernel-3.10.14
$ make newton2_v20_defconfig
$ cp arch/mips/boot/compressed/zImage ../device/ingenic/newton/kernel
$ cd ..
$ make bootimage
```

Use next commands to compile Android, and generate system.img, userdata.img, cache.img and recovery.img.

```
$ make
```