Chipsee BeagleBoneBlack Expansion Board User Manual

V1.0.2

chipsee.com

Copyright:

Update record:

Version	Date	Details
v1.0.0	20140222	The initial version
v1.0.1	20140316	Debian OS added
v1.0.2	20140412	eMMC support added

Summary：

This manual is used to provide users with a fast guide of Chipsee BeagleBone Black expansion board. Through this manual, users can quickly understand the hardware resources; users can build a complete compilation of Android, Linux, Debian and Angstrom development environment; users can debug the OS via serial, USB OTG and Internet.

Contents

1. Chipsee BeagleBoneBlack Development Kit

Hardware:
（1）BeagleBoneBlack
（2）Chipsee BeagleBoneBlack expansion board
（3）Micro SD card and card reader
（4）5V power adapter
（5）Micro USB cable
（6）Common serial cable or USB to serial cable

Software:
（1）Android USB driver(for Windows)
（2）Chipsee Android 4.2 source file(including all Chipsee drivers)
（3）Chipsee Android 4.2 prebuilt file(to make a bootable SD card)
（4）Chipsee Linux source file(including all Chipsee drivers)
（5）Chipsee Linux prebuilt file(to make a bootable SD card)
（6）Chipsee Angstrom source file(including all Chipsee drivers)
（7）Chipsee Angstrom prebuilt file(to make a bootable SD card)
（8）Chipsee Debian prebuilt file(to make a bootable SD card)
（9）Chipsee Android prebuilt file to update the eMMC
（10）Chipsee Linux/Angstrom/Debian prebuilt file to update the eMMC

2. Development environment requirements

Basic configuration requirements of the PC for compiling Android:
（1）Hard disk at least 50G
（2）Memory at least 4G
（3）Ubuntu 10.04 64 bit operating system

3. Android OS

This chapter will introduce Android 4.2 OS for Chipsee BeagleBoneBlack board, through this, users can quickly understand the hardware resources; users can build a complete compilation of Android OS development environment; users can debug the OS via serial, USB OTG and Internet.

3.1. Getting start

Notes: Using the prebuilt file we provided in the CD to test the hardware.

3.1.1 How to make a bootable SD card

1. Insert the SD card into your computer, if using virtual machines, please make sure the SD card mounted to the Linux operating system.
2. Confirm the SD card mount point, "**/dev/sdX**" usually it should be "**/dev/sdb**"**.** You can use this command to find out what the "X" is in the Linux system.

```
$ sudo fdisk –l
```

3. Copy the file "***Prebuilt-JB-Chipsee-BBB-EXP-XXXXXX.tar.gz***" somewhere(such as $HOME).
4. Extract the file "***Prebuilt-JB-Chipsee-BBB-EXP-XXXXXX.tar.gz***"

```
$ tar xzvf Prebuilt-JB-Chipsee-BBB-EXP-XXXXXX.tar.gz
```

5. Go to the folder "***Prebuilt-JB-Chipsee-BBB-EXP-XXXXXX***"

```
$ cd ~/Prebuilt-JB-Chipsee-BBB-EXP-XXXXXX
```

6. Flash the Android OS to the SD card

```
$ sudo ./mkmmc-android.sh /dev/sd<?>
```

Notes: The SD card should be at least 2GB, and you'd better to use Sandisk Class4 level SD card or above.

3.1.2 How to update eMMC with Android OS

Follow the steps in chapter 3.1.1 to make a bootable SD card for eMMC-flasher, you find the file ***prebuilt-BBB-Exp-Andriod-eMMC-flasher-XXXXXX.tar.gz*** in CD.

1. Extract "***prebuilt-BBB-Exp-Andriod-eMMC-flasher-XXXXXX.tar.gz***"

```
$ tar xzvf prebuilt-BBB-Exp-Andriod-eMMC-flasher-XXXXXX.tar.gz
```

2. Go to the folder "***prebuilt-BBB-Exp-Andriod-eMMC-flasher-XXXXXX***"

```
$ cd ~/prebuilt-BBB-Exp-Andriod-eMMC-flasher-XXXXXX
```

3. Run the command to make a bootable SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

4. It will finished in about 10 minutes. Once done switch SW8 to “uSD”, then insert the SD card and power on the board. The screen will be dark.
5. Wait for almost 30 minutes, when all the four user LEDs on Beaglebone Black stay lit. It is done.
6. Power off the board, pull out of the SD card from Beaglebone Black, switch SW8 to "eMMC", then power on.

3.1.3 Start the Android OS

1. Insert SD card into BeagleBoneBlack
2. Switch SW8 on expansion board to uSD
3. Power on the board

Notes: The first time starting Android OS will take a little time, after this it will be very quick to start the Android. You can see the Chipsee Logo(it can be changed by using software ***ChipSee_LOGO_MOD_EN.exe*** we provided in the CD)shown on the LCD screen. It is successful start When you see the Android desktop like Figure 3-1:

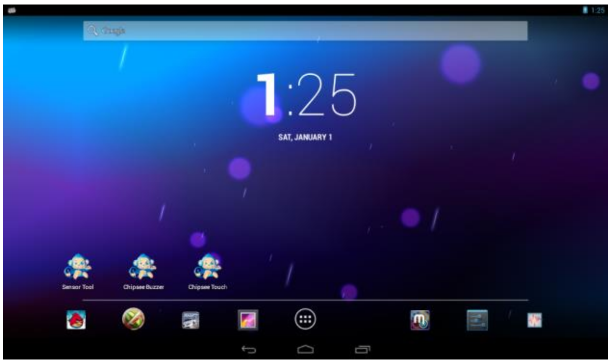


Figure 3-1 Android desktop

3.2. Tests

3.2.1 Touch screen test

Run MultiTouchTest App, Screen will show the number and position of the touch point when touching the screen. Resistive screen expansion board only supports single-touch, capacitive screen expansion board supports five-point touch like Figure 3-2:

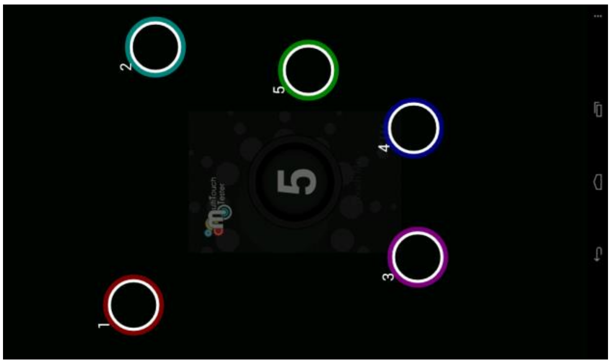


Figure 3-2 Touch screen test(Capacitive)

3.2.2 GPIO test(buttons)

The keys on expansion board is defined as shown in Figure 3-3:

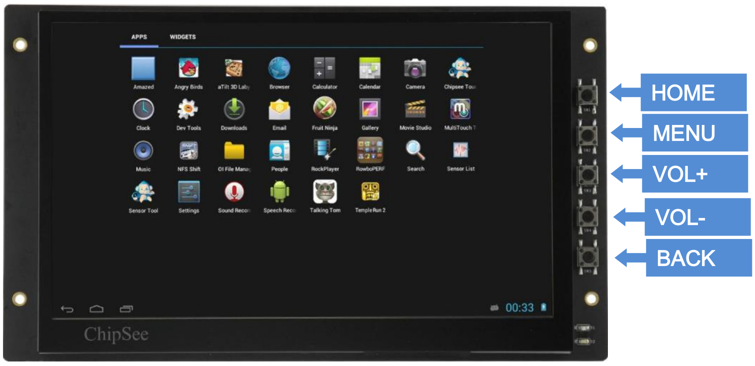


Figure 3-3 Buttons on board

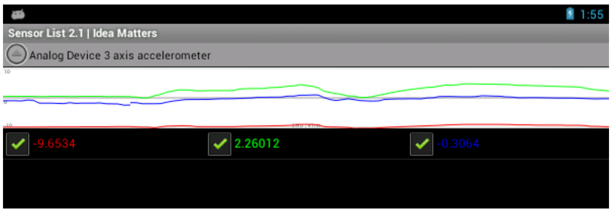
3.2.3 Buzzer test

Run ChipseeBuzzer App, push “OpenBuzze” button the buzzer will continue to sound. push “CloseBuzzer” button to stop it.

3.2.4 Gravity sensor function test

(1) Gravity sensor can be tested by whirling the screen.

(2) Run SensorList App, in the option “Analog Device 3 axis accelerometer”, You ca n see real-time changes of the three axis acceleration value curve, like Figure 3-4.


1:55

Sensor List 2.1 | Idea Matters

Analog Device 3 axis accelerometer

☑ -9.6534 ☑ 2.26012 ☑ -0.3064

Figure 3-4 Real-time acceleration curve

(3) Use gravity sensing game to test, such as “NFS shift” or “aTilt 3D laby”. If usin g “NFS shift” , pleas run “ChipseeSensorTool” app to adjust the direction of the axis,

select “Invert X axis” and “Swap X/Y axes”, if other games please adjust the settings as default.

3.2.5 Audio input and output test

Insert the microphone and earphone into expansion board Audio IN (pink), Audio OUT (light blue) interface. Start “Talking Tom” App(Tom Cat), speak into the microphone, Tom cat will repeat spoken content

3.2.6 Video test

Run Gallery App, choose “Video”, select “Transformers.Dark of the Moon.2011.720p.avi”, like Figure 3-5:

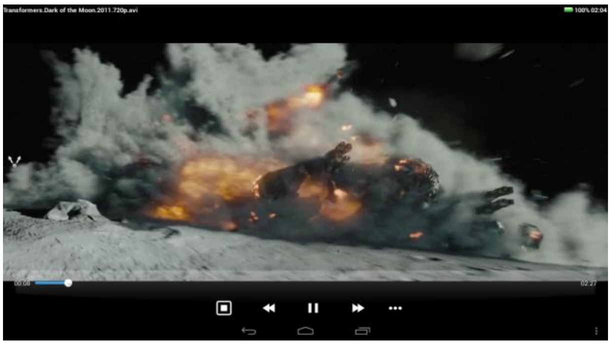
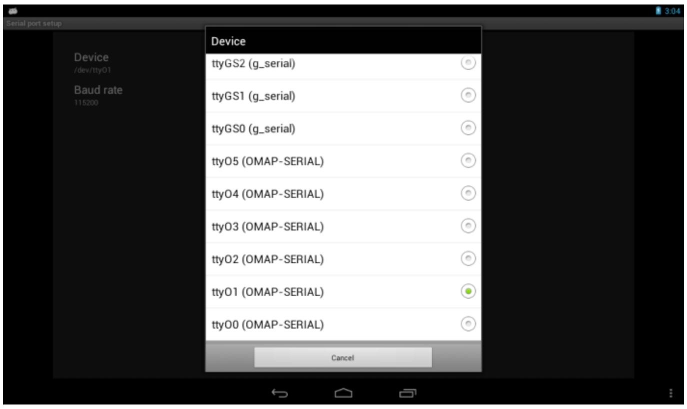


Figure 3-5 Video test

3.2.7 Serial test

(1) Connect COM1 on board to PC. Use software “SecureCRT” or “Putty” or some others in PC. Run “Serial Port API” App to communicate with PC. Like Figure 3-6.



Serial port setup

Device
/dev/ttyO1

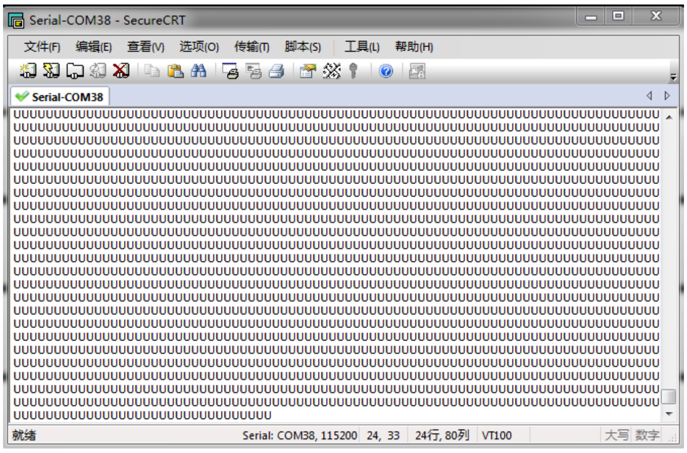
Baud rate
115200

Device

ttyGS2 (g_serial) ○
ttyGS1 (g_serial) ○
ttyGS0 (g_serial) ○
ttyO5 (OMAP-SERIAL) ○
ttyO4 (OMAP-SERIAL) ○
ttyO3 (OMAP-SERIAL) ○
ttyO2 (OMAP-SERIAL) ○
ttyO1 (OMAP-SERIAL) ●
ttyO0 (OMAP-SERIAL) ○

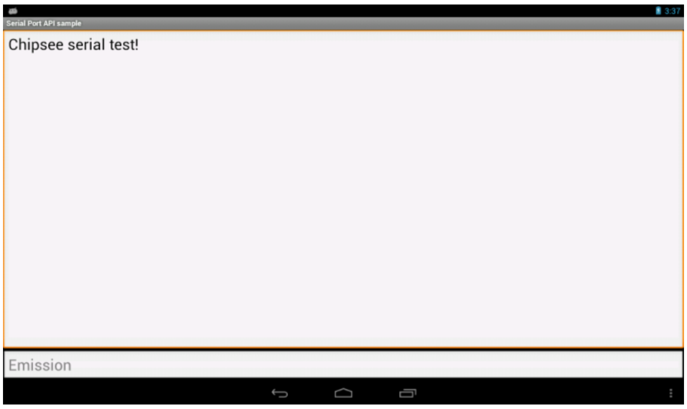
Figure 3-6 Serial settings

(2) Push button “Send 01010101”, you will see something in PC like Figure 3-7.
(3) Push button “Console”, you can send what you want like Figure 3-8.



```
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
UUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
```

Figure 3-7 Serial send test



```
Chipsee serial test!
```

Figure 3-8 Serial receive test

3.3. Build Android4.2 compilation environment

Notes: This work is done under Ubuntu 10.04 64 bit operation system.

3.3.1 Install the required packages

```
$ sudo apt-get install git-core gnupg flex bison gperf build-essential \
zip curl zlib1g-dev libc6-dev lib32ncurses5-dev ia32-libs \
x11proto-core-dev libx11-dev lib32readline5-dev lib32z-dev \
libgl1-mesa-dev g++-multilib mingw32 tofrodos python-markdown \
libxml2-utils xsltproc minicom tftpd uboot-mkimage expect
```

Notes: Ensure the PC is connected to the Internet.

3.3.2 Install Oracle JDK 6

1. Copy the file "***jdk-6u45-linux-x64.bin*" to $HOME.**
2. Do the commands shown below:

```
$ chmod a+x jdk-6u45-linux-x64.bin
$ ./jdk-6u45-linux-x64.bin
$ sudo mkdir -p /usr/lib/jvm
$ sudo mv jdk1.6.0_45 /usr/lib/jvm/
$ sudo update-alternatives --install "/usr/bin/java" "java" "/usr/lib/jvm/jdk1.6.0_45/bin/java" 1
$ sudo update-alternatives --install "/usr/bin/javac" "javac" "/usr/lib/jvm/jdk1.6.0_45/bin/javac" 1
$ sudo update-alternatives --config java
$ sudo update-alternatives --config javac
```

3.3.3 Prepare Android source

1. Copy the file "***Chipsee-BBB-JB-42-Source-XXXXXX.tar.gz***" to $HOME
2. Extract the file：

```
$ cd $HOME
$ tar xzvf Chipsee-BBB-JB-42-Source-XXXXXX.tar.gz
```

You can find what you need under folder "***Chipsee-BBB-JB-42-Source-XXXXXX***", such as "u-boot", "kernel":

(1) Android file system source: **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX/**

(2) Android kernel source: **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX/kernel**

(3) U-BOOT source: **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX/u-boot**

(4) Cross-compiler tools: **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX/prebuilts/gcc/linux-x86/arm/arm-eabi-4.6/bin**

3. Set Environment Variables

```
$ cd Chipsee-BBB-JB-42-Source-XXXXXX/
$ source set_env.sh
```

Notes: For ease of use, The environment variable settings related are written in set_env.sh script, and run the script only after the current terminal is valid, when the terminal closed environment variable itself is lost, so in the new terminal need to re-run the script when Android compiled. And the content of the script is as follows:

```
export PATH=$PATH:/usr/lib/jvm/jdk1.6.0_45/bin/
export PATH=$PATH:`pwd`/prebuilts/gcc/linux-x86/arm/arm-eabi-4.6/bin
export ARCH=arm
export CROSS_COMPILE=arm-eabi-
```

3.4. Compile and install the Android system

3.4.1 Compile U-BOOT

1. Go to u-boot folder

```
$ cd ~/Chipsee-BBB-JB-42-Source-XXXXXX/u-boot/
```

2. Clear the result compiled before

```
$ make distclean
```

3. Configure the compile options

```
$ make am335x_evm_config
```

4. Compile u-boot

```
$ make
```

Notes: Once done, you can find the results under folder “**u-boot**”, such as “MLO”, “u-boot.img”.

3.4.2 Compile kernel

1. Go to kernel folder

```
$ cd ~/Chipsee-BBB-JB-42-Source-XXXXXX/kernel/
```

2. Clear the result compiled before

```
$ make distclean
```

3. Configure the compile options

```
$ make am335x_evm_android_defconfig
```

4. Compile uImage

```
$ make uImage
```

Notes: Once done, you can find the result(uImage) under “**kernel/arch/arm/boot”**

3.4.3 USB-WiFi

If you need the function USB-WiFi, you can do this steps, or go to the next: **Compile Android Filesystem.**

1. Go to WiFi folder

```
$ cd ~/Chipsee-BBB-JB-42-Source-XXXXXX/wifi/rtl8192cu_beaglebone/
```

2. Compile

```
$ make
```

Notes: Once done, you can find the result **8192cu.ko** in the current directory, youc can copy the file to the Android OS root partition directory /system/lib/modules/.

3.4.4 Compile Android Filesystem

1. Go to Android source folder.

```
$ cd ~/Chipsee-BBB-JB-42-Source-XXXXXX/
```

2. Compile the Android Filesystem, This case can be compiled according to the host system of multi-threaded CPU cores, <N> usually 2 times the number of CPU cores.

```
$ make TARGET_PRODUCT=beagleboneblack OMAPES=4.x –j<N>
```

Notes: Once done, the results located at **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX /out/target/product/beagleboneblack,** including both root and system directories

3.4.5 Package image file

1. Go to Android source folder.

```
$ cd ~/Chipsee-BBB-JB-42-Source-XXXXXX/
```

2. Package image file

```
$ make TARGET_PRODUCT=beagleboneblack OMAPES=4.x sdcard_build
```

Notes: Once done, the results located at **$HOME/Chipsee-BBB-JB-42-Source-XXXXXX /out/target/product/beagleboneblack/beagleboneblack,** The content of the directory as described below:

```
--Boot_Images      // This directory contains all the files needed to start
    --MLO          //AM335x startup file
    --u-boot.img       //U-BOOT startup file
    --uEnv.txt         //U-BOOT startup parameter configuration file
    --uImage           //Android kernel
--Filesystem           //Android filesystem
    --rootfs.tar.bz2
--Media_Clips      // Media Files
    --Audio
    --Images
    --Video
--mkmmc-android.sh // SD card installation script
--REDAME.txt       // Instructions
```

3.4.6 Make a bootable SD card

1. Go to the packaged file folder

```
$ cd $HOME/Chipsee-BBB-JB-42-Source-XXXXXX/out/target/product/beagleboneblack/beagleboneblack/
```

2. See 3.1.1 How to make a bootable SD card

3.4.7 Start Android System

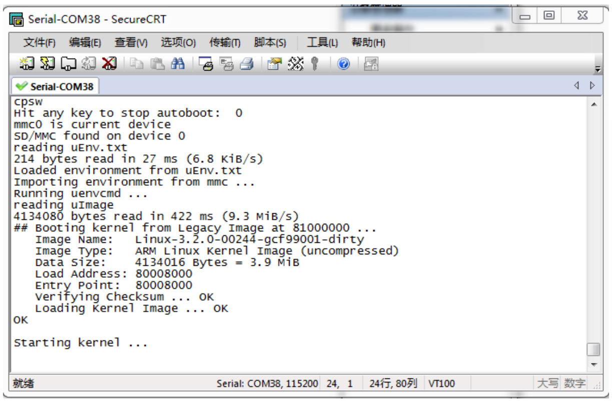
See 3.1.2 Start the Android OS, but this Android OS is pure.

3.5. Android system debug in Windows

In this chapter we will describe how to view Android system via the serial port and how to debug the system via USB OTG. We can also install applications via USB OTG. The following operation under Windows 7 x64 environment, similar to other Windows platfor ms.

3.5.1 View Android system via the serial port

1. Connect the COM1 on board to PC
2. Open software “SecureCRT” or “Putty” in Windows.
3. Power on the board, you can see the serial output of information like Figure 3-9.



```
cpsw
Hit any key to stop autoboot:  0
mmc0 is current device
SD/MMC found on device 0
reading uEnv.txt
214 bytes read in 27 ms (6.8 KiB/s)
Loaded environment from uEnv.txt
Importing environment from mmc ...
Running uenvcmd ...
reading uImage
4134080 bytes read in 422 ms (9.3 MiB/s)
## Booting kernel from Legacy Image at 81000000 ...
   Image Name:   Linux-3.2.0-00244-gcf99001-dirty
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    4134016 Bytes = 3.9 MiB
   Load Address: 80008000
   Entry Point:  80008000
   Verifying Checksum ... OK
   Loading Kernel Image ... OK
OK

Starting kernel ...
```

Figure 3-9 Serial output

4. When the system is fully booted, you can communicate with it.

3.5.2 Adb connect via USB OTG

1. Install Oracle JDK 6 for Windows.
2. Install ADT. Download the file here: http://developer.android.com/sdk/index.html. Extract the file somewhere(named ADT). Adb command located**<ADT>\sdk\platform-tools.**
3. Optionally, you may want to add the location of the SDK's primary tools directory to your system PATH. Right-click on My Computer, and select Properties. Under the Advanced tab, hit the Environment Variables button, and in the dialog that comes up, double-click on Path (under System Variables). Add the full path to the tools\ directory to the path.
4. Install Android USB driver: Copy the folder “**usb_driver**” in CD to **<ADT>** folder

Boot the board as normal and wait until shell prompt is available (micro-B USB cable must be disconnected).

- Connect micro-B USB cable between board and Windows PC.
- If it is proceeding as planned, Windows will tell you it found a new hardware asks you to install the driver. Install driver that was downloaded as described in step 3 above: Answer "No, not this time" to the question about running Windows Update to search for software.
- Choose "Install the hardware that I manually select from a list (Advanced)" this is the 2nd option, then click "Next"
- Select "Show All Devices", then click "Next"
- You are going to see a grayed-out text box with "(Retrieving a list of all devices)", click the "Have Disk..." button
- Browse" to your driver folder (<ADT>\usb_driver). It will be looking of a .inf file so s

elect "android_winusb.inf" and click "Open" then "OK". It's the only file there so you sho uldn't go wrong.

- Select "Android ADB Interface" then click the "Next" button.
- A warning will appear, answer "Yes" but read the warning anyway.
- Click the "Close" when the wizard is completed.

Now you can see the driver is installed successfully link Figure 3-10.

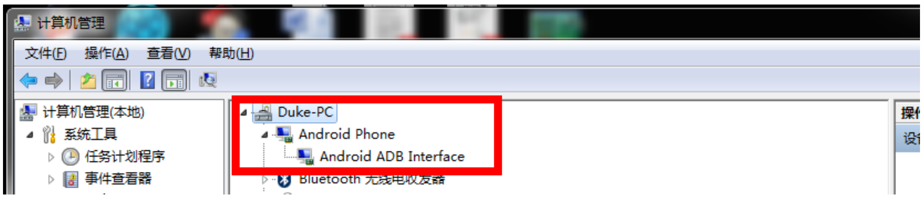
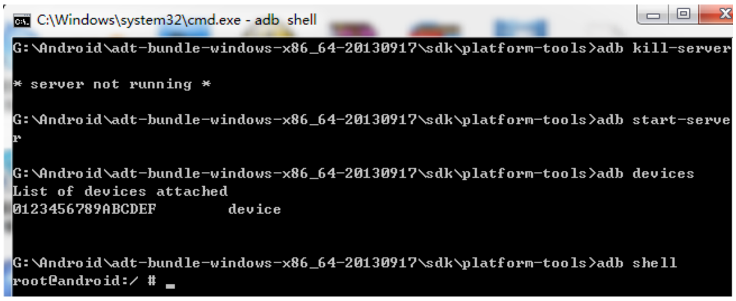


Figure 3-10 ADB driver

5. Test adb: “Win+r” enter “cmd”, test like below:

```
> cd <ADT>\sdk\platform-tools\
> adb kill-server
> adb start-server
> adb devices
> adb shell
```

When the "#" prompt appears, it means we connect the board with PC successfully.



```
G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>adb kill-server

* server not running *

G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>adb start-serve
r

G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>adb devices
List of devices attached
0123456789ABCDEF        device


G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>adb shell
root@android:/ # _
```

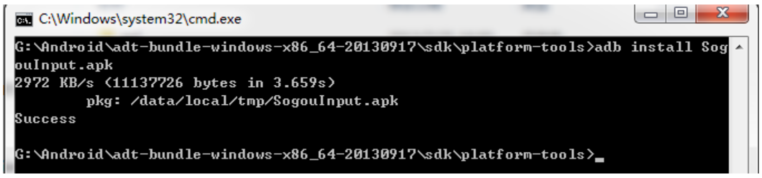
Figure 3-11 ADB Command

Now you can use Linux commands like “ls”, “cd” and so on. Ctrl + C to exit the shell return to Windows system.

6. Use adb command to install Android App: for example SogouInput.apk.

```
> adb install SogouInput.apk
```

If there is a “Success”, the app has already installed in Android.



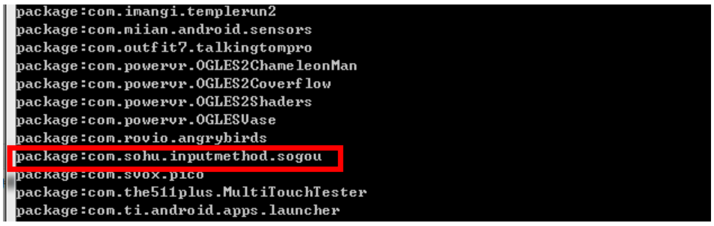
```
G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>adb install Sog
ouInput.apk
2972 KB/s (11137726 bytes in 3.659s)
        pkg: /data/local/tmp/SogouInput.apk
Success

G:\Android\adt-bundle-windows-x86_64-20130917\sdk\platform-tools>_
```

Figure 3-12 Install App

7. Use adb command to uninstall App

(1) Uninstall user app(such as ***SogouInput.apk***): Use command “pm list” to get the full nam e of the app, like Figure 3-13. Then use command “uninstall” to uninstall the app.

```
> adb shell pm list packages
> adb uninstall com.sohu.inputmethod.sogou
```



```
package:com.imangi.templerun2
package:com.miian.android.sensors
package:com.outfit7.talkingtompro
package:com.powervr.OGLES2ChameleonMan
package:com.powervr.OGLES2Coverflow
package:com.powervr.OGLES2Shaders
package:com.powervr.OGLESVase
package:com.rovio.angrybirds
package:com.sohu.inputmethod.sogou
package:com.svox.pico
package:com.the511plus.MultiTouchTester
package:com.ti.android.apps.launcher
```

Figure 3-13 Command "pm list" to get app's name

(2) Uninstall default app: Use "adb shell" to log in the board and delete the apk file.

```
> adb shell
# cd /system/app/
# ls
# rm Browser.apk
```

8. Use adb command to transport files between board and PC: "adb pull" and "adb push"

(1) Board to PC: **<remote>** is the file or folder on board, **<local>** is the file or fold er in PC.

```
>adb pull <remote> <local>
```

(2) PC to board:

```
>adb push <local> <remote>
```

For example copy <ADT>\sdk\platform-tools\chipsee.txt to board:

```
>adb push chipsee.txt /chipsee.txt
```

Opposite, board to PC:

```
>adb pull /testFile.txt testFile.txt
```

3.5.3 Adb connect via internet

Make sure Ethernet port on board and host machine are connected to the network. C heck Ethernet configuration for the board

```
# netcfg
lo       UP     127.0.0.1         255.0.0.0         0x00000049
eth0     UP     192.168.1.117/24    255.255.252.0    0x00001043
```

1. If Ethernet was not configured, configure Ethernet of the board using ifconfig/netc fg as shown below.

```
# netcfg eth0 dhcp
```

2. Configure the ADB Daemon to use an ethernet connection using setprop as show n below.

```
# setprop service.adb.tcp.port 5555
```

3. If network is configured successfully (above steps) then Restart service adbd on t he target

```
# stop adbd
# start adbd
```

4. On the host machine use following commands to establish adb connection

```
$ adb kill-server
$ adb start-server
$ adb connect <target_ip_address>:5555
```

5. Verify for device connectivity, by executing the following commands. If connected, find the device name listed as a "IPADDRESS:PORT"

```
$ adb devices
List of devices attached
emulator-5554      device
192.168.1.117:5555   device
```

6. An example of using adb to install software for Android

Make sure **.apk at the current folder, and export the adb path

```
$ adb –s 192.168.1.117:5555 install **.apk
```

Use the argument **–s** to appoint the device over the internet.

4. Linux OS

This chapter will introduce Linux OS for Chipsee BeagleBoneBlack board, through this, users can quickly understand the hardware resources; users can build a complete compilation of Linux OS development environment; users can debug the OS via serial, and Internet.

4.1. Getting start

Note: Using the prebuilt file we provided in the CD to test the hardware.

4.1.1 How to make a bootable SD card

1. Insert the SD card into your computer, if using virtual machines, please make sure the SD card mounted to the Linux operating system.

2. Confirm the SD card mount point, “**/dev/sdX**” usually it should be “**/dev/sdb”.** You can use this command to find out what the “X” is in the Linux system.

```
$ sudo fdisk –l
```

3. Copy the file ***“prebuilt-chipsee-bbb-exp-ezsdk-20131210.tar.gz”*** somewhere(such as $HOME).

4. Extract the file “***Prebuilt-chipsee-bbb-exp-ezsdk-20131210.tar.gz***”

```
$ tar xzvf Prebuilt-chipsee-bbb-exp-ezsdk-20131210.tar.gz
```

5. Go to the folder “***Prebuilt-chipsee-bbb-exp-ezsdk-20131210***”

```
$ cd ~/Prebuilt-chipsee-bbb-exp-ezsdk-20131210
```

6. Flash the Linux OS to the SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

Notes: The SD card should be at least 2GB, and you’d better to use Sandisk Class4 level SD card or above.

4.1.2 How to update eMMC with Linux OS

Follow the steps in chapter 4.1.1 to make a bootable SD card for eMMC-flasher, you find the file ***prebuilt-BBB-Exp-eMMC-flasher-XXXXXX.tar.gz*** in CD.

1. Extract “***prebuilt-BBB-Exp-eMMC-flasher-XXXXXX.tar.gz”***

```
$ tar xzvf prebuilt-BBB-Exp-eMMC-flasher-XXXXXX.tar.gz
```

2. Go to the folder “***prebuilt-BBB-Exp-eMMC-flasher-XXXXXX***”

```
$ cd ~/prebuilt-BBB-Exp-eMMC-flasher-XXXXXX
```

3. Run the command to make a bootable SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?> --system Linux
```

4. It will finished in about 10 minutes. Once done switch SW8 to “uSD”, then insert the SD card and power on the board. The screen will be dark.
5. Wait for almost 30 minutes, when all the four user LEDs on Beaglebone Black stay lit. It is done.
6. Power off the board, pull out of the SD card from Beaglebone Black, switch SW8 to "eMMC", then power on.

4.1.3 Start the Linux OS

1. Insert SD card into BeagleBoneBlack
2. Switch SW8 on expansion board to uSD
3. Power on the board

Notes: You can see the Chipsee Logo(it can be changed by using software ***ChipSee_LOGO_MOD_EN.exe*** we provided in the CD)shown on the LCD screen. It is successful start When you see the Linux desktop like Figure 4-1:

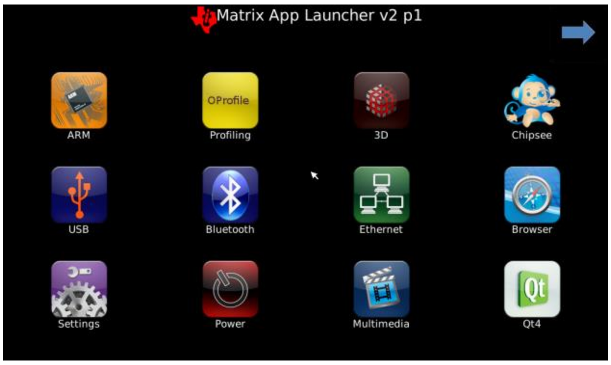
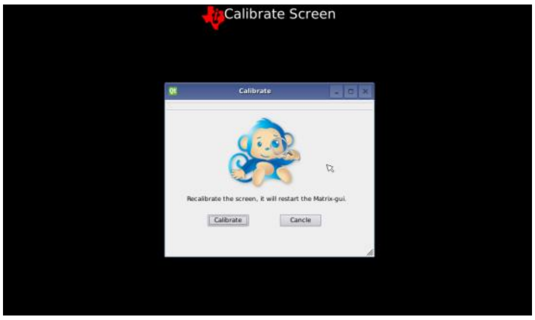


Figure 4-1 Linux desktop

4.2. Tests

4.2.1 Touch screen and buzzer test

Click on the screen, the mouse arrow stays in position triggered and the buzzer sounds, indicating that touch and buzzer work properly. After working for some time resistive touch screen may not be accurate, need to be calibrated, click on the "Chipsee" icon on desktop, select "Calibrate Screen" to calibrate. Like Figure 4-2:



Recalibrate the screen, it will restart the Matrix-gui.

Figure 4-2 Resistive touch screen calibration app

4.2.2 Audio and video test

Click "Multimedia" icon on desktop, choose "MPEG-4+AAC Dec" to test. You need insert the earphone into expansion board Audio OUT (light blue) before testing. The result like Figure 4-3:

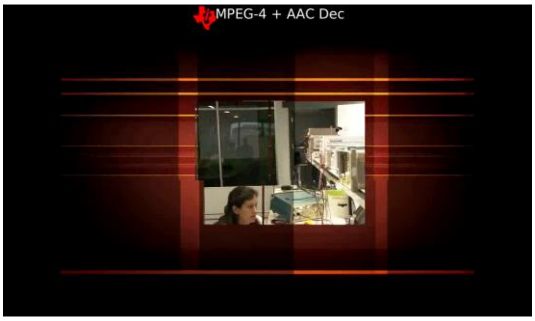


Figure 4-3 Audio and video

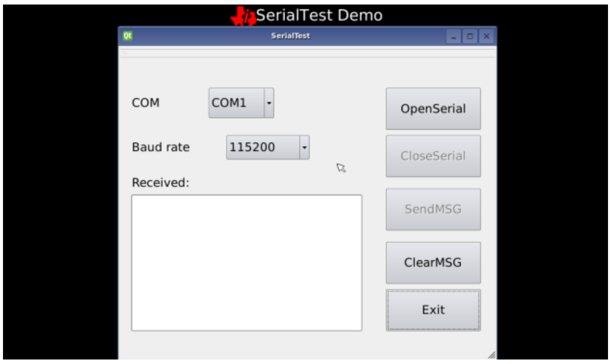
4.2.3 3D test

Click “3D” icon on desktop, choose “Film TV” to test. Like Figure 4-4:

Figure 4-4 3D test Film TV

4.2.4 Serial test

(1) Connect COM1 on board to PC. Use software “SecureCRT” or “Putty” or some others in PC. Click on the “Chipsee” icon on desktop, select “SerialTest” to run “SerialTest” App to communicate with PC. Like Figure 4-5.


SerialTest Demo

SerialTest

COM COM1

Baud rate 115200

Received:

Figure 4-5 Serial test

Note: There are only three serial ports available on board, one is RS232(COM1), the others are RS485(COM3 and COM4). And COM1(RS232) is used to debug the system, if you want to use it by your own. See [6.1.2 Use the debug serial port](#).

When you start the test. It will send string "Succeed in sending message!!!" every two seconds. Click on the "SendMSG" button, it will send string "Succeed in sending message-manual!!!". Every two seconds, it will read the received buffer, show the result to the received area.

4.3. Build Linux compilation environment

Notes: This work is done under Ubuntu 10.04 64 bit operation system.

4.3.1 Prepare Linux source

1. Copy the file ***“Chipsee-BBB-Linux-Source-20130902.tar.gz”*** to $HOME.
2. Extract the file：

```
$ cd $HOME
$ tar xzvf Chipsee-BBB-Linux-Source-20130902.tar.gz
```

You can find what you need under folder ***“Chipsee-BBB-Linux-Source-20130902”,*** such as “u-boot”, “kernel”:

(1) Linux file system: **$HOME/Chipsee-BBB-Linux-Source-20130902/filesystem**

(2) Linux kernel source: **$HOME/Chipsee-BBB-Linux-Source-20130902/kernel**

(3) U-boot source: **$HOME/Chipsee-BBB-Linux-Source-20130902/u-boot**

(4) Cross-compiler tools: **$HOME/Chipsee-BBB-Linux-Source-20130902/linux-devkit/bin**

4.3.2 Set Environment Variables

Go to the source folder, export the environment variables

```
$ cd Chipsee-BBB-Linux-Source-20130902/
$ source set_env.sh
```

Notes: For ease of use, The environment variable settings related are written in set_env.sh script, and run the script only after the current terminal is valid, when the terminal closed environment variable itself is lost, so in the new terminal need to re-run the script when Linux compiled. And the content of the script is as follows:

```
export PATH=$PATH:`pwd`/linux-devkit/bin
export ARCH=arm
export CROSS_COMPILE=arm-arago-linux-gnueabi-
```

4.4. Compile and install the Linux system

Through the above settings, it is ready to compile Linux system, please refer to the following chapter.

4.4.1 Compile u-boot

1. Go to u-boot folder

```
$ cd ~/Chipsee-BBB-Linux-Source-20130902/u-boot/
```

2. Clear the result compiled before

```
$ [ -d ./am335x ] && rm -rf ./am335x
```

3. Compile u-boot

```
$ make O=am335x am335x_evm
```

Notes: Once done, you can find the results under folder “**$HOME/Chipsee-BBB-Linux-Source-20130902/u-boot/am335x/**”, such as “MLO”, “u-boot.img”.

4.4.2 Compile kernel

1. Go to kernel folder

```
$ cd ~/Chipsee-BBB-Linux-Source-20130902/kernel/
```

2. Clear the result compiled before

```
$ make distclean
```

3. Configure the compile options

```
$ make am335x_evm_defconfig
```

4. Compile uImage

```
$ make uImage
```

Notes: Once done, you can find the result(uImage) under “**kernel/arch/arm/boot/**”

4.4.3 Package image file

1. Go to Linux source folder.

```
$ cd ~/Chipsee-BBB-Linux-Source-20130902/
```

2. Do the command to package the files

```
$ ./sdcard_build.sh --directory beagleboneblack
```

Notes: Once done, the results located at **“$HOME/Chipsee-BBB-Linux-Source-20130902/beagleboneblack”,** The content of the directory as described below:

```
--boot          // This directory contains all the files needed to start
    --MLO           // AM335x startup file
    --u-boot.img        // U-BOOT startup file
    --uEnv.txt          // U-BOOT startup parameter configuration file
    --uImage            // Linux kernel
    --pointercal        // calibrate date file
--filesystem            // Linux filesystem
    --rootfs.tar.bz2
--mksdcard.sh         // SD card installation script
--REDAME            // Instructions
```

4.4.4 Make a bootable SD card

1. Insert the SD card into Ubuntu system.
2. Go to folder “**beagleboneblack**”

```
$ cd $HOME/Chipsee-BBB-Linux-Source-20130902/beagleboneblack/
```

3. Do the command like 4.4.1 How to make a bootable SD card.

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

4.4.5 Start Linux system

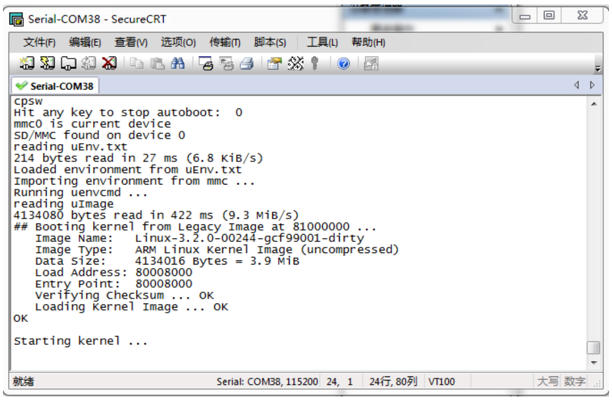
See 4.1.2 Start the Linux OS.

4.5. Linux OS Debug

In this chapter we will describe how to view Linux system via the serial port and how to debug program via Internet by using NFS.

4.5.1 View the system infomation via the serial port

1. Connect the COM1 on board to PC
2. Open software “SecureCRT” or “Putty” in Windows.
3. Power on the board, you can see the serial output of information like Figure 4-6.



```
cpsw
Hit any key to stop autoboot:  0
mmc0 is current device
SD/MMC found on device 0
reading uEnv.txt
214 bytes read in 27 ms (6.8 KiB/s)
Loaded environment from uEnv.txt
Importing environment from mmc ...
Running uenvcmd ...
reading uImage
4134080 bytes read in 422 ms (9.3 MiB/s)
## Booting kernel from Legacy Image at 81000000 ...
   Image Name:   Linux-3.2.0-00244-gcf99001-dirty
   Image Type:   ARM Linux Kernel Image (uncompressed)
   Data Size:    4134016 Bytes = 3.9 MiB
   Load Address: 80008000
   Entry Point:  80008000
   Verifying Checksum ... OK
   Loading Kernel Image ... OK
OK

Starting kernel ...
```

Figure 4-6 Serial output

4. When the system is fully booted, you can communicate with it(user: root, no pass word).

4.5.2 NFS

Embedded Qt has been in Linux system, The development environment is Ubuntu12.04, more information you can find in CD we provided《User Guide For Embedded Qt.docx》

We assume the development environment is ready.

1. Install NFS in Ubuntu

```
$sudo apt-get install nfs-kernel-server
```

2. Configure the file “/etc/exports”, add this at the end of file:

```
/qtprojects *(rw, sync, insecure, no_subtree_check)
```

Note:

“/qtprojects”: the shared folder in Ubuntu system;

“*”: allows all other PC to get access to this system;

“rw”: means this folder can be read and write by NFS client;

“sync”: synchronous write memory and hard disk;

“insecure”: sent message through the port above 1024;

“no_subtree_check”: no check the parent directory permissions

3. Restart NFS service

```
$ sudo /etc/init.d/portmap restart
$ sudo /etc/init.d/nfs-kernel-server restart
```

4. Test

```
$ showmount -e
```

or mount the shared folder to /mnt:

```
$ sudo mount -t nfs –o nolock localhost:/qtprojects /mnt
```

umount /mnt

```
$ sudo umount /mnt
```

5. Mount NFS on board

Create a directory

```
# mkdir /nfsdir
```

Mount the folder /qtprojects in Ubuntu to /nfsdir on board

```
# mount –t nfs <NFS-SERVER-IP>:/qtprojects /nfsdir
```

If you have an executable program like “SerialTest” under folder “/qtprojects”, you can run it directly on board.

```
# /nfsdir/SerialTest
```

5. Angstrom OS

This chapter will introduce Angstrom OS for Chipsee BeagleBoneBlack board, through this, users can quickly understand the hardware resources; users can debug the OS via serial, and Internet.

5.1. Getting start

Notes: Using the prebuilt file we provided in the CD to test the hardware.

5.1.1 How to make a bootable SD card

1. Insert the SD card into your computer, if using virtual machines, please make sure the SD card mounted to the Ubuntu(or other Linux) operating system.
2. Confirm the SD card mount point, “**/dev/sdX**”, usually it should be “**/dev/sdb**”**.** You can use this command to find out what the “X” is in the Linux system.

```
$ sudo fdisk –l
```

3. Copy the file ***“prebuilt-angstrom-XXXXXX.rar”*** somewhere(such as $HOME).
4. Extract the file ***“prebuilt-angstrom-XXXXXX.rar***”
5. Go to the folder “***prebuilt-angstrom-XXXXXX***”

```
$ cd ~/prebuilt-angstrom-XXXXXX
```

6. Flash the Angstrom OS to the SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

5.1.2 How to update eMMC with Angstrom OS

See chapter 4.1.2 How to update eMMC with Linux OS

5.1.3 Start the Angstrom OS

1. Insert SD card into BeagleBoneBlack
2. Switch SW8 on expansion board to uSD
3. Power on the board

Notes: You can see the Chipsee Logo(it can be changed by using software ***ChipSee_LOGO_MOD_EN.exe*** we provided in the CD) shown on the LCD screen. It is successful start When you see the Angstrom desktop like Figure 5-1:

Figure 5-1 Angstrom desktop

5.2. Tests

5.2.1 Touch screen and buzzer test

Click on the screen, the mouse arrow stays in position triggered and the buzzer sounds, indicating that touch and buzzer work properly. After working for some time resistive touch screen may not be accurate, need to be calibrated: firstly remove the file ***/etc/pointercal.xinput***, then click on the ***System→Administration→Calibrate Touchscreen*** on desktop to calibrate, more information you can find "**Angstrom Resistive Touchsreen Calibration Steps.pdf**"

5.2.2 Audio test

Start terminal, then use command ***mplayer*** to test.

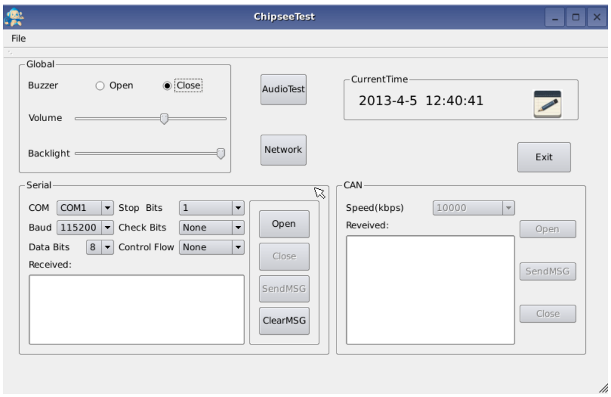
```
# mplayer FILENAME   //such as: mplayer ~/chipsee/Music/AudioTest.aac
```

5.2.3 Serial test

1. Connect COM1 on board to PC. Use software "SecureCRT" or "Putty" or some others in PC. Connect keyboard and mouse to the board. Then press "Ctrl+Alt+F1(or F3~F6)" to get into tty1(tty3~tty6), enter user name root, no password. Go to chipsee folder start the test, Like Figure 5-2.

Notes: The QtE in Angstrom OS is not working well, by now user only can use mouse for the Qt apps.。

```
# cd chipsee
# ./ChipseeTest -qws
```



Buzzer ○ Open ● Close
Volume
Backlight
CurrentTime 2013-4-5 12:40:41
COM COM1 Stop Bits 1
Baud 115200 Check Bits None
Data Bits 8 Control Flow None
Received:
Speed(kbps) 10000
Reveived:

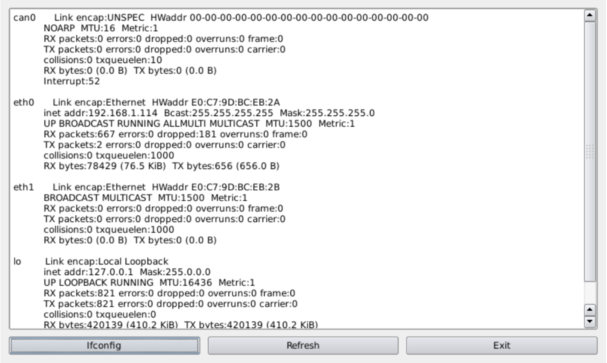
Figure 5-2 ChipseeTest

Note: There are three serial ports available on board, one RS232(COM1), the others a re RS485(COM3 and COM4). And COM1(RS232) is used to debug the system, the b aud rate is 115200.

2. Serial test: at the serial area, set Com COM2, set Baud 115200, click on "Open" It will send string "Succeed in sending message!!!" every two seconds. Click on the "SendMSG" button, it will send string "Succeed in sending message-manual!!!". Every two seconds, it will read the received buffer, show the result to the received area.

5.2.4 Network test

Click on "Network", then click on "Ifconfig" to view the network information on boa rd, click on "Refresh" to restart the network service, it will take five or six seconds to finish. Like Figure 5-3:

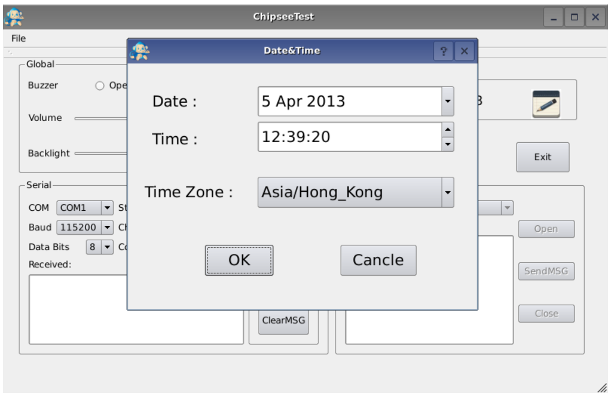


```
can0      Link encap:UNSPEC  HWaddr 00-00-00-00-00-00-00-00-00-00-00-00-00-00-00-00
          NOARP  MTU:16  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:10
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)
          Interrupt:52

eth0      Link encap:Ethernet  HWaddr E0:C7:9D:BC:EB:2A
          inet addr:192.168.1.114  Bcast:255.255.255.255  Mask:255.255.255.0
          UP BROADCAST RUNNING ALLMULTI MULTICAST  MTU:1500  Metric:1
          RX packets:667 errors:0 dropped:181 overruns:0 frame:0
          TX packets:2 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:78429 (76.5 KiB)  TX bytes:656 (656.0 B)

eth1      Link encap:Ethernet  HWaddr E0:C7:9D:BC:EB:2B
          BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:821 errors:0 dropped:0 overruns:0 frame:0
          TX packets:821 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:420139 (410.2 KiB)  TX bytes:420139 (410.2 KiB)
```

Figure 5-3 Network infomation

5.2.5 Date&Time

Click the time display area "Edit" icon to set the time and date, like Figure 5-4:



Date : 5 Apr 2013

Time : 12:39:20

Time Zone : Asia/Hong_Kong

Figure 5-4 Date and Time

5.2.6 Backlight

By modifying the size “Backlight” can change the brightness of the backlight..

5.2.7 USB Devices

1. USB webcam

If you want to use USB webcam, you need to connect the webcam to the board before power on. Then choose ***Application→Sound&Video→Cheese Webcam Booth*** to take pictures.

2. USB-Wifi module

If you want to use USB-Wifi module in the system, you need to edit the file ***/var/lib/connman/wifi.config***, modify the router, the login name and password, save and reboot. The system will automatically connect the next time you start, the contents are as follows:

```
Type = wifi
Name = chipsee   //router’s name
Security = AES   //security mode
Passphrase = 1234567890  //password
```

5.3. Build Angstrom compilation environment

Notes: This work is done under Ubuntu 10.04 64 bit operation system.

5.3.1 Prepare Angstrom source

1. Copy the file ***“Angstrom-bbb-exp-source-0210.tar.gz”*** to $HOME.
2. Extract the file：

```
$ cd $HOME
$ tar xzvf Angstrom-bbb-exp-source-0210.tar.gz
```

You can find what you need under folder ***"Angstrom-bbb-exp-source-0210",*** such as "u-boot", "kernel":

(1) Linux file system: **$HOME/Angstrom-bbb-exp-source-0210/filesystem**

(2) Linux kernel source: **$HOME/Angstrom-bbb-exp-source-0210/kernel***

(3) U-boot source: **$HOME/Angstrom-bbb-exp-source-0210/u-boot***

(4) Cross-compiler tools: **$HOME/Angstrom-bbb-exp-source-0210/gcc-linaro-arm-linux-gnueabihf-4.7-2013.04-20130415_linux**

5.3.2 Set Environment Variables

Go to the source folder, export the environment variables

```
$ cd Angstrom-bbb-exp-source-0210/
$ source setEnv.sh
```

Notes: For ease of use, The environment variable settings related are written in ***setEnv.sh*** script, and run the script only after the current terminal is valid, when the terminal closed environment variable itself is lost, so in the new terminal need to re-run the script when Android compiled. And the content of the script is as follows:

```
export PATH=`pwd`/gcc-linaro-arm-linux-gnueabihf-4.7-2013.04-20130415_linux/bin:$PATH
export CROSS_COMPILE=arm-linux-gnueabihf-
export ARCH=arm
```

5.4. Compile and install the Angstrom system

Through the above settings, it is ready to compile Angstrom system, please refer to the following chapter.

5.4.1 Compile u-boot

1. Go to u-boot folder

```
$ cd ~/Angstrom-bbb-exp-source-0210/u-boot*/
```

2. Clear the result compiled before

```
$ [ -d ./am335x ] && rm -rf ./am335x
```

3. Compile u-boot

```
$ make O=am335x am335x_evm
```

Notes: Once done, you can find the results under folder "**am335x/**", such as "MLO", "u-boot.img".

5.4.2 Compile kernel

1. Go to kernel folder

```
$ cd ~/Angstrom-bbb-exp-source-0210/kernel*/
```

2. Clear the result compiled before

```
$ make distclean
```

3. Configure file

```
$ cp config-chipsee .config
```

4. Compile uImage

```
$ make dtbs uImage
```

Notes: Once done, you can find the results: 1. "**arch/arm/boot/uImage",** 2. "**arch/arm/boot/dts/am335x-bbb-exp.dtb**

5.4.3 Package image file

1. Go to Angstrom source folder.

```
$ cd ~/Angstrom-bbb-exp-source-0210/
```

2. Do the command to package the files

```
$ ./sdcard_build.sh --directory beagleboneblack
```

Notes: Once done, the results located at **"$HOME/*Angstrom-bbb-exp-source-0210*/beagleboneblack",** The content of the directory as described below:

```
--boot          // This directory contains all the files needed to start
    --MLO           // AM335x startup file
    --u-boot.img        // U-BOOT startup file
    --uEnv.txt          // U-BOOT startup parameter configuration file
    --uImage            // kernel
    --am335x-bbb-exp.dtb
--filesystem            // filesystem
    --*rootfs*.tar.bz2
--mksdcard.sh         // SD card installation script
--REDAME            // Instructions
```

5.4.4 Make a bootable SD card

1. Insert the SD card into Ubuntu system.
2. Go to folder "**beagleboneblack**"

```
$ cd $HOME/Angstrom-bbb-exp-source-0210/beagleboneblack/
```

3. Do the command like 5.1.1 How to make a bootable SD card.

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

5.4.5 Start Angstrom system

See 5.1.2 Start the Angstrom OS.

5.5. Angstrom OS Debug

5.5.1 View Angstrom system via the serial port

See 4.5.1 View the system infomation via the serial port.

5.5.2 NFS

See 4.5.2 NFS.

6. Debian OS

This chapter will introduce Debian OS for Chipsee BeagleBoneBlack board, through this, users can quickly understand the hardware resources; users can debug the OS via serial, and Internet.

6.1. Getting start

Notes: Using the prebuilt file we provided in the CD to test the hardware.

6.1.1 How to make a bootable SD card

1. Insert the SD card into your computer, if using virtual machines, please make sure the SD card mounted to the Ubuntu(or other Linux) operating system.
2. Confirm the SD card mount point, “**/dev/sdX**” usually it should be “**/dev/sdb”.** You can use this command to find out what the “X” is in the Angstrom system.

```
$ sudo fdisk –l
```

3. Copy the file ***“prebuilt-debian-XXXXXX.tar.gz”*** somewhere(such as $HOME).
4. Extract the file ***“prebuilt-debian-XXXXXX.tar.gz***”

```
$ tar zxfv prebuilt-debian-XXXXXX.tar.gz
```

5. Go to the folder “***prebuilt-debian-XXXXXX***”

```
$ cd ~/prebuilt-debian-XXXXXX
```

6. Flash the Angstrom OS to the SD card

```
$ sudo ./mksdcard.sh --device /dev/sd<?>
```

6.1.2 How to update eMMC with Debian OS

See chapter 4.1.2 How to update eMMC with Linux OS

6.1.3 Start Debian OS

1. Insert SD card into BeagleBoneBlack
2. Switch SW8 on expansion board to uSD
3. Power on the board

Notes: You can see the Chipsee Logo(it can be changed by using software ***ChipSee_LOGO_MOD_EN.exe*** we provided in the CD) shown on the LCD screen. It is successful start When you see the Debian desktop like Figure 6-1:

Figure 6-1 Debian desktop

6.2. Tests

6.2.1 Touch screen and buzzer test

Click on the screen, the mouse arrow stays in position triggered and the buzzer sounds, indicating that touch and buzzer work properly. After working for some time resistive touch screen may not be accurate, need to be calibrated: choose ***Preferences→Calibrate Touchscreen*** app to recalibrate, but it only works this time, if you reboot the System, you need to do it again. You can do it this way: delete the file ***/etc/pointercal.xinput***, then reboot. You will see the calibrate app first before you access to the system. Just calibrate, the result will saved.

6.2.2 Audio test

Start terminal, then use command **mplayer** to test.

```
# mplayer FILENAME   //如 mplayer ~/Music/test.mp3
```

6.2.3 Serial test

1. Connect COM1 on board to PC. Use software “SecureCRT” or “Putty” or some others in PC. You will see the system information when the system start.
Note: There are three serial ports available on board, one is RS232(COM1), the others are RS485(COM3 and COM4). And COM1(RS232) is used to debug the system, baud rate is 115200. Users can communicate with the OS via it, just as Terminal did.

2. Serial test: Use software “SecureCRT” or “Putty” or some others in PC. Set baud rate as 9600.

```
# echo “This is a test” > /dev/ttyO2
```

You will see the string in PC, then change the ttyO1 to ttyO2/ttyO4 to test RS485_2.

6.2.4 Networking

```
# ifconfig –a
```

You can see the information of CAN0, eth0.

6.2.5 Date and Time

Check the system time

```
# date
```

Set the system time

```
# date –s “2014-03-15 10:30:30”
```

Check RTC

```
# hwclock
```

Write RTC

```
# hwclock –w
```

Modify the time zone, such as China:

```
# ln -sf /usr/share/zoneinfo/Asia/Hong_Kong /etc/localtime
```

6.2.6 Backlight

Modify the file /sys/class/backlight/backlight.8/Brightness to change the backlight. range from 0 to 100, 0 means shutdown the backlight, 100 is the MAX value.

```
# echo 50 > /sys/class/backlight/backlight.8/Brightness
```

6.2.7 USB Devices

USB-Wifi module

If you want to use USB-Wifi module in the system, you need to edit the file ***/etc/network/interfaces***, modify the router, the login name and password, save and reboot. The system will automatically connect the next time you start, the contents are as follo ws:

```
#Wifi Example
auto wlan0
iface wlan0 inet dhcp
wpa-ssid "Chipsee"   //router's name
wpa-psk "1234567890"   //password
```

6.3. Debian OS Compile and Debug

Note: The u-boot and kernel of Debian OS are the same as Angstrom's. The difference between them is the system files. More details about compile you can see [chapter 5.4].

6.3.1 View Angstrom system via the serial port

See [4.5.1 View the system infomation via the serial port].

6.3.2 NFS

See [4.5.2 NFS].

6.4. Java for Debian

This chapter we will setup the environment of Java, and show you how to a simple Java application.

1. Install jdk(Use command java -version to see the jdk is installed or not)

```
# sudo apt-get install openjdk-6-jdk
```

2. Edit a simple program HelloWorld.java

```
import java.awt.Color;
import java.awt.Font;
import java.awt.Toolkit;
import javax.swing.JFrame;
import javax.swing.JTextField;
public class HelloWorld extends JFrame{
        public HelloWorld(){
                JTextField text = new JTextField("Hello, world!");
                text.setFont(new Font("Times New Roman",Font.BOLD,60));
                text.setForeground(Color.BLACK);
                this.getContentPane().add(text);
        }
        public static void main(String argv[]){
                HelloWorld win = new HelloWorld();
                Toolkit tk   = Toolkit.getDefaultToolkit();
                int winWidth = 512;
                int winHeight = 300;
                int Width   = tk.getScreenSize().width;
                int Height = tk.getScreenSize().height;
                win.setSize(winWidth, winHeight);
                win.setLocation((Width-winWidth)/2, (Height-winHeight)/2);
                win.setVisible(true);
                win.setDefaultCloseOperation(EXIT_ON_CLOSE);
        }
}
```

3. Compile the source

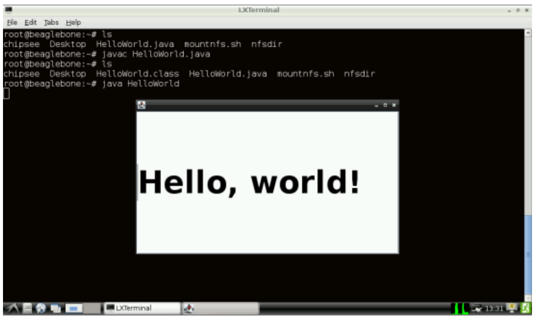
```
# javac HelloWorld.java
```

This will be very slow in Debian OS, we suggest do it in your PC, you need install jdk-1.6 first.

4. Run the program

```
# java HelloWorld
```

You will see this:



```
root@beaglebone:~# ls
chipsee  Desktop  HelloWorld.java  mountnfs.sh  nfsdir
root@beaglebone:~# javac HelloWorld.java
root@beaglebone:~# ls
chipsee  Desktop  HelloWorld.class  HelloWorld.java  mountnfs.sh  nfsdir
root@beaglebone:~# java HelloWorld
```

Hello, world!

Figure 6-2 HelloWorld (1)

5. Adding Java program to Quick Start

a) Make a directory

```
# mkdir /usr/lib/java/
```

b) Copy HelloWorld.class to /usr/lib/java/

```
# cp HelloWorld.class /usr/lib/java/
```

c) Edit script **/usr/bin/HelloWorld.sh** like this:

```
#!/bin/bash
cd /usr/lib/java/
java HelloWorld
```

Change the permissions of the script

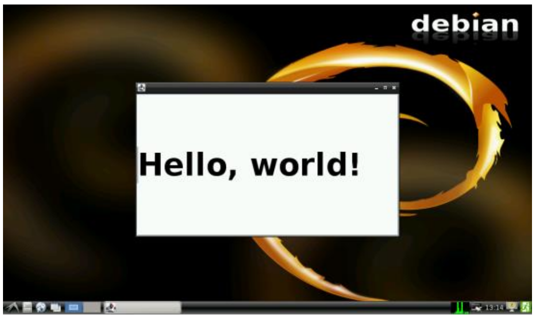
```
# sudo chmod a+x HelloWorld.sh
```

d) Edit file **/usr/share/applications/javatest.desktop** like this:

```
[Desktop Entry]
```

```
Name=HelloWorld
Comment=Simple test for Java
Exec=/usr/bin/HelloWorld.sh
Icon=/usr/share/pixmaps/chipsee.png
Terminal=false
Type=Application
Categories=GTK;Utility;GNOME;
```

This is the result:



Hello, world!

Figure 6-3 HelloWorld(2)

6. Auto-Launch Java app

Add script **89javatest** in directory **/etc/X11/Xsession.d/** :

```
#!/bin/bash
cd /usr/lib/java/
java HelloWorld
```

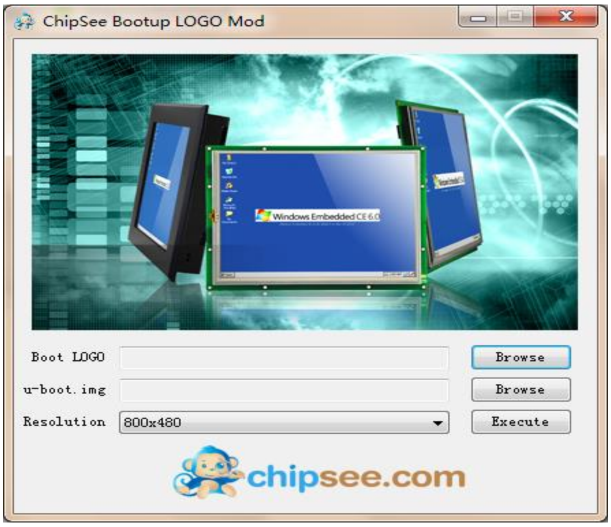
Reboot, the app HelloWorld will automatically launch.

7. Customized

In this chapter users can change some settings for the systems, such as the Logo wh en the OS started.

7.1. Logo modify

We provide a software to change the Logo we the OS start, you can find the tool in the CD along with our product: ***ChipSee_LOGO_MOD_EN.exe.***(It can be used for Android, Linux, Debian and Angstrom) Like Figure 7-1:



ChipSee Bootup LOGO Mod

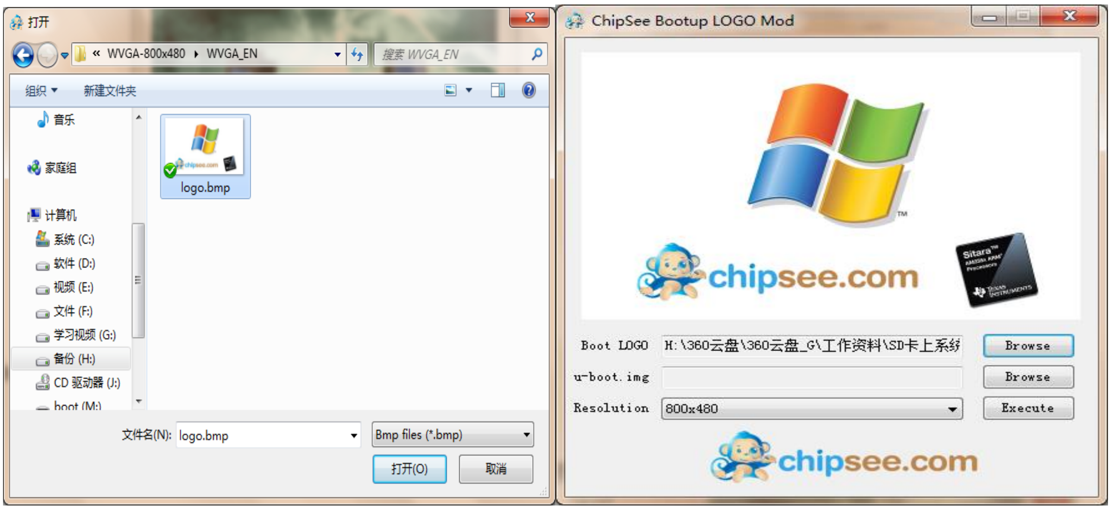
Boot LOGO

u-boot.img

Resolution 800x480

Figure 7-1 Logo modify App

1. Click the first Browse button, find the picture file.



打开

« WVGA-800x480 ▸ WVGA_EN

文件名(N): logo.bmp

Bmp files (*.bmp)

ChipSee Bootup LOGO Mod

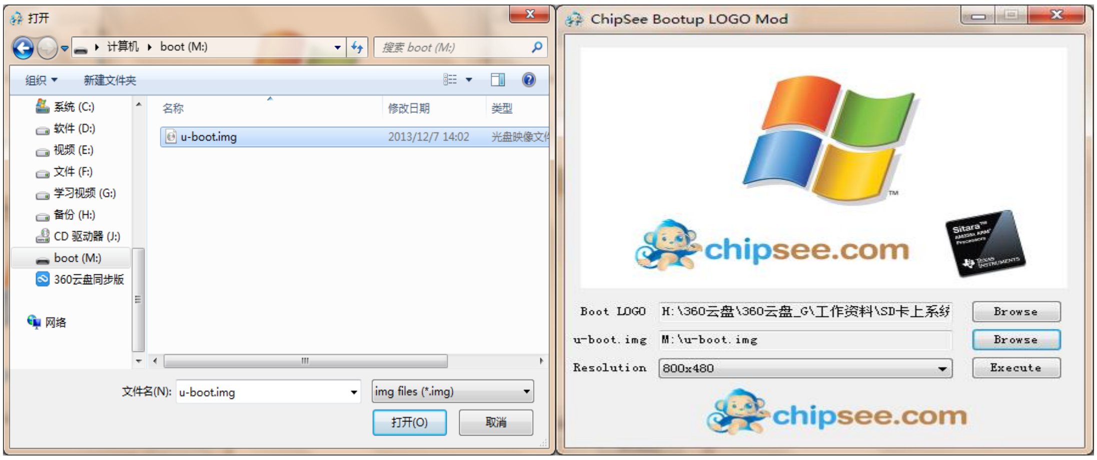
Boot LOGO H:\360云盘\360云盘_G\工作资料\SD卡上系纟

u-boot.img

Resolution 800x480

Figure 7-2 Choose the Logo file

2. Click the second Browse button, find the u-boot.img file.



u-boot.img 2013/12/7 14:02 光盘映像文件

文件名(N): u-boot.img img files (*.img)

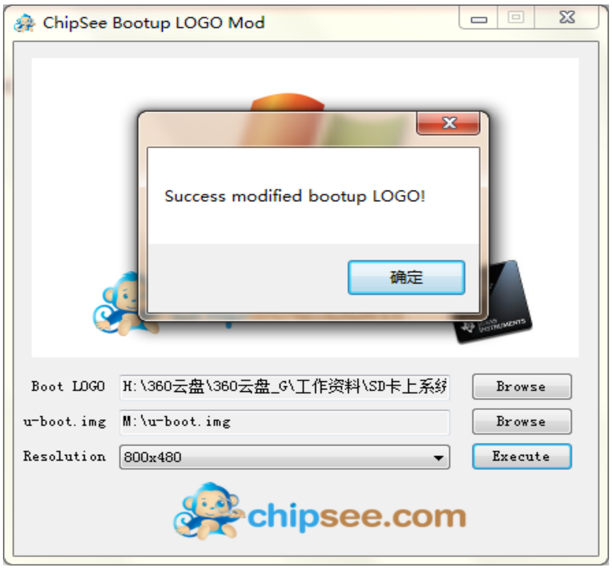
Boot LOGO H:\360云盘\360云盘_G\工作资料\SD卡上系纟

u-boot.img M:\u-boot.img

Resolution 800x480

Figure 7-3 Choose the u-boot.img file

3. Choose the resolution , click “Execute”.



Success modified bootup LOGO!

Boot LOGO H:\360云盘\360云盘_G\工作资料\SD卡上系纟

u-boot.img M:\u-boot.img

Resolution 800x480

Figure 7-4 Change the Logo successful

4. Insert the SD card, power the board, the Logo will be replaced.

7.2. Use the debug serial port

In the four OS for BeagleBoneBlack board. The COM1(RS232) is used as debug serial port, users can communicate with the OS via it, just as Terminal did. If users want to use it as normal serial port, this chapter will show how to change it.

1. Android OS

   Edit the file ***uEnv.txt*** which you can find in the ***boot*** partition.

```
bootargs=console=ttyO1,115200n8 androidboot.console=ttyO1
```

Change it to ttyO2 or ttyO4(RS485_1 and RS485_2), you can change it to ttyO0, then you can use all the three serial ports as normal.

```
bootargs=console=ttyO0,115200n8 androidboot.console=ttyO0
```

2. Linux OS

   Edit the file ***/etc/inittab*** around line 31:

```
S:2345:repawn:/sbin/getty  115200  ttyO1
```

Change it to ttyO2 or ttyO4(RS485_1 and RS485_2), you can add "#" before this line to comments off this line. Then you can use all the three serial ports as normal.

```
# S:2345:repawn:/sbin/getty  115200  ttyO1
```

3. Angstrom OS

(1) Edit the file ***uEnv.txt*** which you can find in the ***boot*** partition.

```
bootargs=console=ttyO1,115200n8
```

Change it to ttyO2 or ttyO4(RS485_1 and RS485_2), you can change it to ttyO0, then you can use all the three serial ports as normal.

(2) Stop the service in Angstrom.

```
# systemctl  disable  serial-getty@ttyO1.service
# systemctl  stop  serial-getty@ttyO1.service
```

Now you can use the COM1 as normal serial port.

(3) If you want to use COM1 as debug serial port, you need to edit the file ***uEnv.txt*** which you can find in the ***boot*** partition. And start the service:

```
# systemctl  start  serial-getty@ttyO1.service
```

4. Debian OS

Edit the file ***/etc/inittab*** , at the end of the file:

```
T0:23:respawn:/sbin/getty  –L  ttyO0  115200  vt102
```

Change it to ttyO2 or ttyO4(RS485_1 and RS485_2), you can add "#" before this line to comment off this line. Then you can use all the three serial ports as normal.

```
# T0:23:respawn:/sbin/getty  –L  ttyO0  115200  vt102
```

7.3. IP address Settings

In the three OS for BeagleBoneBlack board. The IP address is DHCP, if you want to use is used as static. You can follow the steps below.

1. Android OS

Edit the file ***uEnv.txt*** which you can find in the ***boot*** partition.

```
bootargs=console=ttyO0,115200n8  androidboot.console=ttyO0  mem=512M  root=/dev/mmcblk0p2  r
w  rootfstype=ext4  rootwait  init=/init  ip=off
```

Edit the red part like this:

ip=<client-ip>:<server-ip>:<gw-ip>:<netmask>:<hostname>:<device>:<autoconf>:<dns0-ip>:<dns1-ip>

For example:

```
bootargs=console=ttyO0,115200n8  androidboot.console=ttyO0  mem=512M  root=/dev/mmcblk0p2  r
w  rootfstype=ext4  rootwait  init=/init  ip=192.168.1.111:::255.255.0.0
```

2. Linux and Debian OS

Edit the file ***/etc/network/interfaces*** like this:

```
auto  eth0
iface  eth0  inet  static
```

```
address  192.168.1.111
gateway  192.168.1.1
netmask  255.255.0.0
```

Restart the network service.

```
# /etc/init.d/networking restart
```

About us:

Chipsee Information Technology Co.,Ltd
Room 1004, Mansion Haojing 3#,Zhichun Road 108
Haidian District, Beijing, China,100080
TEL:+86-10-62561127
E-Mail: service@chipsee.com
Web: www.chipsee.com