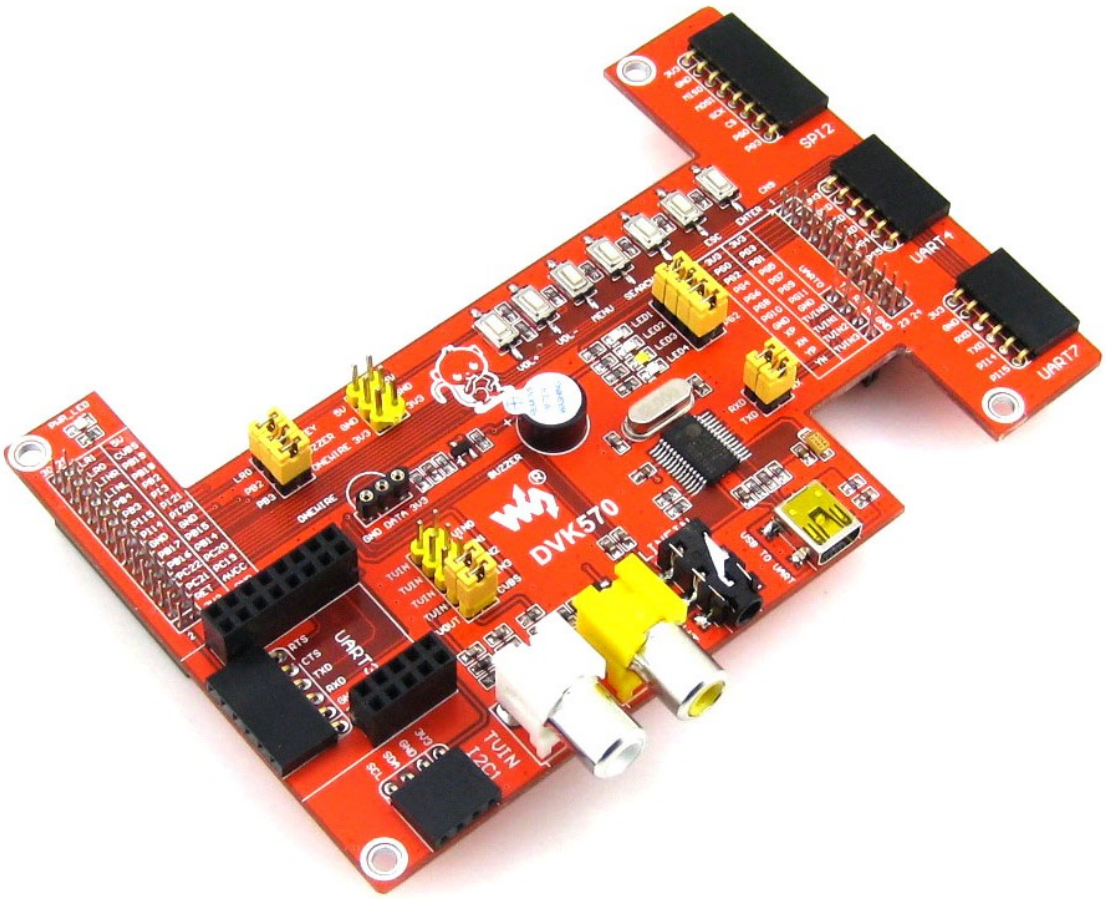
DVK570 Expansion Board

User Manual

2014.04.12 V1.0



Waveshare Electronics

www.wvshare.com

Copyright Statement

Version update records

Version	Date	Description
V1.0	2014.04.12	Initial Release

Contents

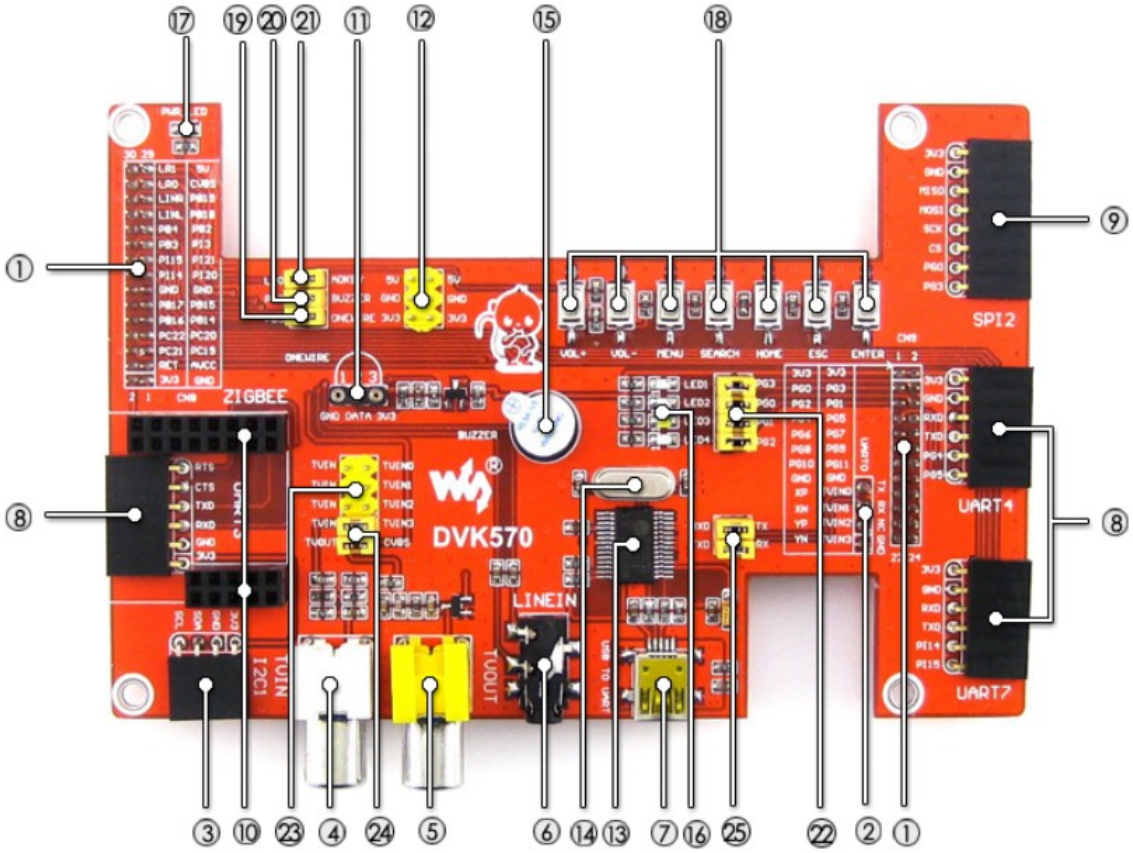
Document formatting convention

- Commands on PC ubuntu terminal: formatted in red, preceding with '#'
- Commands on SD card linaro terminal: formatted in red, preceding with '$'

1.Overview

DVK570 is an expansion board designed for Cubietruck, integrates various interfaces for connecting external accessory boards, supports complete sample codes, users can easily develop their own products.

2.What's on Board



2.1. Interfaces

1) CUBIETRUCK interface:
   For connecting CUBIETRUCK
2) UART0 interface :
   For easily connecting various serial port modules
3) I2C interface:

easily connects to I2C modules such as PCF8563 RTC Module, MAG3110 Board Module, etc

4) TVIN interface:
   For video input
5) TVOUT interface:
   For video CVBS output, can connect to devices such as TV, etc
6) LINEIN interface:
   For audio input
7) USB interface:
   USB TO UART（PL2303TA）
8) UART interface:
   Easily connects to various modules with UART peripherals, such as RS485 Board (3.3V)、GPS modules, etc
9) SPI interface:
   Easily connects to all kinds of modules with SPI peripherals, such as AT45DBXX Dataflash modules, etc
10) ZIGBEE interface:
    For easily connecting to core board Core2530, used with ZB500.
11) ONEWIRE interface:
    Easily connects to ONE-WIRE devices (TO-92 package), such as temperature sensor (DS18B20), electronic registration number (DS2401), etc.
12) 5V/3.3 V power input/output:
    Usually used as power output, also common-grounding with other user board

2.2. Component

13) PL2303TA
    USB TO UART MCU
14) 12M crystal oscillator
    PL2303TA crystal oscillator
15) Buzzer
16) User LED
    4 different color user LEDs
17) Power LED
18) AD Keypad
    7 ANDROID common keypads：
    VOL+、VOL-、MENU、SEARCH、HOME、ESC、ENTER

2.3. Jumper

19) ONEWIRE jumper
20) Buzzer jumper

21) AD keypad jumper
22) User LED jumper
23) TVIN jumper
    Users can choose video input of 4 channels, factory default is the forth channel.
24) TVOUT jumper
25) UART0 jumper

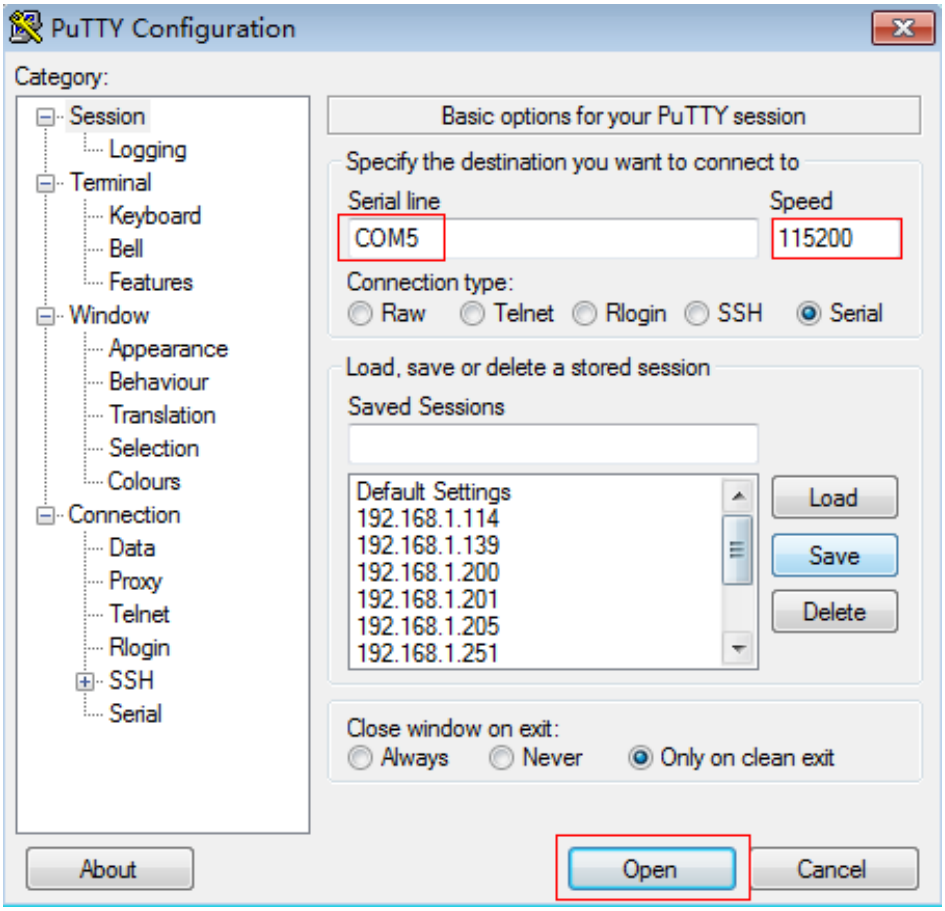
3.Preparation

3.1Firmware burning

Burning corresponding firmware: ct-dvk-xxxx.img is needed when testing DVK570 ,Click:
http://dl.cubieboard.org/parteners/waveshare/Image/ to download，
details please refer to “Burning Firmware”.
Note：Firmware with “sdcard”marking is TF card firmware；with “nand” marking is nand firmware.

3.2USB to serial port driver installation

Connect DVK570 to Cubietruck, then connect it to PC using a mini USB wire via USB TO UART connector.
Launch PL2303_Prolific_DriverInstaller_v1.8.0.exe to install the driver. After installed, launch the serial debugging assistant and check putty.exe, configure like below, then click “open”.



Note: Check your computer's "Device Manager"to see what the COM is.

4.Starting mode

4.1. TF Card starting

Insert the burned firmware TF card to the CARD0 slot of the Cubietruck, connect electricity for starting.

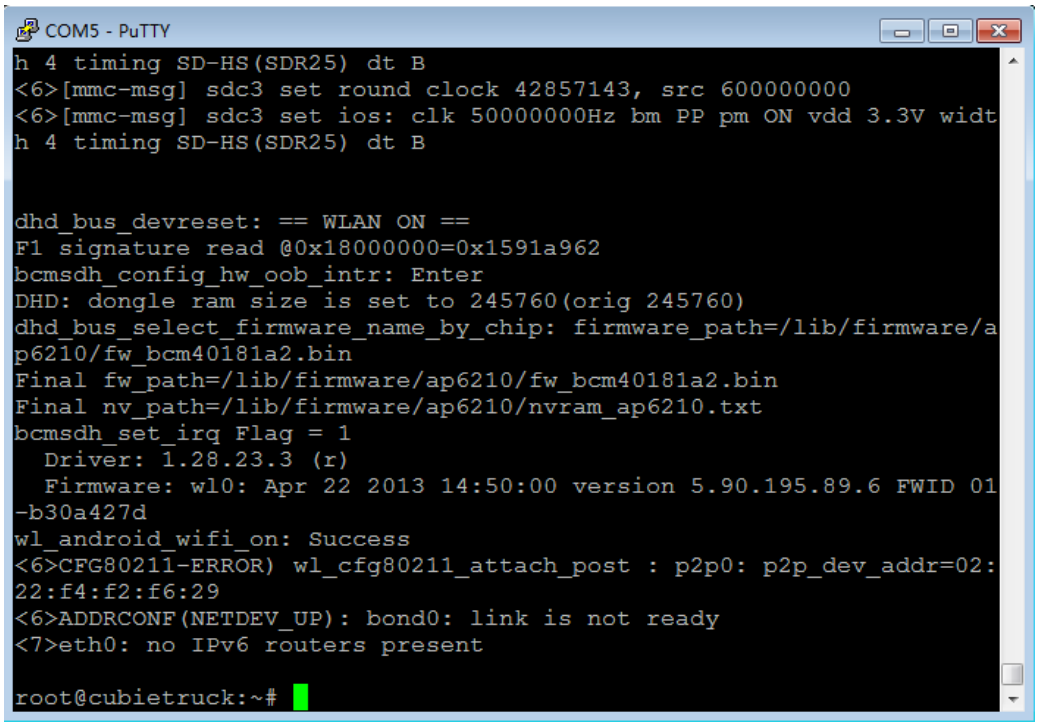
4.2. Nand starting

After burned firmware, connect to electricity for starting directly.

5.Type of system

5.1 Lubuntu

Input "enter" at the terminal to enter Bash Shell development environment with root user privileges.



5.2 Debian

Reboot the system, input user name and password:

User:root

Password:chird

Then enter Bash Shell development environment with root user privileges.

Note: If it is not root user privilege, switch to root user !

6. Demos

Note:

1.Ensure the system firmware is provided by us, otherwise the test could not be operated!

2.Reboot the system, find all the testing sample under root of /home/waveshare_demo/API.

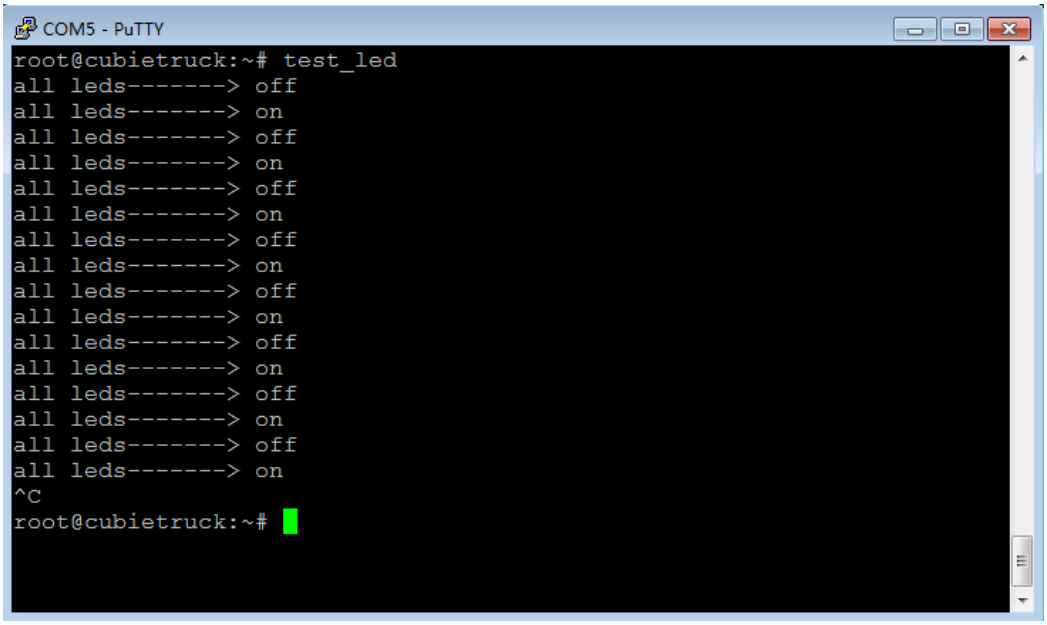
6.1. LED Demo

Short the onboard LED jumper（set by default, following are the same）

Enter the following command:

$ test_led

4 different color led blinking：



Press “Ctrl+C” to stop.

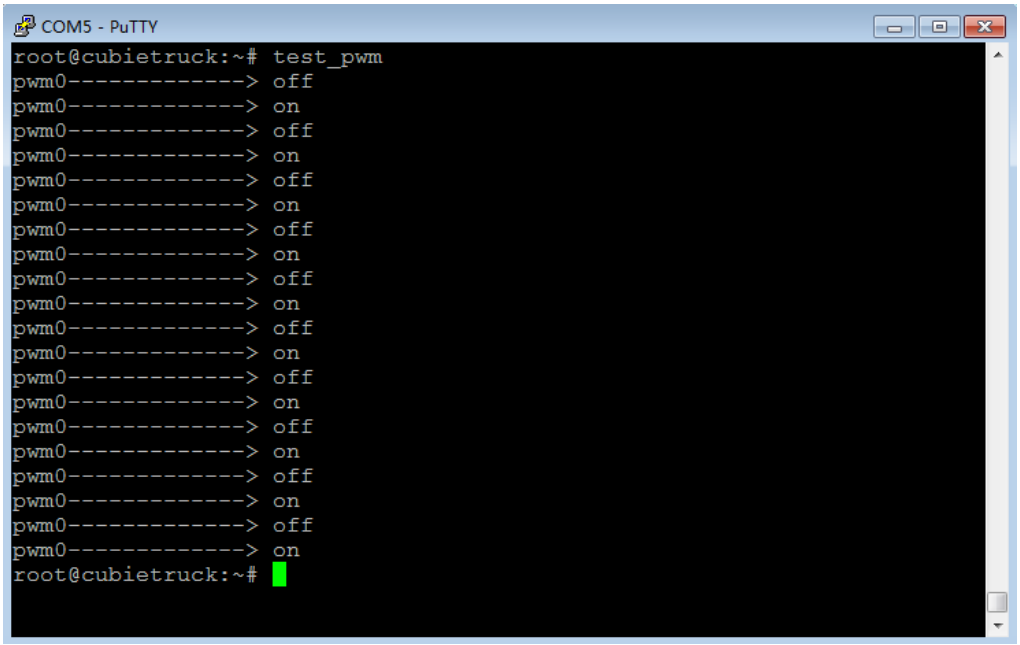
6.2. Buzzer Demo

Short the onboard BUZZER jumper

Enter the following command:

$test_pwm

The buzzer will start to make sound and stop later.

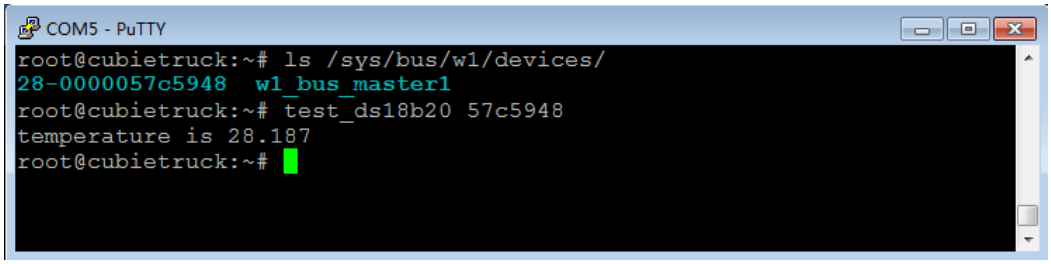


6.3. DS18B20 Demo

Insert the DS18B20 into the 1-WIRE socket, short the onboard 1-WIRE jumper (ensure that the AT45DBXX DataFlash Board has been disconnected).
Enter the following command:
$ls /sys/bus/w1/devices/

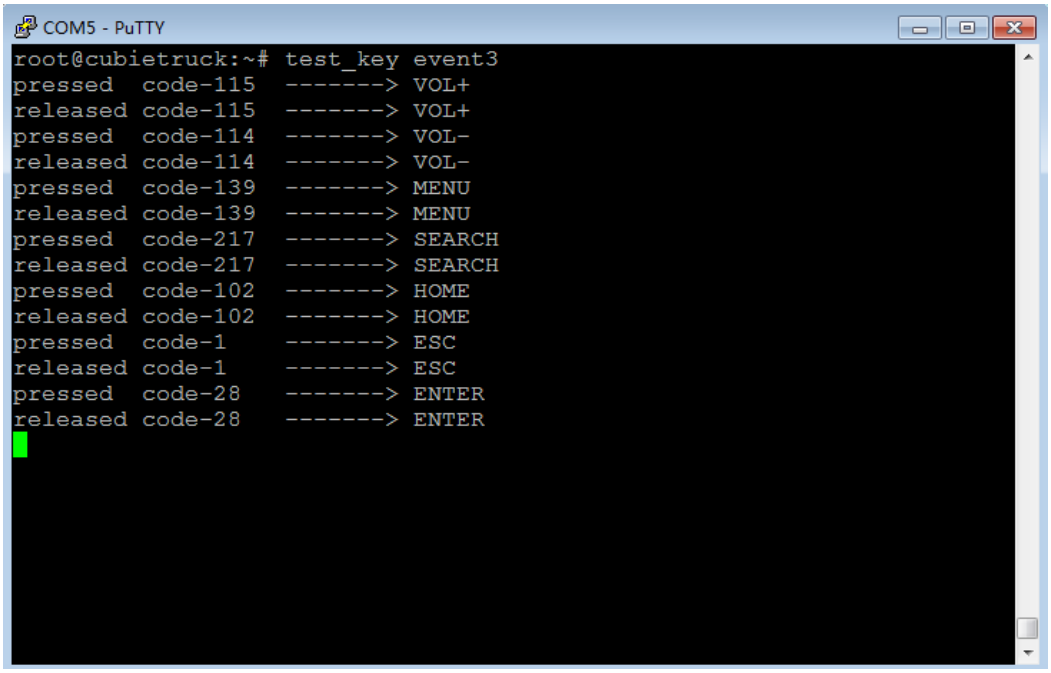
There's a folder with the name looks like "28-0000054a5bec " (the last 7 characters is an unique device ID of every different DS18B20, in this case, the device ID is 54a5bec)
Enter the following command:
$test_ds18b20 57c5948

The current environment temperature will be displayed on the console terminal.
As shown in the figure below:



6.4. AD Keypad Demo

Short the ADKEY jumper
Enter the following command:
$ test_key event3
Note：
1.What the event* is depended on the actual situation, please check directory “/dev/input”；
2. Please perform: modprobe sun4i-keyboard and put sun4i-keyboard into listing /etc/modules if the keypad driver is not insmod.
Press 7 keypads respectively, then related key value that were pressed or released will be displayed on the console terminal:



Press “ Ctrl+C “ to stop.

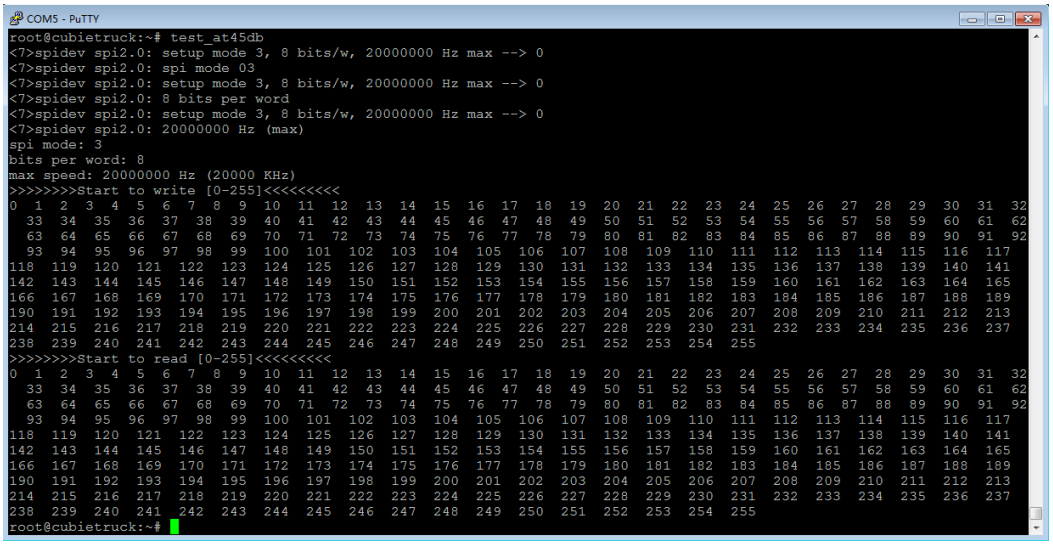
6.5. AT45DB Read/Write Demo

Connect the AT45DBXX DataFlash Board to the onboard SPI2 interface

Enter the following command：

$ test_at45db

Data will be read and displayed on the console terminal:



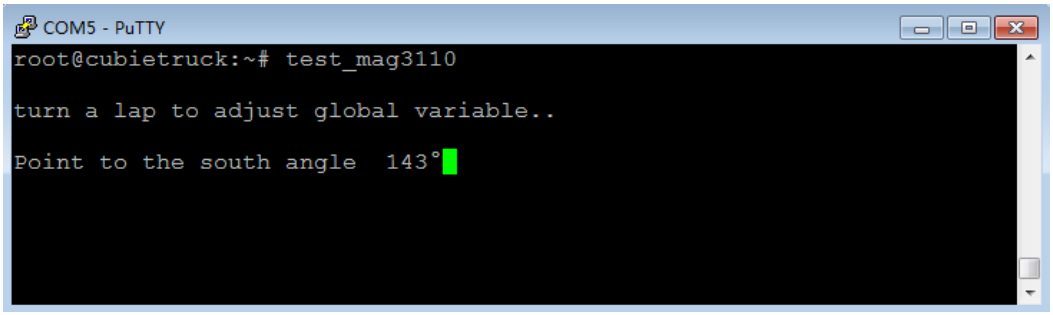
6.6. MAG3110 Demo

Connect the MAG3110 Board to the onboard I2C1 interface，

Enter the following command：

$test_mag3110

Rotate the module for a circle in the same plane to record the maximum and minimum mean parameter. When the correction finished, the correct guide angle will be displayed on the console terminal：



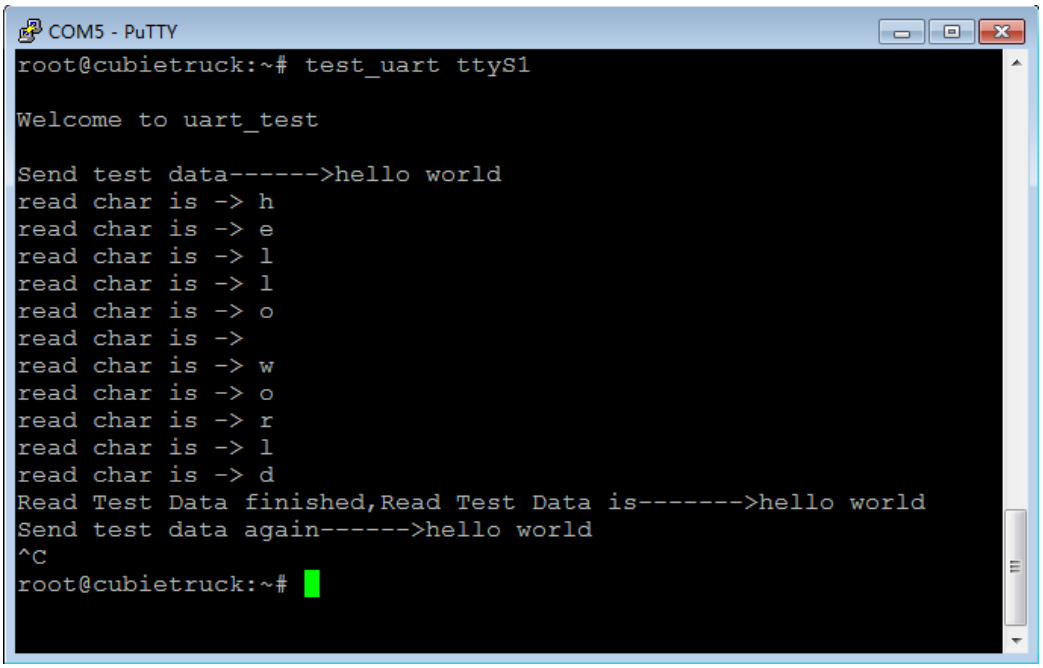
Press “ Ctrl+C” to stop.

6.7. UART Interface Demo

Short RXD and TXD of the UART

Enter the following command：

$ test_uart ttyS1



If the serial port can receive and send automatically, it means the UART can work normally.

Note：

UART3 interface corresponds to ttyS1,

UART4 interface corresponds to ttyS2,

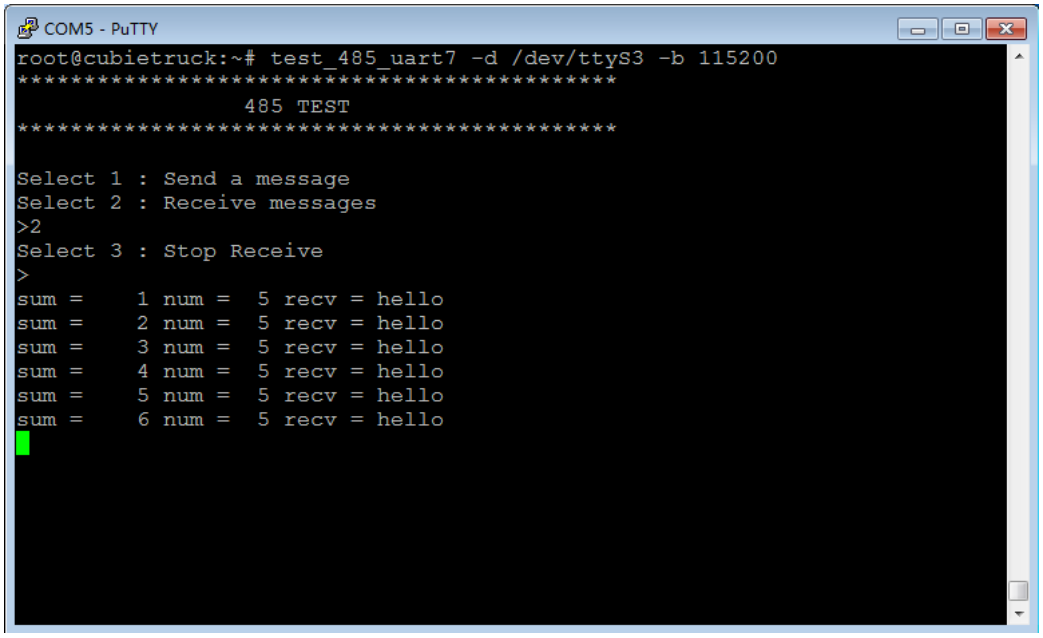
UART7 interface corresponds to ttyS3.

6.8. RS485 Demo

Connect the two RS485 Boards to the onboard UART4 and UART7 interface. Connect the A, B side of one RS485 module to the A, B side of the other RS485 module using connecting wires. Users can also use their own RS485 for testing.
The two RS485 devices can optionally regarded as a receiver or transmitter, the receiver should firstly be in receiving status, then the transmitter begin to send.

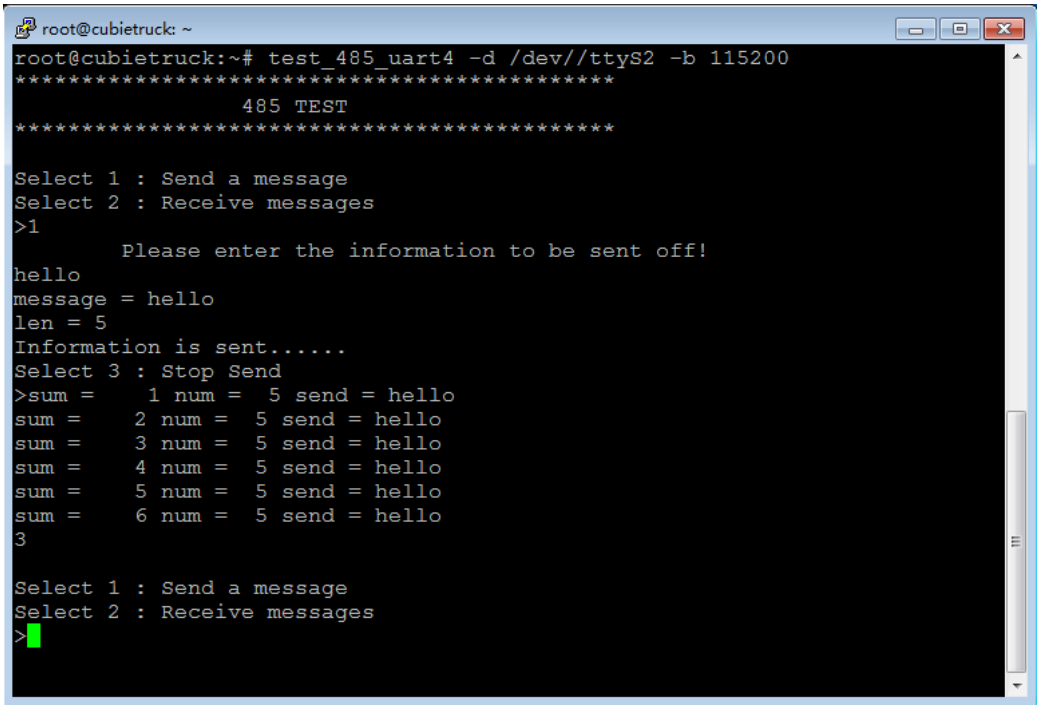
Open two console terminals, one enter the following command：
$ test_485_uart7 -d /dev/ttyS3 -b 115200
The other enter the following command：
$ test_485_uart4 -d /dev/ttyS2 -b 115200

1) Select "2" for the receiver, before select "3" to stop receiving, the receiver remain in the status of receiving ,
   As shown in the figure below:



2) Select "1" for the receiver, enter information that you want to send, such as "hello", before select "3" to stop sending, the transmitter remain in the status of loop sending, keep sending data,

   As shown in the figure below:



Press Ctrl+C to stop.

6.9. GPS Demo

Connect the UART GPS NEO-6M module to the onboard UART3 interface,
Enter the following command:

Note：

1.The GPS module demo must be operated outdoor, otherwise it can not receive the satellite data.

2.The testing program is compatible with GPS module with baud rate 9600.

```
$ test_gps ttyS1
```

User can analyze corresponding data according to their needs. Press Ctrl+C to stop.
Detail for how to use the UART GPS NEO-6M module please refer to:
http://www.wvshare.com/product/UART-GPS-NEO-6M.htm

6.10. ZIGBEE Demo

Interfaces of onboard ZIGBEE only compatible with configured Core2530 board. When burning program for the core board or other corresponding configure, it may need support from ZB500. Detail development package please refer to：
http://www.wvshare.com/product/Core2530-Acce.htm

6.11. USB Camera Demo

Connect our standard USB Camera to the onboard Cubietruck USB Host interface, connect the network cable(to ensure access to the Internet), enter corresponding command：

Note：Users can directly start from step 5) as the firmware we provided already finished step 1)- step 4).

1) Install corresponding tool

```
$apt-get install libv4l-dev
$apt-get install libjpeg8-dev
$apt-get install subversion
$apt-get install imagemagick
$apt-get install make
$apt-get install vim
```

2) Download mjpg-streamer source code

```
$cd /
$svn co https://svn.code.sf.net/p/mjpg-streamer/code/ mjpg-streamer
```

It will download automatically after executed the command, after finish download, the mijpg-streamer document will appeared in the current directory.

3) Modify the configuration file

```
$vi mjpg-streamer/mjpg-streamer/plugins/input_uvc/input_uvc.c
```

Modify

int width = 640, height = 480, fps = 5, format = V4L2_PIX_FMT_MJPEG, i;

to：

int width = 640, height = 480, fps = 5, format = V4L2_PIX_FMT_YUYV, i;

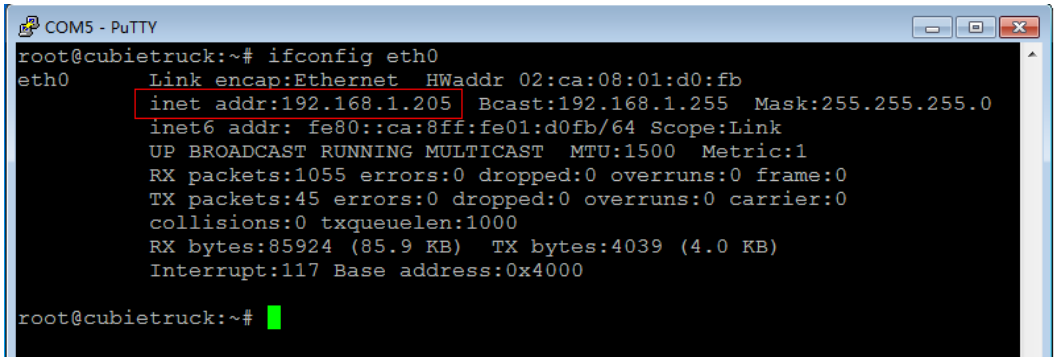
Exit after save it.

4) Compile

```
$cd /mjpg-streamer/mjpg-streamer
$make clean
$make
```

5) Check the assigned ip address:

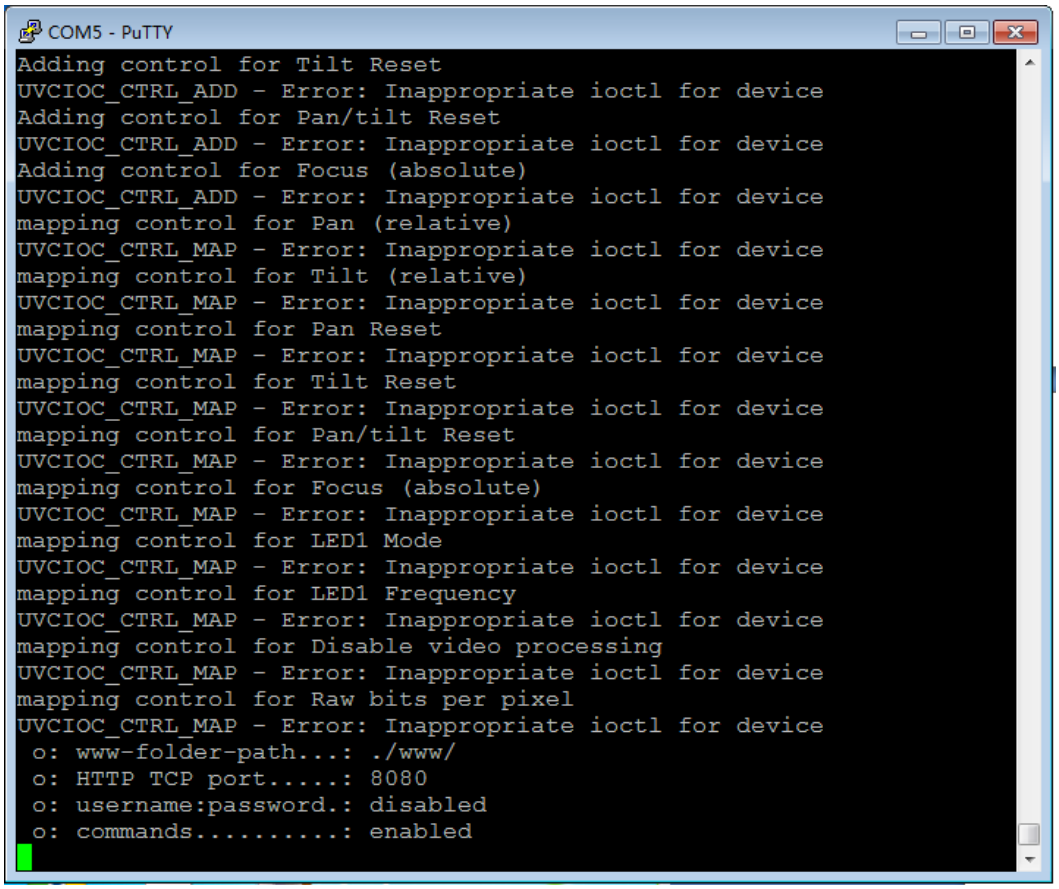
```
$ ifconfig eth0
```



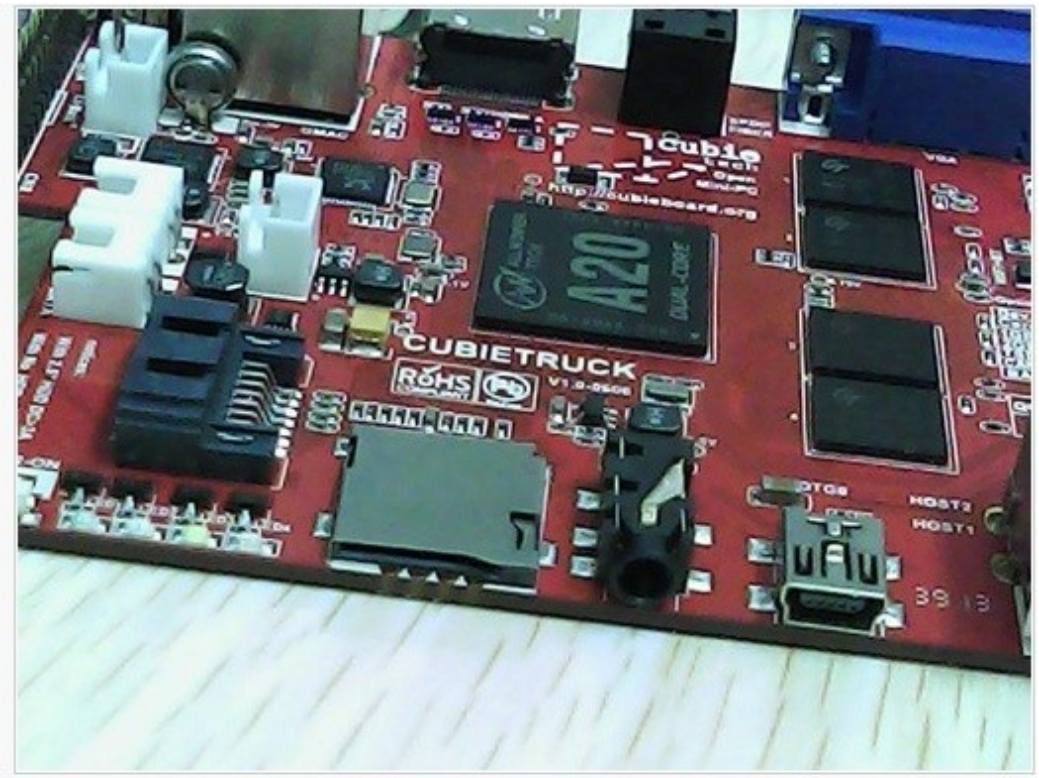
The ip address is 192.168.1.205.

6) Start the video streamer server：

$cd /mjpg-streamer/mjpg-streamer
$ ./ start.sh



7) Open the browser on a computer which is connected to the same subnet(or directly on the display which is connected to Cubietruck), enter the following address： http://192.168.1.205:8080/javascript.html
You can see the captured video stream. Press Ctrl+C to stop.

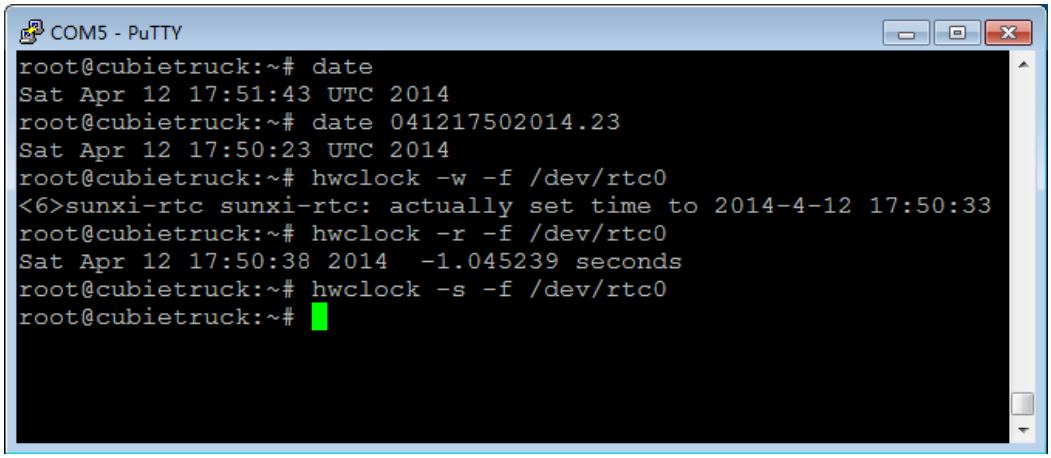


© The MJPG-streamer team | Design by Andreas Viklund

6.12. RTC Demo

Test onboard Cubietruck RTC，enter corresponding demand on the console terminal：

1) Read the system time：
   $ date
2) Configure the system time：
   $ date 041217502014.23
3) Set the hardware of RTC time：
   $ hwclock -w -f /dev/rtc0
4) Read time of RTC hardware：
   $ hwclock -r -f /dev/rtc0
5) Time of RTC hardware synchronized to the system time：
   $ hwclock -s -f /dev/rtc0

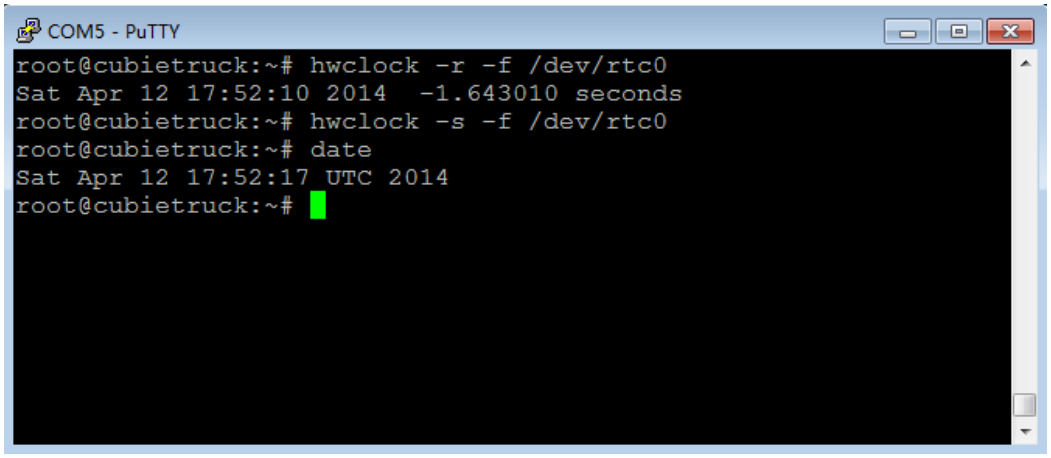


6) Cut off the power and restart, read the time of RTC hardware and synchronized to the system time, enter the following command：

$ hwclock -r -f /dev/rtc0

$ hwclock -s -f /dev/rtc0

$ date



Now, time of the software and hardware are synchronized, the RTC works normally.

6.13. WIFI Demo

Test the onboard Cubietruck WIFI module， enter corresponding command on the console terminal：

Note： Please execute command: “modprobe bcmdhd” and add “bcmdhd” to list of /etc/modules if the WIFI driver did no insmod.

1) Install corresponding tools

$apt-get install wifi-radar

$apt-get install linux-firmware

When finished， reboot the system.

2) After rebooted the system, turn off the Ethernet card and open WIFI card.

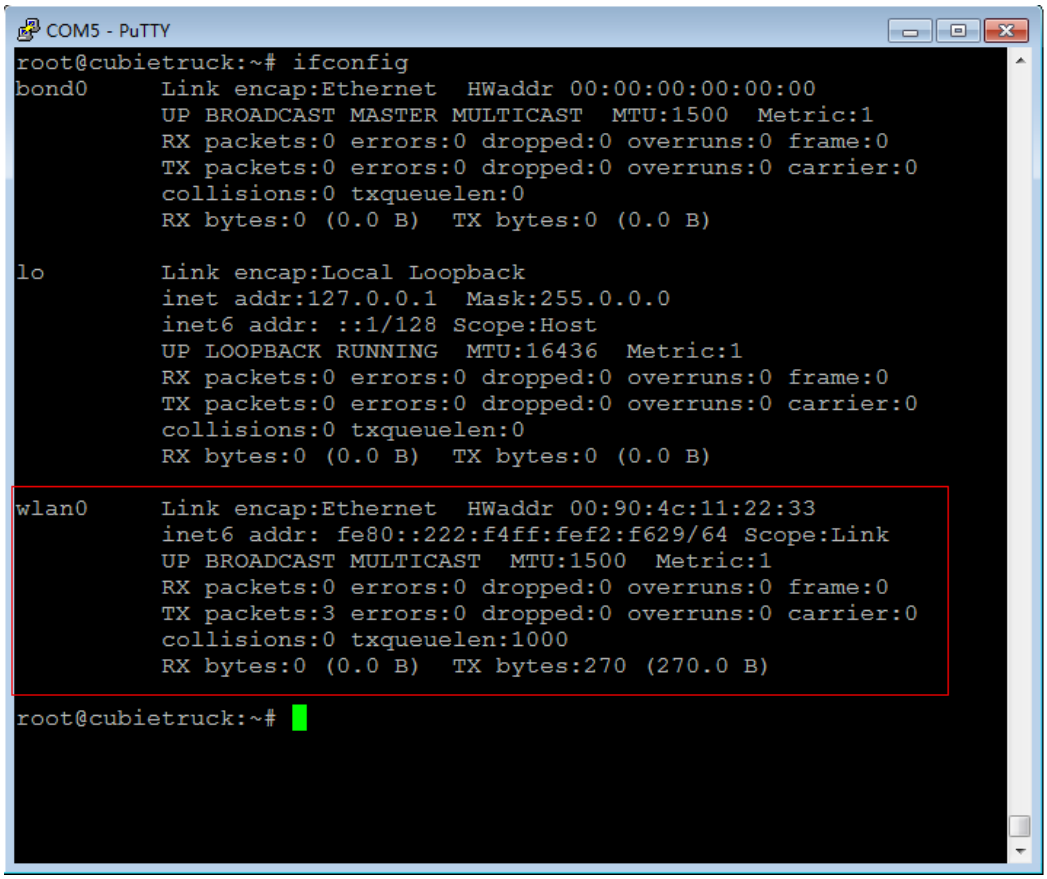
$ifconfig eth0 down

$ifconfig wlan0 up

Note: It may be “wlan1” in different system, according to the actual situation.

3) Check the network status：

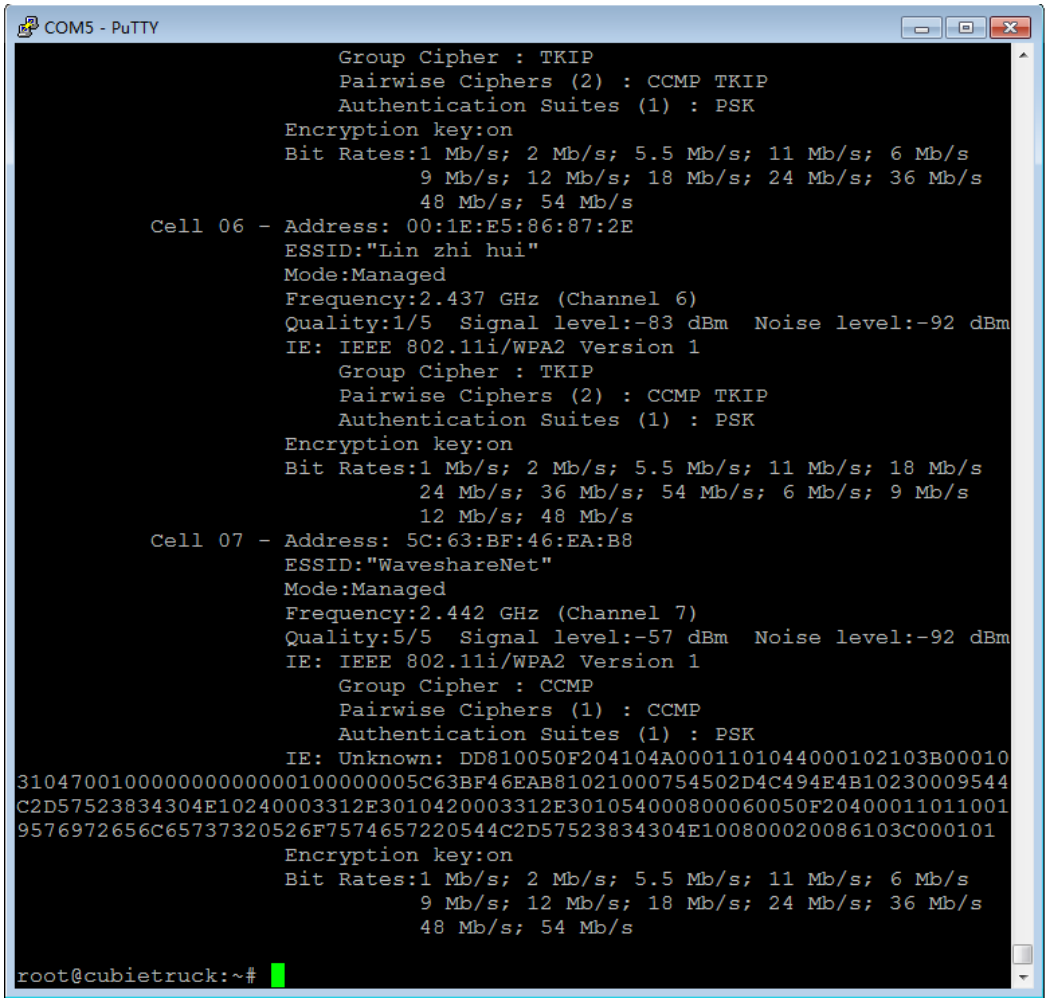
$ifconfig



4) Scan the wireless router：

$ iwlist wlan0 scan

to find available wireless network.



5) Configure wlan0:

$vi /etc/network/interfaces

Acquire the IP configuration dynamically as following:

```
#auto lo eth0
#iface lo inet loopback
#iface eth0 inet dhcp

auto wlan0
iface wlan0 inet dhcp
pre-up ip link set wlan0 up
pre-up iwconfig wlan0 essid waveshareNet
wpa-ssid waveshareNet
wpa-psk 123456
```

Acquire the IP configuration statically as following:

```
#auto lo eth0
#iface lo inet loopback
#iface eth0 inet dhcp
```

```
auto wlan0
iface wlan0 inet static
address 192.168.1.121
netmask 255.255.255.0
gateway 192.168.1.1
pre-up ip link set wlan0 up
pre-up iwconfig wlan0 essid waveshareNet
wpa-ssid waveshareNet
wpa-psk 123456
```

Exit after save it.

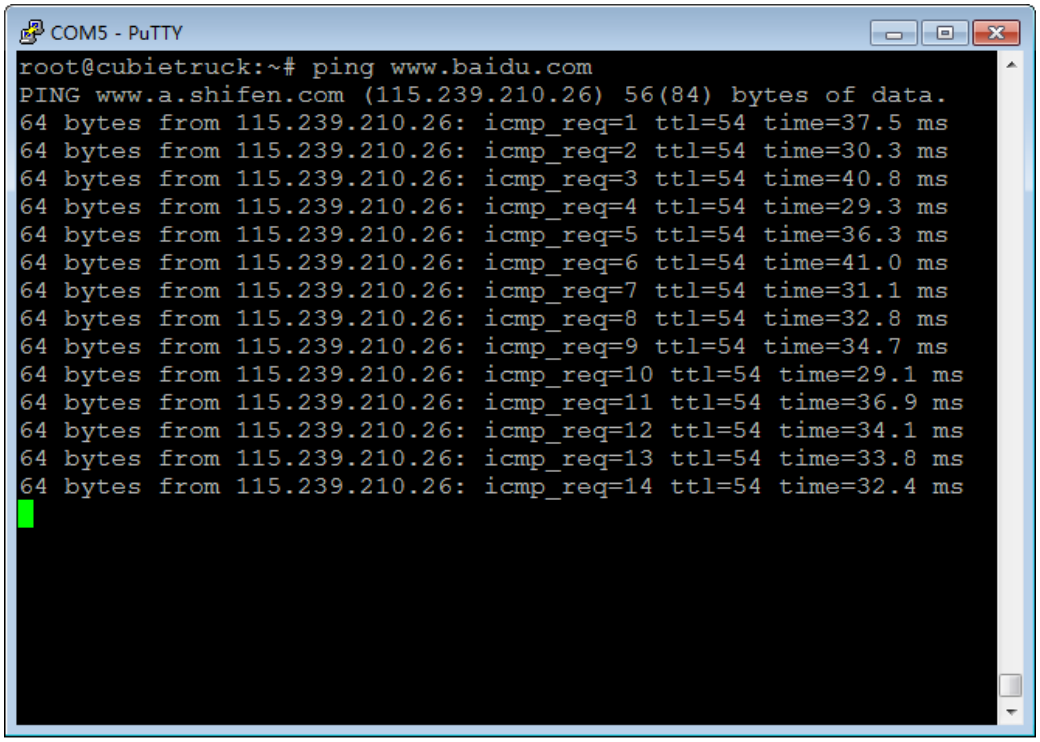
Note: Configure ESSID and PSK properly according to the scan result.

6) Restart the network：

$/etc/init.d/networking restart

7) Network Demo：

$ ping www.baidu.com



Note：

If the below print message appear：

CFG80211-ERROR) wl_escan_handler : Couldn't find P2PIE in probe response/beacon

Press the following command：

$ifconfig wlan0 down

$ifconfig wlan0 up

$/etc/init.d/networking restart