佩特科技
www.gzpeite.net

PET-R58 开发板/全功能板
Tina IoT/OpenWrt 开发手册

一、解压源代码

将源代码压缩文件全部复制到 Ubuntu 系统下，保证所在磁盘剩余空间要大于 20G，使用以下命令解压源代码：

```
tar xvJf PET_R58_Tina_Source.tar.xz
```

二、编译 Tina IoT/OpenWrt

首次编译请严格按照步骤进行 uboot、Tina IoT 的编译，否则编译可能会出现错误。

1、编译 uboot

首次编译或修改 uboot 代码后需要执行这一步骤。

首先进入源码根目录

```
source build/envsetup.sh
lunch octopus_dev-tina
cd lichee/brandy/u-boot-2011.09
make sun8iw6p1_config
make -j4 sun8iw6p1
```

编译完成后正确提示如下

```
s/.*\(__u_boot_cmd_.*\)/-u\1/p'|sort|uniq`; cd /hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-
boot-2011.09 && /hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-boot-2011.09/../gcc-linaro/bin/
arm-linux-gnueabi-ld  -pie -T u-boot.lds -Bstatic $UNDEF_SYM arch/arm/cpu/armv7/start.o --start-gro
up api/libapi.o arch/arm/cpu/armv7/libarmv7.o arch/arm/cpu/armv7/sun8iw6/libsun8iw6.o arch/arm/lib/
libarm.o common/libcommon.o disk/libdisk.o drivers/audio/libaudio.o drivers/bios_emulator/libatibio
semu.o drivers/block/libblock.o drivers/dma/libdma.o drivers/efuse/libsunxi_efuse.o drivers/fpga/li
bfpga.o drivers/gpio/libgpio.o drivers/hwmon/libhwmon.o drivers/i2c/libi2c.o drivers/input/libinput
.o drivers/misc/libmisc.o drivers/mmc/libmmc.o drivers/mtd/nand/libnand.o drivers/mtd/onenand/libon
enand.o drivers/mtd/spi/libspi_flash.o drivers/mtd/ubi/libubi.o drivers/net/libnet.o drivers/net/ph
y/libphy.o drivers/p2wi/libp2wi.o drivers/pci/libpci.o drivers/pcmcia/libpcmcia.o drivers/power/lib
power.o drivers/pwm/libsunxi_pwm.o drivers/rsb/librsb.o drivers/rtc/librtc.o drivers/serial/libseri
al.o drivers/smc/libsmc.o drivers/spi/libspi.o drivers/spinor/libspinor.o drivers/storage_type/libs
torage_type.o drivers/twserial/libtws.o drivers/usb/eth/libusb_eth.o drivers/usb/gadget/libusb_gadg
et.o drivers/usb/host/libusb_host.o drivers/usb/musb/libusb_musb.o drivers/usb/phy/libusb_phy.o dri
vers/usb/sunxi_usb/libusb_sunxi_usb.o drivers/video_sunxi/libvideo_sunxi.o drivers/watchdog/libwatc
hdog.o fs/aw_fs/libawfat.o fs/cramfs/libcramfs.o fs/ext2/libext2fs.o fs/fat/libfat.o fs/fdos/libfdo
s.o fs/jffs2/libjffs2.o fs/reiserfs/libreiserfs.o fs/ubifs/libubifs.o fs/yaffs2/libyaffs2.o lib/lib
fdt/libfdt.o lib/libgeneric.o lib/lzma/liblzma.o lib/lzo/liblzo.o lib/openssl/libopenssl.o lib/zlib
/libz.o memtest/libsunxi_memtest.o net/libnet.o post/libpost.o sprite/libsprite.o usb_sunxi/libsunx
i_usb.o board/sunxi/sun8iw6/libsun8iw6.o board/sunxi/libsunxi.o --end-group /hdd2/Sekede/Dev_Board/
PET_R58_Tina/lichee/brandy/u-boot-2011.09/arch/arm/lib/eabi_compat.o -L /hdd2/Sekede/Dev_Board/PET_
R58_Tina/lichee/brandy/gcc-linaro/bin/../lib/gcc/arm-linux-gnueabi/4.6.3 -lgcc -L /hdd2/Sekede/Dev_
Board/PET_R58_Tina/lichee/brandy/gcc-linaro/bin/../lib/gcc/arm-linux-gnueabi/4.6.3 -lgcc -Map u-boo
t.map -o u-boot
/hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-boot-2011.09/../gcc-linaro/bin/arm-linux-gnueab
i-objcopy -O srec u-boot u-boot.srec
/hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-boot-2011.09/../gcc-linaro/bin/arm-linux-gnueab
i-objcopy --gap-fill=0xff -O binary u-boot u-boot.bin
fatal: Not a git repository (or any parent up to mount point /hdd2)
Stopping at filesystem boundary (GIT_DISCOVERY_ACROSS_FILESYSTEM not set).
not set commit log
'u-boot-sun8iw6p1.bin' -> '/hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-boot-2011.09/../../.
./target/allwinner/octopus-common/bin/u-boot-sun8iw6p1.bin'
make[1]: Leaving directory `/hdd2/Sekede/Dev_Board/PET_R58_Tina/lichee/brandy/u-boot-2011.09'

#### make completed successfully (21 seconds) ####

[root@SeKeDe u-boot-2011.09]#
```

2、编译 Tina IoT/OpenWrt

首先进入源码根目录

```
source build/envsetup.sh
lunch octopus_dev-tina
export FORCE_UNSAFE_CONFIGURE=1
make -j4
pack
```

编译完成后正确提示如下

```
FilePath: recovery.fex
FileLength=18sys_config.fex Len: 0x14b92
config.fex Len: 0xe400
split_xxxx.fex Len: 0x200
sys_partition.fex Len: 0xc3e
sunxi.fex Len: 0x9
boot0_nand.fex Len: 0x8000
boot0_sdcard.fex Len: 0x8000
u-boot.fex Len: 0xb4000
toc1.fex Len: 0x8
toc0.fex Len: 0x8
fes1.fex Len: 0x3500
boot_package.fex Len: 0x10
usbtool.fex Len: 0x23600
aultools.fex Len: 0x2847b
aultls32.fex Len: 0x24d23
cardtool.fex Len: 0x11c00
cardscript.fex Len: 0x6ea
sunxi_mbr.fex Len: 0x10000
dlinfo.fex Len: 0x4000
boot-resource.fex Len: 0x5b400
Vboot-resource.fex Len: 0x4
env.fex Len: 0x20000
Venv.fex Len: 0x4
boot.fex Len: 0x800000
Vboot.fex Len: 0x4
rootfs.fex Len: 0x13e0000
Vrootfs.fex Len: 0x4
recovery.fex Len: 0x18
Vrecovery.fex Len: 0x4
BuildImg 0
Dragon execute image.cfg SUCCESS !
----------image is at----------

/hdd2/Sekede/Dev_Board/PET_R58_Tina/out/octopus-dev/tina_octopus-dev_uart0.img

pack finish
[root@SeKeDe PET_R58_Tina]#
```

编译完成后会在 out/octopus-dev 目录下生成 tina_octopus-dev_uart0.img 系统烧写镜像文件。

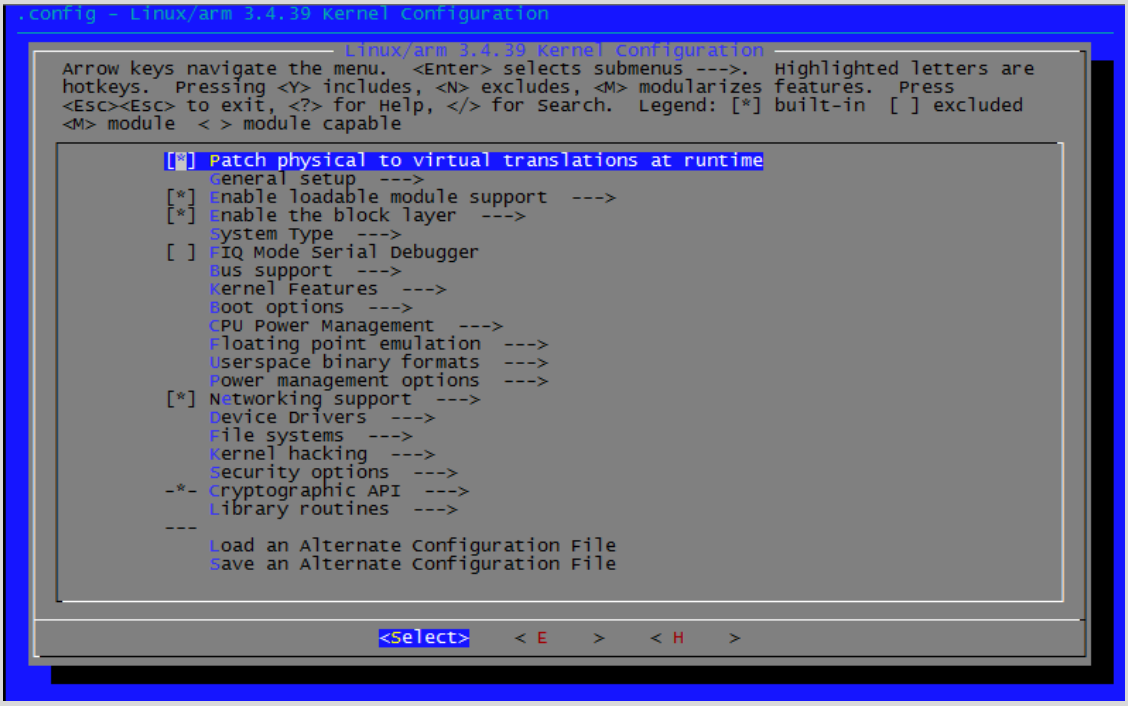
三、修改 Linux 内核编译选项

首先切换到源码根目录

source build/envsetup.sh

lunch octopus_dev-tina

make kernel_menuconfig



完成配置后保存退出，

完成内核配置修改后，重新编译 Tina IoT/OpenWrt 即可。

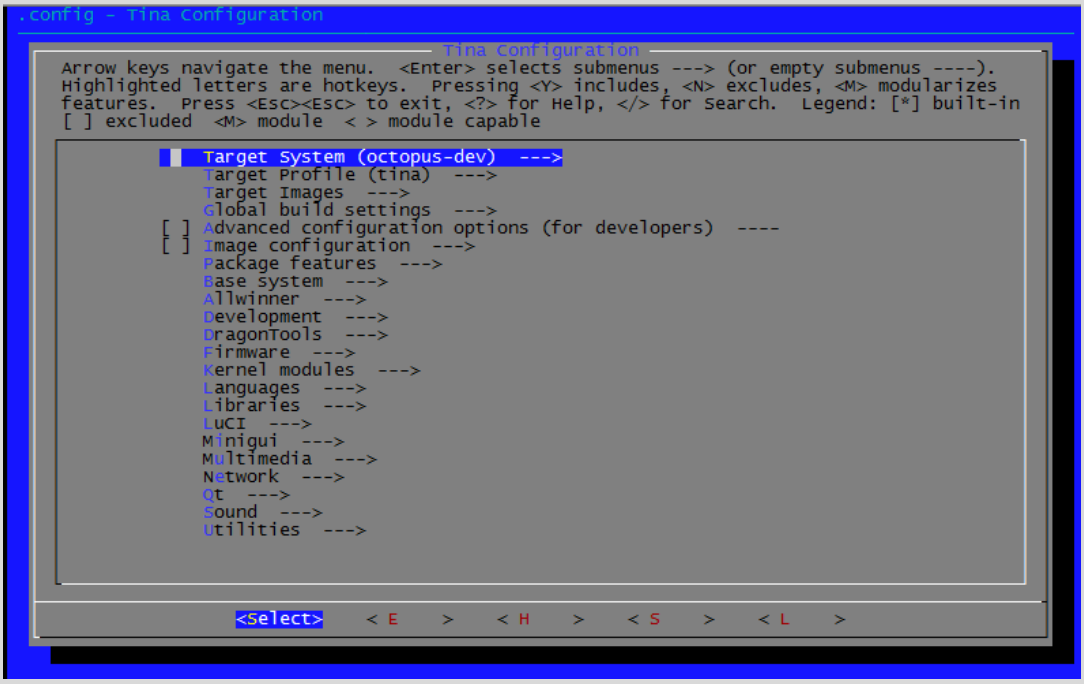
四、修改 Tina IoT/OpenWrt 编译选项

首先切换到源码根目录

source build/envsetup.sh

lunch octopus_dev-tina

make menuconfig



完成配置后保存退出，

完成 Tina IoT/OpenWrt 修改后，重新编译 Tina IoT/OpenWrt 即可。

五、镜像文件烧写

开发过程中，一般使用 PhoenixSuit 进行镜像文件的烧写，具体操作方式请参考开发工具目录下的《PhoenixSuit 使用说明文档.pdf》，。

将开发板的 MicroUSb 接口连接到系统主机后，Linux+QT 系统检测到的设备信息如下：

烧写操作需要首先通过 Micro USB 数据线连接主机的开发板，在进行烧写时如果出现主机识别到新的设备没有正常安装驱动的情况时，需要手动安装设备驱动程序，驱动程序位于开发工具文件夹内。

注意，在点击烧写镜像后，设备会重启黑屏，此时需要在 PC 端的设备管理区中再手动安装镜像烧写设备驱动。

六、主要硬件功能测试

硬件功能测试需要首先连接好调试串口，请参考《PET-R58 开发板全功能板用户手册》。

1、以太网功能测试

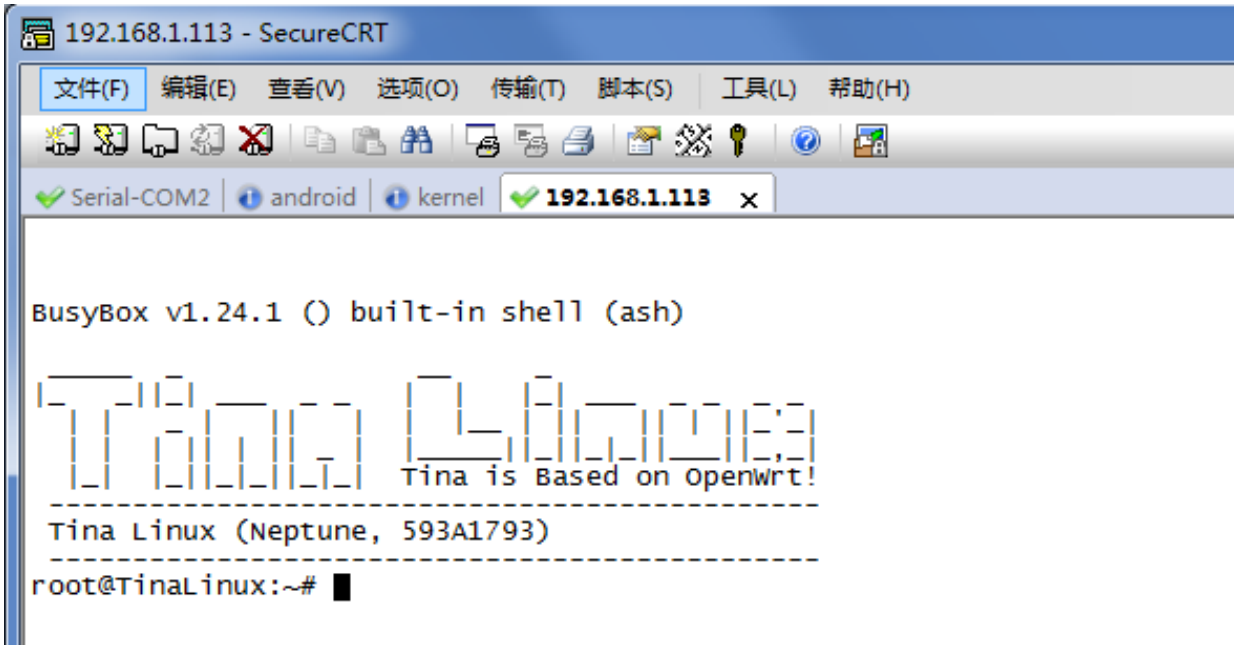
连接好以太网网线，并确保局域网内有 DHCP 服务器，然后上电开机，在串口调试终端输入命令 ifconfig

```
root@TinaLinux:/# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:60:6E:C2:30:52
          inet addr:192.168.1.113  Bcast:192.168.1.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:14 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:1361 (1.3 KiB)  TX bytes:966 (966.0 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:136 errors:0 dropped:0 overruns:0 frame:0
          TX packets:136 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:8809 (8.6 KiB)  TX bytes:8809 (8.6 KiB)
```

2、SSH 远程连接测试

首先执行以太网功能测试，获取设备的 IP 地址，如上图是 192.168.1.113
在电脑端使用 SSH2 登陆软件即可远程登陆，用户名密码都是 root



3、RTC 功能测试

在串口调试终端输入命令

date -s "2017-12-27 17:56"

hwclock -w

```
root@TinaLinux:/# date -s "2017-12-27 17:56"
Wed Dec 27 17:56:00 CST 2017
root@TinaLinux:/# hwclock -w
```

然后断电重启设备，再次出入命令 date，可以看到设备的时间是正常的。

```
root@TinaLinux:/# date
Wed Dec 27 17:57:27 CST 2017
root@TinaLinux:/#
```

4、WIFI 功能测试

在串口调试终端输入命令

wifi_scan_results_test，可以查看 wifi 扫描到的热点信息，其他 wifi 命令还有:

```
wifi_add_network_test           wifi_list_networks_test
wifi_connect_ap_test            wifi_longtime_test
wifi_connect_ap_with_netid_test wifi_on_off_test
wifi_connect_chinese_ap_test    wifi_remove_network_test
wifi_get_netid_test             wifi_scan_results_test
```

```
root@TinaLinux:/# wifi_scan_results_test
Unable to open connection to supplicant on "/etc/wifi/sockets/wlan0": Connection refused
wpa_suppplicant not running!
Cannot create "/data/misc/wifi/entropy.bin": No such file or directory
Wi-Fi entropy file was not created
Connected to wpa_supplicant!
event_label 0x0
WiFi on success!
do cmd LIST_NETWORKS
call event 0xf004
do cmd SCAN
event_label 0x0
It has no wifi auto connect when wifi on!

**********************************
***Start scan!***
**********************************
update scan results enter
scan stauts 1
do cmd SCAN_RESULTS
[   40.533079] RTL871X: nolinked power save enter
ret of scan is 0
******************************
Wifi scan: Success!
******************************
ret of get_scan_results is 0
bssid / frequency / signal level / flags / ssid
6e:74:bf:59:9d:be       2437    -57     [WPA2-PSK-CCMP][ESS]    Apollo
24:05:0f:41:49:f7       2412    -71     [WPA-PSK-CCMP][WPA2-PSK-CCMP][ESS]      yy
d8:15:0d:8d:d3:8a       2462    -71     [WPA-PSK-CCMP][WPA2-PSK-CCMP][WPS][ESS] PBL-32061168
54:e6:fc:29:c4:e6       2452    -73     [WPA-PSK-CCMP][WPA2-PSK-CCMP][WPS][ESS]
20:6b:e7:48:13:e4       2462    -74     [WPA-PSK-CCMP+TKIP][WPA2-PSK-CCMP+TKIP][ESS]    TP-LINK0
fc:37:2b:b2:d6:c1       2472    -72     [WPA-PSK-CCMP+TKIP][WPA2-PSK-CCMP+TKIP][WPS][ESS]       ChinaNet-WdgT
78:d3:8d:ef:32:95       2412    -73     [WPA2-PSK-CCMP+TKIP][ESS]
******************************
Wifi get_scan_results: Success!
******************************
```

在串口调试终端输入下面命令进行连接 AP 测试： SSID 是 Apollo 密码是 1357924680

wifi_connect_ap_test Apollo 1357924680

```
root@TinaLinux:/# wifi_connect_ap_test Apollo 1357924680

**********************************
***Start wifi connect ap test!***
**********************************
event_label 0x0
WiFi on success!
do cmd LIST_NETWORKS
do cmd LIST_NETWORKS
call event 0xf00b
event_label 0x0
WiFi connected ap!
aw wifi connect state 0xf3
enter get_key_mgmt, ssid Apollo
no ap scan, return
update scan results enter
do cmd SCAN
scan stauts 1
do cmd SCAN_RESULTS
enter get_key_mgmt, ssid Apollo
ssid Apollo, flag [WPA2-PSK-CCMP][ESS]
do cmd LIST_NETWORKS
do cmd GET_NETWORK 0 key_mgmt
GET_NETWORK 0 key_mgmt reply WPA-PSK
key type WPA-PSK
do cmd ADD_NETWORK
do cmd SET_NETWORK 1 ssid "Apollo"
do cmd SET_NETWORK 1 key_mgmt WPA-PSK
do cmd SET_NETWORK 1 psk "1357924680"
do cmd LIST_NETWORKS
[  185.656899] cfg80211: Calling CRDA for country: CN

do cmd GET_NETWORK 1 priority
[  185.666061] RTL871X: rtw_set_802_11_connect(wlan0)  fw_state=0x00000008

do cmd SELECT_NETWORK 1
do cmd RECONNECT
[  187.082736] RTL871X: start auth
[  187.093143] RTL871X: auth success, start assoc
[  187.111260] RTL871X: assoc success
[  187.215047] RTL871X: send eapol packet
[  187.234814] RTL871X: send eapol packet
[  187.248717] RTL871X: set pairwise key camid:4, addr:6e:74:bf:59:9d:be, kid:0, type:
do cmd LIST_NETWORKS
connecting id 1, connected id 1[  187.266944] RTL871X: set group key camid:5, addr:6e:

do cmd REMOVE_NETWORK 0
do cmd SAVE_CONFIG
wifi connected in inner!
do cmd LIST_NETWORKS
do cmd ENABLE_NETWORK 1
do cmd SAVE_CONFIG
wifi state busing,waiting
  855 root      1032 S    udhcpc -p /var/run/udhcpc-eth0.pid -s /lib/netifd/dh
  923 root      1032 S    /sbin/udhcpc -i wlan0 -h When_you_like_AW -S -T 10
  949 root      1032 S    sh -c /etc/wifi/udhcpc_wlan0 restart
  954 root      1124 S    {udhcpc_wlan0} /bin/sh /etc/rc.common /etc/wifi/udhc
  949 root      1032 S    sh -c /etc/wifi/udhcpc_wlan0 restart
  954 root      1124 S    {udhcpc_wlan0} /bin/sh /etc/rc.common /etc/wifi/udhc
vflag= 4
call event 0xf00b
event_label 0x1
WiFi connected ap!
******************************
Wifi connect ap test: Success!
******************************
```

5、Soft AP 功能测试

在电脑的串口调试终端输入命令

softap_test

```
root@TinaLinux:/etc# softap_test
****************************
Start hostapd test!
****************************
killall: wpa_supplicant: no process killed
Start to reload firmware!
Message is: OK
Reload firmware finished!
Start to set softap!
Message is: OK
Set softap finished!
[   63.191839] RTL871X: nolinked power save enter
Start to start softap!
Configuration file: /etc/wifi/hostapd.conf
[   65.258432] RTL871X: nolinked power save leave
nl80211: Could not re-add multicast membership for vendor events: -2 (No such file or directory)
Using interface wlan0 with hwaddr 20:f4:1b:fd:13:42 and ssid "[   65.281833] RTL871X: assoc success
Smart-AW-HOSTAPD"
VLAN: vlan_se[   65.288534] RTL871X: set group key camid:1, addr:00:00:00:00:00:00, kid:1, type:AES
t_name_type: SET_VLAN_NAME_TYPE_CMD name_type=2 failed: No error information
wlan0: interface state UNINITIALIZED->ENABLED
wlan0: AP-ENABLED
SoftAP started successfullyMessage is: OK
Start softap finished!
****************************
Hostapd test successed!
****************************
```

可搜索到 ssid 为 Smart-AW-HOSTAPD 的热点，密码为 wifi1111

6、Soft AP SSID 及密码功能测试

在电脑的串口调试终端输入命令

softap_up "peite_wifi_test" "peite123"

```
root@TinaLinux:/etc# softap_up "peite_wifi_test" "peite123"
****************************
Start hostapd test!
****************************
killall: wpa_supplicant: no process killed
Start to reload firmware!
Message is: OK
Reload firmware finished!
Start to set softap!
Message is: OK
Set softap finished!
Start to start softap!
Configuration file: /etc/wifi/hostapd.conf
nl80211: Could not re-add multicast membership for vendor events: -2 (No such file or directory)
Using interface wlan0 with hwaddr 20:f4:1b:fd:13:42 and ssid "peite_wifi_test"
VLAN: vlan_set_n[  627.161815] RTL871X: set group key camid:1, addr:00:00:00:00:00:00, kid:1, type
ame_type: SET_VLAN_NAME_TYPE_CMD name_type=2 failed: No error information
wlan0: interface state UNINITIALIZED->ENABLED
wlan0: AP-ENABLED
SoftAP started successfullyMessage is: OK
Start softap finished!
****************************
Hostapd test successed!
****************************
```

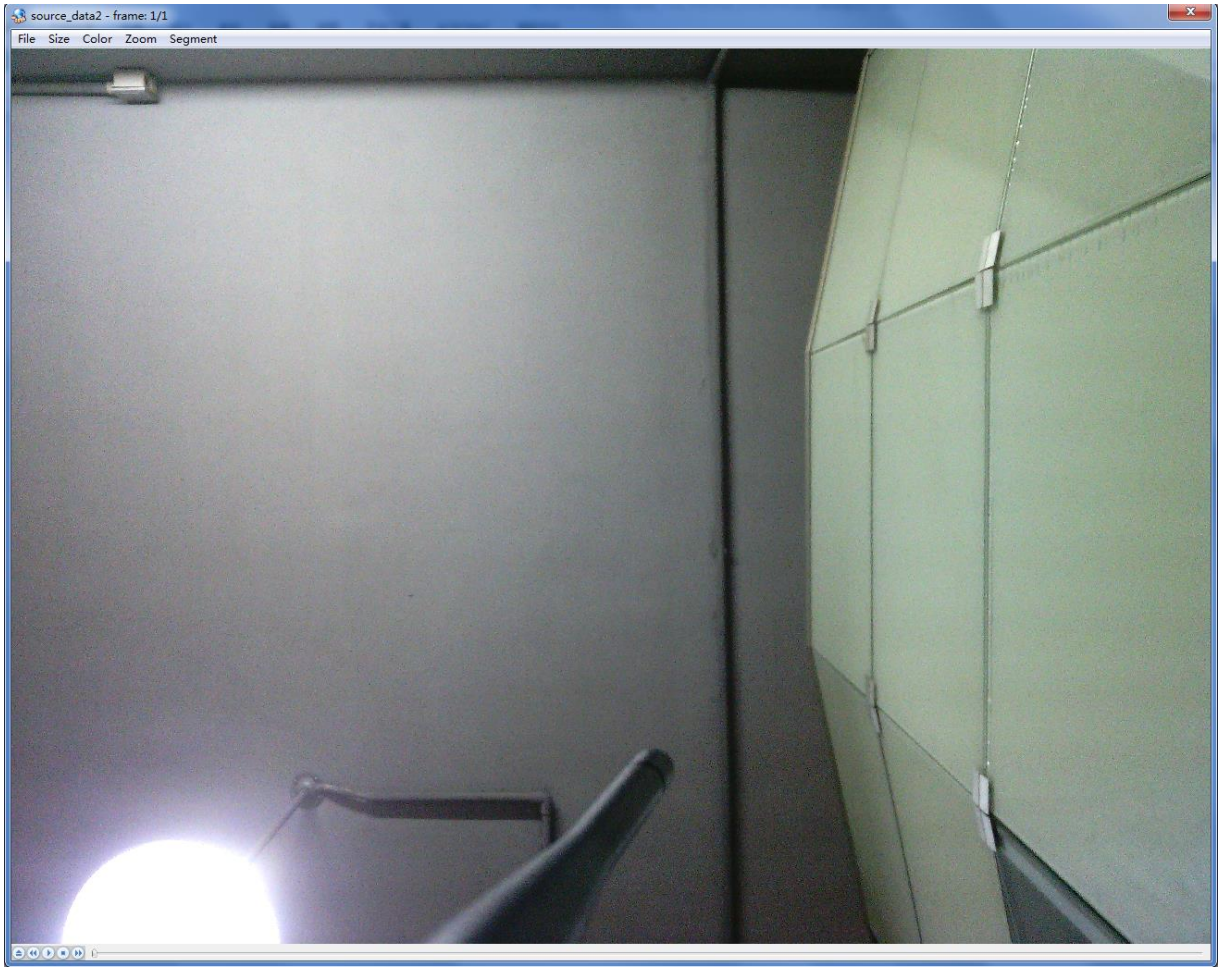
可搜索到 ssid 为 peite_wifi_test 的热点，密码为 peite123

7、板载摄像头功能测试

在电脑的串口调试终端输入命令
cameratest 2592 1936 photo 2 /tmp NV21
在 /tmp 目录下会生成 source_data2.yuv 文件 ，

然后在电脑 cmd 命令行终端用 adb pull 命令将文件复制到电脑里面
adb pull /tmp/source_data2.yuv

用 yuvplauer.exe（位于开发工具目录内） 打开文件就可以查看图像了(图像大小设置为 2592x1936，颜色设置为 NV21)。



8、USB 摄像头功能测试

首先将支持 UVC 标准的 USB 摄像头插入设备，
在电脑的串口调试终端输入命令
fswebcam -d /dev/video1 -r 640*480 /mnt/UDISK/test.jpg　分辨率可以根据摄像头的实际情况修改

```
root@TinaLinux:/# fswebcam -d /dev/video1 -r 640*480 /mnt/UDISK/test.jpg
--- Opening /dev/video1...
Trying source module v4l2...
/dev/video1 opened.
No input was specified, using the first.
Adjusting resolution from 640x-1 to 640x480.
--- Capturing frame...
Captured frame in 0.00 seconds.
--- Processing captured image...
Unable to load font 'sans': libgd was not built with FreeType font support

Disabling the the banner.
Writing JPEG image to '/mnt/UDISK/test.jpg'.
```

然后在电脑 cmd 命令行终端用 adb pull 命令将文件复制到电脑里面查看效果
adb pull /mnt/UDISK/test.jpg

9、音频播放功能测试

在电脑 cmd 命令行终端用 adb push 命令将文件复制到设备里面
adb push test.mp3 /mnt/UDISK/

然后在电脑的串口终端中用下面命令播放，即可听到音乐输出
tinyplayer /mnt/UDISK/test.mp3

10、　录音功能测试

在电脑的串口终端中用下面命令进行录音操作
arecord /mnt/UDISK/recored.wav
然后在电脑的串口终端中用下面命令播放，即可听到录音结果
aplay /mnt/UDISK/recored.wav

11、　硬解码功能测试

在电脑 cmd 命令行终端用 adb push 命令将文件复制到设备里面
adb push test.mp4 /mnt/UDISK/

然后在电脑的串口终端中用下面命令序列，即可听到音乐输出
xplayerdemo
set url: /mnt/UDISK/test.mp4
play
由于 Tina IoT/OpenWrt 系统没有图形界面，只能听到音乐输出，看不到解码图像。

七、联系方式

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