V81-Ver1.0 测试简书

一、测试概要

1.1、系统简介

该系统主要工作单元分为下位机：Freescale S32K144 型号 MCU 和上位机：Freescale IMX6 ARM 型号 MCU。

S32K144 芯片主要负责汽车 CAN 数据采集，以及车身控制。

IMX6 芯片则负责图片数据采集、数据汇总、数据保存、网络传输等。

系统标准外设有：SD 卡、USB 摄像头、GPS/GPS 天线、GSENSOR、WIFI 天线、SIM 卡/卡槽、GPRS 模块。

1.2、测试环境

用例测试串口工具：SecureCRT。

虚拟机环境：ubuntu-12.04.5-desktop-amd64.iso。

文件拷贝工具：SD 卡。

串口转接工具：USB 转 RS232 转接板。

1.3、所需设备

除开发板已集成的外部设备，还需要以下外设：

SD 卡、USB 摄像头、GPS 天线、WIFI 天线、SIM 卡/卡槽、串口转接板。

1.4、测试过程简述

首先模块化测试，包括各模块设备驱动适配和应用测试，保证各功能模块工作正常，最后进行综合测试。

测试前请先确认一下设备接好：

1、USB 转 RS232 转接板接上 PC 和开发板串口。

2、插入 SD 卡，否则程序检测不到 SD 无法正常工作。

3、USB 摄像头。

4、GPRS/WIFI/GPS 天线。

5、打开 PC 的软件 SecureCRT，通过软件打开调试串口。波特率为 115200。

6、接上 OBD 接口，并支持 OBD 供电。

1.5、系统启动准备

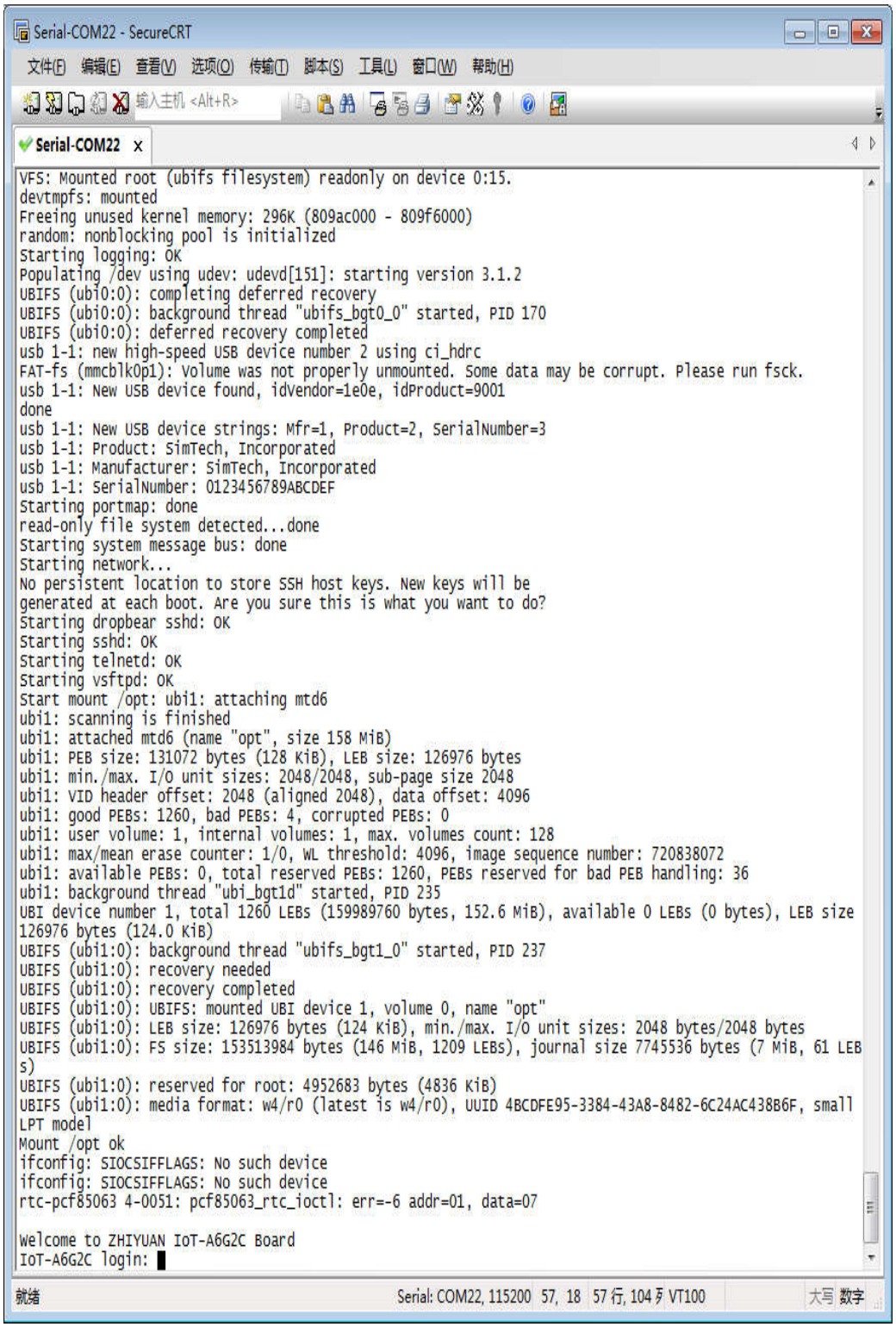
确保上述各外设连接好后，电源上电。

Uboot 启动、Kernel 启动，最后会等待用户输入用户名和密码。

USERNAME:root

PASSWD：root

输入用户名和密码后即成功登录到 ARM 的 linux 系统。


Serial-COM22 - SecureCRT
文件(F) 编辑(E) 查看(V) 选项(O) 传输(T) 脚本(S) 工具(L) 窗口(W) 帮助(H)
输入主机 <Alt+R>
Serial-COM22
VFS: Mounted root (ubifs filesystem) readonly on device 0:15.
devtmpfs: mounted
Freeing unused kernel memory: 296K (809ac000 - 809f6000)
random: nonblocking pool is initialized
Starting logging: OK
Populating /dev using udev: udevd[151]: starting version 3.1.2
UBIFS (ubi0:0): completing deferred recovery
UBIFS (ubi0:0): background thread "ubifs_bgt0_0" started, PID 170
UBIFS (ubi0:0): deferred recovery completed
usb 1-1: new high-speed USB device number 2 using ci_hdrc
FAT-fs (mmcblk0p1): Volume was not properly unmounted. Some data may be corrupt. Please run fsck.
usb 1-1: New USB device found, idVendor=1e0e, idProduct=9001
done
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
usb 1-1: Product: SimTech, Incorporated
usb 1-1: Manufacturer: SimTech, Incorporated
usb 1-1: SerialNumber: 0123456789ABCDEF
Starting portmap: done
read-only file system detected...done
Starting system message bus: done
Starting network...
No persistent location to store SSH host keys. New keys will be
generated at each boot. Are you sure this is what you want to do?
Starting dropbear sshd: OK
Starting sshd: OK
Starting telnetd: OK
Starting vsftpd: OK
Start mount /opt: ubi1: attaching mtd6
ubi1: scanning is finished
ubi1: attached mtd6 (name "opt", size 158 MiB)
ubi1: PEB size: 131072 bytes (128 KiB), LEB size: 126976 bytes
ubi1: min./max. I/O unit sizes: 2048/2048, sub-page size 2048
ubi1: VID header offset: 2048 (aligned 2048), data offset: 4096
ubi1: good PEBs: 1260, bad PEBs: 4, corrupted PEBs: 0
ubi1: user volume: 1, internal volumes: 1, max. volumes count: 128
ubi1: max/mean erase counter: 1/0, WL threshold: 4096, image sequence number: 720838072
ubi1: available PEBs: 0, total reserved PEBs: 1260, PEBs reserved for bad PEB handling: 36
ubi1: background thread "ubi_bgt1d" started, PID 235
UBI device number 1, total 1260 LEBs (159989760 bytes, 152.6 MiB), available 0 LEBs (0 bytes), LEB size
126976 bytes (124.0 KiB)
UBIFS (ubi1:0): background thread "ubifs_bgt1_0" started, PID 237
UBIFS (ubi1:0): recovery needed
UBIFS (ubi1:0): recovery completed
UBIFS (ubi1:0): UBIFS: mounted UBI device 1, volume 0, name "opt"
UBIFS (ubi1:0): LEB size: 126976 bytes (124 KiB), min./max. I/O unit sizes: 2048 bytes/2048 bytes
UBIFS (ubi1:0): FS size: 153513984 bytes (146 MiB, 1209 LEBs), journal size 7745536 bytes (7 MiB, 61 LEB
s)
UBIFS (ubi1:0): reserved for root: 4952683 bytes (4836 KiB)
UBIFS (ubi1:0): media format: w4/r0 (latest is w4/r0), UUID 4BCDFE95-3384-43A8-8482-6C24AC438B6F, small
LPT model
Mount /opt ok
ifconfig: SIOCSIFFLAGS: No such device
ifconfig: SIOCSIFFLAGS: No such device
rtc-pcf85063 4-0051: pcf85063_rtc_ioctl: err=-6 addr=01, data=07
Welcome to ZHIYUAN IoT-A6G2C Board
IoT-A6G2C login:
就绪
Serial: COM22, 115200 57, 18 57 行, 104 列 VT100
大写 数字

二、测试过程

2.1、硬件模块测试

2.1.1、GPRS/WIFI 模块测试

GPRS/WIFI 模块集成在开发板中，执行加载 GPRS 模块驱动操作：

insmod /lib/modules/GobiSerial.ko，

系统就会检测到 GPRS 虚拟出来的 USB 设备，串口会打印出下列信息，同时输入

ls /dev/ttyUSB*，系统会打印出 /dev/ttyUSB0 /dev/ttyUSB1 /dev/ttyUSB2 /dev/ttyUSB3 /dev/ttyUSB4 四个虚拟设备。

```
[root@IoT-A6G2C setScript]# insmod /lib/modules/GobiSerial.ko
usbcore: registered new interface driver GobiSerial
usbserial: USB Serial support registered for GobiSerial

Num Interfaces = 6
This Interface = 0
1num=0, inface_num=7f0004a0num=0, inface_num=5
Modem port found
GobiSerial 1-1:1.0: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB0

Num Interfaces = 6
This Interface = 1
1num=0, inface_num=7f0004a0num=0, inface_num=5
Modem port found
GobiSerial 1-1:1.1: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB1

Num Interfaces = 6
This Interface = 2
1num=0, inface_num=7f0004a0num=0, inface_num=5
Modem port found
GobiSerial 1-1:1.2: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB2

Num Interfaces = 6
This Interface = 3
1num=0, inface_num=7f0004a0num=0, inface_num=5
Modem port found
GobiSerial 1-1:1.3: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB3

Num Interfaces = 6
This Interface = 4
1num=0, inface_num=7f0004a0num=0, inface_num=5
Modem port found
GobiSerial 1-1:1.4: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB4

Num Interfaces = 6
This Interface = 5
1num=0, inface_num=7f0004a0num=0, inface_num=5
Unsupported interface number
GobiSerial: 2011-07-29-1026
[root@IoT-A6G2C setScript]#
```

执行加载 wifi 驱动操作：

insmod /lib/modules/brcmutil.ko

insmod /lib/modules/brcmfmac.ko

系统检测到 wifi 设备会打印下列信息

```
[root@IoT-A6G2C setScript]# insmod /lib/modules/brcmutil.ko
[root@IoT-A6G2C setScript]# insmod /lib/modules/brcmfmac.ko
[root@IoT-A6G2C setScript]# brcmfmac: brcmf_c_preinit_dcmds: Firmware version = wl0: Apr 22 2013 14:50:0
0 version 5.90.195.89.6 FWID 01-b30a427d
brcmfmac: brcmf_cfg80211_reg_notifier: not a ISO3166 code
```

输入 ifconfig -a，可以发现 wlan0 设备，该设备为 wifi 模块的虚拟网卡设备。

2.1.2、SD 卡测试

热插拔 SD，插入时打印下列信息，并且会生成/dev/mmcblk0p1 设备节点。

```
mmc0: new high speed SDHC card at address aaaa
mmcblk0: mmc0:aaaa SS04G 3.69 GiB
 mmcblk0: p1
FAT-fs (mmcblk0p1): Volume was not properly unmounted. Some data may be corrupt. Please run fsck.
```

拔出时，会打印下列信息。

```
mmc0: card aaaa removed
```

2.1.3、USB 摄像头测试

将 USB 摄像头插入开发板 USB 接口，设备驱动会检测到设备的插入，打印出设备信息和驱动信息，并且会生成摄像头设备节点/dev/video1：

```
usb 2-1: new high-speed USB device number 3 using ci_hdrc
usb 2-1: New USB device found, idVendor=0fde, idProduct=2024
usb 2-1: New USB device strings: Mfr=3, Product=1, SerialNumber=2
usb 2-1: Product: USB Camera
usb 2-1: Manufacturer: ZS
usb 2-1: SerialNumber: 201805120
uvcvideo: Found UVC 1.00 device USB Camera (0fde:2024)
input: USB Camera as /devices/platform/soc/2100000.aips-bus/2184200.usb/ci_hdrc.1/usb2/
2-1/2-1:1.0/input/input3
```

将摄像头拔出，驱动会检测到设备断开：

```
usb 2-1: USB disconnect, device number 3
```

2.1.4、GSENSOR 测试

该设备集成于开发板中，通过 I2C 接口与 MCU 交互，该部分已做成应用层驱动，后续再测试。

2.1.5、GPS 测试

该设备集成于开发板中，通过串口接口与 MCU 交互，后续再测试。

2.2、功能模块测试

2.2.1、数据上传

测试该功能前需要先连接 GPRS 或 WIFI。

连接 GPRS：加载 GPRS 设备驱动后，执行 pppd call ls-gprs &

将打印下列信息：

```
[root@IoT-A6G2C setScript]# pppd call ls-gprs &
[root@IoT-A6G2C setScript]#
timeout set to 15 seconds
abort on (DELAYED)
abort on (BUSY)
abort on (ERROR)
abort on (NO DIALTONE)
abort on (NO CARRIER)
timeout set to 40 seconds
send (^MAT^M)
expect (OK)
^M
+CPIN: READY^M
^M
SMS DONE^M
^M
PB DONE^M
AT^M^M
OK
 -- got it

send (ATS0=0^M)
expect (OK)
^M
ATS0=0^M^M
OK
 -- got it

send (ATE0V1^M)
expect (OK)
^M
ATE0V1^M^M
OK
 -- got it

send (AT+CGDCONT=1,"IP","4GNET"^M)
expect (OK)
^M
^M
OK
 -- got it

send (AT+CGEQREQ=1,2,128,384,,,0,,,,,,^M)
expect (OK)
^M
^M
OK
 -- got it

send (ATDT*99*1#^M)
expect (CONNECT)
^M
^M
CONNECT
 -- got it
```

```
Script /usr/sbin/chat -s -v -f /etc/ppp/chat/gprs-connect-chat finished (pid 309), stat
us = 0x0
Serial connection established.
using channel 1
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB3
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0x95b3769a> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0xd0f68557> <pcomp> <acc
omp>]
No auth is possible
sent [LCP ConfRej id=0x0 <auth chap MD5>]
rcvd [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0x95b3769a> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0xd0f68557> <pcomp> <accomp>]
sent [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0xd0f68557> <pcomp> <accomp>]
sent [CCP ConfReq id=0x1 <deflate 15> <deflate(old#) 15> <bsd v1 15>]
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2
 0.0.0.0>]
rcvd [LCP DiscReq id=0x2 magic=0xd0f68557]
rcvd [LCP ProtRej id=0x3 80 fd 01 01 00 0f 1a 04 78 00 18 04 78 00 15 03 2f]
Protocol-Reject for 'Compression Control Protocol' (0x80fd) received
rcvd [IPCP ConfReq id=0x0]
sent [IPCP ConfNak id=0x0 <addr 0.0.0.0>]
rcvd [IPCP ConfRej id=0x1 <compress VJ 0f 01>]
sent [IPCP ConfReq id=0x2 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [IPCP ConfReq id=0x1]
sent [IPCP ConfAck id=0x1]
rcvd [IPCP ConfNak id=0x2 <addr 10.168.158.168> <ms-dns1 211.136.20.203> <ms-dns2 211.1
36.17.107>]
sent [IPCP ConfReq id=0x3 <addr 10.168.158.168> <ms-dns1 211.136.20.203> <ms-dns2 211.1
36.17.107>]
rcvd [IPCP ConfAck id=0x3 <addr 10.168.158.168> <ms-dns1 211.136.20.203> <ms-dns2 211.1
36.17.107>]
Could not determine remote IP address: defaulting to 10.64.64.64
local  IP address 10.168.158.168
remote IP address 10.64.64.64
primary   DNS address 211.136.20.203
secondary DNS address 211.136.17.107
```

通过 ping 测试网络是否畅通：

```
[root@IoT-A6G2C setScript]# ping www.sina.cn
PING www.sina.cn (221.179.175.207): 56 data bytes
64 bytes from 221.179.175.207: seq=0 ttl=53 time=151.898 ms
64 bytes from 221.179.175.207: seq=1 ttl=53 time=62.696 ms
64 bytes from 221.179.175.207: seq=2 ttl=53 time=131.861 ms
64 bytes from 221.179.175.207: seq=3 ttl=53 time=125.044 ms
64 bytes from 221.179.175.207: seq=4 ttl=53 time=76.327 ms
^C
--- www.sina.cn ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 62.696/109.565/151.898 ms
```

此时表示网络已联网，可以进行网络传输，通过自己写的 tcp 小程序可以实现网络数据传输。

WIFI 模块：

保留，暂时不使用 wifi 功能。

2.2.2、SD 卡读写

插入 SD 卡后，SD 卡会被自动挂在在/media/mmcblk0p1/目录。

cd /media/mmcblk0p1/,执行 touch sdtext.txt，最后在该目录生成 sdtext.txt 文件，说明 SD 卡正常可写。写入数据到 sdtext.txt 文件文件并保存，然后关闭文件重新打开，可读出写入的数据，说明 SD 卡正常可写。

2.2.3、图像抓拍

接上摄像头后，执行测试程序 testsnap，生成图片 xx.jpg，说明摄像头正常。

```
[root@IoT-A6G2C setScript]# ./testsnap
-2140645888,1075074620,-1070836166/n320
```

2.2.4、GPS/GSENSOR 数据采集

cd /home/setScript/，执行./gps：

```
[root@IoT-A6G2C setScript]# cd /home/setScript/
[root@IoT-A6G2C setScript]# ./gps
Start gps working...!
1111111
2222222222
fcntl=0
fd->open=3
GPS init success!
**Valid:A
**N_S_Hemip:N
**E_W_Hemip:E
**Longitude:113*59`71.264``
**Latitude:22*39`69.817``
**Speed:0.119
**Course:0.00
**Valid:A
**N_S_Hemip:N
**E_W_Hemip:E
**Longitude:113*59`71.255``
**Latitude:22*39`69.893``
**Speed:0.157
**Course:0.00
**Valid:A
**N_S_Hemip:N
**E_W_Hemip:E
**Longitude:113*59`71.235``
**Latitude:22*39`69.968``
**Speed:0.197
**Course:16.29
```

Gps 定位需要耗时，耐心等待。

执行./gsensor

```
[root@IoT-A6G2C setScript]# ./gsensor
Start gSensor working...!
open /dev/i2c-4 success !
set slave address to 0x68 success!
**********
**********
ACCEL_XOUT_H:0.08
 ACCEL_YOUT_H:0.10
 ACCEL_ZOUT_H:0.89
 GYRO_XOUT_H:-0.05
 GYRO_YOUT_H:-0.05
 GYRO_ZOUT_H:-0.02
 **********
**********
ACCEL_XOUT_H:0.08
 ACCEL_YOUT_H:0.10
 ACCEL_ZOUT_H:0.90
 GYRO_XOUT_H:-0.05
 GYRO_YOUT_H:-0.05
 GYRO_ZOUT_H:-0.02
 **********
**********
ACCEL_XOUT_H:0.09
 ACCEL_YOUT_H:0.10
 ACCEL_ZOUT_H:0.87
 GYRO_XOUT_H:-0.05
 GYRO_YOUT_H:-0.05
 GYRO_ZOUT_H:-0.02
 **********
**********
ACCEL_XOUT_H:0.08
 ACCEL_YOUT_H:0.10
 ACCEL_ZOUT_H:0.88
 GYRO_XOUT_H:-0.05
 GYRO_YOUT_H:-0.05
 GYRO_ZOUT_H:-0.02
 **********
```

有上述打印信息，说明模块功能正常，可以采集数据。

2.2.5、上下位机通道串口

见下。

2.2.6、下位机车型固件升级

通过测试该功能可以测试上下位机通道串口是否正常功能，因为下位机升级是通过串口传输的。

cd /home/setScript/，执行./FirewareUpdate　V81_XX.bin，这里的 V81_XX.bin 是指对应车型的固件。拷贝到 SD 中方便升级，注意指定文件路径。

```
[root@IoT-A6G2C setScript]# ./FirewareUpdate /media/mmcblk0p1/V81_V1.0.1_CAMRY.b
in
fcntl=0
fd->open=3
Serial init success!
Start IAP process!
Enter IAP...try again(1)!
Enter IAP...try again(2)!
Enter IAP...try again(3)!
Enter IAP...try again(4)!
Enter IAP...try again(5)!
Enter IAP...try again(6)!
Enter IAP...try again(7)!
Enter IAP...try again(8)!
Enter IAP...try again(9)!
Enter IAP...try again(10)!
Reset ...
IAP has entered into update mode!
ShakeHand send 10
IAP shakes hand successfully(1)!
Erase flash complete!
Image file /media/mmcblk0p1/V81_V1.0.1_CAMRY.bin
Start Image transmission!
The packet[1] is successfully transmitted,correct return value(0xA3)
The packet[2] is successfully transmitted,correct return value(0xA3)
The packet[3] is successfully transmitted,correct return value(0xA3)
The packet[4] is successfully transmitted,correct return value(0xA3)
The packet[5] is successfully transmitted,correct return value(0xA3)
The packet[6] is successfully transmitted,correct return value(0xA3)
The packet[7] is successfully transmitted,correct return value(0xA3)
The packet[8] is successfully transmitted,correct return value(0xA3)
The packet[9] is successfully transmitted,correct return value(0xA3)
The packet[10] is successfully transmitted,correct return value(0xA3)
The packet[11] is successfully transmitted,correct return value(0xA3)
The packet[12] is successfully transmitted,correct return value(0xA3)
The packet[13] is successfully transmitted,correct return value(0xA3)
The packet[14] is successfully transmitted,correct return value(0xA3)
The packet[15] is successfully transmitted,correct return value(0xA3)
The packet[16] is successfully transmitted,correct return value(0xA3)
The packet[17] is successfully transmitted,correct return value(0xA3)
The packet[18] is successfully transmitted,correct return value(0xA3)
The packet[19] is successfully transmitted,correct return value(0xA3)
The packet[20] is successfully transmitted,correct return value(0xA3)
The packet[21] is successfully transmitted,correct return value(0xA3)
The packet[22] is successfully transmitted,correct return value(0xA3)
The packet[23] is successfully transmitted,correct return value(0xA3)
The packet[24] is successfully transmitted,correct return value(0xA3)
The packet[25] is successfully transmitted,correct return value(0xA3)
The packet[26] is successfully transmitted,correct return value(0xA3)
The packet[27] is successfully transmitted,correct return value(0xA3)
The packet[28] is successfully transmitted,correct return value(0xA3)
The packet[29] is successfully transmitted,correct return value(0xA3)
The packet[30] is successfully transmitted,correct return value(0xA3)
The packet[31] is successfully transmitted,correct return value(0xA3)
The packet[32] is successfully transmitted,correct return value(0xA3)
The packet[33] is successfully transmitted,correct return value(0xA3)
The packet[34] is successfully transmitted,correct return value(0xA3)
The packet[35] is successfully transmitted,correct return value(0xA3)
The packet[36] is successfully transmitted,correct return value(0xA3)
The packet[37] is successfully transmitted,correct return value(0xA3)
The packet[38] is successfully transmitted,correct return value(0xA3)
The packet[39] is successfully transmitted,correct return value(0xA3)
The packet[40] is successfully transmitted,correct return value(0xA3)
The packet[41] is successfully transmitted,correct return value(0xA3)
The packet[42] is successfully transmitted,correct return value(0xA3)
```

```
The packet[41] is successfully transmitted,correct return value(0xA3)
The packet[42] is successfully transmitted,correct return value(0xA3)
The packet[43] is successfully transmitted,correct return value(0xA3)
The packet[44] is successfully transmitted,correct return value(0xA3)
The packet[45] is successfully transmitted,correct return value(0xA3)
The packet[46] is successfully transmitted,correct return value(0xA3)
The packet[47] is successfully transmitted,correct return value(0xA3)
The packet[48] is successfully transmitted,correct return value(0xA3)
Complete all data transmission, total length 48208!
Send Image length(3)
Image length check successfully!
IAP reboot...
Reset ...
```

2.3、整机测试

完成上述步骤后，开始整机测试，确保外设全部接上。

cd /home/setScript/，执行 ./CameraJnl &，首先开始启动网络，并且校时。

```
[root@IoT-A6G2C setScript]# ./CameraJnl &
[root@IoT-A6G2C setScript]# Reset ...
fcntl=0
fd->open=3
Serial init success!
usbcore: registered new interface driver GobiSerial
usbserial: USB Serial support registered for GobiSerial

Num Interfaces = 6
This Interface = 0
inum=0, iface_num=7f0004a0num=0, iface_num=5
Modem port found
GobiSerial 1-1:1.0: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB0

Num Interfaces = 6
This Interface = 1
inum=0, iface_num=7f0004a0num=0, iface_num=5
Modem port found
GobiSerial 1-1:1.1: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB1

Num Interfaces = 6
This Interface = 2
inum=0, iface_num=7f0004a0num=0, iface_num=5
Modem port found
GobiSerial 1-1:1.2: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB2

Num Interfaces = 6
This Interface = 3
inum=0, iface_num=7f0004a0num=0, iface_num=5
Modem port found
GobiSerial 1-1:1.3: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB3

Num Interfaces = 6
This Interface = 4
inum=0, iface_num=7f0004a0num=0, iface_num=5
Modem port found
GobiSerial 1-1:1.4: GobiSerial converter detected
usb 1-1: GobiSerial converter now attached to ttyUSB4

Num Interfaces = 6
This Interface = 5
inum=0, iface_num=7f0004a0num=0, iface_num=5
Unsupported interface number
GobiSerial: 2011-07-29-1026

timeout set to 15 seconds
abort on (DELAYED)
abort on (BUSY)
abort on (ERROR)
abort on (NO DIALTONE)
abort on (NO CARRIER)
timeout set to 40 seconds
send (^MAT^M)
expect (OK)
AT^M^M
OK
 -- got it

send (ATS0=0^M)
expect (OK)
^M
ATS0=0^M^M
```

```
OK
 -- got it

send (ATE0V1^M)
expect (OK)
^M
ATE0V1^M^M
OK
 -- got it

send (AT+CGDCONT=1,"IP","4GNET"^M)
expect (OK)
^M
^M
OK
 -- got it

send (AT+CGEQREQ=1,2,128,384,,,0,,,,,,^M)
expect (OK)
^M
^M
OK
 -- got it

send (ATDT*99*1#^M)
expect (CONNECT)
^M
^M
CONNECT
 -- got it

Script /usr/sbin/chat -s -v -f /etc/ppp/chat/gprs-connect-chat finished (pid 264), stat
us = 0x0
Serial connection established.
using channel 1
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB3
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0xda86135> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0xd12085f3> <pcomp> <acc
omp>]
No auth is possible
sent [LCP ConfRej id=0x0 <auth chap MD5>]
rcvd [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0xda86135> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0xd12085f3> <pcomp> <accomp>]
sent [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0xd12085f3> <pcomp> <accomp>]
sent [CCP ConfReq id=0x1 <deflate 15> <deflate(old#) 15> <bsd v1 15>]
sent [IPCP ConfReq id=0x1 <compress VJ 0f 01> <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2
 0.0.0.0>]
rcvd [LCP DiscReq id=0x2 magic=0xd12085f3]
rcvd [LCP ProtRej id=0x3 80 fd 01 01 00 0f 1a 04 78 00 18 04 78 00 15 03 2f]
Protocol-Reject for 'Compression Control Protocol' (0x80fd) received
rcvd [IPCP ConfReq id=0x0]
sent [IPCP ConfNak id=0x0 <addr 0.0.0.0>]
rcvd [IPCP ConfRej id=0x1 <compress VJ 0f 01>]
sent [IPCP ConfReq id=0x2 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [IPCP ConfReq id=0x1]
sent [IPCP ConfAck id=0x1]
rcvd [IPCP ConfNak id=0x2 <addr 10.180.23.17> <ms-dns1 211.136.17.107> <ms-dns2 211.136
.20.203>]
sent [IPCP ConfReq id=0x3 <addr 10.180.23.17> <ms-dns1 211.136.17.107> <ms-dns2 211.136
.20.203>]
rcvd [IPCP ConfAck id=0x3 <addr 10.180.23.17> <ms-dns1 211.136.17.107> <ms-dns2 211.136
.20.203>]
Could not determine remote IP address: defaulting to 10.64.64.64
local  IP address 10.180.23.17
remote IP address 10.64.64.64
```

```
GPRS is setup
26 Oct 11:27:38 ntpdate[273]: step time server 120.25.115.20 offset 1540524248.054435 s
ec

The network is OK,start ntp check!!
----------------------DEVICE INFO---------------------
DriverName   :uvcvideo
Card Name    :USB Camera
Bus info     :usb-ci_hdrc.1-1
DriverVersion:4.1.15
---------------------SUPPORT FORMAT---------------------
Supportformat:
        1.MJPEG
        2.YUV 4:2:2 (YUYV)
-------------------------FRAME INFO-----------------------
Currentdata format information:
        width:1280
        height:720
        format:MJPEG
-------------------------FRAME INFO-----------------------
Stream Format Informations:
 type: 1
 width: 320
 height: 240
 pixelformat: MJPG
 field: 1
 bytesperline: 0
 sizeimage: 153600
 colorspace: 8
 priv: -17970434
 raw_date: @
--------------------SET FPS---------------------
        set fps : 20
        Frame rate:   30/1

count : 5
Start snap working...!
Start gps working...!
Start gSensor working...!
fcntl=0
fd->open=9
GPS init success!
Init Gsensor device successfully!
-------------------SD CARD INFO--------------------
Total:3955789824 Byte
Use:  97472512 Byte
Free: 3858317312 Byte
-----------------------------------------------------
DEVICEID = 18975

Get DeviceID:18975
Start FTP_UPLOAD working...!
----------[Thread_Upload:122]
```

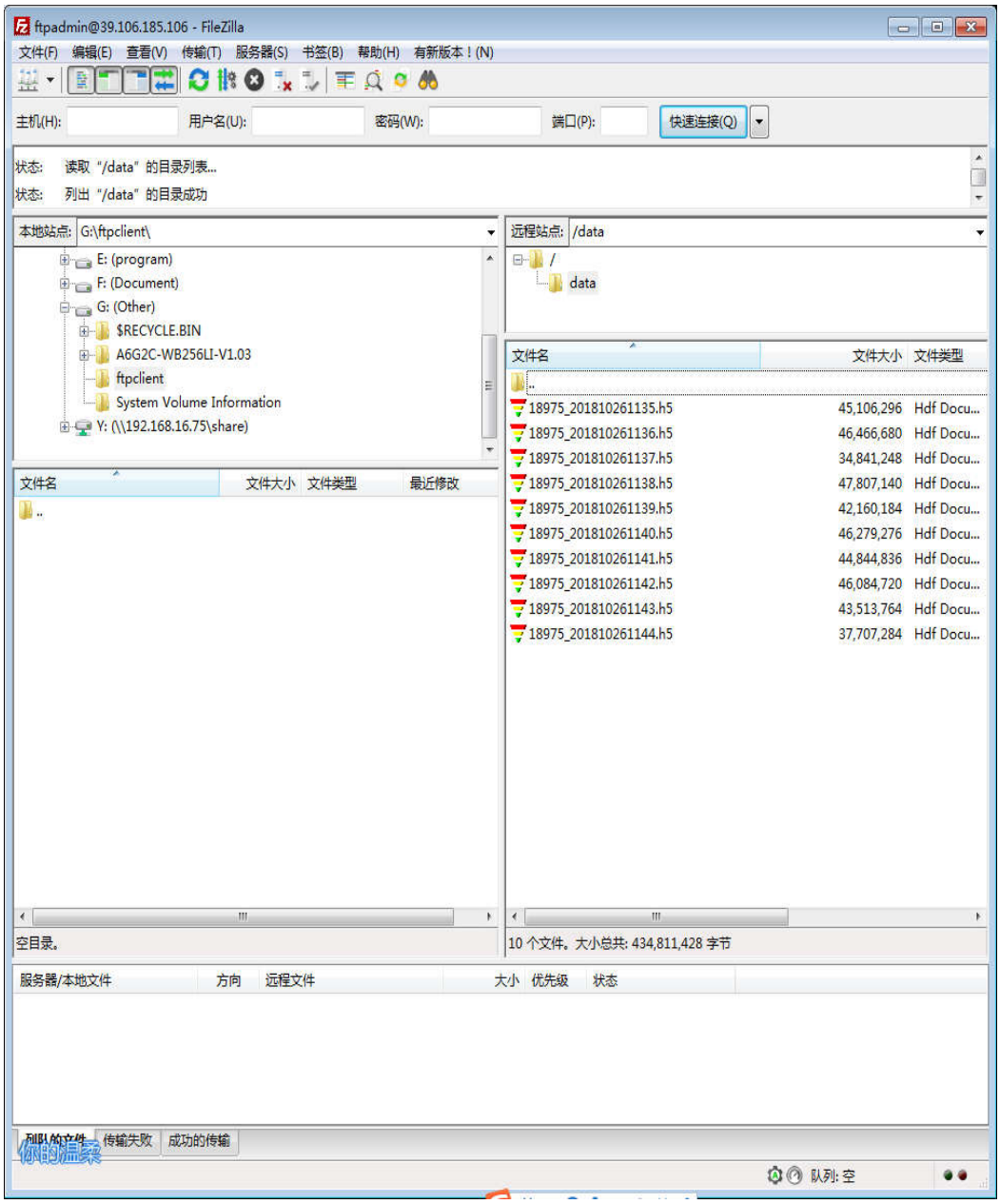
程序启动就绪，开启汽车，使车速大于 10km/h，OBD 开始采集 can 的车速方向数据。当采集到数据时，系统会开始穿件 h5 文件用于保存数据，每分钟的数据都会保存在一个新的文件中：

```
---------Create new h5 file /media/mmcblk0p1/18975_201810261134.h5
```

文件名格式，下划线前五个数字代表设备 ID，设备 ID 文件位于/opt 目录 deviceid.txt 文件，下划线后代表采集的年月日时分信息。

程序会开启线程每隔十秒遍历一次已经写完的文件，并上传到服务器。采集数据的同时，上传之前采集的数据，基本可以做到在较短时间内上传采集的数据到服务器。

```
This index gets 3 files
/media/mmcblk0p1/18975_201810261142.h5
/media/mmcblk0p1/18975_201810261143.h5
/media/mmcblk0p1/18975_201810261144.h5
The file currently being written is /media/mmcblk0p1/18975_201810261144.h5
Ready to upload /media/mmcblk0p1/18975_201810261142.h5
----------upload for 1 time

**********FTP CONNECT START**********
ftp connect: Unblock mode socket is connecting...
connection ready after select with the socket: 11
**********FTP CONNECT END**********


**********FTP LOGIN**********
USER RET:220 Welcome to blah FTP service.
USER RET:331 Please specify the password.
--------------------------
PASS RET:230 Login successful.


**********FTP PASSIVEMODE**********
227 Entering Passive Mode (39,106,185,106,136,115)

39 106 185 106 136 115
RET: Get FTP data port 34931!

**********FTP CONNECT START**********
ftp connect: Unblock mode socket is connecting...
connection ready after select with the socket: 12
**********FTP CONNECT END**********

connect to FTPServer data port!
CWD /data/

250 Directory successfully changed.

TYPE I

200 Switching to Binary mode.

/media/mmcblk0p1/18975_201810261142.h5 length is 46084720
SIZE 18975_201810261142.h5

SIZE RET:550 Could not get file size.

APPE 18975_201810261142.h5

APPE:150 Ok to send data.

FTPServer: Current file offset is 0
(1532 photos have been stored into hdf5 file)
close hdf5 file
---------Create new h5 file /media/mmcblk0p1/18975_201810261145.h5
(1459 photos have been stored into hdf5 file)
close hdf5 file
---------Create new h5 file /media/mmcblk0p1/18975_201810261146.h5
---------RET:226 Transfer complete.

Current file transfer complete
FTP Upload success!
```


ftpadmin@39.106.185.106 - FileZilla
文件(F) 编辑(E) 查看(V) 传输(T) 服务器(S) 书签(B) 帮助(H) 有新版本！(N)
主机(H): 用户名(U): 密码(W): 端口(P): 快速连接(Q)
状态: 读取 "/data" 的目录列表...
状态: 列出 "/data" 的目录成功
本地站点: G:\ftpclient\
E: (program)
F: (Document)
G: (Other)
$RECYCLE.BIN
A6G2C-WB256LI-V1.03
ftpclient
System Volume Information
Y: (\\192.168.16.75\share)
远程站点: /data
/
data
文件名 文件大小 文件类型 最近修改
..
空目录。
文件名 文件大小 文件类型
..
18975_201810261135.h5 45,106,296 Hdf Docu...
18975_201810261136.h5 46,466,680 Hdf Docu...
18975_201810261137.h5 34,841,248 Hdf Docu...
18975_201810261138.h5 47,807,140 Hdf Docu...
18975_201810261139.h5 42,160,184 Hdf Docu...
18975_201810261140.h5 46,279,276 Hdf Docu...
18975_201810261141.h5 44,844,836 Hdf Docu...
18975_201810261142.h5 46,084,720 Hdf Docu...
18975_201810261143.h5 43,513,764 Hdf Docu...
18975_201810261144.h5 37,707,284 Hdf Docu...
10 个文件。大小总共: 434,811,428 字节
服务器/本地文件 方向 远程文件 大小 优先级 状态
传输失败
成功的传输
队列: 空

三、测试结果

序号	功能	预计结果	实测结果	备注
1	GPS	1	1	
2	GSENSOR	1	1	
3	SD 卡	1	1	
4	USB Camera	1	1	
5	GPRS	1	1	
6	WIFI	1	1	
7	整机测试	1	1	若网速较慢，会导致上传实时性降低，具体看测试情况。