GlobalMems Accelerometer Sensor -Proting Guides

Platform: AllWinner

Rev: V0.1

Date: 12/18/2014

目錄

1. Revision History

Version	Revision Date	Descriptions
0.1	12/18/2014	First release of document applicable to gma302 products.

2. Preface

This document highlights the fundamental porting procedures to comply with gma302 driver to AllWinner platform.

3. Release folders

The software release packages contain the following gma302 device specific folders.

3.1 Kernel Driver

src\kernel\gma30x.c

src\kernel\gma30x.h

3.2 HAL

src\libsensors

3.3 Java Application

\APK-LEVEL\GLevel_D1.apk

\APK-LEVEL\GLevel_L1.apk

\APK-LEVEL\GLevel_D2.apk

\APK-LEVEL\GLevel_L2.apk

\APK-LEVEL\GLevel_D9.apk

\APK-LEVEL\GLevel_L9.apk

\APK-LEVEL\LevelCalibrationManual.pdf

3.4 SellScript

src\gss.sh

src\GlobalmemsShellScriptManual.pdf

4. Software configuration detail

板卡配置

目前請先參考A20平台CTP與SENSOR自動檢測使用文檔.pdf

這邊僅先pandaboard平台作為範例,與客戶A33平台仍有不小落差,

這部分資訊不足,以下先以pandaboard示例,日後有A33經驗後,麻煩協助補充

打開 /kernel/arch/arm/mach-omap2/board-omap4panda.c

增加以下gma302的配置描述。(選擇註冊I2C通道)

```
static struct i2c_board_info __initdata panda_i2c_boardinfo[] = {
#if (defined(CONFIG_SENSORS_GMA302) || defined(CONFIG_SENSORS_GMA302_MODULE))
        {
                I2C_BOARD_INFO("gma302", 0x18),
                .flags = I2C_CLIENT_WAKE,
        },
#endif
```

5. Software Porting Steps

This document is a guideline helps to port to Android.

5.1 Linux kernel driver porting

Chip info	Slave Address	Who am I Register	Who am I value
GMA302	0x18	0x00	0x02
GMA303	0x18	0x00	0x03

Gma302 13bit reg : 1G=512LSB dynamic range: +-16G

Gma302 Kernel driver redefined 1G = 1024

a) 拷貝gma30x.*源碼至目錄：

切換到Gsensor驅動的源碼目錄/kernel/drivers/input/misc，將gma30x.c目拷貝至此。

這部分資訊不足,以下先以pandaboard示例,請根據客戶實際gsensor存放位置來存放底層驅動

必須先參考"A20平台CTP與SENSOR自動檢測使用文檔.pdf"

CH 2.3 源碼結構介紹

CH 2.4.1 sys_config.fex

CH 2.4.1 sys_config.fex

以下先參考"A20平台CTP與SENSOR自動檢測使用文檔.pdf" CH 5.2.12 Kconfig Makefile 文件

```
$cp src/kernel/gma30x.c ../exdroid/lichee/linux-3.4/drivers/gsensor
$cp src/kernel/gma30x.h ../exdroid/lichee/linux-3.4/include/linux
```

b) 添加編譯配置：

Modification of /kernel/drivers/input/sensors/accel/Makefile

```
obj-$(CONFIG_SENSORS_GMA302)                    += gma30x.o
```

Modification of /kernel/drivers/input/sensors/accel/Kconfig

```
config SENSORS_GMA302
```

```
tristate " GMA30x Three-Axis Digital Accelerometer"
depends on I2C
help
  Say Y here if you have a Accelerometer interface using the
  GMA302/GMA303 controller, and your board-specific initialization
  code includes that in its table of devices.
```

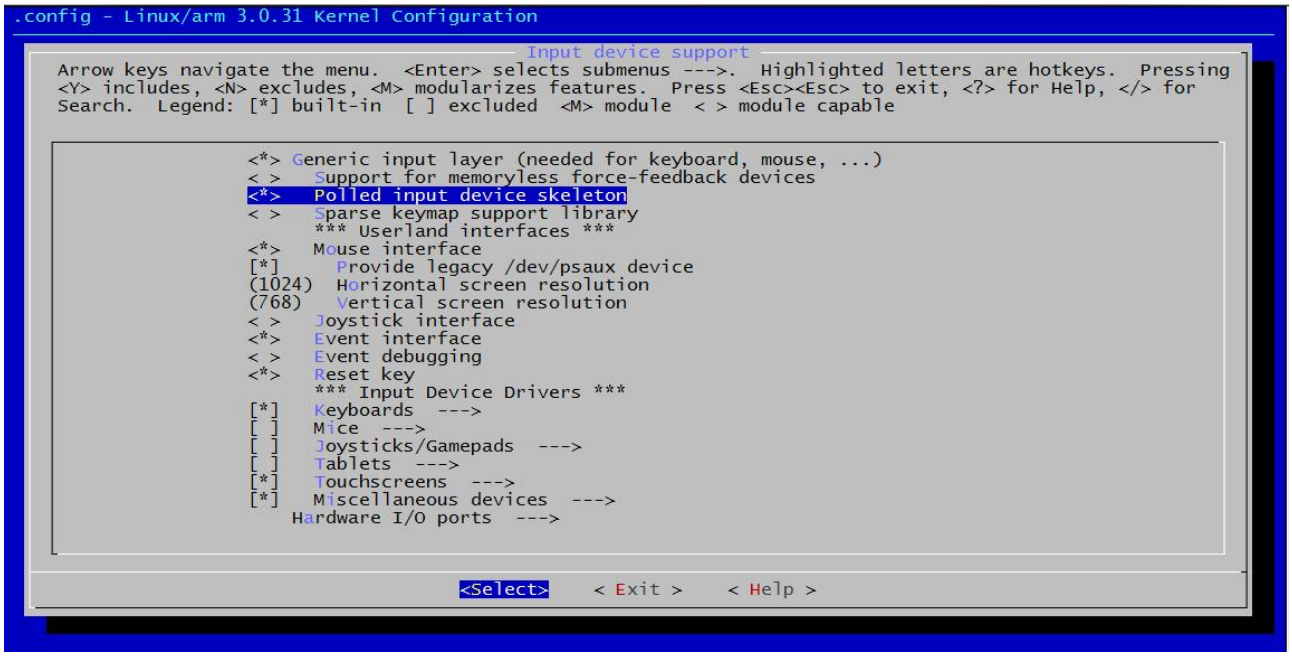
c) Module menuconfig setup：

在編譯服務器上,目錄為workspace/exdroid/lichee/linux-3.4下使用命令

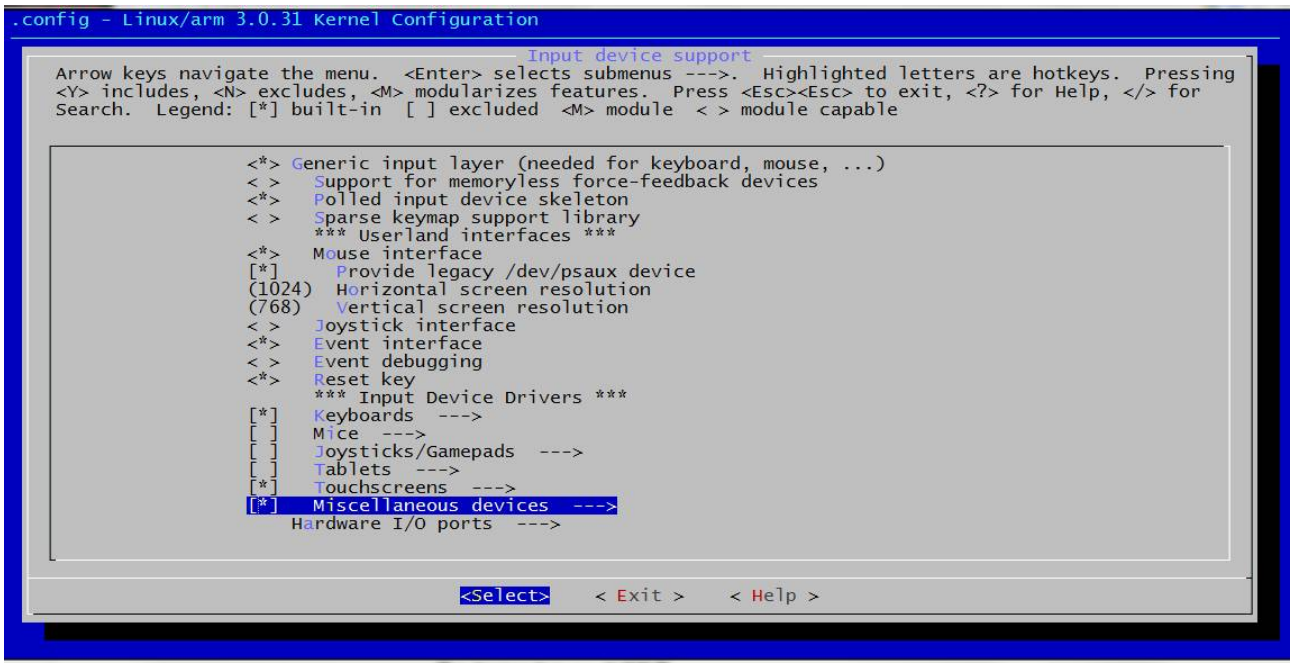
$make ARCH=arm menuconfig

進入配置主介面,操作步驟如下

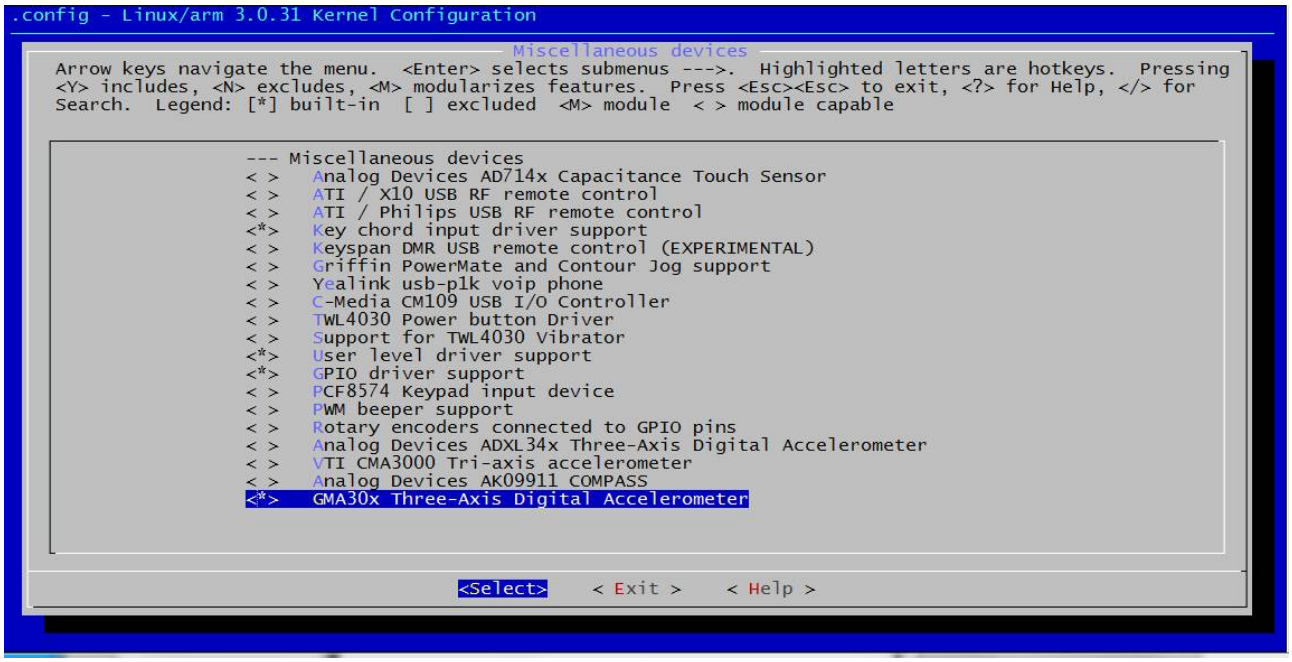
1. Select ”Device Drivers”
2. Enter “Input device support”
3. Select “Polled input device skeleton” module



4. Enter “Miscellaeous devices”



5. Select “GMA30x Three-Axis Digital Accelerometer”



6. 全志平台補充(A20平台CTP與SENSOR自動檢測使用文檔.pdf CH 2.4)
   Enter ”Device Drivers” >> “Input device support”
   Select “init device”

7. 存檔離開並開始編譯Kernel
   編譯之後會自動生成.Ko文件.可以到系統中查看是否添加成功,
   進入目錄 Device Drivers/gsensor support即可看到添加的驅動.
   加載模組 insmod /system/vendor/modules/gma30x.ko

d) Device Driver Debug

gma30x.c use switch #define DEBUG

#define DEBUG : Enable gma->client->dev debug data .

//#define DEBUG : Disable gma->client->dev debug data

6. HALsupport

Gsensor's HAL source Path

"android/device/softwinner/fiber-common/hardware/libhardware/libsensors/"

Input->name : accelerometer

1g = 1024 LSB

6.1.1 Modify libsensor/sensorDetect.cpp , add follow line

```
{
        {
            "gma30x", LSG_GMA302,
        }, {
            "GMA302 3-axis Accelerometer",
                "GlobalMems Inc.",
                1, 0,
                SENSOR_TYPE_ACCELEROMETER,
                (GRAVITY_EARTH * 16.0f),
                GRAVITY_EARTH/1024.0f,
                0.145f, 0,
                0, 0,
                { },
        },
    },
```

6.1.2 Modify libsensor/sensors.h , add follow line

```
{
        {
            "gma30x", LSG_GMA302,
        }, {
            "GMA302 3-axis Accelerometer",
                "GlobalMems Inc.",
                1, 0,
                SENSOR_TYPE_ACCELEROMETER,
                (GRAVITY_EARTH * 16.0f),
                GRAVITY_EARTH/1024.0f,
                0.145f, , 0,
                0, 0,
                { },
        },
    },
```

6.1.3 方向的配置

在android/device/softwinner/wingr-xxx目錄下有個gsensor.cfg

這部分無法在pandaboard上模擬驗證,

請參考" A20平台CTP與SENSOR自動檢測使用文檔.pdf" CH6.1

6.1.4 驅動的加載

請參考" A20平台CTP與SENSOR自動檢測使用文檔.pdf" CH6.2,

在android上移植Gsensor還必須將驅動複製到android打包目錄的對應文件夾中並在init.sun7i.rc中將其加載.

對應目錄為 $PRODUCT_ROOT/system/vendor/modules/

6.1.5 權限開放與自動化腳本

a) Copy gss.sh to $ANDROID/libhardware/modules/libsensors/

```
$cp src/gss.sh $ANDROID/libhardware/modules/libsensors/
```

Modification of device.mk

For example, add the following descriptions (Red part) to "PRODUCT_COPY_FILES" section in "$ANDROID/device/ti/panda/device.mk" as shown below.

```
# Kernel
 ##################################################################
 PRODUCT_COPY_FILES += \
     $(TARGET_PREBUILT_KERNEL):kernel \
     hardware/libhardware/modules/libsensors/gss.sh:/system/bin/gss.sh
```

b) Modification of init.sun7i.rc

add: insmod /vendor/modules/gma30x.ko

c) Modification of init.rc

In "$ANDROID/system/core/rootdir/init.rc" of Android source code tree,

Modify the permission of sysfs interface. Sensor HAL should be allowed to access to sysfs interface of the acceleration sensor. Add the following descriptions to "on boot" section in init.rc.

```
on post-fs-data
……
      # create basic filesystem structure
      mkdir /data/misc 01771 system misc
# for gma302/gma303 setup
      mkdir /data/misc/sensor 01777 system shell
      chmod 755 /system/bin/gss.sh
      chown system system /sys/class/input/input0/enable
      chown system system /sys/class/input/input0/delay
…..
```

On the above, input2, input3, input4, input5, and input6 correspond to sysfs interface numbers of each acceleration sensor driver, geomagnetic sensor driver, geomagnetic raw sensor driver, orientation sensor driver, gyro sensor driver. In order to find sysfs interface number, use

"getevent" check /sys/class/input/inputX/name (X indicates a number) after embedding each driver to the kernel and starting-up.

7. GLevel.apk support

Gsensor出廠時一般都有校準，但由於安裝外力等因素，到整機還是會有少數有較大的偏差，為了達到一致翻轉反應效果，所以少數有較大的偏差需要手動校準。

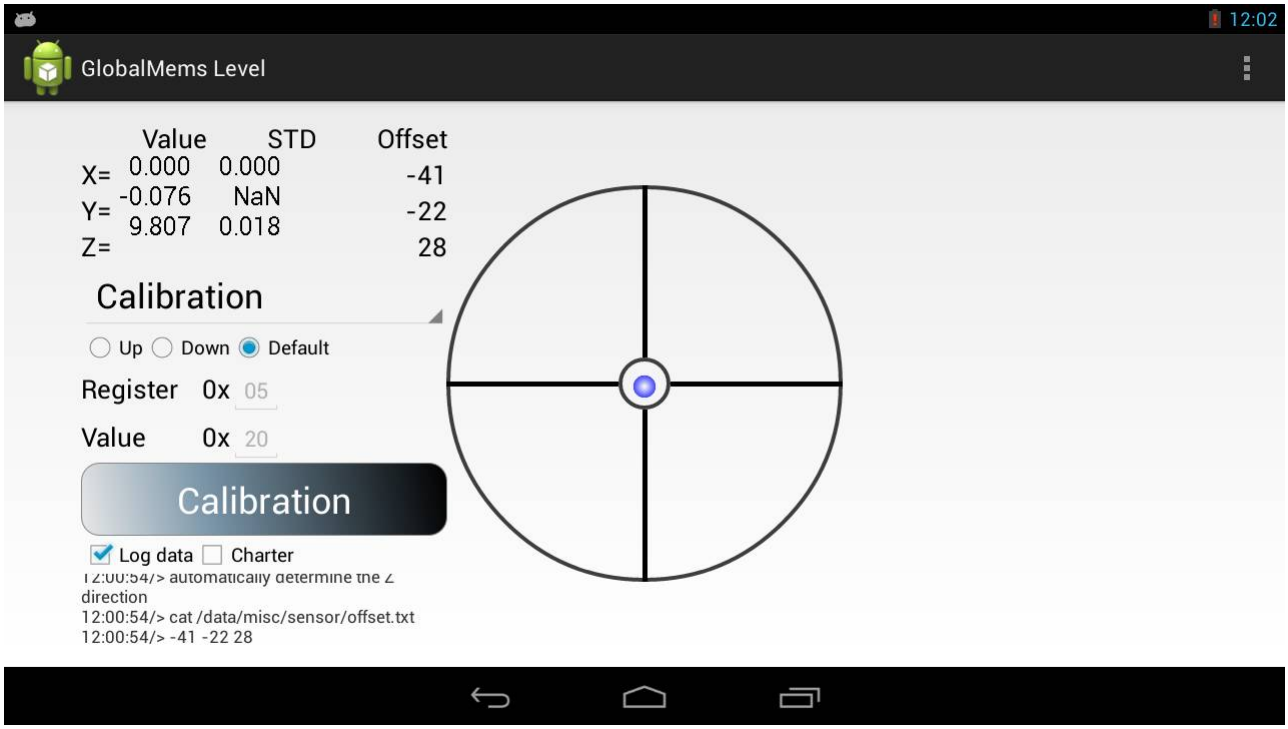
在水平狀態時點選校準的apk如下,請選擇合適的一種來安裝

\APK-LEVEL\GLevel_D1.apk　預設在綁定選單，Z軸朝上,DEFAULT

\APK-LEVEL\GLevel_L1.apk　預設在桌面，Z軸朝上,LUNCHER

\APK-LEVEL\GLevel_D2.apk　預設在綁定選單，Z軸朝下,DEFAULT

\APK-LEVEL\GLevel_L2.apk　預設在桌面，Z軸朝下,LUNCHER



詳細設置請參考\APK-LEVEL\LevelCalibrationManual.pdf

7.1 讀寫sysfs文件

/sys/class/input/inputX/

7.2 補充

gss.sh 是apk跟driver溝通的shellscript，gss.sh將溝通介面固定，所以Level apk不需要經常更動

a) 先將gss.sh置入平台

adb push gss.sh /system/bin

adb shell chmod 755 /system/bin/gss.sh

b) Use getevent 得到 name : "accelerometer"註冊inputX

Case : /dev/input/event0 表示gsensor註冊位置為input0

getevent

c) 如何使用gss.sh

Example **usage** 等同下右列**command**

cd /sys/class/input/input0

Implement interface	Apk Example Usage	Command
calib	sh /system/bin/gss.sh calib 1	echo 1 > calibration
Clear_offset	sh /system/bin/gss.sh clear_offset	echo 1 > clear_offset
Read_reg	sh /system/bin/gss.sh read_reg 0x12 讀出register的值	echo 0x12 > reg_rx cat reg_rx
Write_reg	sh /system/bin/gss.sh write_reg 0x0f 0x20 將register 0x0f 的值改為0x20	echo 0x0f > reg_rx echo 0x20 > reg_tx cat reg_rx

```
$ adb shell
root@android:/ # cd /system/bin
cd /system/bin
root@android:/system/bin # ls -l ./gss.sh
ls -l ./gss.sh
-rw-rw-rw- root     root         6989 2014-07-21 09:38 gss.sh
root@android:/system/bin # sh ./gss.sh calib 1
sh ./gss.sh calib 1
start calibration....  ( Fri Jan  2 00:06:14 GMT 1970)
49 107 201
root@android:/system/bin # sh ./gss.sh clear_offset
sh ./gss.sh clear_offset
0 0 0
root@android:/system/bin # cat /sys/class/input/input0/calibration_value
cat /sys/class/input/input0/calibration_value
0 0 0
```