GT9XX for Android driver migration manual

I. driving basic information

Support chip model	GT911 GT9110 GT9110P GT913 GT915 GT918 GT927 GT928 GT960 GT968 GT910 GT912 GT960F GT950 GT968F GT9158 GT967 GT9150 GT963 GT9271 GT917D
I2C device address (7 bits)	0x5d 、 0x14
I2C register address	16 bits
APK tool / ADB tool	Support
Automatic upgrade	Firmware header file, search for bin file
Support for Sensor ID number	6 个

II. Description of the driver document

In general, the following files are included under the *Reference drivers* folder that drives the Resources package, and the functionality and usage of each file are described below:

1. *The main function file of* Gt9xx.c *(Required): driver is used to realize the basic functions of touch screen driver, such as mounting, reading report coordinates, sleeping wake-up processing and so on.*
2. *The* Gt9xx.h *(Required): driver header file contains the definitions of some macros and constants to be used in the driver, the declaration of external variables and functions, and so on.*
3. A file used by the Gt9xx_update.c *(Recommended)*: driver to support firmware upgrades, which is not required for touch screen drivers, but it is highly recommended to add this feature to the driver so that the touch IC you use can be upgraded to the latest version of firmware if necessary.
4. The Gt9xx_firmware.h *(Recommended)*: default storage header file upgrade default firmware array, which is empty by default. To turn on compatible GT9XXFGT9XXFT9XXF MODE (GTP_COMPATIBLE_MODE set 1), you need to replace tHe *Gt9xx_firmware.h*Irmware.h in the corresponding GT9XXF folder in the GT9XXF Firmware HeAders with the file of the same name in the driver.
5. Goodix_tool.c *(Recommended)*: driver is used to support *Gtp_tools.apk* tool and ADB tool file, this tool can be installed into the whole machine and then Android upper layer touch IC test, debugging, testing and other functions, it is highly recommended to add this function in the

driver, especially when using COB (touch IC direct layout on the motherboard) mode TP, this tool can greatly facilitate TP debugging on the whole machine.

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III. Drive migration STEP_BY_STEP

1. *Copy files: copy all files in the Reference driver folder to kernel's drivers/input/touchscreen/*

Under the directory.

2. *Modify* **Makefile***: in the drivers/input/touchscreen/ directory, open the Makefile file, and add the following entries to the file (note that the different (. O) files are separated by spaces):*

```
Obj-y + = gt9xx.o gt9xx_update.o goodix_tool.o
```

3. *Add device: find the board-level file of the initial I2C bus in kernel, if the development platform real6410 development board of this driver is located in the arch/arm/mach-s3c6410/ mach-smdk6410.c file, if you need to mount the touch screen driver on the I2C0 bus, add the i2c device driver of TP according to the following methods.* 0x5d *is the i2C slave device address of the model touch IC, specifically, how much to refer to the* Datasheet*, of the chip of this model "Goodx-TS" is the i2c device driver name and must remain the same as* GTP_I2C_NAME *in the driver reference code.*

```
Static Struct i2c_board_info I2c_devs0 [] Initdata                    =
{
        { I2C_BOARD_INFO ("Goodix-TS", 0x5d),},
};
```

4. **Modify the reference code***: in general, in the process of migration, just modify the contents of the gt9xx.h file, open the header file, follow the instructions in the comments to migrate, focus on the modification of* TODO Part.

（1） The STEP1 replacement configuration information table **(REQUIRED)**: will correspond to the configuration information that you are using TP (typically TP factory mention)

Replace the contents of the CTP_CFG_GROUP with the contents of the (* cfg or * txt) file.

```
//TODO: define your own default or for Sensor_ID = = 0 config here.
#Define CTP_CFG_GROUP1 {\ 0x42, 0xE0, 0x01, 0x20, 0x03, 0x05,
    0x14, 0x01, 0x02, 0x08,\
    // ...
}
//TODO: Define your config for Sensor_ID = = 1 here, if needed # define
CTP_CFG_GROUP2 {\
    }
//TODO: Define your config for Sensor_ID = = 2 here, if needed # define
CTP_CFG_GROUP3 {\\
    }
```


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```
#Define CTP_CFG_GROUP4 {\
    }
//TODO: Define your config for Sensor_ID = = 4 here, if needed # define
CTP_CFG_GROUP5 {\\
    }
//TODO: Define your config for Sensor_ID = = 5 here, if needed # define
CTP_CFG_GROUP6 {\\
```

Note:

（1） If Sensor ID (is not set up in the appendix), be sure to define the configuration information macro in CTP_CFG_GROUP1, and keep the other groups empty, and when the replacement is complete, you need to add the macro-defined connector "\" after each line;

（2） If you actually use more sensor ID than the six groups in the reference driver, refer to these three groups to complete the configuration of the other groups to be distinguished by sensor ID;

（3） If the first line of the configuration macro sets the write register GTP_REG_CONFIG_DATA, for configuration information, replace the configuration from the second line.

（2） STEP2 modifies the IO definition and the IO operation mode **(REQUIRED)**: changes the definitions of GTP_INT_PORT and GTP_RST_PORT to pin definitions corresponding to the project, as well as checking that the following statements about IO operations apply to the platform you are using or, if not, to the appropriate mode of operation.

```
//STEP_2 (REQUIRED): Change I/O define & I/O operation mode.# #Define
GTP_INT_PORT                S3C64XX_GPN (15)
#Define GTP_RST_PORT        S3C64XX_GPL (10)
#Define GTP_INT_IRQ         Gpio_to_irq (GTP_INT_PORT)
.....
#Define GTP_GPIO_AS_INPUT (Pin) Do {\
                                Gpio_direction_input (Pin);\ s3c_gpio_setpull (pin,
                                S3C_GPIO_PULL_NONE);\
```

Note: interrupt foot and reset foot should be initiated into suspended input state.（ *(Suspension: neither up nor down).*

STEP3 customer custom parameter (OPTIONAL): if you need to specify your own resolution, interrupt trigger mode, the maximum number of TOUCH supported, and so on, open the GTP_CUSTOM_CFG macro in ON/OFF define and refer to the following modification parameters.

```
//**********************PART1:ON/OFF define*
#Define GTP_CUSTOM_CFG          1
```

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```
//STEP_3 (optional): Custom  Set some     Config    By  Custom, if     Need.
```

```
#If GTP_CUSTOM_CFG
  #Define GTP_MAX_WIDTH      800
  #Define GTP_MAX_HEIGHT     480
  #Define GTP_MAX_TOUCH      5
    #Define GTP_INT_TRIGGER  0
#Else
  #Define GTP_MAX_WIDTH      4096
  #Define GTP_MAX_HEIGHT     4096
  #Define GTP_MAX_TOUCH      5
    #Define GTP_INT_TRIGGER  1
#Endif
```

（4） STEP4 Configure Touch Keys (OPTIONAL): If you are using TP with touch keys, you need to configure the touch keys, first turn on the GTP_HAVE_TOUCH_KEY switch in ON/OFF define, and then refer to the settings below. Please adjust the function and order of the keys as required in GTP_KEY_TAB.

```
//**********************PART1: ON/OFF define**********************
#Define GTP_HAVE_TOUCH_KEY      1
//**********************PART2: TODO define**********************
.....
//STEP4 (optional): If this project have touch key, Set touch key config.
#If GTP_HAVE_TOUCH_KEY
    #Define GTP_KEY_TAB {KEY_MENU, KEY_HOME, KEY_SEND}
```

（5） STEP5 Add Include File (OPTIONAL): Add the file in front of the header file that corresponds to what you need to use the platform

#Include contains files, which are also optional and are added as needed, depending on your compilation.

（6） GT9XXF Compatibility Notes

The current GT9XXF ICs are GT910, GT912, GT950, GT960F, and GT968F. Compatible processing has been done in the driver, and the macro switch is GTP_COMPATIBLE_MODE. To turn this switch on, replace *Gt9xx_firmware.H* in the driver with gt9xx_firmware. H in the corresponding GT9XXF folder in the GT9XXF Firmware Headers folder. Also make sure that GTP_DRIVER_SEND_CFG is turned on and turn on the GTP_ESD_PROTECT switch.

That is, recommended combinations:

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```
#Define    GTP_COMPATIBLE_MODE    1
#Define    GTP_DRIVER_SEND_CFG    1
#Define    GTP_ESD_PROTECT        1
```

If the shutdown mode is small-system, you need to turn on the following switches:

```
#Define      GTP_COMPATIBLE_MODE    1
#Define GTP_DRIVER_SEND_CFG        1
#Define GTP_ESD_PROTECT            1
#Define GTP_POWER_CTRL_SLEEP       1
#Define GTP_FL_LITTLE_SYSTEM       1
```

（7） Automatic Upgrade Instructions

You need to turn on the macro GTP_AUTO_UDPATE with automatic upgrade in two ways:

① Search for BIN file upgrade:

GT9XX *default file paths are /data/_goodix_update_.bin and /sdcard/_goodix_udpate_.bin,*

GT9XXF *is /data/_fl_update_.bin and /sdcard/_fl_update_.bin.*

② Firmware array upgrade:

Upgrade using the firmware array Gtp_default_FW *in gt9xx_firmware. H, you need to turn on* GTP_AUTO_UDPATE and GTP_HEADER_FW_UPDATE. This is not supported by GT9XXF.

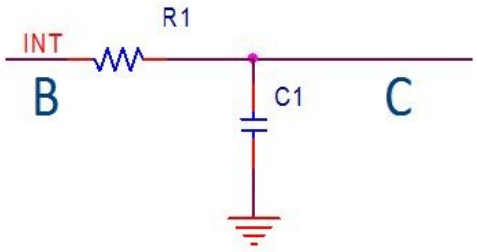
The IC type is not GT9XXF, and you need to turn on the macro GTP_AUTO_UPDATE_CFG at the same time if you want to upgrade the configuration automatically.

Configure automatic upgrade paths to default to: */Data/_goodix_config_.cfg* and /data/_goodix_config_.cfg. The method of ① will be searched together with the BIN file, and if found, the configuration will be upgraded first; Using the method of ②, the file search and upgrade will be performed after the firmware is upgraded.

（8） Gesture/Slide Wake-Up Instructions

The macro associated with gesture/slide wake-up is GTP_GESTURE_WAKEUP. This feature requires the following circuitry to be added (see Datasheet for detailed circuit design):

Connect the RC circuit in series on the INT pin, R: 680 Ohm, C: 680p, as shown in the following figure:



B Pull-up resistors cannot be connected to INT terminating GT91X INT, C terminating host INT, host.

IV. Appendices

1. Sensor ID: If several TP factories are used in the same project and the same IC of GOODIX is used, the Sensor ID can be set for the touch IC, and the host sends configuration information of the corresponding ID during initialization, thereby distinguishing the TP of different manufacturers. The setting method of Sensor ID is usually pull-up, pull-down or floating setting for one or several IO ports of IC when layout is performed. The setting method of each chip is different. Please refer to the Datasheet of each IC for details.

2. IC firmware and configuration information: firmware is a program that runs inside an IC, firmware is for an IC, and configuration information is provided in the

An array that initializes firmware in the early stage of firmware operation. After the host is powered up, it is sent to the IC through I2C so that the IC can operate normally. Configuration information is specific to a TP, and most of the modifications of the structure, process, and channel number of TP need to be adapted by modifying the configuration information.

3. Configuration version number and curing configuration: the first data of GT9XX configuration information is the configuration information version number, only the configuration sent

If the version number of the information is greater than or equal to the configuration version number stored in the chip, the sent configuration information will be accepted by GT9XX and take effect. If the configuration information cannot be sent out during debugging, please read out the version number of the configuration information in the chip to see if it meets the requirements. Configure the IC configuration version to 0x5A (90) or more, the driver will not send the configuration for solidifying the configuration, or the driver will clear the IC configuration version to 0x41 (65).

4. SLOT dot reporting method: Some upper layer configurations of Android 4.0 system must use SLOT dot reporting method. If the driver still uses traditional dot reporting method, the upper layer of android may recognize the reported coordinates as relative coordinates. If this phenomenon occurs, please open the

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GTP_ICS_SLOT_REPORT macro and switch the dot reporting method to SLOT method. Please refer to linux for details

Enter information about escalation events in the subsystem and in the upper layer of Android, InputReader.cpp.

5. ESD protection mechanism: refers to adding a thread in the driver to query the working status of the IC. If abnormal work is found, the IC is reset, which is mainly used to avoid TP failure under strong ESD conditions. You can decide whether to turn on the function according to the ESD test results.

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Note: This function is used on the premise that the VDD of the CTP chip can be switched by the host or the CTP chip can be reset by the host via RESET.

6. Definition of macro switch: *Gt9xx.h* Defines some macro switches in the ON/OFF define section of the driver for use during debugging, 0 indicates that the function is off, 1 indicates that the function is on, and the definitions of each switch are as follows:

```
#Define GTP_DEBUG_ON                    // Debug information switch. If it is turned on, debug information will be output
#Define GTP_DEBUG_ARRAY_ON              // Debug Array Switch, used to print the contents of a piece of memory during debugging
#Define GTP_DEBUG_FUNC_ON               // Debug function switch for tracking function call flow
#Define GTP_CUSTOM_CFG                  // Custom configuration switch for customers to modify certain parameters themselves
#Define GTP_HAVE_TOUCH_KEY              // Touch button switch, TP with only touch buttons needs to be turned on
#Define GTP_AUTO_UPDATE                 // Boot search bin file for firmware upgrade
#Define GTP_HEADER_FW_UPDATE//firmware upgrade in gt9xx_firmware. H) required
                                            Start GTP_AUTO_UPDATE)
#Define GTP_AUTO_UPDATE_CFG             // Search for. Cfg file upgrade (GTP_AUTO_UPDATE must be turned on)
#Define GTP_ESD_PROTECT                 // ESD protection mechanism switch
#Define GTP_ICS_SLOT_REPORT             // Android 4.0 or above is configured as slot-based dot reporting
#Define GTP_GESTURE_WAKEUP                // Gesture awakening
#Define GTP_COMPATIBLE_MODE             // Compatible with GT9XXF mode
#Define GTP_LITTLE_SYSTEM               //     GT9XXF with small system, POWER_CTRL_SLEEP should be turned on as well
#Define GTP_WITH_PEN                    // Pen Event Support
#Define GTP_PEN_HAVE_BUTTON             // The active pen has key
```

V. Records of Version Revision

Document Version	Revision	Date
V1.0	Initial establishment	2012-08-31
V1.2	SLOT mode	2012-10-15
V1.4	Slide Wake Up, Header Upgrade	2013-03-11
V1.6	Rearrangement	2013-06-08
V1.8	GT9XXF Compatibility Notes, Slide Wake-Up Description, Automatic Upgrade Description	2013-08-06
V2.0	Gesture Wake-Up Instructions	2014-01-14

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