

TouchKitD eGTouch Linux Programming Guide v2.5c

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Sec 1: Introduction

TouchKitD provides all kinds of touch solution. TouchKitD eGTouchD is a touch daemon driver for TouchKitD touch controller. Only is available for kernel **2.6.24** upward.

Support interfaces:

1. **USB**
2. **RS232**
3. **PS/2**

Having below features:

1. **Precise points.**
2. **Great calibration precision for Resistive controller.**
3. **Capable for 10+ points report.**
4. **Following Linux Standard Multitouch-protocol point report.**
5. **Rightclick, beep sound, constant touch filter, etc.**
6. **Support multi devices.**
7. **Available for detecting X-window rotation to do rotating coordinate.**
8. **Provide manually modify driver's behavior.**

This document would assist you to install eGTouchD.

Sec 2: Before install

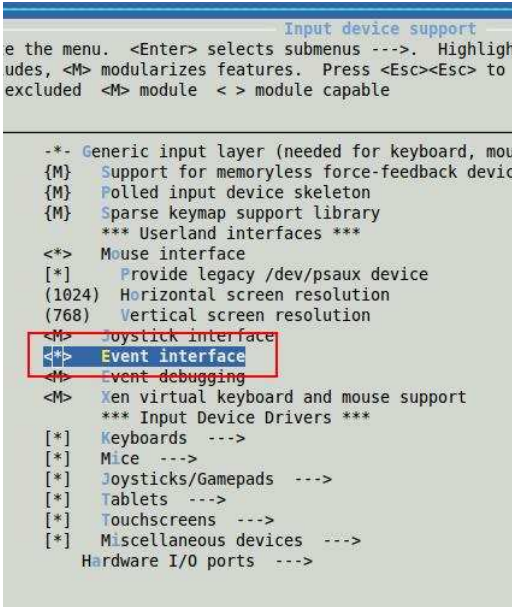
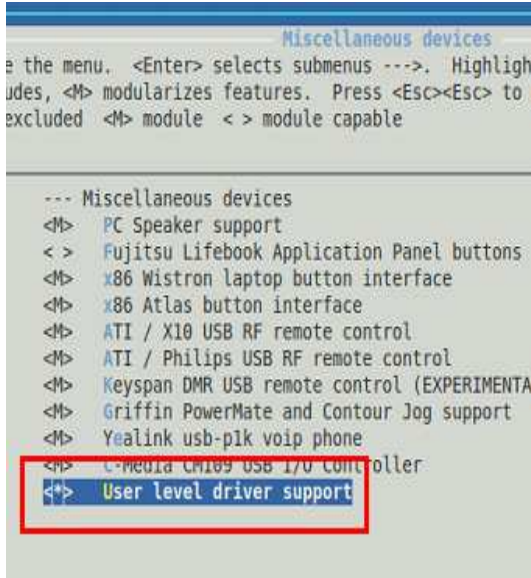
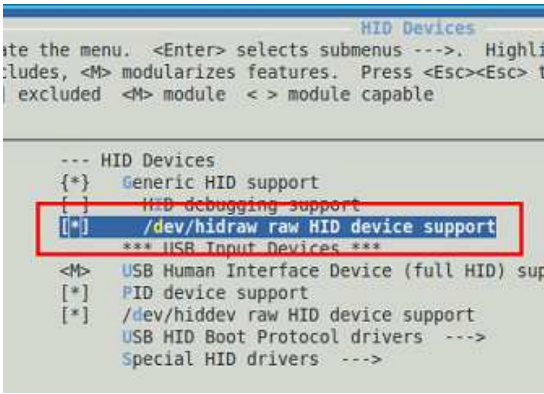
2.1 Patch kernel module

To install driver, we need below kernel modules support. Please make sure to enable these modules.

1. **EVDEV**
2. **UINPUT**
3. **HIDRAW (USB Interface)**

You could check this by "make menuconfig" command or modify Kconfig file. There is an example of "make menuconfig" below:

Make menuconfig:

<p>[Device Drivers] / [Input device support] / [Event interface]</p>	<p>[Device Drivers] / [Input device support] / [Miscellaneous devices] / [User level driver support]</p>
 <pre>Input device support e the menu. <Enter> selects submenus --->. Highligh udes, <M> modularizes features. Press <Esc><Esc> to excluded <M> module < > module capable -*- Generic input layer (needed for keyboard, mou {M} Support for memoryless force-feedback devic {M} Polled input device skeleton {M} Sparse keymap support library *** Userland interfaces *** <M> Mouse interface [*] Provide legacy /dev/psaux device (1024) Horizontal screen resolution (768) Vertical screen resolution <M> Joystick interface <+> Event interface <+> Event debugging <M> Xen virtual keyboard and mouse support *** Input Device Drivers *** [*] Keyboards ---> [*] Mice ---> [*] Joysticks/Gamepads ---> [*] Tablets ---> [*] Touchscreens ---> [*] Miscellaneous devices ---> Hardware I/O ports ---></pre>	 <pre>Miscellaneous devices e the menu. <Enter> selects submenus --->. Highligh udes, <M> modularizes features. Press <Esc><Esc> to excluded <M> module < > module capable --- Miscellaneous devices <M> PC Speaker support < > Fujitsu Lifebook Application Panel buttons <M> x86 Wistron laptop button interface <M> x86 Atlas button interface <M> ATI / X10 USB RF remote control <M> ATI / Philips USB RF remote control <M> Keyspan DMR USB remote control (EXPERIMENTA <M> Griffin PowerMate and Contour Jog support <M> Yealink usb-plk voip phone <M> C-Media CM109 USB I/O Controller <+> User level driver support</pre>
<p>[Device Drivers] / [HID Devices] / [/dev/hidraw raw HID device support] (for USB Interface)</p>	
 <pre>HID Devices ite the menu. <Enter> selects submenus --->. Highli cludes, <M> modularizes features. Press <Esc><Esc> t excluded <M> module < > module capable --- HID Devices [*] Generic HID support [*] HID debugging support [*] /dev/hidraw raw HID device support *** USB Input Devices *** <M> USB Human Interface Device (full HID) sup [*] PID device support [*] /dev/hiddev raw HID device support USB HID Boot Protocol drivers ---> Special HID drivers ---></pre>	

2.2 Patch kernel source code

Important! If your system fulfill below two conditions, please refer to **Sec 6-1** to do kernel blacklist patch first, or driver would **NOT** be functional.

1.	Interface is using USB
2.	X.org version < 1.7.6 or without X

2.3 check device

- 1.) If you did above modification, please rebuild your kernel to make it effect.
- 2.) After that, you could check those kernel functions enable or not through below steps.

All interface.
a. UINPUT device node
<p>You should see uinput under /dev/input/uinput or /dev/uinput.</p> <p>For example:</p> <pre>File Edit View Terminal Help root@william-desktop:/dev/input# pwd /dev/input root@william-desktop:/dev/input# ls uinput -al crw-r----- 1 root root 10, 223 2010-01-05 15:43 uinput root@william-desktop:/dev/input#</pre>

USB interface only.
b. hidraw device node
<p>As the usb device is plug-in, there would be a hidraw node generated under /dev</p> <pre>File Edit View Terminal Help root@william-desktop:/dev# pwd /dev root@william-desktop:/dev# ls hidraw* -al crw-rw---- 1 root root 251, 0 2010-01-05 17:02 hidraw0 root@william-desktop:/dev#</pre>
c. USB touch device handlers
<p>Type command "cat /proc/bus/input/devices" and see the result.</p> <p>If you need and have done the source code patch at section 2.2, you would see a blank content behind the Handlers item.</p> <pre>I: Bus=0003 Vendor=0eef Product=720c Version=0100 N: Name="eGalax Inc. USB TouchController" P: Phys=usb-0000:00:1d.0-2/input0 S: Sysfs=/devices/pci0000:00/0000:00:1d.0/usb2/2-2/2-2:1.0/input/input7 U: Uniq= H: Handlers= B: EV=1b B: KEY=421 0 30001 0 0 0 0 0 0 0 B: ABS=100 3f B: MSC=10</pre>

Sec 3: Install Driver Package

3-1 Install Process

You could execute script file **setup.sh** to automatically install driver.

Syntax:

sh setup.sh # To install the eGTouch driver.

sh setup.sh uninstall # To remove the eGTouch driver.

You could also complete these steps manually.

1. Decompress eGTouch package which contains:
 - a) eGTouchD: a daemon service driver for TouchKitD touch controller.
 - b) eGTouchL.ini: a parameter list loaded by driver
 - c) GetEvent.c: a sample code describes how to read TouchKitD input event.

If you have X-window, you may also be available for these:

- d) eGTouchU: a X-window utility tool for eGTouchD (x86 system only)
- e) eCalib: a command line X-window calibration tool.

2. Place "eGTouchL.ini" into Linux system directory "/etc/eGTouchL.ini" where driver would load it. We can change driver behavior by modifying this file. **The detail descriptions of parameters are described in Section 5.** (You can see brief definitions in eGTouchL.ini)
3. Place eGTouchD & eGTouchU & eCalib under /usr/bin. Place /usr/bin/eGTouchD execution in /etc/rc.local to make eGTouchD execute at system boot.

4. After launching eGTouchD with device plugged, check **/proc/bus/input/devices** file and you will find two virtual devices. Like below figures:

```
I: Bus=0006 Vendor=0eef Product=0010 Version=0001
N: Name="Touchkit Virtual Device for Single"
P: Phys=
S: Sysfs=/devices/virtual/input/input19
U: Uniq=
H: Handlers=mouse3 event11 js0
B: PROP=0
B: EV=b
B: KEY=30000 0 0 0 0
B: ABS=1000003
```

```
I: Bus=0006 Vendor=0eef Product=0020 Version=0001
N: Name="Touchkit Virtual Device for Multi"
P: Phys=
S: Sysfs=/devices/virtual/input/input18
U: Uniq=
H: Handlers=mouse2 event10
B: PROP=0
B: EV=b
B: KEY=400 0 0 0 0 0
B: ABS=660800001000003
```

We could check event node which was assigned to the virtual device and read/get input event through this device node, e.g. /dev/input/eventX.

3-2 Tools

As you have **X-window**, these tools are available for use.

Please execute these tools under “root” permission!

eGTouchU x86 system only	The tool eGTouchU is a utility tool which could help you modify driver's parameter through UI. The detail descriptions please refer to the document “TouchKitD eGTouch Utility Guide” in driver package.
eCalib	The tool eCalib is a calibration tool with command line. Please type “eCalib -h” to see the usage content.

Sec 4: Touch Input Event Sequence

The eGTouchD daemon sends input event through kernel feature UINPUT so that the client program can get these events from /dev/input/eventX.

4-1 Two different event sequences

The eGTouchD daemon would report event based on different kernel version.

1. kernel version is 2.6.36 upwards:

Multi-touch Protocol Type B

```
ABS_MT_SLOT 0
ABS_MT_TRACKING_ID 0
ABS_MT_POSITION_X x[0]
ABS_MT_POSITION_Y y[0]
ABS_MT_SLOT 1
ABS_MT_TRACKING_ID 1
ABS_MT_POSITION_X x[1]
ABS_MT_POSITION_Y y[1]
```

you can see the detailed rule described in /Documentation/input/multi-touch-protocol.txt under Linux kernel source code.

2. kernel version is 2.6.35 downwards:

TouchKitD protocol: Standard mouse event and custom extra event

Type = EV_KEY Code = BTN_LEFT Value = left mouse button state of first point , 1: pen down / 0: life off.	Type = EV_KEY Code = BTN_EXTRA Value = the touch state of second point , 1: pen down / 0: lift off.
Type = EV_ABS	Type = EV_ABS

Code = ABS_X Value = the X axis position of first point . The range is from 0 to 2047.	Code = ABS_RX Value = the X axis position of second point . The range is from 0 to 2047
Type = EV_ABS Code = ABS_Y Value = the Y axis position of first point . The range is from 0 to 2047.	Type = EV_ABS Code = ABS_RY Value = the Y axis position of second point . The range is from 0 to 2047.
Type = EV_SYNC Code = SYN_REPORT Value = 0 A Sync report event, all data will be valid after this event is received.	

4-2 How to read touch event

TouchKitD provide a sample code **GetEvent.c** to show how the event sequence behaves. Please compile the sample code and execute it corresponding to the event node (/dev/input/eventX). You would see the event sequence as panel is touched and design your own application based on this input sequence as well.

Sec 5: eGTouchL.ini Parameter Explanations

The file **eGTouchL.ini** has a parameter list which would be loaded by driver. Driver's behavior could be changed by these parameters. Please **DON'T** modify the front title as setting up eGTouchL.ini.

5-1 Parameter Table

This table describe the detailed usage of all parameters. There is also a simple description in eGTouchL.ini.

◆ DebugEnableBits	Debug message you want to show.
0	Close all Debug
1	Print initialization debug message [Default]
FFFF	Open all Debug
◆ ShowDebugPosition	Position you want to show/store Debug message
0	Print in file located at /tmp [Default]
1	Print in terminal
2	Print in above both
◆ DeviceNums	How many devices you want to plug-in to the system. If you want

		more than one device, please modify this value.
1	Only one device [Default]	
2-10	More than one device. [Max = 10]	
◆ Baudrate		Choose the BaudRate
0	Auto detect Baudrate [Default]	
X	Set Baudrate to X bps. (PCAP: 57600 , Resis: 9600)	
◆ SerialPath		RS232 Serial Path
default	Default path /dev/ttySX (X could be equals to 0-10) [Default]	
/dev/serial/ttyS0	Customized path. Please type in your specific serial path according to the form.	
◆ SupportPoints		The amount of points you want to report (This is also confined by Controller)
0	No point	
1	Single-touch	
>=2	Multi-touch [Default = 5]	
◆ Direction		Change the X and Y direction
0	Don't make any invert [Default]	
1	Invert X	
2	Invert Y	
3	Invert both X and Y	
4	Swap X and Y	
◆ Orientation		Change the orientation
0	0 degree [Default]	
1	90 degree	
2	180 degree	
3	270 degree	
◆ EdgeCompensate		Do edge compensate
0	Disable [Default]	
1	Enable	
EdgeLeft, EdgeRight EdgeTop, EdgeBottom	Edge compensate value	
X	If equals to 100, it means no change. If you set Left=50, you'll see the left-edge points are shrinks inward. And vice versa. [Min 50 - 150 Max] [Default = 100]	
◆ HoldFilterEnable		Filter out constant touch or not
0	Disable [Default]	
1	Enable	

HoldRange		Constant touch valid area									
X	±X range of the point which would lead to constant touch [Min 0 - 50 Max] [Default = 10]										
◆ SplitRectMode		Split the display into Specific Rect. Touch would just show on the specific Rect.									
0	No change (Full Display) [Default]										
1-8	Driver in-built split Rect										
	<table><tr><td>2</td><td>1</td></tr><tr><td>3</td><td>4</td></tr></table>	2	1	3	4	<table><tr><td>5</td></tr><tr><td>6</td></tr></table>	5	6	<table><tr><td>7</td><td>8</td></tr></table>	7	8
2	1										
3	4										
5											
6											
7	8										
9	Customized Rect.										
CustomRectLeft CustomRectRight CustomRectTop CustomRectBottom		Theses parameters are valid as SplitRectMode=9. You can customize the Rect by these parameters.									
0-2047	Four sides of the customized Rect										
◆ DetectRotation (Only for x86 system)		Enable: Driver would map its coordinate corresponding to X window rotation. *Please see Sec 6-2. Disable: If there's no roation requirement, just disable it.									
0	Disable [Default]										
1	Enable										
◆ ReportMode		Set different report type									
1	Normal Mode. Report point normally. [Default]										
2	Click on Touch. Only report point as touch down.										
3	Click on Release. Only report point as touch up.										
◆ BtnType		Set TouchKitD protocol BtnType									
0	Report single event as BTN_LEFT. [Default]										
1	Report single event as ABS_PRESSURE. (Generally for Tslib)										
2	Report single event as BTN_TOUCH.										
◆ RightClickEnable		Report mouse Right Click after constant touch for a while									
0	Disable Right Click										
1	Enable Right Click [Default]										
RightClickDuration		Constant touch duration to trigger Right Click									
X	X milliseconds [Default = 1500]										
RightClickRange		Valid area of trigger-RightClick constant touch									
X	±X range of the point would lead to constant touch for RightClick [Min 0 - 50 Max] [Default = 10]										
◆ BeepState		Make a beep sound as touch *Please see Sec 6-3.									

0	Disable Beep	
1	Make a beep sound as "Touch Down"	
2	Make a beep sound as "Touch Up"	
3	Make a beep sound as both two above conditions.	
BeepDevice		Choose the beep sound device
0	No device	
1	Send beep sound by from system buzzer	
2	Send beep sound by from sound card (Only for x86 system)	
3	Send beep sound from both devices.	
BeepFreq		You can modify buzzer beep frequency here.
X	(Only for buzzer) The buzzer beep frequency. [Default = 1000]	
BeepLen		You can modify buzzer beep time length here.
X	(Only for buzzer) The buzzer beep time length (ms). [Default = 200]	

Sec 6 Annotation

6-1 Kernel source patch

Please append following **RED** section into your source code.

If your kernel is **2.6.33 downwards**, please follow section **6-1-1**.

If your kernel is **2.6.34 upwards**, please follow section **6-1-2**.

6-1-1 kernel 2.6.33 downwards

1. /SourceCode/drivers/input/**evdev.c**

```
static struct input_device_id evdev_blacklist[] =  
{ /* Added by TouchKitD */  
    {  
        .flags = INPUT_DEVICE_ID_MATCH_BUS | INPUT_DEVICE_ID_MATCH_VENDOR,  
        .bustype = BUS_USB,  
        .vendor = 0x0EEF,  
    },  
    {}, /* Terminating entry */  
};
```

```
static struct input_handler evdev_handler = {  
    .event = evdev_event,  
    .connect = evdev_connect,  
    .disconnect = evdev_disconnect,  
    .fops = &evdev_fops,  
    .minor = EVDEV_MINOR_BASE,  
    .name = "evdev",  
    .id_table = evdev_ids,  
    .blacklist = evdev_blacklist, /* Added by TouchKitD */  
};
```

2. /SourceCode/drivers/input/mousedev.c

```
static struct input_device_id mousedev_blacklist[] =
{
    /* Added by TouchKitD */
    {
        .flags = INPUT_DEVICE_ID_MATCH_BUS | INPUT_DEVICE_ID_MATCH_VENDOR,
        .bustype = BUS_USB,
        .vendor = 0x0EEF,
    },
    {
        .flags = INPUT_DEVICE_ID_MATCH_BUS | INPUT_DEVICE_ID_MATCH_VENDOR,
        .bustype = BUS_VIRTUAL,
        .vendor = 0x0EEF,
    },
    {}, /* Terminating entry */
};

static struct input_handler mousedev_handler = {
    .event = mousedev_event,
    .connect = mousedev_connect,
    .disconnect = mousedev_disconnect,
    .fops = &mousedev_fops,
    .minor = MOUSEDEV_MINOR_BASE,
    .name = "mousedev",
    .id_table = mousedev_ids,
    .blacklist = mousedev_blacklist, /* Added by TouchKitD */
};
```

3. /SourceCode/drivers/input/joydev.c

```
static const struct input_device_id joydev_blacklist[] =
{
    {
        .flags = INPUT_DEVICE_ID_MATCH_EVBIT | INPUT_DEVICE_ID_MATCH_KEYBIT,
        .evbit = { BIT_MASK(EV_KEY) },
        .keybit = { [BIT_WORD(BTN_TOUCH)] = BIT_MASK(BTN_TOUCH) },
    },    /* Avoid itouchpads and touchscreens */
    {
        .flags = INPUT_DEVICE_ID_MATCH_EVBIT | INPUT_DEVICE_ID_MATCH_KEYBIT,
        .evbit = { BIT_MASK(EV_KEY) },
        .keybit = { [BIT_WORD(BTN_DIGI)] = BIT_MASK(BTN_DIGI) },
    },    /* Avoid tablets, digitisers and similar devices */
    {
        .flags = INPUT_DEVICE_ID_MATCH_BUS | INPUT_DEVICE_ID_MATCH_VENDOR,
        .bustype = BUS_VIRTUAL,
        .vendor = 0x0EEF,
    },    /* Added by TouchKitD */
    { }    /* Terminating entry */
};

static struct input_handler joydev_handler = {
    .event = joydev_event,
    .connect = joydev_connect,
    .disconnect = joydev_disconnect,
    .fops = &joydev_fops,
    .minor = JOYDEV_MINOR_BASE,
    .name = "joydev",
    .id_table = joydev_ids,
    .blacklist = joydev_blacklist,
};
```

6-1-2 kernel2.6.34 upwards

1. /SourceCode/drivers/input/**evdev.c**

```
static bool evdev_match(struct input_handler *handler, struct input_dev *dev)
{
    /* Avoid TouchKitD USB touchscreens */
    #define VID_TouchKitD 0x0EEF
    if ((BUS_USB == dev->id.bustype) && (VID_TouchKitD == dev->id.vendor))
        return false;
    return true;
}
```

```
static struct input_handler evdev_handler = {
    .event = evdev_event,
    .match = evdev_match, /* Added by TouchKitD */
    .connect = evdev_connect,
    .disconnect = evdev_disconnect,
    .fops = &evdev_fops,
    .minor = EVDEV_MINOR_BASE,
    .name = "evdev",
    .id_table = evdev_ids,
};
```

2. /SourceCode/drivers/input/**mousedev.c**

```
static bool mousedev_match(struct input_handler *handler, struct input_dev *dev)
{
    /* Avoid TouchKitD USB touchscreens */
    #define VID_TouchKitD 0x0EEF
    if ((BUS_USB == dev->id.bustype) && (VID_TouchKitD == dev->id.vendor))
        return false;

    /* Avoid TouchKitD virtual devices */
    if ((BUS_VIRTUAL == dev->id.bustype) && (VID_TouchKitD == dev->id.vendor))
        return false;
    return true;
}
```

```
static struct input_handler mousedev_handler = {
    .event = mousedev_event,
```

```
.match = mousedev_match, /* Added by TouchKitD */

.connect = mousedev_connect,
.disconnect = ousedev_disconnect,
.fops = &mousedev_fops,
.minor = MOUSEDEV_MINOR_BASE,
.name = "mousedev",
.id_table = mousedev_ids,

};
```

3. /SourceCode/drivers/input/joydev.c

```
static bool joydev_match(struct input_handler *handler, struct input_dev *dev)
{
    /* Avoid touchpads and touchscreens */
    if (test_bit(EV_KEY, dev->evbit) && test_bit(BTN_TOUCH, dev->keybit))
        return false;

    /* Avoid tablets, digitisers and similar devices */
    if (test_bit(EV_KEY, dev->evbit) && test_bit(BTN_DIGI, dev->keybit))
        return false;

    /* Avoid TouchKitD virtual devices */
    #define VID_TouchKitD 0x0EEF
    if ((BUS_VIRTUAL == dev->id.bustype) && (VID_TouchKitD == dev->id.vendor))
        return false;

    return true;
}

static struct input_handler joydev_handler = {
    .event = joydev_event,
    .match = joydev_match,
    .connect = joydev_connect,
    .disconnect = joydev_disconnect,
    .fops = &joydev_fops,
    .minor = JOYDEV_MINOR_BASE,
    .name = "joydev",
    .id_table = joydev_ids,
};
```


6-2 DetectRotation Note

As DetectRotation is enabled, eGTouch driver have to be executed after X-server is ready.(We use Xlib to do detection). You have to remove the eGTouch execution in rc.local because it would not work out. Please manually put eGTouch execution in the sequence after OS's X server is ready.

We provides **gdm** solution since it's a general startup.

1. Modify the file "**Default**" under **/etc/gdm/Init**
2. Add eGTouch execution **/usr/bin/eGTouchD** at the end of file but before "**exit 0**"
3. Reboot system.

Since the ready time sequence of Xlib is different among diverse startup. We're sorry that we couldn't provide solution correspond to all startup. If there's any further problem as setting up please contact us for technical support.

6-3 Rotation and Beep for Embedded System

If you are using an embedded system (ex: ARM CPU), and you need support for rotation detection. There's a necessary condition: **Xrandr** lib support since eGTouch detect rotation event by Xrandr lib.

And so on. If you are using an embedded system (ex: ARM CPU), you need support for sound card beep. There's a necessary condition: **ALSA** lib support since eGTouch send beep sound by ALSA lib.

If you need this support and your system got target library, please contact us for a customized driver. Thanks.

6-4 Numerous Devices

If you're going to use numerous devices, please do remember to modify the parameter "DeviceNums" in the ini file. For example: If you've plug two EETI devices on your system, please modify the parameter as below:

DeviceNums	2
-------------------	----------

After modifying the parameter, please reboot your system to make it valid.

Sec 7: Technical Support

If you encounter any problem as running eGTouchD driver, please help us follow below steps to collect debug information. Send those information to us and tell us your problem.

With these information we could help you solve the problem faster.

Please provide us below information and the description of the problem you encountered for us.

7-1 Environment Information

Please fill in this chart as much as you could. These would help us clarify the environment.

If you're not sure or don't know about it. You could just keep it blank.

1. CPU type	
2. Kernel version	
3. Linux Distribution and Version.	
4. If having X-window, X version? (X --version)	
5. If no X-window, what's your GUI system? (QT?)	
6. Controller Interface	
7. Controller Type (PCAP or Resistive or Else)	
8. Controller Model, Version	

7-2 Register input devices

1. Execute command `cat /proc/bus/input/devices`
2. Send us the output result.

7-3 Driver debug log

1. Modify file eGTouchL.ini. Change the value of the parameter DebugEnableBits from 1 to FFFFF. Change the value of ShowDebugPosition from 1 to 0.

As below

```
[eGTouchL.ini]
DebugEnableBits      FFFFF
ShowDebugPosition    0
```

2. Reboot your system. After rebooting, please touch four corner of the touch panel.
3. The log file would be printed in /tmp/eGTouch_[year]_[date]_[time]
4. You may see numerous logs named eGTouch_[year]_[date]_[time]. Please send us the Newest one for analyzing. Thanks.