

# OSOYOO 3.5 Inch SPI Touch Display for RPi



Online tutorial: <https://osoyoo.com/?p=50824>

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# Caution

- If you don't install the touch driver and use 3.5" SPI screen, this screen will show white screen. Please don't worry and follow our guide to make it work.
- Please confirm that your SD card have enough space for touch driver
- In this guide, we introduce two way to install the touch driver for this screen: ready-to-use image and touch driver installation.
- This screen is just compatible with Raspberry Pi OS. All guide in this user manual are tested with Raspberry Pi OS from official website.

# Overview

## INTRODUCTION

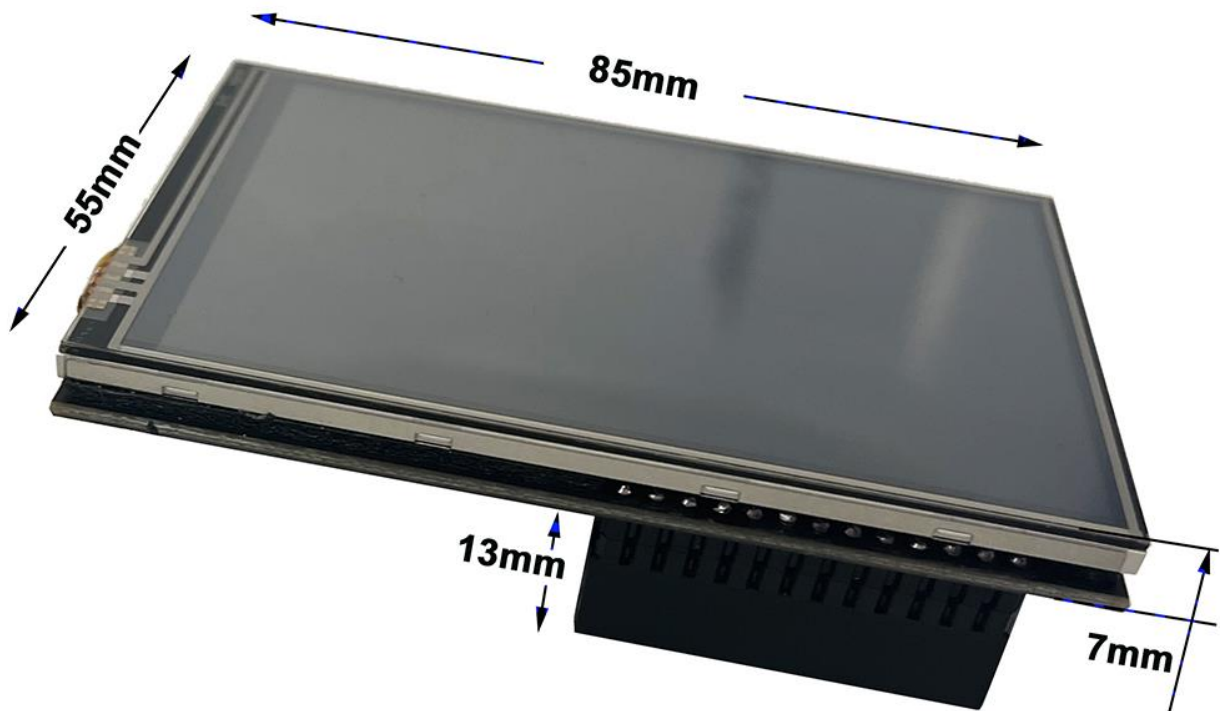
3.5 inch SPI Touch Display is designed for Raspberry Pi.



## FEATURES

- 320 x 480 hardware resolution
- Resistive touch control
- Compatible and supported by any version of Raspberry Pi board.(Directly-pluggable)
- Drivers provided (works with your own Raspbian)
- Supports FBCP software driver as well, allows to config software resolution and set up dual-display
- Size perfectly fits the Pi (Raspberry Pi B+/2B/3B/3B+/4/Zero/Zero W)
- Use software keyboard (system interaction without keyboard/mouse)
- Reversible screen display orientation
- PWM backlight brightness controllable
- High-quality PCBs and components.

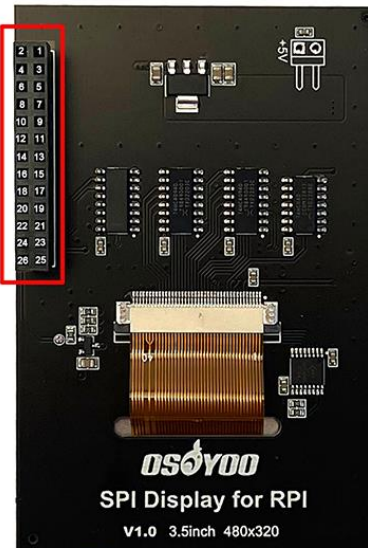
## KEY PARAMETERS



SKU	O
LCD Type	TFT
LCD Interface	SPI(Fmax:24MHz)
Touch Screen Type	Resistive
Touch Screen Controller	XPT2046
Colors	262K
Driver IC	ILI9488
Backlight	LED
Resolution	320RGB(H)×480(V) (Pixel)
Backlight Current	120ma
Power Dissipation	0.13A*5V
Operating Temp. (°C)	-20~60
Active Area	49×73.4(mm)
Product Size	85.5*55(mm)
Package Size	135*95*45 (mm)
Net Weight	55 (g)

## INTERFACE DEFINITION

Pin No.	Pin Name	Pin No.	Pin Name
1	3.3V	2	5V
3	NC	4	5V
5	NC	6	GND
7	NC	8	NC
9	GND	10	NC
11	TP_IRQ	12	NC
13	NC	14	GND
15	NC	16	NC
17	3.3V	18	LCD_RS
19	LCD_SI / TP_SI	20	GND
21	TP_SO	22	RST
23	LCD_SCK/TP_SCK	24	LCD_CS
25	GND	26	TP_CS



The pins marked as “NC” below indicate that the pins are not occupied by the LCD and can be used by the user for other applications.

<b>Pin No.</b>	<b>Identification</b>	<b>Description</b>
1	3.3V	Power (3.3V input)
2	5V	Power (5V input)
3	NC	NC
4	5V	Power (5V input)
5	NC	NC
6	GND	Ground
7	NC	NC
8	NC	NC
9	GND	Ground
10	NC	NC
11	TP_IRQ	The touch panel is interrupted, and it is low when it is detected that the touch panel is pressed
12	NC	NC
13	NC	NC
14	GND	Ground
15	NC	NC
16	NC	NC
17	3.3V	Power (3.3V input)
18	LCD_RS	Command/Data Register Select
19	LCD_SI / TP_SI	LCD display / SPI data input of touch panel
20	GND	Ground
21	TP_SO	SPI data output of touch panel
22	RST	Reset
23	LCD_SCK / TP_SCK	SPI clock signal for LCD display / touch panel
24	LCD_CS	LCD chip select signal, low level selects LCD
25	GND	Ground
26	TP_CS	Touch panel chip select signal, low level selects touch panel

# Getting Started

## READY-TO-USE IMAGE INSTALLATION GUIDE FOR RASPBERRY PI OS

**Step 1:** Download Ready-to-use Image of Raspberry Pi OS

from: <https://osoyoo.com/driver/pi/raspberrypi.img>

**Step 2:** Prepare a newly MicroSD memory card (TF card) with USB microSD card reader, recommend sizes are 8G, 16G, and 32G. Insert Micro SD card in USB micro SD card reader, and connect USB micro SD card reader with your PC.



Insert the SD card into SD card reader, then plug card into computer USB port.



If you need to format MicroSD card, please download SDFormatter

from: [https://www.sdcard.org/downloads/formatter\\_4/](https://www.sdcard.org/downloads/formatter_4/).

## SD Card Formatter 4.0 for Windows and Mac

Download SD Card Formatter for Windows >

Released on January 30, 2013


Download SD Card Formatter for Mac >

Released on January 30, 2013

## SD Card Formatter 4.0 for Windows User's Manual

Download the SD Card Formatter 4.0 for Windows User's Manual from the buttons below:

English

 (337k)

Japanese

 (332k)

Traditional Chinese

 (517k)

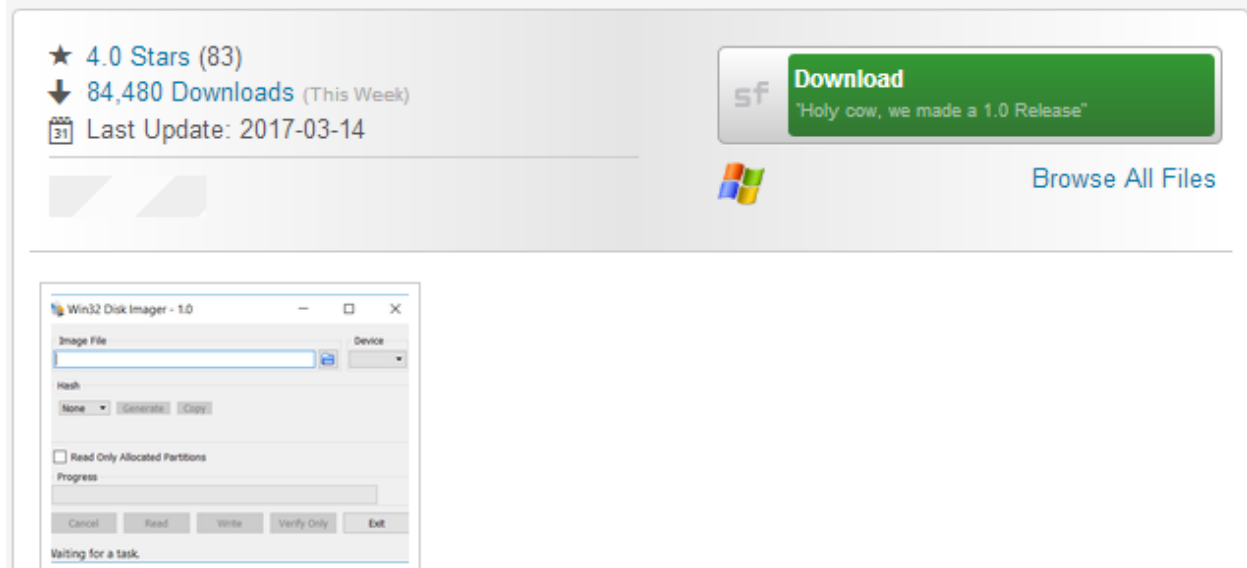
Simplified Chinese

 (423k)

**Step 3:** Download the Win32DiskImager utility from

Sourceforge: <https://sourceforge.net/projects/win32diskimager/>

[Summary](#) | [Files](#) | [Reviews](#) | [Support](#) | [Wiki](#) | [Feature Requests](#) | [Bugs](#) | [Code](#) | [Mailing List](#)

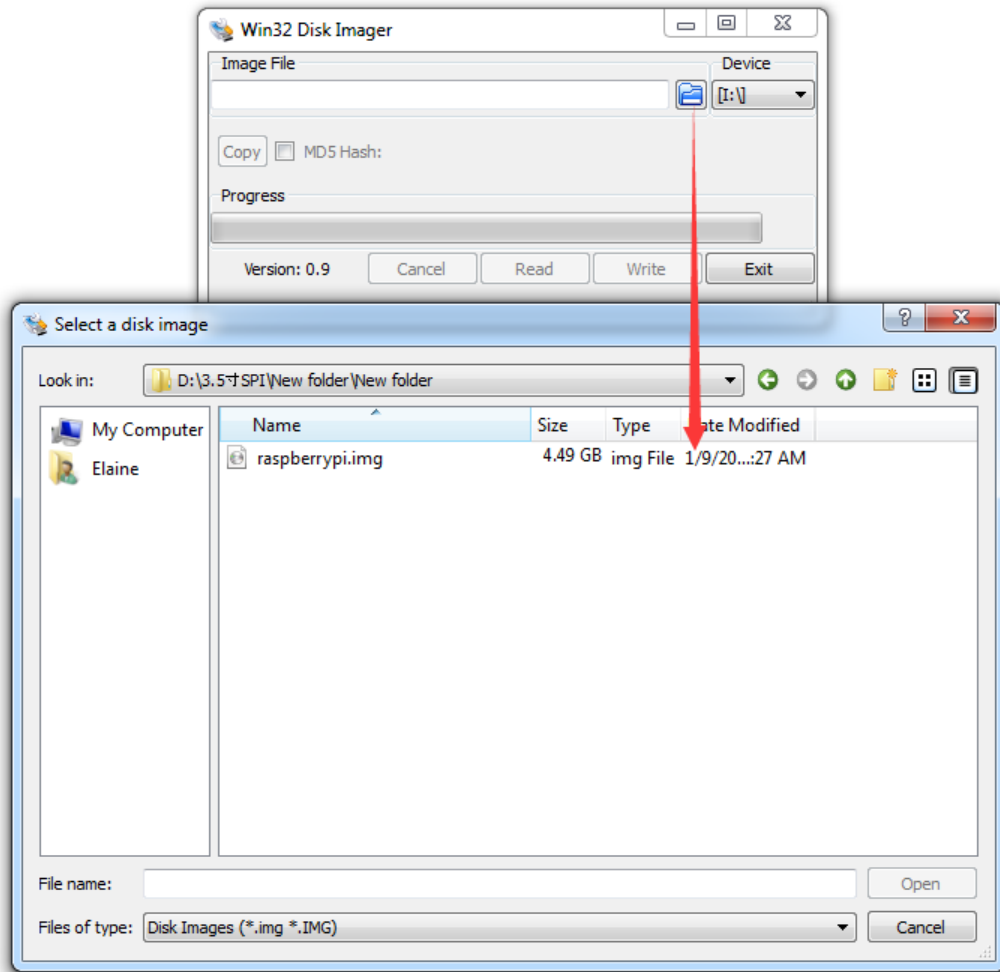


The screenshot shows the SourceForge project page for Win32DiskImager. It features a navigation bar with links for Summary, Files, Reviews, Support, Wiki, Feature Requests, Bugs, Code, and Mailing List. The main content area displays the project's star rating (4.0 Stars, 83 reviews), download count (84,480 Downloads This Week), and last update date (2017-03-14). A prominent green 'Download' button is visible, along with a 'Browse All Files' link. A small Windows logo is also present. Below the project information, a screenshot of the Win32 Disk Imager application interface is shown, displaying fields for Image File, Device, Hash, and Read Only Allocated Partitions, along with buttons for Read, Write, Verify Only, and Exit.

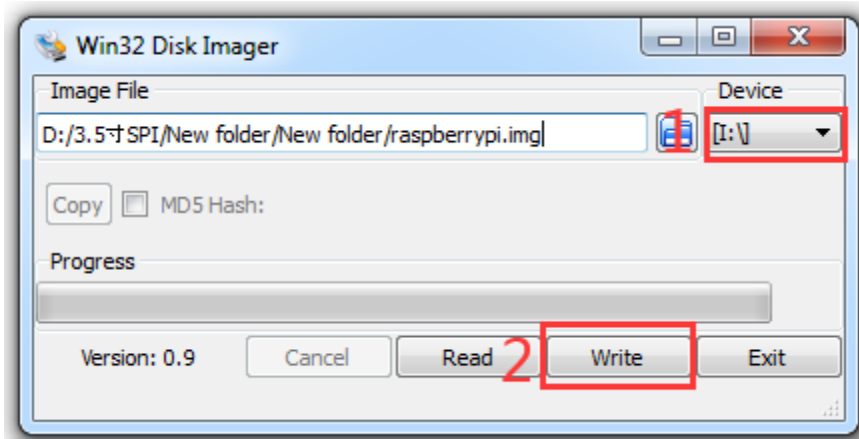
**Step 4:** Run the Win32DiskImager utility. You may need to run the utility as administrator. Right-click on the file, and select Run as administrator.

**Step 5:** Browse driver image file from **Step 1**:





**Step 6:** Select correct device you prepared and click “write” to burn the driver image file (from Step 1) into MicroSD card. (*Note: Please confirm you choose the correct SD card, or you'll damage the files in your device*)



**Step 7:** Connecting touch screen LCD display to your Raspberry Pi (Note: There are 40 pins on Raspberry Pi, but there are 26 pins on the LCD, so you should pay attention to connecting the pins to your Pi accordingly.)



**Step 8:** Insert MicroSD card from step 8 into your raspberry pi and power it up.



## TOUCH DRIVER INSTALLATION GUIDE FOR RASPBERRY PI OS

### Caution:

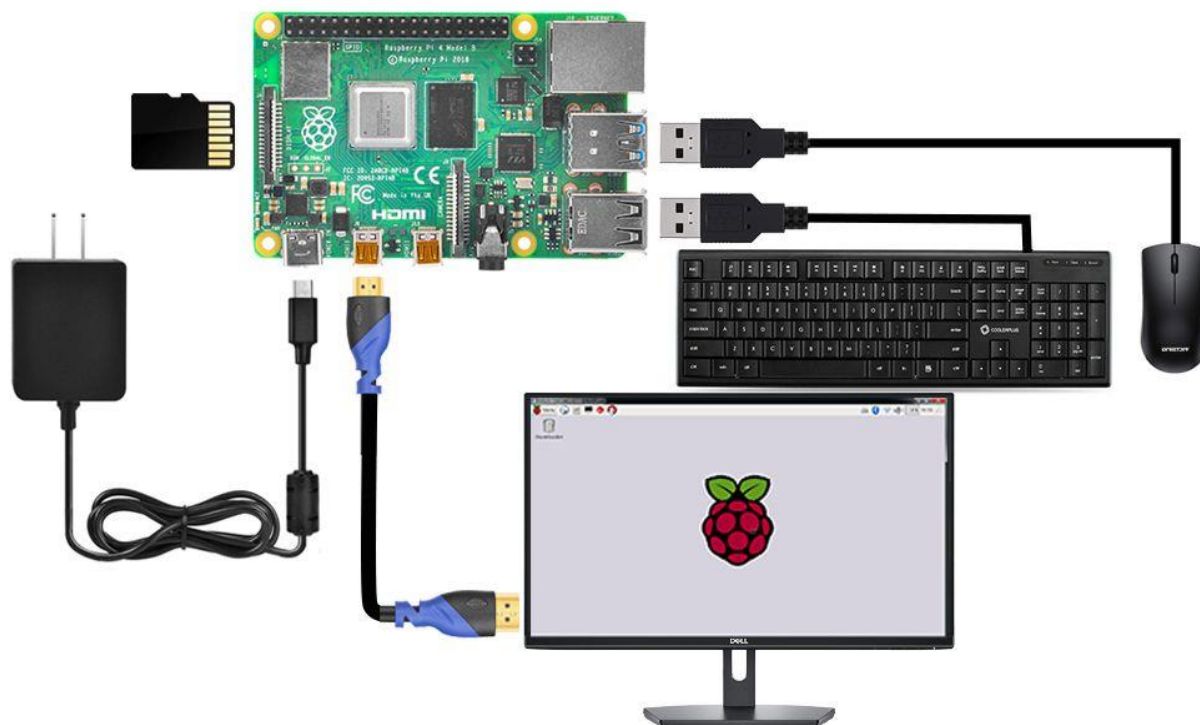
1. If you don't install the touch driver and use 3.5" SPI screen, this screen will show white screen. Please don't worry and follow the following guide to make it work.

2. You can install the touch driver on the existing Raspberry Pi OS.

3. Please confirm that your SD card have enough space for touch driver

**Step 1.** Burn Raspberry Pi OS (please download OS from [Raspberry Pi official website](#)) in a TF card/micro SD card, and insert this card in your raspberry Pi. (please confirm that the SD card have enough space for touch driver)

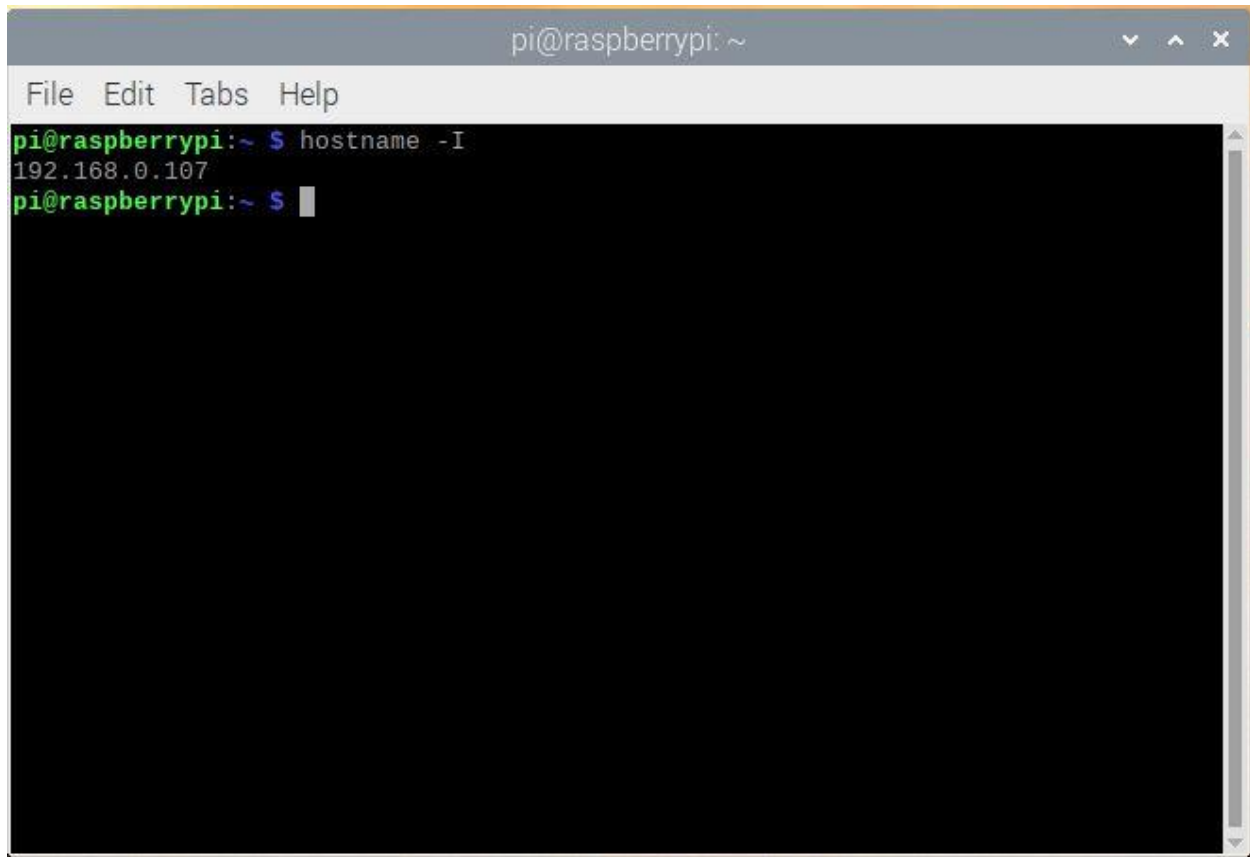
**Step 2.** Connect Raspberry Pi to your HDMI monitor or TV. Put a keyboard and mouse into Raspberry Pi USB ports, as following. (please don't install 3.5" SPI screen now, as it will show white screen)



**Step 3.** Getting the Raspberry Pi connected to the Internet (If you want to learn how to get the Raspberry Pi connected to the Internet, please visit <https://osoyoo.com/2017/06/20/raspberry-pi-3-basic-tutorial/> )

**Step 4.** Open terminal, and enter the following command to get the Raspberry Pi's IP address

## hostname -I

A terminal window titled 'pi@raspberrypi: ~' with a menu bar containing 'File Edit Tabs Help'. The terminal shows the command 'hostname -I' being entered and executed, resulting in the output '192.168.0.107'. The prompt 'pi@raspberrypi:~\$' is visible on the next line.

```
pi@raspberrypi:~$ hostname -I
192.168.0.107
pi@raspberrypi:~$
```

**Step 6.** Enter the following command in the terminal of Raspberry Pi to install the touch driver.

**git clone https://github.com/osoyoo/LCD-show.git**

**cd LCD-show/**

A terminal window showing the execution of 'git clone https://github.com/osoyoo/LCD-show.git'. The output includes progress information for cloning: 'Cloning into 'LCD-show'...', 'remote: Enumerating objects: 76, done.', 'remote: Counting objects: 100% (76/76), done.', 'remote: Compressing objects: 100% (39/39), done.', 'remote: Total 76 (delta 36), reused 74 (delta 34), pack-reused 0', and 'Unpacking objects: 100% (76/76), done.'. The prompt 'pi@raspberrypi:~\$' is followed by the command 'cd LCD-show/'.

```
pi@raspberrypi:~$ git clone https://github.com/osoyoo/LCD-show.git
Cloning into 'LCD-show'...
remote: Enumerating objects: 76, done.
remote: Counting objects: 100% (76/76), done.
remote: Compressing objects: 100% (39/39), done.
remote: Total 76 (delta 36), reused 74 (delta 34), pack-reused 0
Unpacking objects: 100% (76/76), done.
pi@raspberrypi:~$ cd LCD-show/
```

**Step 7.** Enter the following command in the terminal of Raspberry Pi to run touch driver

**chmod +x lcd35b-show**

**./lcd35b-show**

The touch function will restart automatically.

```
pi@raspberrypi:~/LCD-show $ chmod +x lcd35b-show
pi@raspberrypi:~/LCD-show $ ./lcd35b-show
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  cmake-data librhash0 libuv1
Suggested packages:
  cmake-doc ninja-build
The following NEW packages will be installed:
  cmake cmake-data librhash0 libuv1
0 upgraded, 4 newly installed, 0 to remove and 0 not upgraded.
Need to get 4,357 kB of archives.
After this operation, 22.3 MB of additional disk space will be used.
Get:1 http://archive.raspberrypi.org/debian buster/main armhf cmake-data all 3.16.3-3~bpo10+1 [1,628 kB]
Get:2 http://mirrors.zju.edu.cn/raspbian/raspbian buster/main armhf librhash0 armhf 1.3.8-1 [132 kB]
Get:3 http://mirrors.bfsu.edu.cn/raspbian/raspbian buster/main armhf libuv1 armhf 1.24.1-1+deb10u1 [96.9 kB]
Get:4 http://archive.raspberrypi.org/debian buster/main armhf cmake armhf 3.16.3-3~bpo10+1 [2,500 kB]
Fetched 4,357 kB in 3s (1,321 kB/s)
Selecting previously unselected package cmake-data.
(Reading database ... 98959 files and directories currently installed.)
Preparing to unpack .../cmake-data_3.16.3-3~bpo10+1_all.deb ...
Unpacking cmake-data (3.16.3-3~bpo10+1) ...
```

Step 8. Shut down and remove the HDMI/TV monitor, keyboard and mouse, then install the 3.5" SPI screen with the Raspberry Pi which has install touch driver. (There are 40 pins on Raspberry Pi, but there are 26 pins on the LCD, so you should pay attention to connecting the pins to your Pi accordingly)



Step 9. Power on this Raspberry Pi screen.



## Advanced course

### USE SSH TOOL TO CONTROL RASPBERRY PI REMOTELY

**Step 1.** After installing the touch driver, put a keyboard and mouse into Raspberry Pi USB ports, and open terminal, and enter the following command to get the Raspberry Pi's IP address

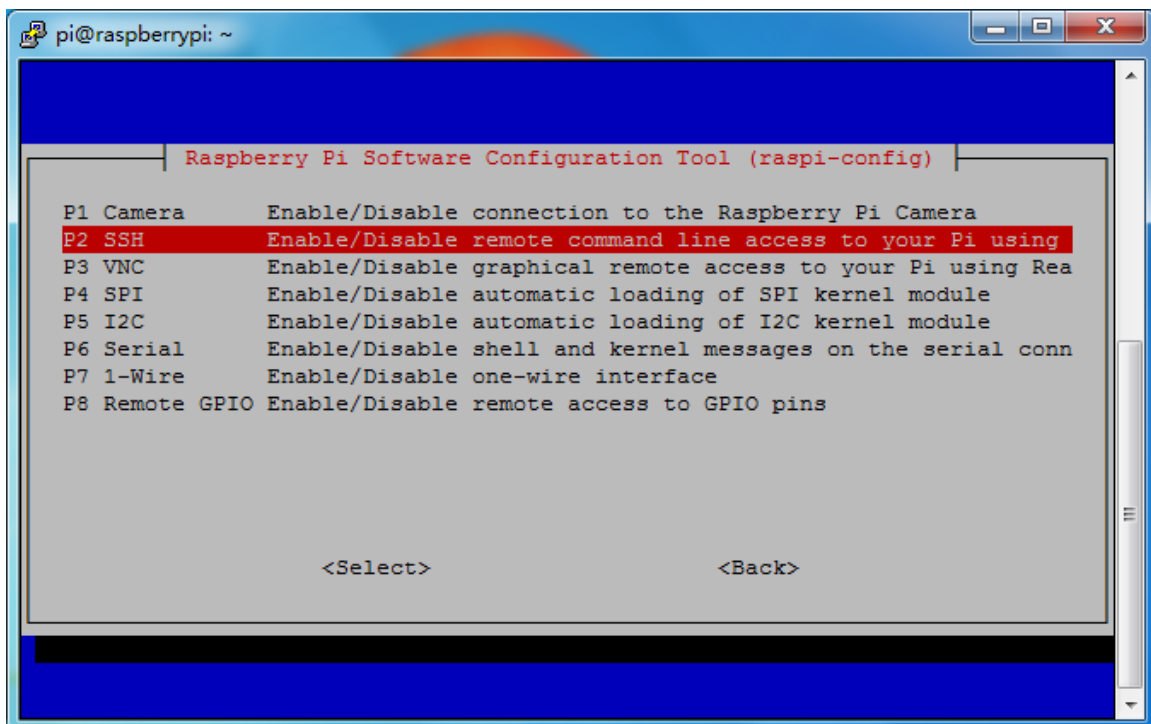
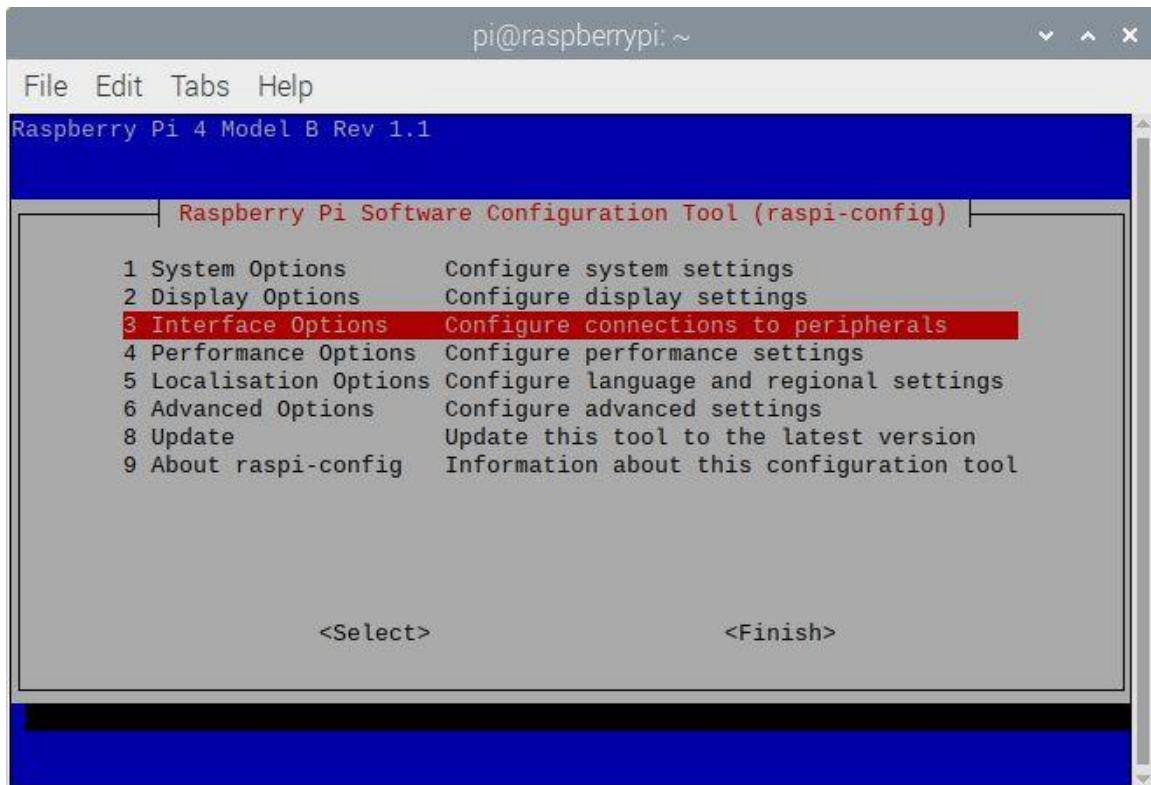
**hostname -I**

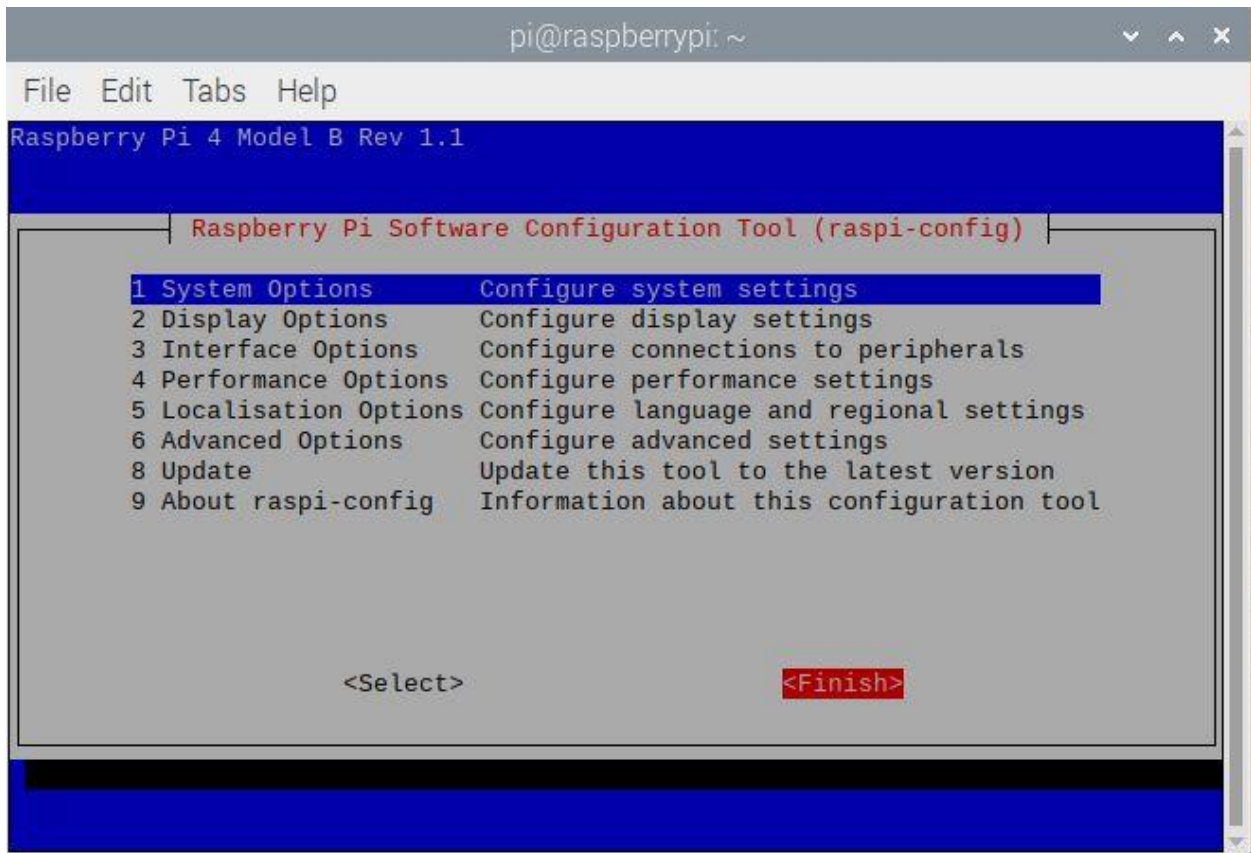
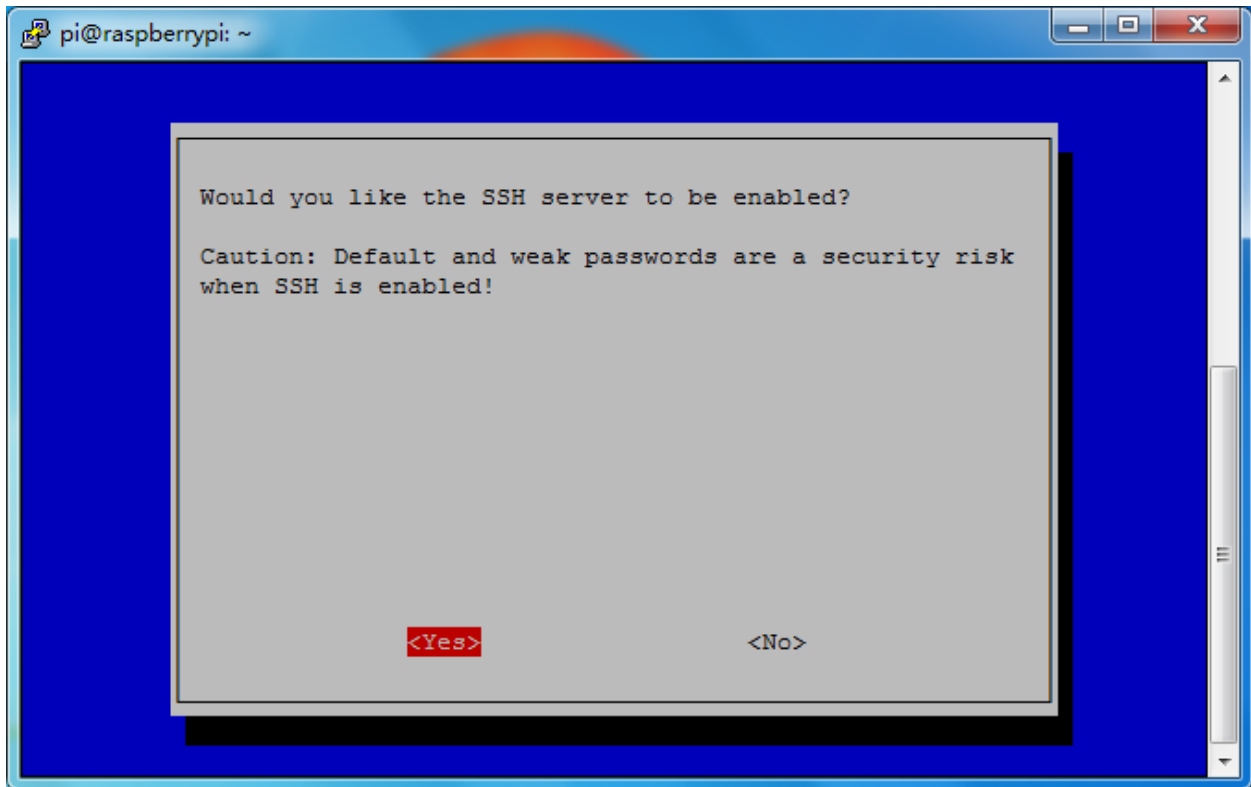
Step2. Enter the following command to enable SSH.

**sudo raspi-config**

```
pi@raspberrypi: ~
pi@raspberrypi: ~
File Edit Tabs Help
pi@raspberrypi:~ $ sudo raspi-config
```

Step 3. You will go to configuration menu, select **Interface Options ->SSH -> Yes ->OK ->Finish**





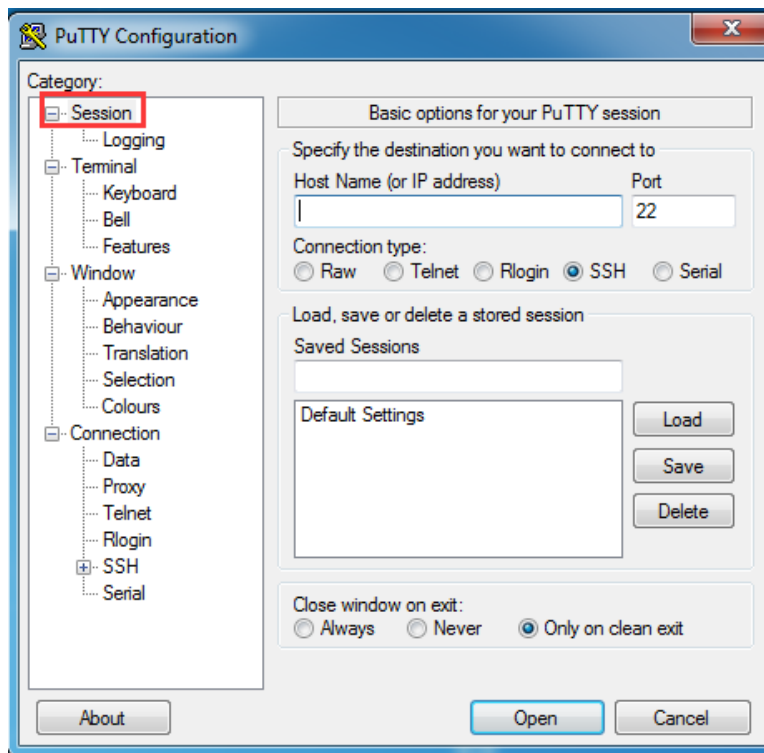


Step 4. Install ssh tool in your computer (If you want to learn how to Use ssh tool to control Raspberry Pi's remotely, please visit <https://osoyoo.com/2017/06/20/raspberry-pi-3-basic-tutorial/>)

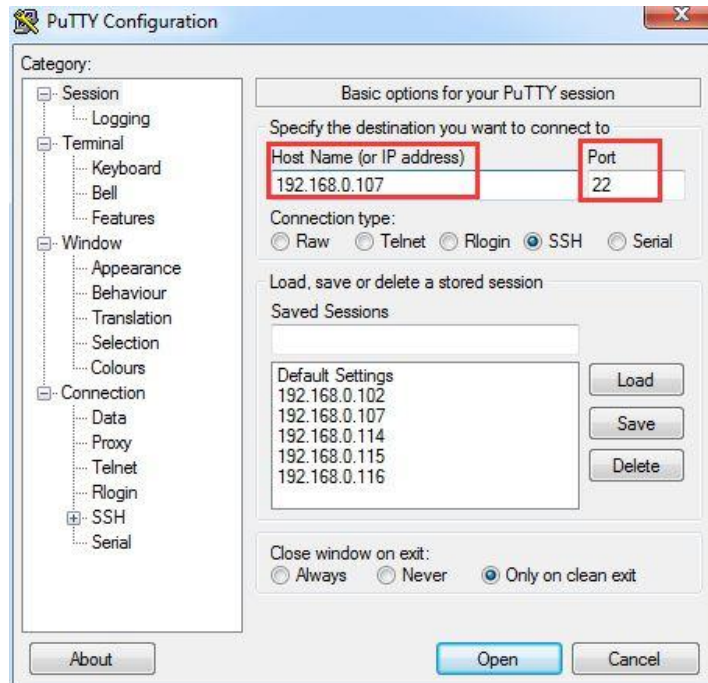
Here we take PuTTY for windows users as example. Please download PuTTY from: <https://www.chiark.greenend.org.uk/~sgtatham/putty/> and install this exe. in your Windows PC



Step 5. Open PuTTY and click Session on the left tree-like structure (generally it's collapsed upon PuTTY startup):

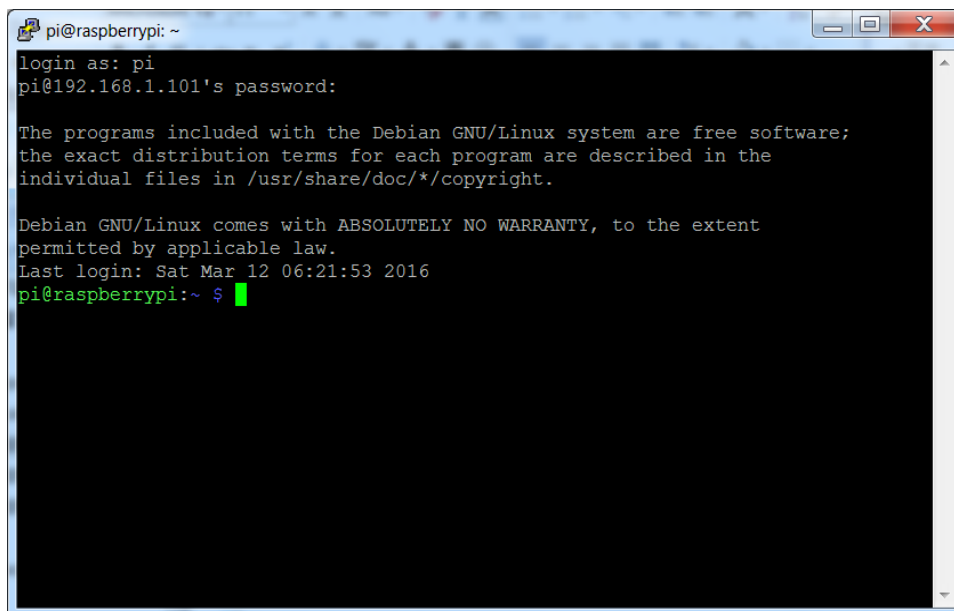


Step 6. Enter the IP address you got from step1 under Host Name (or IP address) and 22 under Port (by default it is 22), then click open.



Step 7. Note that when you first log in to the Raspberry Pi with the IP address, you'll be prompted with a security reminder. Just click **Yes**. When the PuTTY window prompts login as: type in the user name: **pi**, and password: **raspberrypi** (the default one, if you haven't changed it).

*Note: when you're typing the password in, the window shows nothing just null, but you're in fact is typing things in. So just focus on typing it right and press Enter. After you log in the RPi successfully, the window will display as follows:*



## ROTATE THE DISPLAY DIRECTION

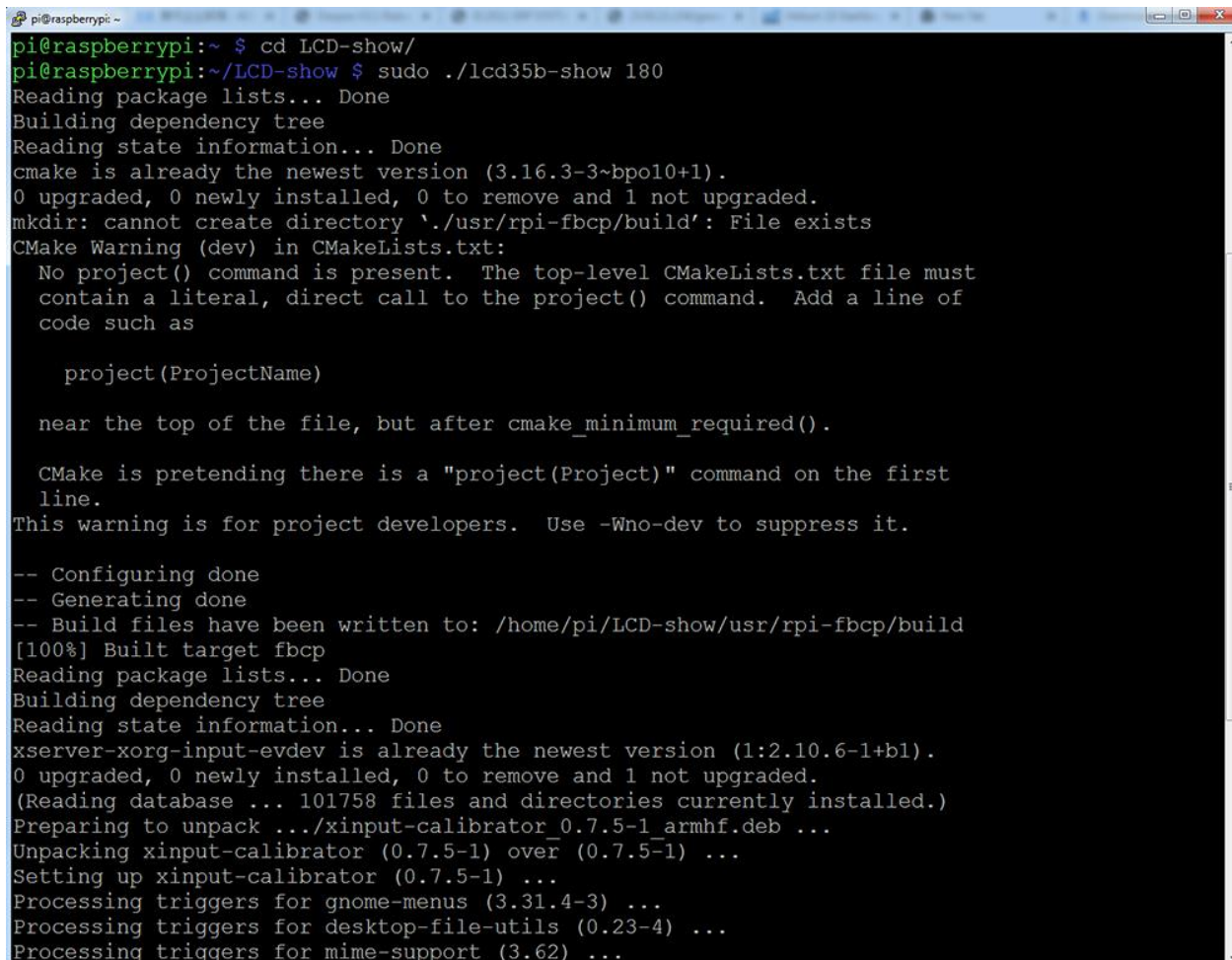
Step1. Enter ssh tool to control Raspberry Pi remotely

Step2. After installing the touch driver, you can rotate display 90 degrees clockwise direction by running the following commands (Note: #90 can be 0, 90, 180 and 270.

Indicates that the display rotates 0 degrees, 90 degrees, 180 degrees and 270 degrees clockwise direction, respectively.)

**cd LCD-show/**

**sudo ./lcd35b-show 90**



```
pi@raspberrypi:~ $ cd LCD-show/
pi@raspberrypi:~/LCD-show $ sudo ./lcd35b-show 180
Reading package lists... Done
Building dependency tree
Reading state information... Done
cmake is already the newest version (3.16.3-3~bpo10+1).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
mkdir: cannot create directory './usr/rpi-fbcp/build': File exists
CMake Warning (dev) in CMakeLists.txt:
  No project() command is present.  The top-level CMakeLists.txt file must
  contain a literal, direct call to the project() command.  Add a line of
  code such as

      project(ProjectName)

  near the top of the file, but after cmake_minimum_required().

  CMake is pretending there is a "project(Project)" command on the first
  line.
This warning is for project developers.  Use -Wno-dev to suppress it.

-- Configuring done
-- Generating done
-- Build files have been written to: /home/pi/LCD-show/usr/rpi-fbcp/build
[100%] Built target fbcv
Reading package lists... Done
Building dependency tree
Reading state information... Done
xserver-xorg-input-evdev is already the newest version (1:2.10.6-1+b1).
0 upgraded, 0 newly installed, 0 to remove and 1 not upgraded.
(Reading database ... 101758 files and directories currently installed.)
Preparing to unpack ../xinput-calibrator_0.7.5-1_armhf.deb ...
Unpacking xinput-calibrator (0.7.5-1) over (0.7.5-1) ...
Setting up xinput-calibrator (0.7.5-1) ...
Processing triggers for gnome-menus (3.31.4-3) ...
Processing triggers for desktop-file-utils (0.23-4) ...
Processing triggers for mime-support (3.62) ...
```

## INSTALL VIRTUAL KEYBOARD

Step 1. Enter ssh tool to control Raspberry Pi remotely

Step 2. Update matchbox-keyboard

**sudo apt-get install update**

**sudo apt-get install matchbox-keyboard**

```
pi@raspberrypi:~ $ sudo apt-get install update
Reading package lists... Done
Building dependency tree
Reading state information... Done
E: Unable to locate package update
pi@raspberrypi:~ $ sudo apt-get install matchbox-keyboard
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  libfakekey0 matchbox-keyboard-im
The following NEW packages will be installed:
  libfakekey0 matchbox-keyboard matchbox-keyboard-im
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.
Need to get 44.3 kB of archives.
After this operation, 162 kB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://mirrors.zju.edu.cn/raspbian/raspbian buster/main armhf libfakekey0 armhf 0.1-10 [5,792 B]
Get:2 http://mirrors.sjtug.sjtu.edu.cn/raspbian/raspbian buster/main armhf matchbox-keyboard armhf 0.1+svn20080916-12 [28.4 kB]
Get:3 http://mirrors.sjtug.sjtu.edu.cn/raspbian/raspbian buster/main armhf matchbox-keyboard-im armhf 0.1+svn20080916-12 [10.1 kB]
Fetched 44.3 kB in 3s (16.8 kB/s)
Selecting previously unselected package libfakekey0:armhf.
(Reading database ... 101759 files and directories currently installed.)
Preparing to unpack .../libfakekey0_0.1-10_armhf.deb ...
Unpacking libfakekey0:armhf (0.1-10) ...
Selecting previously unselected package matchbox-keyboard.
Preparing to unpack .../matchbox-keyboard_0.1+svn20080916-12_armhf.deb ...
Unpacking matchbox-keyboard (0.1+svn20080916-12) ...
Selecting previously unselected package matchbox-keyboard-im.
Preparing to unpack .../matchbox-keyboard-im_0.1+svn20080916-12_armhf.deb ...
Unpacking matchbox-keyboard-im (0.1+svn20080916-12) ...
Setting up matchbox-keyboard-im (0.1+svn20080916-12) ...
Setting up libfakekey0:armhf (0.1-10) ...
Setting up matchbox-keyboard (0.1+svn20080916-12) ...
```

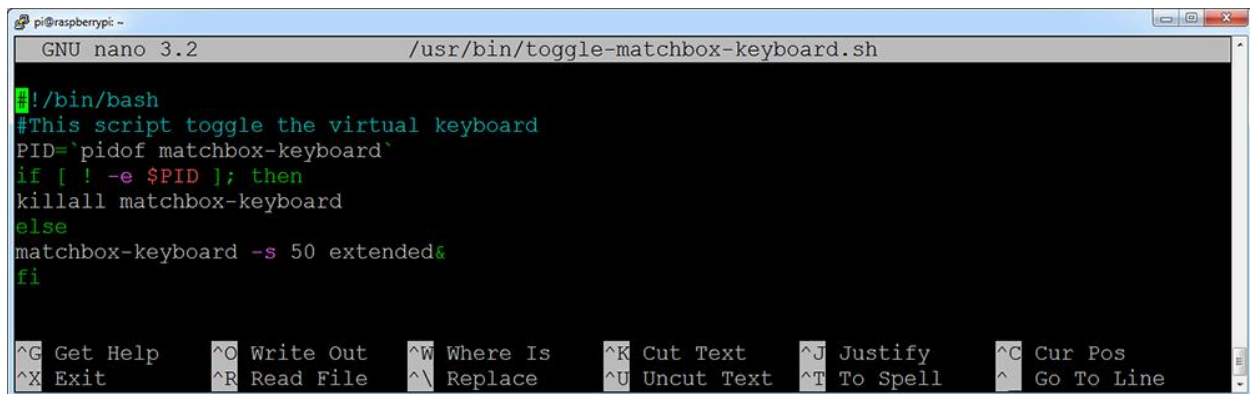
Step 3. Run the following command to create file toggle-matchbox-keyboard.sh under /usr/bin

**sudo nano /usr/bin/toggle-matchbox-keyboard.sh**

```
pi@raspberrypi:~ $ sudo nano /usr/bin/toggle-matchbox-keyboard.sh
Processing triggers for man-db (2.8.5-2) ...
Processing triggers for desktop-file-utils (0.23-4) ...
```

Step 4. Copy the statements below to toggle-matchbox-keyboard.sh and press ctrl + X then Y to save this file, then click “enter” to exit nano editor (Note: press right key of keyboard to paste statements in Putty terminal).

```
#!/bin/bash
#This script toggle the virtual keyboard
PID=`pidof matchbox-keyboard`
if [ ! -e $PID ]; then
killall matchbox-keyboard
else
matchbox-keyboard -s 50 extended&
fi
```

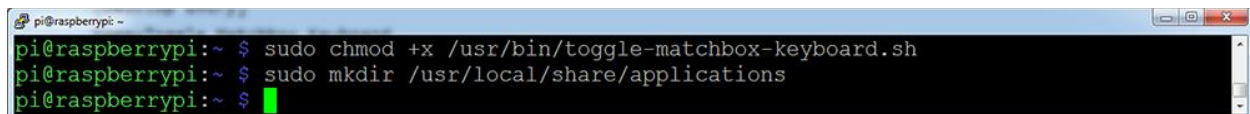


```
pi@raspberrypi ~
GNU nano 3.2 /usr/bin/toggle-matchbox-keyboard.sh
#!/bin/bash
#This script toggle the virtual keyboard
PID=`pidof matchbox-keyboard`
if [ ! -e $PID ]; then
killall matchbox-keyboard
else
matchbox-keyboard -s 50 extended&
fi
^G Get Help      ^O Write Out    ^W Where Is    ^K Cut Text    ^J Justify    ^C Cur Pos
^X Exit          ^R Read File   ^\ Replace     ^U Uncut Text ^T To Spell   ^_ Go To Line
```

Step 5. Execute the commands:

```
sudo chmod +x /usr/bin/toggle-matchbox-keyboard.sh
```

```
sudo mkdir /usr/local/share/applications
```



```
pi@raspberrypi ~ $ sudo chmod +x /usr/bin/toggle-matchbox-keyboard.sh
pi@raspberrypi ~ $ sudo mkdir /usr/local/share/applications
pi@raspberrypi ~ $
```

Step 6. Run the following command to create file applications/toggle-matchbox-keyboard.desktop under /usr/local/share/applications/

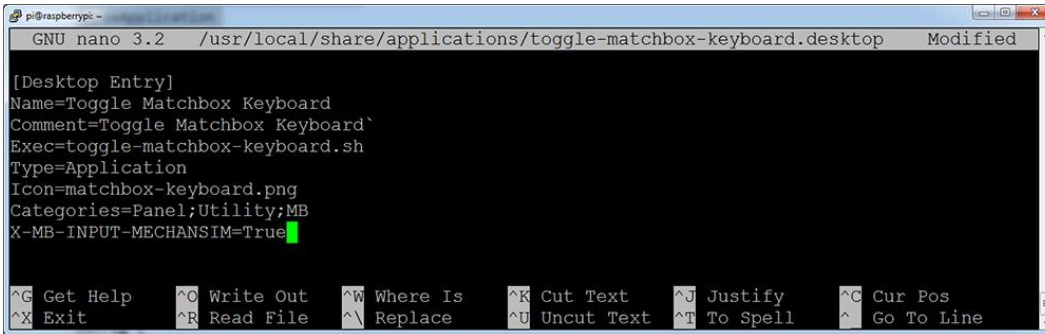
```
sudo nano /usr/local/share/applications/toggle-matchbox-keyboard.desktop
```



```
pi@raspberrypi ~ $ sudo nano /usr/local/share/applications/toggle-matchbox-keyboard.desktop
```

Step 7. Copy the statements to toggle-matchbox-keyboard.desktop and and press ctrl + X then Y to save this file, then click “enter” to exit nano editor. (Note: press right key of keyboard to paste statements in Putty terminal)

```
[Desktop Entry]
Name=Toggle Matchbox Keyboard
Comment=Toggle Matchbox Keyboard`
Exec=toggle-matchbox-keyboard.sh
Type=Application
Icon=matchbox-keyboard.png
Categories=Panel;Utility;MB
X-MB-INPUT-MECHANSIM=True
```




```
pi@raspberrypi: ~
GNU nano 3.2 /usr/local/share/applications/toggle-matchbox-keyboard.desktop Modified

[Desktop Entry]
Name=Toggle Matchbox Keyboard
Comment=Toggle Matchbox Keyboard
Exec=toggle-matchbox-keyboard.sh
Type=Application
Icon=matchbox-keyboard.png
Categories=Panel;Utility;MB
X-MB-INPUT-MECHANSIM=True

^G Get Help      ^O Write Out    ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos
^X Exit          ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell    ^_ Go To Line
```

Step 8. Execute commands as below. Note that you need to use “Pi ” user permission instead of root to execute this command.

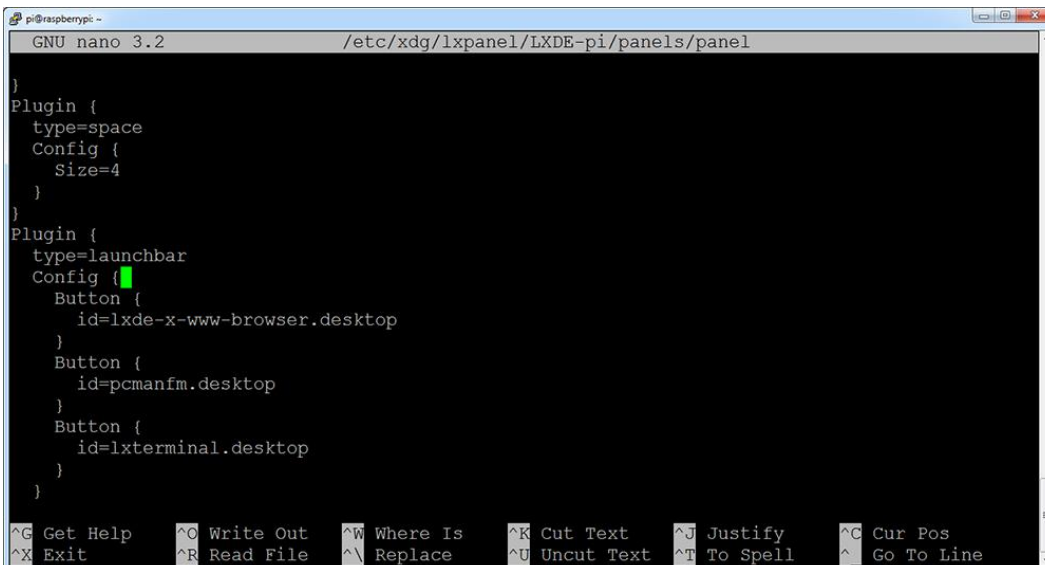
**sudo nano /etc/xdg/lxpanel/LXDE-pi/panels/panel**



```
pi@raspberrypi: ~
pi@raspberrypi:~$ sudo nano /etc/xdg/lxpanel/LXDE-pi/panels/panel
```

6. Find the statement which is similar to below: (It maybe different in different version. You can use ctrl + W to search button to find this part)

```
Plugin {
type = launchbar
Config {
Button {
id=lxde-screenlock.desktop
}
Button {
id=lxde-logout.desktop
}
}
```



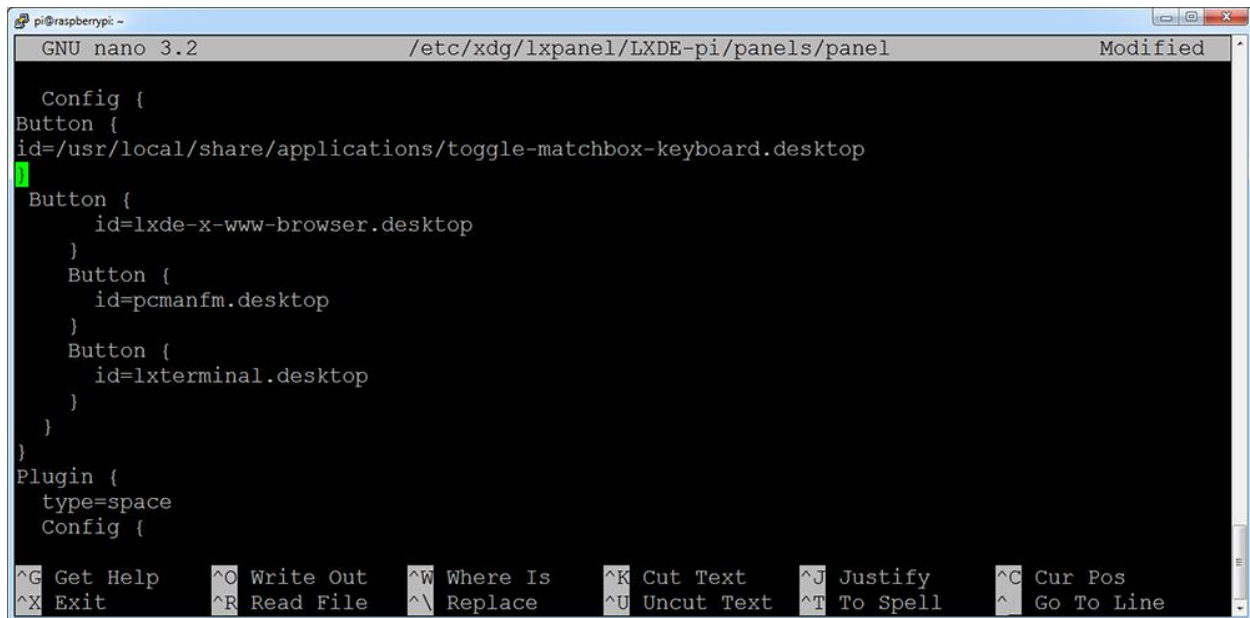
```
pi@raspberrypi: ~
GNU nano 3.2 /etc/xdg/lxpanel/LXDE-pi/panels/panel

}
Plugin {
type=space
Config {
Size=4
}
}
Plugin {
type=launchbar
Config {
Button {
id=lxde-x-www-browser.desktop
}
Button {
id=pcmanfm.desktop
}
Button {
id=lxterminal.desktop
}
}
}

^G Get Help      ^O Write Out    ^W Where Is    ^K Cut Text    ^J Justify     ^C Cur Pos
^X Exit          ^R Read File   ^\ Replace     ^U Uncut Text  ^T To Spell    ^_ Go To Line
```

7. Append these statements to add an button option, and press ctrl + X then Y to save this file, then click “enter” to exit nano editor. (Note: press right key of keyboard to paste statements in Putty terminal)

```
Button {  
id=/usr/local/share/applications/toggle-matchbox-keyboard.desktop  
}
```



```
pi@raspberrypi ~  
GNU nano 3.2 /etc/xdg/lxpanel/LXDE-pi/panels/panel Modified  
Config {  
Button {  
id=/usr/local/share/applications/toggle-matchbox-keyboard.desktop  
|  
Button {  
id=lxde-x-www-browser.desktop  
}  
Button {  
id=pcmanfm.desktop  
}  
Button {  
id=lxterminal.desktop  
}  
}  
Plugin {  
type=space  
Config {
```

8. Run the following command to reboot your Raspberry Pi. If the virtual keyboard is installed correctly, you can find that there is a keyboard icon on the left of the bar  
sudo reboot