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## Raspberry Pi drive 1.44inch LCD HAT with fbtft



三月 30, 2018

The hardware:

- [Raspberry Pi 3B](#)
- [1.44inch LCD HAT](#)

The software:

- [Raspbian](#)
- [fbtft](#)

Some users feedback that this LCD less of instruction and some of them like to use it as a monitor of Pi. So, this article Let's learn how to port fbtft for displaying with Raspberry Pi.



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There is an open source project on github: <https://github.com/notro/fbtf>. Thanks to its contributors. With this project, Raspberry Pi could supports TFT LCD perfectly. Let's do it.

## Framebuffer

1. Open and edit module file to enable modules

```
sudo nano /etc/modules
```

Append two statement below to the file . The first one is to enable the SPI of Pi and the second is used to start the fbtf device.

```
spi-bcm2835  
fbtf_device
```

2. Creating a new file for fbtf configuration

```
sudo nano /etc/modprobe.d/fbtf.conf
```

Add the statements to this new file:

```
# /etc/modprobe.d/fbtf.conf  
options fbtf_device name=adafruit18_green  
gpios=reset:27,dc:25,cs:8,led:24 speed=40000000 bgr=1 fps=60 custom=1 height=128 width=128  
rotate=180
```

**Note:** You need to edit the name to the exact type of controller of your LCD. The controller of 1.44inch LCD HAT is ST7735s which is same as adafruit18\_green and the fbtf support it as well, so we use adafruit18\_green here.

gpios=reset:27,dc:25,cs:8,led:24 This statement set the PIN of LCD according to the schematic.

height=128 width=128 rotate=180 Set the resolution of LCD and the orinetatin of display .

3. Restart your Pi. If you find that the screen is became black display then it is working. (Don't forget inset your LCD to Pi at first)

4. list the device and you can find that there is a device fb1. Otherwise the device failed to boot.

```

pi@raspberrypi:~$ ls /dev
autofs          gpimem          mem              ram12             tty18            tty33            tty49            tty7              vcs5
block           hwrng           memory_bandwidth ram13             tty19            tty34            tty5             tty8              vcs6
btrfs-control  i2c-1          mmcblk0          ram14            tty2             tty35            tty50            tty9              vcs7
bus             initctl         mmcblk0p1        ram15            tty20            tty36            tty51            ttyAMA0           vcsa
cachefiles     input          mmcblk0p2        ram2             tty21            tty37            tty52            ttyprintk         vcsa1
char           kmsg           net              ram3             tty22            tty38            tty53            ttyS0             vcsa2
console        log            network_latency  ram4             tty23            tty39            tty54            uhid              vcsa3
cpu_dma_latency loop0          network_throughput ram5             tty24            tty4             tty55            uinput           vcsa4
cuse           loop1          null             ram6             tty25            tty40            tty56            urandom           vcsa5
disk           loop2          ppp              ram7             tty26            tty41            tty57            vchiq            vcsa6
fb0            loop3          pts              ram8             tty27            tty42            tty58            vcio             vcsa7
fb1            loop4          random           ram9             tty28            tty43            tty59            vc-mem           vcsa8
fd             loop5          raw              ram10            tty29            tty44            tty6             vcs              vchi
full           loop6          rfkill           ram11            tty3             tty45            tty60            vcs1             watchdog
fuse           loop7          serial0          ram1              tty15            tty46            tty61            vcs2             watchdog0
gpiochip0      loop-control  serial1          ram10             tty31            tty47            tty62            vcs3             zero
gpiochip1      mapper        serial1          ram11            tty32            tty48            tty63            vcs4
pi@raspberrypi:~$

```

5. Use fbset command to get the information of fb device

```
sudo fbset -i
```

6. If you failed to execute the fbset command you can install it and try again

```
sudo apt-get install fbset
```

```

pi@raspberrypi:~$ sudo fbset -i

mode "128x128"
  geometry 128 128 128 128 32
  timings 0 0 0 0 0 0 0
  rgba 8/16,8/8,8/0,8/24
endmode

Frame buffer device information:
  Name       : BCM2708 FB
  Address    : 0x3ebda000
  Size       : 65536
  Type       : PACKED PIXELS
  Visual     : TRUECOLOR
  XPanStep   : 1
  YPanStep   : 1
  YWrapStep  : 0
  LineLength : 512
  Accelerator : No
pi@raspberrypi:~$

```

As the image above, the resolution 128x128 is correct. However, others are wrong like the size is 32768 in fact but not 65536.

7. Read the memory with command:

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Type at the bottom to change its format to HEX: `:%!xxd`

```
00000000: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000010: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000020: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000030: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000040: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000050: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000060: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000070: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000080: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000090: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000a0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000b0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000c0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000d0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000e0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000000f0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000100: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000110: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000120: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000130: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000140: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000150: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000160: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000170: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000180: 0000 0000 0000 0000 0000 0000 0000 0000  .....
00000190: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000001a0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000001b0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
000001c0: 0000 0000 0000 0000 0000 0000 0000 0000  .....
:%!xxd
```

9. You can see that there are all 0 on the memory, it is why the screen display black. We change the first line to FF, **convert to BIN file** again and save.

```
:%!xxd -r
:wq
```

10. Display it

```
sudo cat fb.fb > /dev/fb1
```

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Lets display a picture, first we need to install the PIL library of python

```
sudo apt-get install python-imaging
```

The code are:

```
#!/usr/bin/env python2
import os
import struct
from PIL import Image

im = Image.open('time.bmp')
im = im.rotate(270)

w, h = im.size
print( "w:", w , "h:", h)

with open('/dev/fb1', 'wb') as f:
    for j in range(0,h):
        for i in range(0,w):
            r,g,b =im.getpixel((i,j))
            rgb=struct.pack('H', ((r >> 3) << 11) | ((j >> 2) << 5) | (b >> 3))
            f.write(rgb);
```

The code will read one image, convert it to data and write to device /dev/fb1. Note that the display uses two bytes for one pixel which is based on RGB565.

If you run the code above, you will find that the screen displays line by line, it looks uncomfortable.

We can modify the code, first store data to fb file and then display it by command **cat**

```
#!/usr/bin/env python2
import os
import struct
from PIL import Image

im = Image.open('time.bmp')
im = im.rotate(270)

w, h = im.size
print( "w:", w , "h:", h)

with open('time.fb', 'wb') as f:
```

```
os.system('cat time.fb > /dev/fb1')
```

Here we share these projects for you. You can click to download.

[Fbtf.tar.gz](#)

## Display Desktop

To display the desktop, we need to copy the content of fb0 to fb1 to make them keep synchronous.

### 1. Install cmake tool

```
sudo apt-get install cmake git
```

### 2. Use the open source project we mention before

```
cd ~
git clone https://github.com/tasanakorn/rpi-fbcp
cd rpi-fbcp/
mkdir build
cd build/
cmake ..
make
sudo install fbcp /usr/local/bin/fbcp
```

### 3. Modify the file:

```
sudo nano /etc/rc.local
```

Add **fbcp&** in front of **exit 0**

**Note: the character & is necessary, Otherwise the pi may failed to boot**

```
# Print the IP address
_IP=$(hostname -I) || true
if [ "$_IP" ]; then
    printf "My IP address is %s\n" "$_IP"
fi

fbcp&
exit 0
```

### 4. Set the config.txt file

```
sudo vi /boot/config.txt
```

Add statement:

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```
hdmi_mode = 87  
display_rotate = 1
```

5. Reboot your Pi and the LCD will display the desktop



### Keeping lighting

1. Open the lightdm.conf file:

```
sudo vi /etc/lightdm/lightdm.conf
```

2. Modify lightdm.conf

find the 'xserver-command' which is under the option [SeatDefaults]. Uncomment the statement: **#xserver-command=X** and change it to **xserver-command=X -s 0 -dpms**

- -s: Disable the display protection
- dpms: close the power efficiency manage

3. Finally, reboot your Pi.

Some users may like to use it for games, you could refer to these links, and we will not explain anymore.

<https://www.sudomod.com/forum/viewtopic.php?f=11&t=5371&start=10>

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## Make a new larger font for Waveshare SPI e-Paper

八月 23, 2018



There are five fonts (font8, font12, font16, font20 and font24) provided for e-Paper. Some users just want to make their customized fonts or bigger font, but have no idea about how to do it.

This Blog, I will tell you how the provided fonts works and how to make a new bigger fo

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[阅读全文](#)

## Re-Compile Raspbian Kernel for Touch Rotation of Waveshare HDMI LCD

三月 02, 2018



Several months ago, if users of Waveshare HDMI LCD ask about how could I rotate the LCD not only the display but as well as the touch. We always said that you need to re-compile the kernel but we have no instruction about it. And two months ago we provided another method that modi

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