

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/fbtft>. 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 fbtft device.

```
spi-bcm2835  
fbtft_device
```

2. Creating a new file for fbtft configuration

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

Add the statements to this new file:

```
# /etc/modprobe.d/fbtft.conf  
options fbtft_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 fbtft 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 orientation 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      gpiomen   mem          raml2    [redacted]  tty18  tty33  tty49  tty7    vcs5
block       hwrng     memory_bandwidth raml3    [redacted]  tty19  tty34  tty5   tty8    vcs6
btrfs-control i2c-1    mmcblk0      raml4    [redacted]  spidev0.1  tty2   tty35  tty50  tty9    vcs7
bus         initctl   mmcblk0p1    raml5    [redacted]  stderr   tty20  tty36  tty51  ttyAMA0  vcsa
cachefiles  input     mmcblk0p2    raml6    [redacted]  stdin    tty21  tty37  tty52  ttyprintk  vcsal
char        kmsg      mmcblk0p3    raml7    [redacted]  stdout   tty22  tty38  tty53  ttyS0    vcsa2
console     log       net          raml8    [redacted]  tty     tty23  tty39  tty54  uhid    vcsa3
cpu_dma_latency loop0    network_latency raml9    [redacted]  tty0    tty24  tty4   tty55  uinput   vcsa4
cuse        loop1    network_throughput raml10   [redacted]  tty1    tty25  tty40  tty56  urandom  vcsa5
disk        loop2    null         raml11   [redacted]  ram     tty10  tty26  tty41  tty57  vchiq    vcsa6
fb0         loop3    ppp          raml12   [redacted]  random   tty13  tty29  tty44  tty6    vcs
fb1         loop4    ptmx         raml13   [redacted]  raw     tty14  tty3   tty45  tty60  vcs1    watchdog
fd          loop5    pts          raml14   [redacted]  rfkill   tty15  tty30  tty46  tty61  vcs2    watchdog0
full        loop6    ram0         raml15   [redacted]  serial0  tty16  tty31  tty47  tty62  vcs3    zero
fuse        loop7    ram1         raml16   [redacted]  serial1  tty17  tty32  tty48  tty63  vcs4
gpiochip0   loop-control raml17   [redacted]
gpiochip1   mapper    raml18   [redacted]
pi@raspberrypi:~ $

```

5. Use fbset command to get the information of fbtft 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
    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
```

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:
```

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

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

[Fbtft.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-fbcm  
cd rpi-fbcm/  
mkdir build  
cd build/  
cmake ..  
make  
sudo install fbc /usr/local/bin/fbc
```

3. Modify the file:

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

Add **fbc&** 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  
  
fbc&  
exit 0
```

4. Set the config.txt file

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

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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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八月 23, 2018



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

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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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