FBTFT INSTALLATION

Automatic Installation

Download the installation script `rpi-display.sh` and run it with root rights. The last parameter sets the display orientation and can be 0, 90, 180 or 270. Commands (X windows is the desktop):

```
$ wget -N https://github.com/watterott/RPi-Display/raw/master/rpi-display.sh
$ sudo /bin/bash rpi-display.sh 270

Enable TFT display driver and activate X windows on TFT display? y/n Y
Activate the console on the TFT display? y/n Y
Install fbcp (Framebuffer Copy)? y/n N
Install xinput-calibrator? y/n Y
Install tslib (touchscreen library)? y/n N
Reboot the system now? y/n Y
Rebooting now...

$ sudo startx
```

If there are problems with `wget`, then use `curl` for the download:

```
$ curl -k -L -o rpi-display.sh https://github.com/watterott/RPi-Display/raw/master/rpi
```

To start the desktop run one of the commands.

```
$ sudo startx -- -layout TFT
$ sudo startx -- -layout HDMI
$ sudo startx -- -layout HDMITFT
```

If `-layout` is not set, then the TFT display will be used as default.

Manual Installation

1. Install FBTFT

Further information here.

- ### Raspbian

  The latest official Raspberry Pi Device Tree enabled Kernel includes FBTFT, so you need an up to date system. To update your system run:

```
$ sudo apt-get update
$ sudo rpi-update
$ sudo reboot
```

- ### Other Linux Systems

  Update the Kernel with:

```
$ sudo curl -L --output /usr/bin/rpi-update
https://raw.githubusercontent.com/Hexxeh/rpi-update/master/rpi-update &&
sudo chmod +x /usr/bin/rpi-update
$ sudo REPO_URI=https://github.com/notro/rpi-firmware rpi-update
$ sudo reboot
```

  On compatibility errors run rpi-update as follows:

```
$ sudo -E RPI_UPDATE_UNSUPPORTED=0 REPO_URI=https://github.com/notro/rpi-firmware
```

- ### Touchscreen Tools

  To install the touchscreen tools run:

```
$ sudo apt-get install tslib libts-bin
$ sudo apt-get install xinput
$ sudo apt-get install xinput-calibrator
```

2. Activate FBTFT

Note: For a higher speed than 16MHz the display has to be connected directly to the Raspberry Pi or with wires not longer than 5cm.

Choose your respective Kernel version. The default on the latest Raspbian is a Device Tree enabled Kernel.

- ## FBTFT Device Tree enabled Kernel

  ### RPi-Display (8-Bit SPI)

  Open the file `/boot/config.txt` :

  ```
  $ sudo nano /boot/config.txt
  ```

  Add the following line at the file end (rotate can be 0, 90, 180, 270):

  ```
  dtoverlay=rpi-display,speed=32000000,rotate=270
  ```

  The default parameters are `speed=32000000, backlight=12, fps=30, rotate=270` .

  Reboot the system:

  ```
  $ sudo reboot
  ```

  ### ADS7846 Touchcontroller

  Parameters for the ADS7846 overlay (in `/boot/config.txt`) when the **RPi-Display overlay is not used**.

  ```
  dtoverlay=ads7846,cs=1,penirq=25,speed=2000000, swapxy=0, pmax=255,
  xohms=60, xmin=200, xmax=3900, ymin=200, ymax=3900
  ```

To make the touchcontroller accessible as char device `/dev/input/touchscreen` create a new file `/etc/udev/rules.d/95-ads7846.rules` and add the following line:

```
SUBSYSTEM=="input", KERNEL=="event[0-9]*", ATTRS{name}=="ADS7846
Touchscreen", SYMLINK+="input/touchscreen"
```

- ## FBTFT Kernel Modules

To use the fbtft_device module instead of an overlay on a Device Tree enabled Kernel, add the following line to `/boot/config.txt` :

```
dtparam=spi=on
```

If the SPI module (**spi-bcm2708**) is not loaded, remove or comment out the blacklist line in `/etc/modprobe.d/raspi-blacklist.conf` . To load the module by hand run `$ sudo modprobe spi-bcm2708` .

Infos about the automatic loading of modules here.

RPi-Display (8-Bit SPI)

```
$ sudo modprobe fbtft_device name=rpi-display speed=32000000 rotate=270
```

RPi-Display (9-Bit SPI)

Note: Only first generation RPi-Displays before April 2014 use 9-Bit SPI.

```
$ sudo modprobe fbtft_device name=mi0283qt-9a gpios=reset:23,led:18
speed=32000000 rotate=270
```

MI0283QT-Adapter v1.5 (8-Bit SPI)

Note: The display has to be set to 8-Bit SPI.

```
$ sudo modprobe fbtft_device name=rpi-display speed=16000000 rotate=270
```

MI0283QT-Adapter v1 on RPi-ShieldBridge v1 (9-Bit SPI)

```
$ sudo modprobe fbtft_device name=mi0283qt-9a gpios=reset:23,led:24
speed=32000000 rotate=270
```

MI0283QT-Adapter v2 on RPi-ShieldBridge v1 (8-Bit SPI)

```
$ sudo modprobe fbtft_device name=mi0283qt-v2 gpios=reset:23
speed=16000000 rotate=270
```

ADS7846 Touchcontroller

```
$ sudo modprobe ads7846_device model=7846 cs=1 gpio_pendown=25
speed=2000000 keep_vref_on=1 x_plate_ohms=60 pressure_max=255 x_min=200
x_max=3900 y_min=200 y_max=3900
```

To make the touchcontroller accessible as char device `/dev/input/touchscreen` create a new file `/etc/udev/rules.d/95-ads7846.rules` and add the following line:

```
SUBSYSTEM=="input", KERNEL=="event[0-9]*", ATTRS{name}=="ADS7846
Touchscreen", SYMLINK+="input/touchscreen"
```

- ## FBTFT compiled into Kernel (BRANCH=builtin)

RPi-Display (8-Bit SPI)

Add the following Kernel arguments to `/boot/cmdline.txt` :

```
fbtft_device.name=rpi-display fbtft_device.speed=32000000
fbtft_device.rotate=270
```

RPi-Display (9-Bit SPI)

Note: Only first generation RPi-Displays before April 2014 use 9-Bit SPI.

Add the following Kernel arguments to `/boot/cmdline.txt` :

```
fbtft_device.name=mi0283qt-9a fbtft_device.speed=32000000
fbtft_device.gpios=reset:23,led:18 fbtft_device.rotate=270
```

MI0283QT-Adapter v1.5 (8-Bit SPI)

Note: The display has to be set to 8-Bit SPI.

Add the following Kernel arguments to `/boot/cmdline.txt` :

```
fbtft_device.name=rpi-display fbtft_device.speed=16000000
fbtft_device.rotate=270
```

MI0283QT-Adapter v1 on RPi-ShieldBridge v1 (9-Bit SPI)

Add the following Kernel arguments to `/boot/cmdline.txt` :

```
fbtft_device.name=mi0283qt-9a fbtft_device.speed=16000000
fbtft_device.gpios=reset:23,led:24 fbtft_device.rotate=270
```

MI0283QT-Adapter v2 on RPi-ShieldBridge v1 (8-Bit SPI)

Add the following Kernel arguments to `/boot/cmdline.txt` :

```
fbtft_device.name=mi0283qt-v2 fbtft_device.speed=4000000
fbtft_device.gpios=reset:23 fbtft_device.rotate=270
```

3. Enable for Console

Run in console (not desktop terminal):

```
$ con2fbmap 1 1
```

To make it permanent (on Debian) add to the file `/boot/cmdline.txt` at the end of the line the following Kernel arguments: `fbcon=map:10 fbcon=font:VGA8x8`

4. Enable for X-Window-System

If you have not used the automatic installation script then open `99-fbturbo.conf` and change *fb0* to *fb1* (only needed once):

```
$ sudo nano /usr/share/X11/xorg.conf.d/99-fbturbo.conf
```

Start X-Window-System:

```
$ startx &
```

...wait till X-Window-System starts up and set the ADS7846 properties:

- rotate=0 *(no settings needed)*
- rotate=90

```
$ DISPLAY=:0 xinput --set-prop 'ADS7846 Touchscreen' 'Evdev Axes Swap' 1
$ DISPLAY=:0 xinput --set-prop 'ADS7846 Touchscreen' 'Evdev Axis
Inversion' 1 0
```

- rotate=180

```
$ DISPLAY=:0 xinput --set-prop 'ADS7846 Touchscreen' 'Evdev Axis
Inversion' 1 1
```

- rotate=270

```
$ DISPLAY=:0 xinput --set-prop 'ADS7846 Touchscreen' 'Evdev Axes Swap' 1
$ DISPLAY=:0 xinput --set-prop 'ADS7846 Touchscreen' 'Evdev Axis
Inversion' 0 1
```

...to stop X-Window-System:

```
$ sudo pkill x
```

To make it permanent (on Debian) add to the file `/etc/X11/xinit/xinitrc` the respective settings. Further infos: xinput settings and autostart x.

5. Calibrate Touchpanel (optional)

For better accuracy a touchpanel calibration can be done with:

- **xinput_calibrator**

```
$ sudo DISPLAY=:0 xinput_calibrator --device "ADS7846 Touchscreen" --
output-type xinput
```

- **ts_calibrate**

```
$ sudo TSLIB_FBDEVICE=/dev/fb1 TSLIB_TSDEVICE=/dev/input/touchscreen
ts_calibrate
$ sudo TSLIB_FBDEVICE=/dev/fb1 TSLIB_TSDEVICE=/dev/input/touchscreen
ts_test
```

6. Further Infos

- FBTFT on Raspian
- FBTFT Setup on modern Raspbian
- FBTFT on Arch Linux

Tests

Video Test

- Download the test video (file is about 60MB big):

```
$ wget
http://download.blender.org/peach/bigbuckbunny_movies/BigBuckBunny_320x18(
```

- Play with **mplayer**:

```
$ sudo apt-get install mplayer
$ mplayer -vo fbdev2:/dev/fb1 -vf scale=320:-3 BigBuckBunny_320x180.mp4
```

- Play with **omxplayer** (*fbcp* for framebuffer mirroring required):

```
$ fbcp &
$ omxplayer BigBuckBunny_320x180.mp4
$ killall fbcp
```

Pygame Test

- Install **libsdl 1.2** (further infos here):

```
wget -N
https://files.watterott.com/fbtft/libsdl1.2debian_1.2.15+veloci1-
1_armhf.deb
sudo dpkg -i libsdl1.2debian_1.2.15+veloci1-1_armhf.deb
sudo apt-get -f install
```

File mirror:

`https://www.dropbox.com/s/0tkdym8ojhcmbu2/libsdl1.2debian_1.2.15+veloci1-1_armhf.d`

- Install **Pygame**:

```
sudo apt-get install python-pygame
```

- Download and run test script:

```
wget -N https://github.com/watterott/RPi-
Display/raw/master/software/pygame.py
sudo python pygame.py
```