

Raspberry Pi Internet Radio

Tune in and chill out

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With this project you can listen to any online radio station, without forking out on a dedicated Internet radio.

Features

- Plays streaming audio from Internet radio stations
- Uses built-in audio jack
- Operates stand-alone
- Add your own favorite radio stations
- No soldering required

Internet radios are available widely and in many shapes and sizes, but they can get quite expensive. With this project you can make one yourself using the by now ubiquitous Raspberry Pi 2. Through the headphone jack it plays audio decoded from a radio stream on the Internet. To make it you need a Raspberry Pi, a 2.8-inch touchscreen, an SD card, and optionally a Wi-Fi dongle. The user interface is made in python using pygame. The code is easy to understand and can be adapted to your own taste.

Installation

First we need to install Raspbian on the Raspberry Pi. Download Raspbian Jessie from [1] and use Win32DiskImager, free download from [2], to burn the *image* on an empty SD card with a capacity of at least 4 GB. When done, insert the SD card in the Raspberry Pi SD card slot, attach a monitor, mouse, keyboard and a USB Wi-Fi dongle (or a hard-wired Internet connection) and power it up. When the Raspberry Pi has finished booting we can set the network like in the top right corner in **Figure 1**. After connecting to the network, write down the IP address of the Raspberry Pi. This is useful for configuring it later. To get the IP address, hover the mouse over the icon used to connect to the network.

Now we have to install the touchscreen libraries. If you haven't already attached the touchscreen, now is the time. But not before having shut down the Raspberry Pi (top left corner, select Shutdown)! Attach the touchscreen and power the RPi on again. We will install the necessary drivers via the computer. Download PuTTY from [3], start the program and enter the IP address of your RPi in the bar that says "Host address



(or IP address)". If a notification pops up, click "Yes". Now a terminal window should open, asking you to log on. Log on with username "pi" and password "raspberrypi". Now type

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

and press Enter. This will download the necessary files from github. When the prompt returns, type

```
sudo /bin/bash rpi-display.sh 270
```

This will install the github files in the system. After some time, some questions appear. Answer them as follows:

- | | | |
|--|-----|----------|
| • 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 | Y |
| • Calibrate touchscreen now? | y/n | N |
| • Reboot the system now? | y/n | Y |

The Raspberry Pi will reboot and the connection with the computer will be lost. If everything goes right, you should see the user interface on the touchscreen when the Raspberry Pi boots up.

Calibration & music player

To configure the touchscreen, reconnect to the RPi using PuTTY. Log in and type

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

On the touchscreen you'll see the calibration program (see **Figure 2**). After completing the steps shown on the screen the touchscreen is calibrated.

Now we can install the music player client ('mpc') and daemon. To do this, type the following commands:

```
sudo apt-get update
sudo apt-get install mpc mpc
```

User interface

Now we need to install the user interface. For this we use winSCP (free download from [4]) and the download provided on the Elektor magazine website for this project [5]. We have to copy the files from the download onto the SD card in the Raspberry Pi. So we close PuTTY and start winSCP. We log in with the same credentials as used in PuTTY.

If a notification pops up, click "Yes". From the download we copy the folder 'pi-radio' onto the Raspberry Pi. Then we copy the files 'launcher.sh' and 'shutdown.sh' to the Desktop folder of the Raspberry Pi. These two files launch the radio and shut down the RPi. Now we can close winSCP and open PuTTY again.

The two files we just copied onto the Pi's desktop do not work as clickable icons yet. To fix this, in PuTTY, type:

```
sudo chmod +x /home/pi/Desktop/launcher.sh
```

and

```
sudo chmod +x /home/pi/Desktop/shutDown.sh
```

Radio stations

The radio is now installed, but there are no radio stations to be heard yet. To add a radio station, we need to have its streaming link. This is the address from where the audio is streamed. A practical website listing these links is SomaFM [6]. This website lists many free stations of different genres and provides streaming links we can use. To retrieve a usable link from SomaFM, we click on the station we want and click on "Direct stream links". The link we need is beside "Direct server:".

To add a station, we open PuTTY and enter mpc add followed by the station url. For example:

```
mpc add http://ice1.somafm.com/bagel-128-mp3
```

Links ending with '.m3u' will not work. There are many other stations available from other websites that can be added, you're not limited to SomaFM. A url can be tested by entering it in the web browser on your computer. If it's a valid link, a music player will open, playing the radio station.

To list the added radio stations, we can use the command mpc playlist. This lists all added radio stations. To remove a radio station, type mpc del followed by the number in the playlist in PuTTY, for example: mpc del 2 removes the station in the second position.

All set to use

The radio player can be started now by double tapping the icon on the touchscreen and pressing 'Execute'. The interface (**Figure 3**) has been kept simple so that it can be operated with your fingers rather than a stylus (**Figure 2**). These are the available commands:

- 'Play' starts the mpc on the current playlist.
- 'Pause' stops the mpc on the current playlist.
- 'Volume down' reduces volume.
- 'Volume up' increases volume.
- 'Mute' sets the volume to zero.
- 'Refresh' stops the player and starts it again, refreshing the screen.
- 'Exit' closes the radio player interface but keeps the mpc playing.

To conveniently shut down the Raspberry Pi, double tap the shutDown icon and press 'Execute'. Happy listening! ◀

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Web Links

- [1] www.raspberrypi.org/downloads/raspbian
- [2] <https://sourceforge.net/projects/win32diskimager>
- [3] www.chiark.greenend.org.uk/~sgtatham/putty/download.html
- [4] <https://winscp.net/eng/download.php>
- [5] www.elektormagazine.com/160043
- [6] <http://somafm.com>

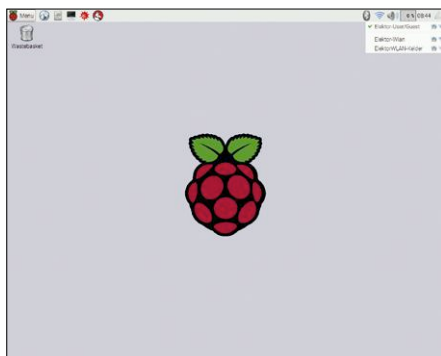


Figure 1. Here we can configure the RPi network settings.



Figure 2. Calibration the touchscreen before operation...



Figure 3. The interface can be operated by finger — no stylus needed.