

Pi Hole Ad Detection Display with PiTFT

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Overview



We already have a guide on using [Pi-Hole with the Raspberry Pi Zero W \(https://adafru.it/BHx\)](https://adafru.it/BHx) to send advertisements on your network into a black hole.

But, the PiOLED is *small* and we want to monitor *more* statistics at a glance. While we could open the web console to monitor Pi-hole, we can't show that to friends easily. Plus, who doesn't want more shiny, blinky, networking hardware?

We're going to install [PADD \(https://adafru.it/BHy\)](https://adafru.it/BHy) (Pi-hole Ad Detection Display) and [Pi-Hole \(https://adafru.it/yuE\)](https://adafru.it/yuE) on the Adafruit 2.8" or 3.5" PiTFT Plus to display useful and fun statistics such as *Amount of Pi-holed Advertisements*, and the top offending domain attempting to serve pesky advertisements to your network.

What's Pi-hole?

[Pi-hole \(https://adafru.it/yuE\)](https://adafru.it/yuE) is an open-source project which let's your Pi act as a DNS (**Domain Name Server**). While you may have an ad-blocker installed on your browser, do you have one on your phone? What about blocking in-application advertisements in your mobile games? On your Smart TV? On your smart *fridge*?

Pi-hole lets you block ads from **any device** configured to use it as a Domain Name Server. When an advertisement (i.e: *ads.adserver.com*) tries to resolve it's IP address, Pi-hole will return nothing back. You'll never connect to the advertisement server and the ad won't even load. This makes it quicker, faster, and use less data than conventional ad blockers.

Parts

You'll need the following parts to get up-and-running with Pi-hole and PADD

You need a Raspberry Pi with built in wireless. The Raspberry Pi 3 line (3, 3 B, 3 B+) devices are wireless-ready without external configuration:

1x [Raspberry Pi 3](#)

Model B+ - 1.4GHz Cortex-A53 with 1GB RAM

Add To Cart

You'll also need a power supply for your Pi and a MicroSD card for holding the Pi's OS and it's applications:

1x [5V 2.4A Power Supply](#)

5V 2.4A Switching Power Supply with 20AWG MicroUSB Cable

Out Of Stock

1x [8GB MicroSD Card](#)

8GB Class 10 SD/MicroSD Memory Card - SD Adapter Included

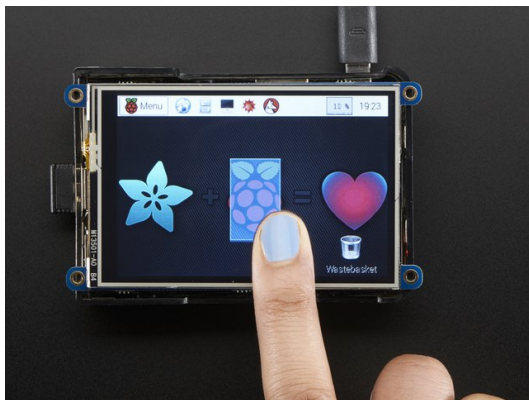
Out Of Stock

PiTFT Display



To use the full version of PADD, you'll need a PiTFT supporting a resolution of at least 480x320.

If you're using a display smaller than 480x320, PADD will boot into a *mini* mode which displays way less statistics about the network. To view PADD, we suggest using the PiTFT Plus 3.5":

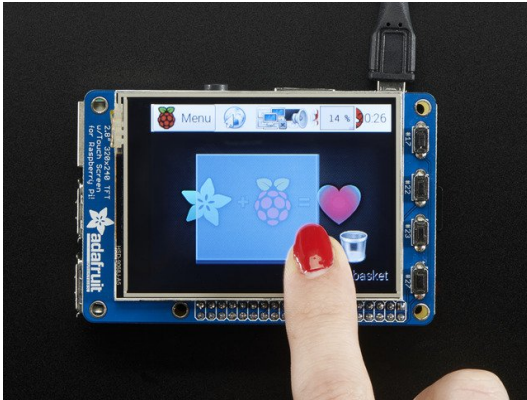


[PiTFT Plus 480x320 3.5" TFT+Touchscreen for Raspberry Pi](#)

\$44.95
IN STOCK

Add To Cart

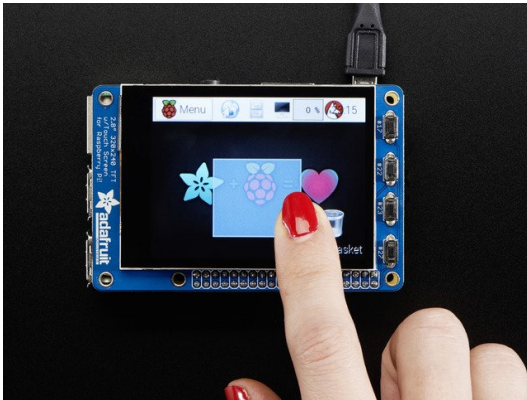
If you happen to have one of our [2.8"](#) or [2.4"](#) PiTFT (<https://adafru.it/BHE>)'s, those will work too



PiTFT Plus Assembled 320x240 2.8" TFT + Resistive Touchscreen

\$34.95
IN STOCK

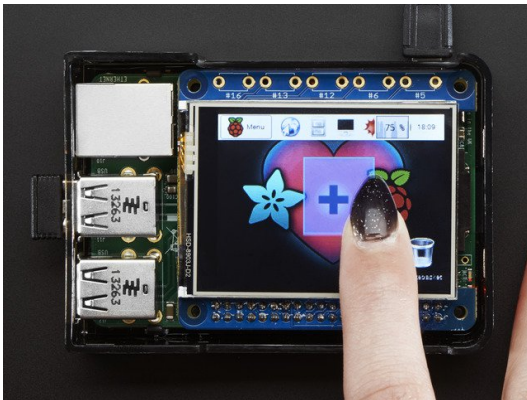
Add To Cart



Adafruit PiTFT Plus 320x240 2.8" TFT + Capacitive Touchscreen

\$44.95
IN STOCK

Add To Cart



Adafruit PiTFT 2.4" HAT Mini Kit - 320x240 TFT Touchscreen

OUT OF STOCK

Out Of Stock

Other Parts

We used a Pi 3 case to protect our Pi from aesthetics and to protect our Pi against scratches, bumps, and falls. The case also makes the Pi-hole look like a networking appliance.



Adafruit Raspberry Pi B+ / Pi 2 / Pi 3 Case - Smoke Base

\$7.95
IN STOCK

Add To Cart

If you don't have a way to burn the OS image onto a **micro** sd card from your computer, we suggest picking up a USB MicroSD reader/writer.

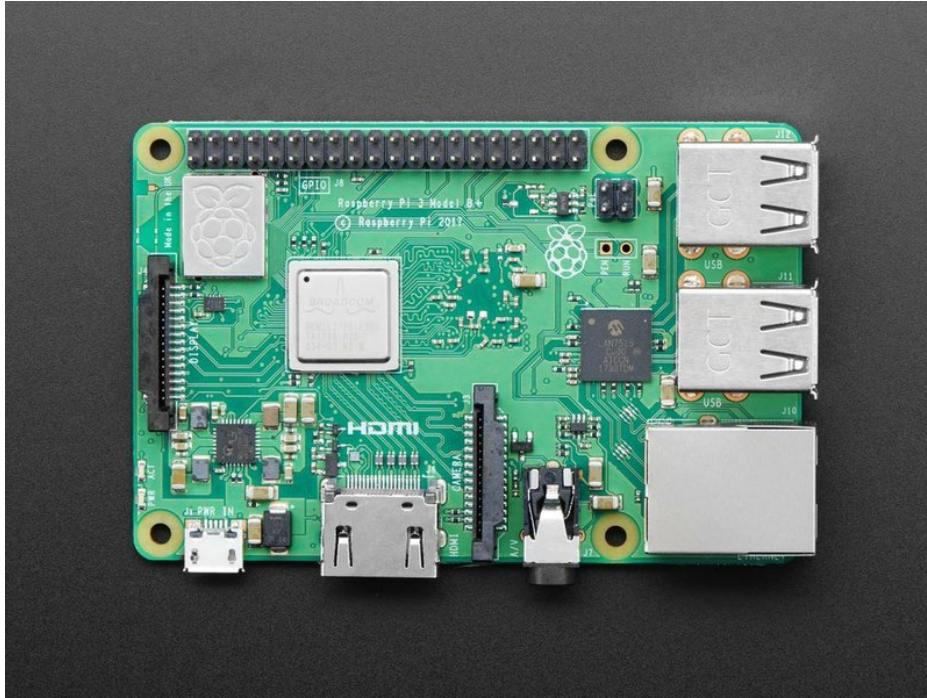


USB MicroSD Card Reader/Writer - microSD / microSDHC / microSDXC

\$5.95
IN STOCK

Add To Cart

Raspberry Pi Setup



We'll need to set up the Pi with an operating system (OS), WiFi, and secure login (SSH) support before we install Pi Hole.

We have a guide on how to set up your Pi Zero W 'headless' which is how we recommend you get started. The Pi 3 (and up) and the Pi Zero W both have built in WiFi, so our guide can be used for both platforms:

<https://adafruit.it/BHz>

<https://adafruit.it/BHz>



Make sure you are using Raspbian LITE and not stretch for the OS setup.

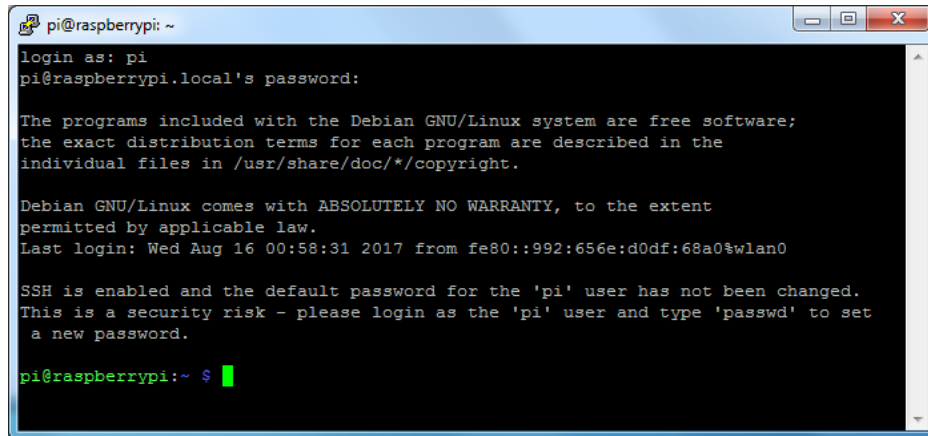
Here's the quick-start for people with some experience:

1. Download the latest '**Lite**' Raspbian (<https://adafruit.it/fQi>) to your computer
2. Burn the Lite Raspbian to your MicroSD card (<https://adafruit.it/dDL>) using your computer
3. Re-plug the SD card into your computer (don't use your Pi yet!) and set up your wifi connection by editing `suppliment.conf` (<https://adafruit.it/yuD>)
4. Activate SSH support (<https://adafruit.it/yuD>)
5. Plug the SD card into the Pi 3
6. If you have an HDMI monitor we recommend connecting it so you can see that the Pi is booting OK
7. Plug in power to the Pi 3 - you will see the green LED flicker a little. The Pi 3 will reboot while it sets up so wait a good 10 minutes
8. If you are running Windows on your computer, install Bonjour support so you can use `.local` names, you'll need to reboot Windows after installation (<https://adafruit.it/IPE>)
9. You can then ssh into `raspberrypi.local` (<https://adafruit.it/jvB>)

Install Pi Hole

Pre-Check

OK once you have set your Pi up and the WiFi is connecting to your home or office network, and you can **ssh** into it, continue with these easy steps! If you cannot connect via **ssh** yet, go back and read some of our guides until you are able to log into your Pi.

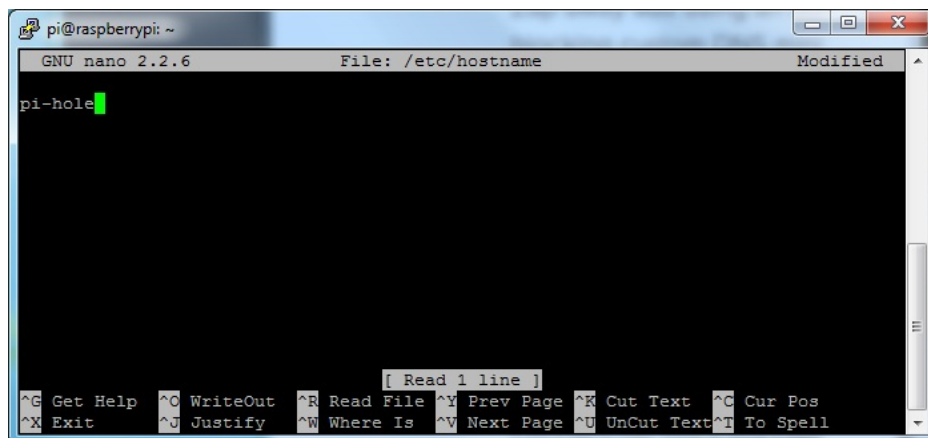


```
pi@raspberrypi: ~  
login as: pi  
pi@raspberrypi.local's password:  
  
The programs included with the Debian GNU/Linux system are free software;  
the exact distribution terms for each program are described in the  
individual files in /usr/share/doc/*/copyright.  
  
Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent  
permitted by applicable law.  
Last login: Wed Aug 16 00:58:31 2017 from fe80::992:656e:d0df:68a0%wlan0  
  
SSH is enabled and the default password for the 'pi' user has not been changed.  
This is a security risk - please login as the 'pi' user and type 'passwd' to set  
a new password.  
  
pi@raspberrypi:~ $
```

Change Hostname

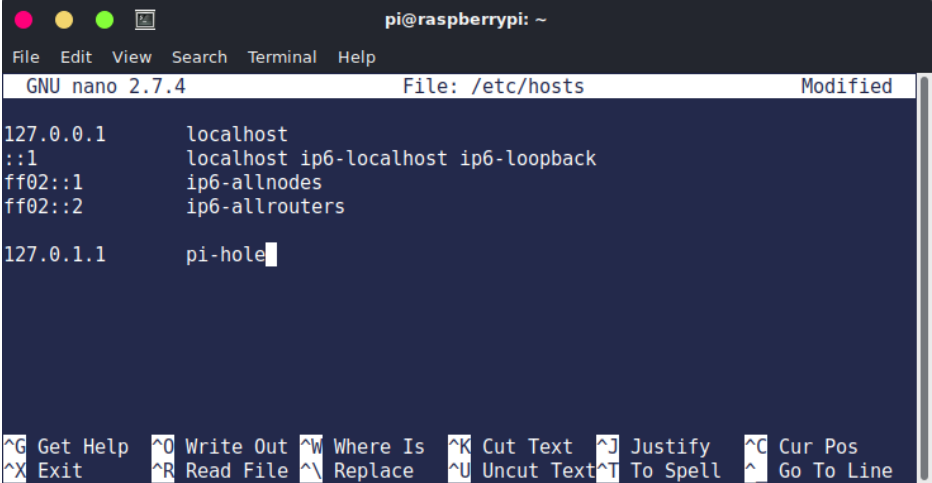
I like to do this first so I don't get confused between all the different Pi's in the house

Edit the hostname with **sudo nano /etc/hostname** and put something else on that first line, like **pi-hole**



```
pi@raspberrypi: ~  
GNU nano 2.2.6 File: /etc/hostname Modified  
pi-hole  
  
[ Read 1 line ]  
^G Get Help ^O WriteOut ^R Read File ^Y Prev Page ^X Cut Text ^C Cur Pos  
^X Exit ^U Justify ^W Where Is ^V Next Page ^U UnCut Text ^T To Spell
```

Also change it in the hosts file with **sudo nano /etc/hosts** to match the same name. It's probably the last line:



Reboot and when you ssh in again, use **pi-hole.local**

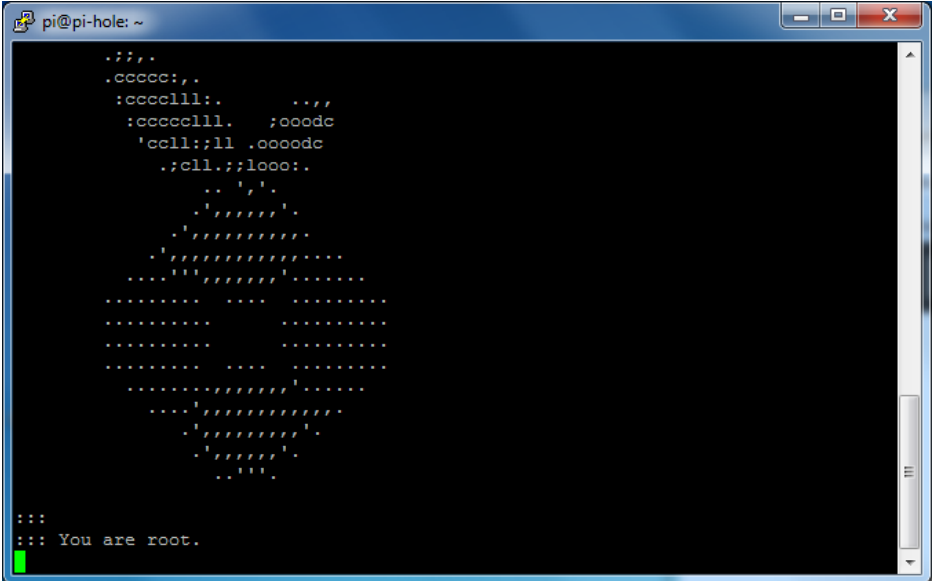
Now's also a good time to change the Pi's password with `passwd`

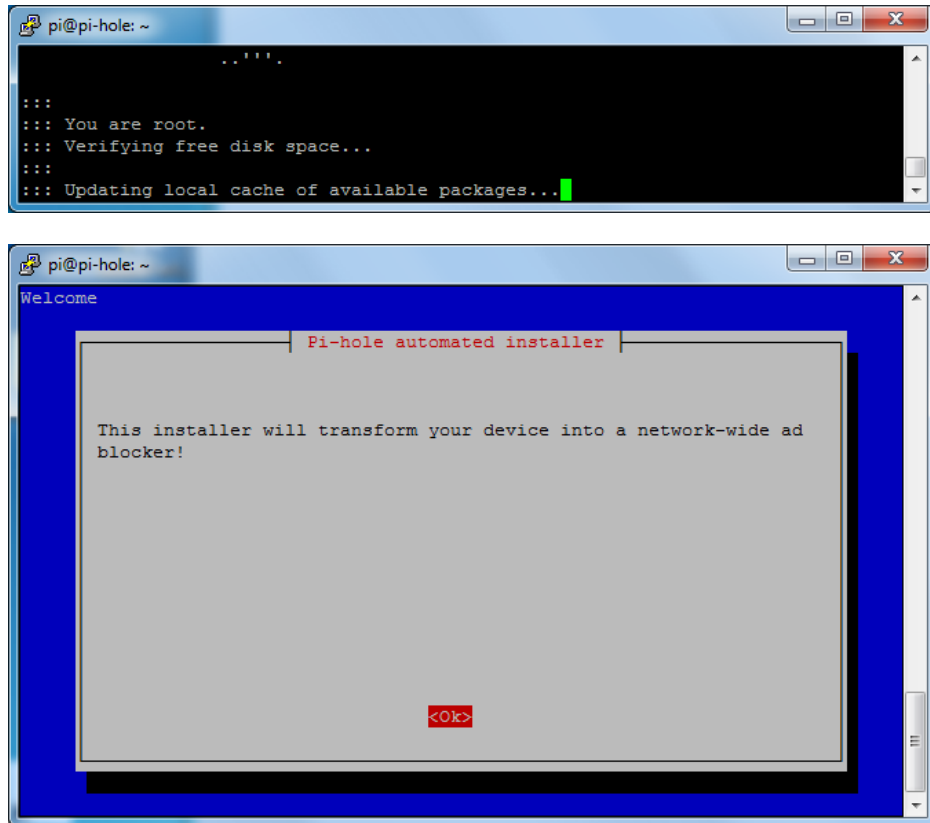
Run Pi Hole Installer

There's more information on how installation at <https://pi-hole.net/> (<https://adafru.it/yuE>) - as of the writing of this guide, its easier to just run:

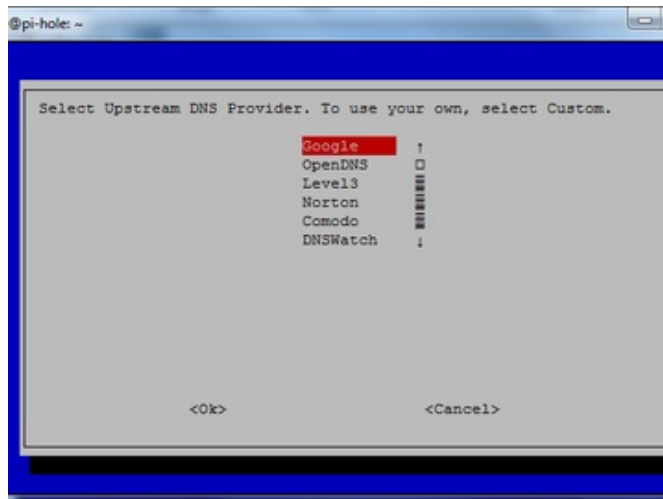
```
curl -sSL https://install.pi-hole.net | bash
```

It will take quite a while to install, and may seem to 'hang' at points. Just let it do its thing for about 20 minutes!

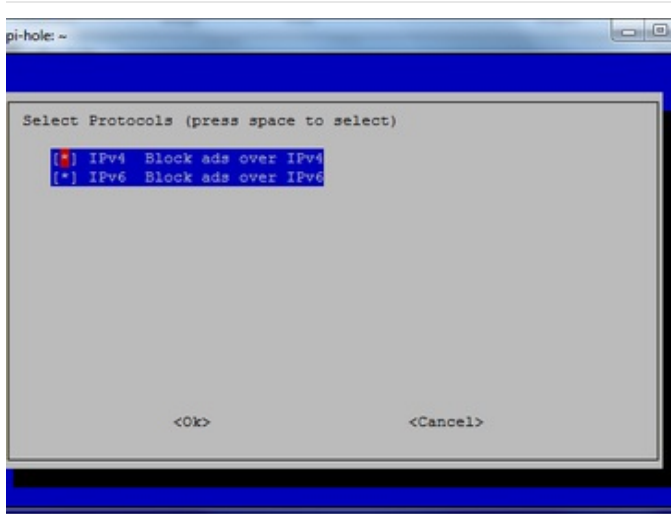




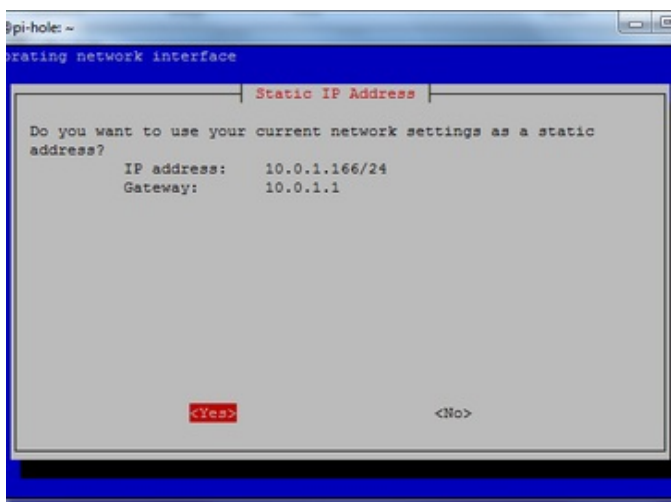
Configuration



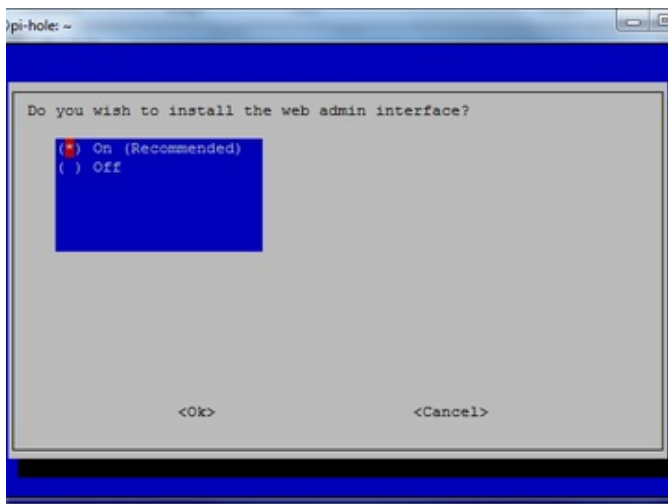
Pick who will be the upstream DNS (for non-ad blocked sites) - Google is fine and will probably be up all the time



99% of people will use IPv4 - if you need IPv6 you'd know!



The installer will automatically try to set the *dynamic* IP address it got from your router to be fixed. This works well enough, if you have an advanced network set up, you can configure a custom IP address

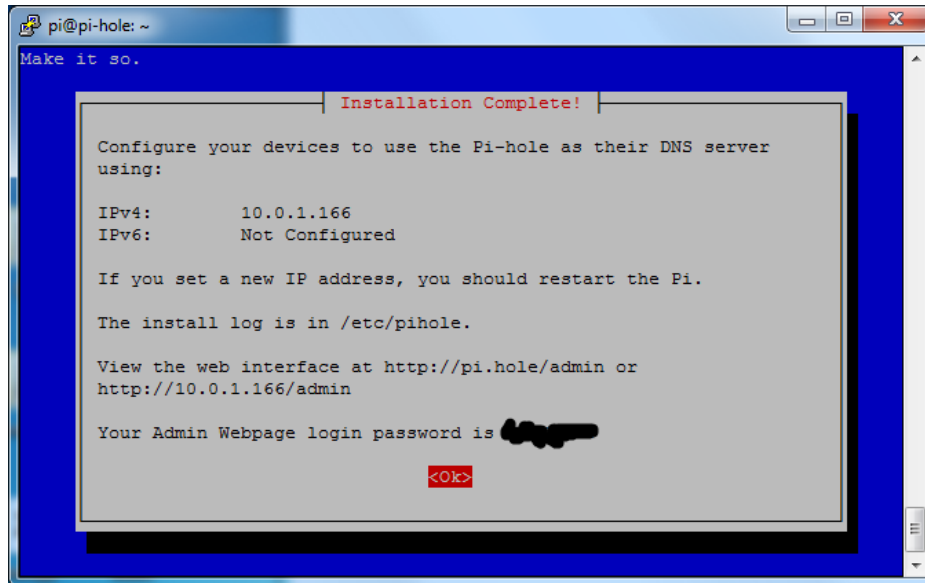


The Web Interface is kinda cool, and is password protected. We'll be showing most of the stats on the little OLED but we still need the API to be running so keep this on

It will keep installing! Just hold tight...

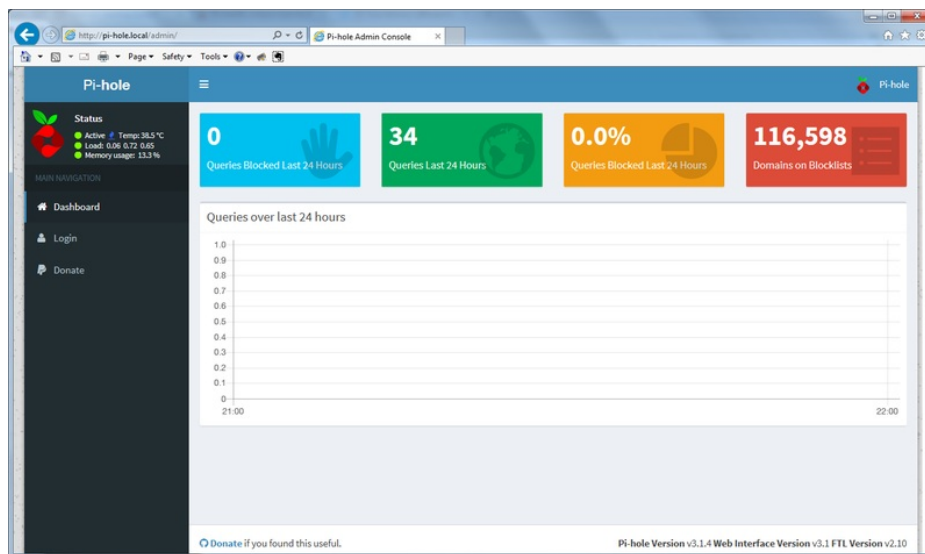
```
pi@pi-hole: ~  
:::  
::: Aggregating list of domains... done!  
::: Formatting list of domains to remove comments.... done!  
::: 141326 domains being pulled in by gravity...  
::: Removing duplicate domains.... done!  
::: 116598 unique domains trapped in the event horizon.  
:::  
::: Adding adlist sources to the whitelist... done!  
rm: cannot remove '/etc/pihole/local.list': No such file or directory  
::: Whitelisting 6 domains... done!  
::: Nothing to blacklist!  
::: No wildcards used!  
::: Formatting domains into a HOSTS file...::: Nothing to blacklist!  
done!  
:::  
::: Cleaning up un-needed files... done!  
:::  
::: Refresh lists in dnsmasq... done!  
::: DNS service is running  
::: Pi-hole blocking is Enabled  
:::  
::: Starting pihole-FTL service... done.  
:::  
::: Enabling pihole-FTL service to start on reboot... █
```

When its done you'll get this final config screen! Copy & paste the password into another window for now



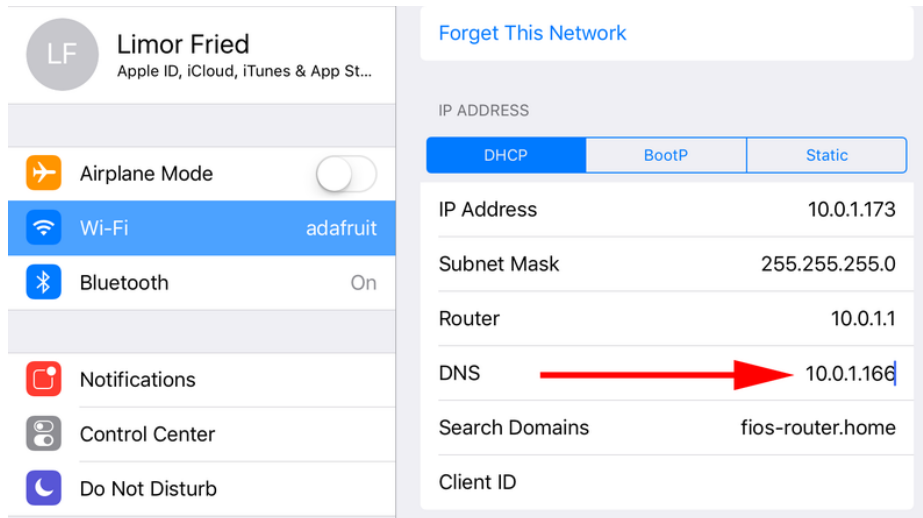
Test Admin Page

On your desktop computer or tablet, visit <http://pi-hole.local/admin/> (<https://adafruit.it/yluF>) And you should see an administration panel!

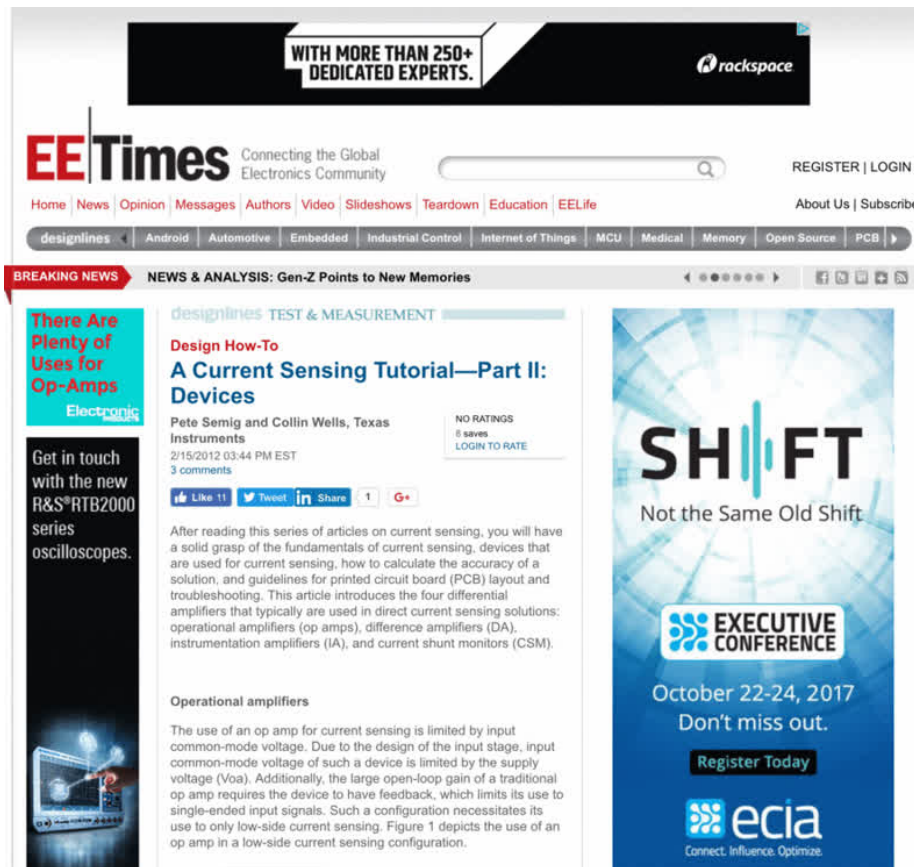


Test Blocking

On your tablet, phone, computer, etc - Set up your **DNS** server in the network settings to be the IP address of the Pi



You *may* need to restart your network or browser to have it kick in, also there may be some cached ads so don't worry if not everything is blocked. Visit your favorite site with ads (not adafruit.com cuz we don't have any! :) and see the difference!

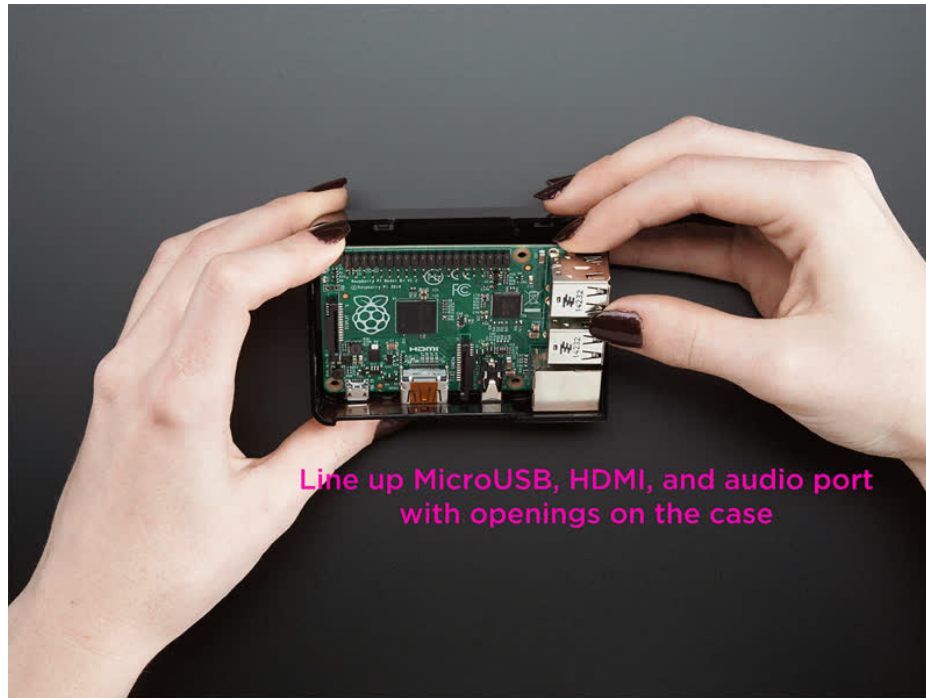


Now that you've got that done, lets continue and install the display!

PiTFT Configuration

Assembly

If you are using a case like the [Adafruit Raspberry Pi Case \(https://adafru.it/ej5\)](https://adafru.it/ej5), snap-fit the Pi into the case:

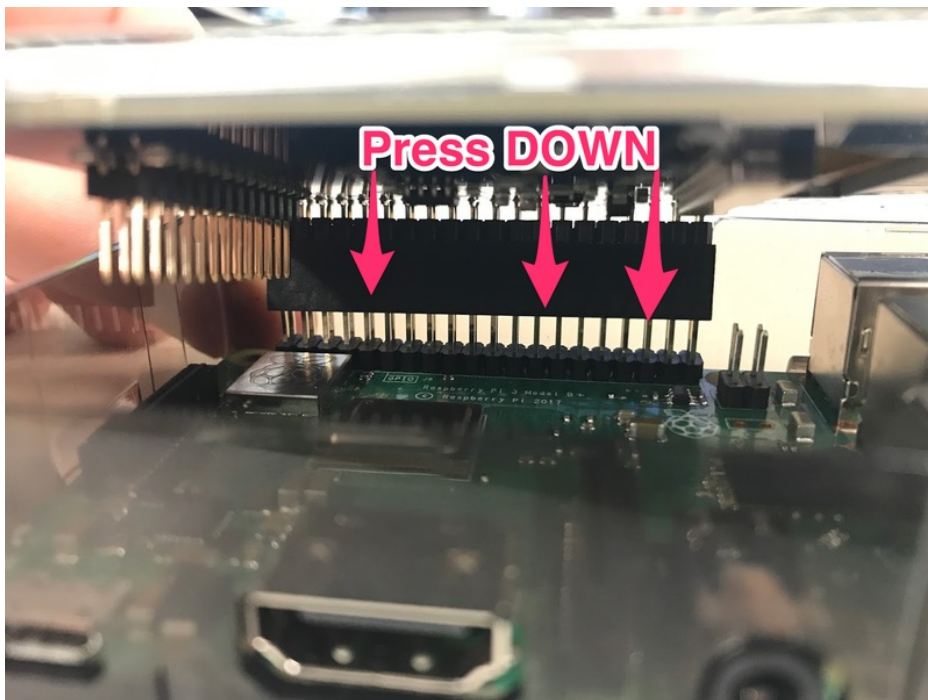


Leave the clear top off, we'll need to access the GPIO header for the PiTFT.

The PiTFT's four mounting ears can be used to attach the display to a bezel. But, we'll be snapping them off with pliers (they're perforated) for a flush-fit with the case/

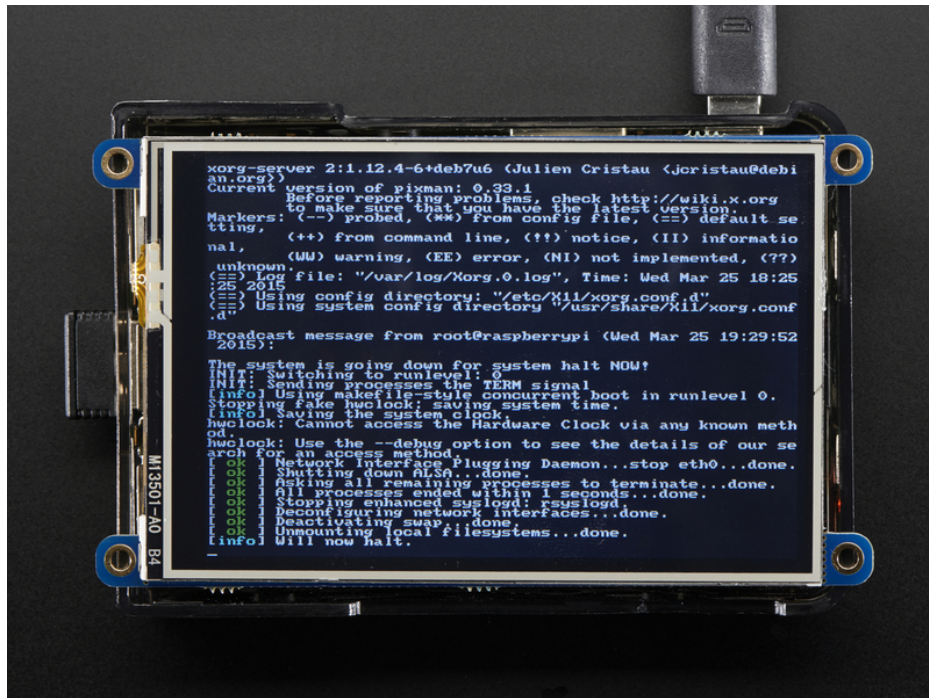


Position the PiTFT over the 2x20 GPIO connector and press downwards. Make sure the PiTFT's header is flush against the GPIO header.



Now that our PiTFT is assembled, let's configure the display to work with our Pi.

PiTFT Configuration



You'll need to perform some configuration to get the PiTFT up and running. We'll do this through the PiTFT installer script.

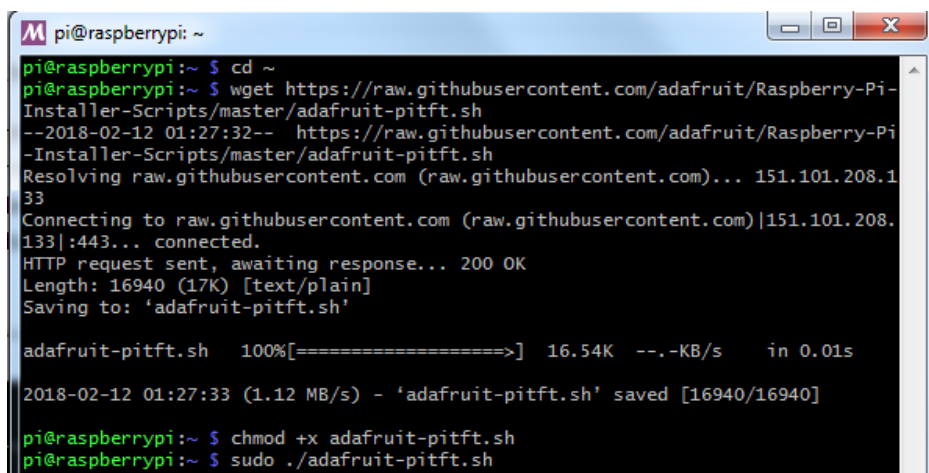
This script will do all the work for you, and install both device tree overlay support as well as configure rotation and any HDMI mirroring. PiTFT no longer needs any custom kernels or modules, so you can continue to update/upgrade your Pi and it will work with the most recent releases.

Here's the commands to run. Make sure your Pi has network access, it needs to download the software!

```

cd ~
wget https://raw.githubusercontent.com/adafruit/Raspberry-Pi-Installer-Scripts/master/adafruit-pitft.sh
chmod +x adafruit-pitft.sh
sudo ./adafruit-pitft.sh

```



Once `./adafruit-pitft.sh` is run, we'll be presented with menus. Since we're using the 3.5" PiTft, we'll select **#4**


```
This script downloads and installs
PiTFT Support using userspace touch
controls and a DTO for display drawing.
one of several configuration files.
Run time of up to 5 minutes. Reboot required!

Select configuration:
1. PiTFT 2.4", 2.8" or 3.2" resistive (240x320)
2. PiTFT 2.2" no touch (240x320)
3. PiTFT 2.8" capacitive touch (240x320)
4. PiTFT 3.5" resistive touch (320x480)
5. Quit without installing
```



If you're not using the 3.5" PiTFT, pick the number that corresponds to the display you are using. For example, for the 2.8" PiTFT with resistive touchscreen select #1

We'll also need to select a rotation of 270 degrees (#3) so the PiTFT + case can sit on your desk when the USB cable is plugged in.

```
SELECT 1-5: 4
Select rotation:
1. 90 degrees (landscape)
2. 180 degrees (portrait)
3. 270 degrees (landscape)
4. 0 degrees (portrait)

SELECT 1-4: 3
```

We're going to want to use the PiTFT as a text console for PADD, type Yes to the question **Would you like the console to appear on the PiTFT display**

```
[PiTFT] Checking init system...
Found systemd
/boot is mounted
[PiTFT] System update
Updating apt indexes...
.....
Reading package lists...
.....
[PiTFT] Installing Python libraries & Software...
Installing Pre-requisite Software...This may take a few minutes!
[PiTFT] Updating /boot/config.txt...
Already have an adafruit-pitft-helper section in /boot/config.txt.
Removing old section...
[PiTFT] Updating SysFS rules for Touchscreen...
[PiTFT] Updating tslib default calibration...
Would you like the console to appear on the PiTFT display? [y/n] y
```

Then, reboot the Pi. You'll see the console appear on the Pi. Don't worry if the Pi-hole doesn't display, we're going to configure that next.

Install PADD

```
|_> ^ | \ | \ Pi-hole@ v3.3.1, Web v3.3, FTL v3.0  
| /--\ | / | / PADD v2.0.0 Pi-hole is up-to-date!  
  
=====PI-HOLE=====  
Status: Active FTL: Running  
=====STATS=====  
Blocking: 127,353 domains  
Pi-holed: [■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■] 0.0%  
Pi-holed: 0 out of 348 queries  
Latest:  
Top Ad:  
Top Dmn: api.github.com  
Top Clnt: 127.0.0.1  
=====NETWORK=====  
Hostname: pi-hole IPv4: 10.0.1.91/23  
IPv6:  
DNS: 2 DNS servers DNSSEC: Disabled  
=====SYSTEM=====  
Uptime: 0 days, 0 hours, 6 minutes  
CPU Temp: 51.5°C CPU Load: 0.27, 0.25, 0.13  
Memory: [■.....] 6.9% CPU Load: [■.....] 6.8% AC
```

Next we're going to install **PADD** (<https://adafru.it/BHA>), the Pi-hole Ad Detection Display. This application displays statistics about advertisements, your Pi's status, network configuration and system statistics on your PiTFT.

It is written and maintained by Jim McKenna who did an awesome job! (<https://adafru.it/BHF>)

In the SSH session with your Pi, navigate to your home directory:

 $cd \sim$

Grab a copy of PADD:

```
wget -N https://raw.githubusercontent.com/jpmck/PADD/master/padd.sh
```

Make PADD executable by running:

```
sudo chmod +x padd.sh
```

Open PADD at Pi Bootup

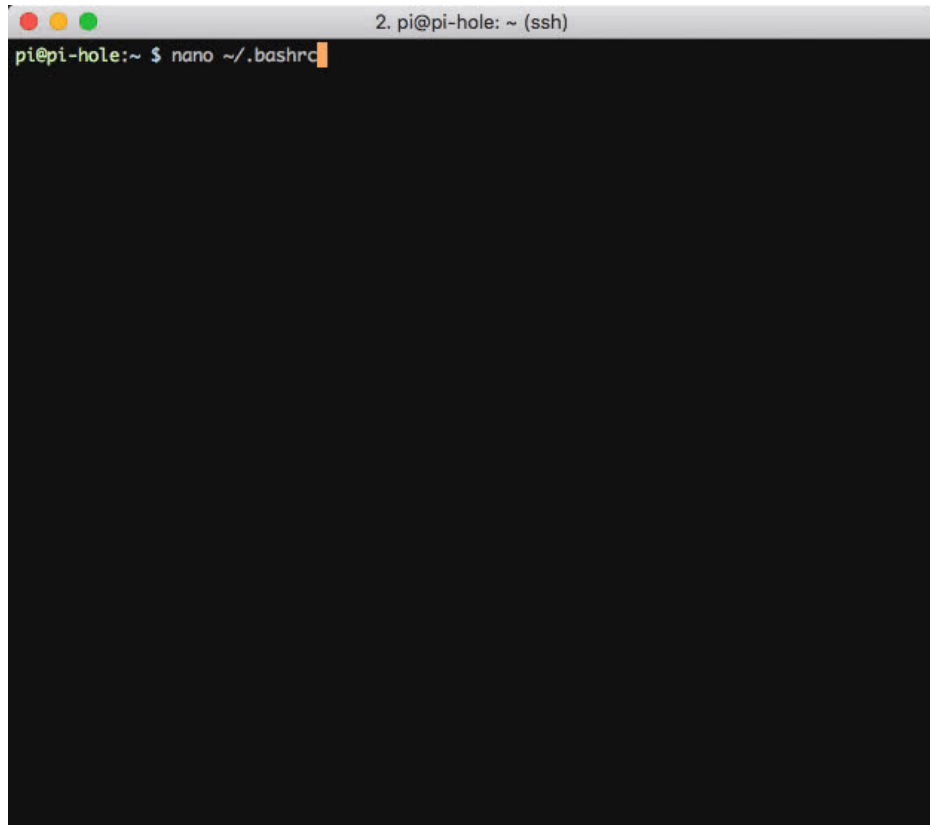
Next, we're going to set PADD to open automatically on your PiTFT when we start our Pi.

Open `~/.bashrc`:

```
nano ~/.bashrc
```

Navigate to the end of the file (by pressing the **down arrow key**) and add the following text:

```
# Run PADD
# If we're on the PiTFT screen (ssh is xterm)
if [ "$TERM" == "linux" ] ; then
  while :
  do
    ./padd.sh
    sleep 1
  done
fi
```



Save (**control+O**) the configuration and exit (**control+X**) nano to be brought back to the terminal.

Turn off the PiTFT at Night

The PiTFT is **bright** and doesn't need to be powered-on at night, so let's put it to sleep until we wake up.

Edit cron as root:

```
sudo crontab -e
```

Select nano as an editor by pressing the **2** key.

```

pi@pi-hole:~ $ sudo crontab -e
no crontab for root - using an empty one

Select an editor. To change later, run 'select-editor'.
 1. /bin/ed
 2. /bin/nano    <---- easiest
 3. /usr/bin/vim.tiny

Choose 1-3 [2]: 2

```

Scroll beneath the commented text (#) and enter the following:

```

# PADD Sleep
# Turn off the PiTFT+ at midnight
00 00 * * * sh -c 'echo "0" > /sys/class/backlight/soc\backlight/brightness'
# Turn on the PiTFT+ at 8:00 am
00 08 * * * sh -c 'echo "1" > /sys/class/backlight/soc\backlight/brightness'

```

```

GNU nano 2.7.4      File: /tmp/crontab.CfbmGY/crontab      Modified
#
# For example, you can run a backup of all your user accounts
# at 5 a.m every week with:
# 0 5 * * 1 tar -zcf /var/backups/home.tgz /home/
#
# For more information see the manual pages of crontab(5) and cron(8)
#
# m h dom mon dow   command
# PADD Sleep
# Turn off the PiTFT+ at midnight
00 00 * * * sh -c 'echo "0" > /sys/class/backlight/soc\backlight/brightness'
# Turn on the PiTFT+ at 8:00 am
00 08 * * * sh -c 'echo "1" > /sys/class/backlight/soc\backlight/brightness'

```

Save (**control+O**) the configuration and exit (**control+X**) nano to be brought back to the terminal.

Reboot the Pi to apply the new changes by running:

```
sudo reboot
```

When your Pi reboots, the TFT should boot into PADD:



After PADD starts, it should go into display mode. If your PADD is displaying statistics about your network, congrats! We're all set up and ready to test our advertisement-blocking-pi.



Smaller Pi Displays

You can also use this guide with smaller displays, like the [PiTFT 2.8"](https://adafruit.it/CFo) (<https://adafruit.it/CFo>). The full PADD display is unsupported by this screen - but don't worry - it'll automatically display a smaller, **mini PADD** interface.



Using PADD and Pi Hole

Configure and Test Ad Blocking

PADD will display the Pi-hole's IP address underneath its *Network* tab:

```
|_> ^ | _\ | \ Pi-hole@ v3.3.1, Web v3.3, FTL v3.0
| /--|\|/|_/ PADD v2.0.0 Pi-hole is up-to-date!
```

```
PI-HOLE
```

```
Status: Active FTL: Running
```

```
STATS
```

```
Blocking: 127,353 domains
Pi-holed: [■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■■] 0.0%
Pi-holed: 0 out of 348 queries
Latest:
Top Ad:
Top Dmn: api.github.com
Top Clnt: 127.0.0.1
```

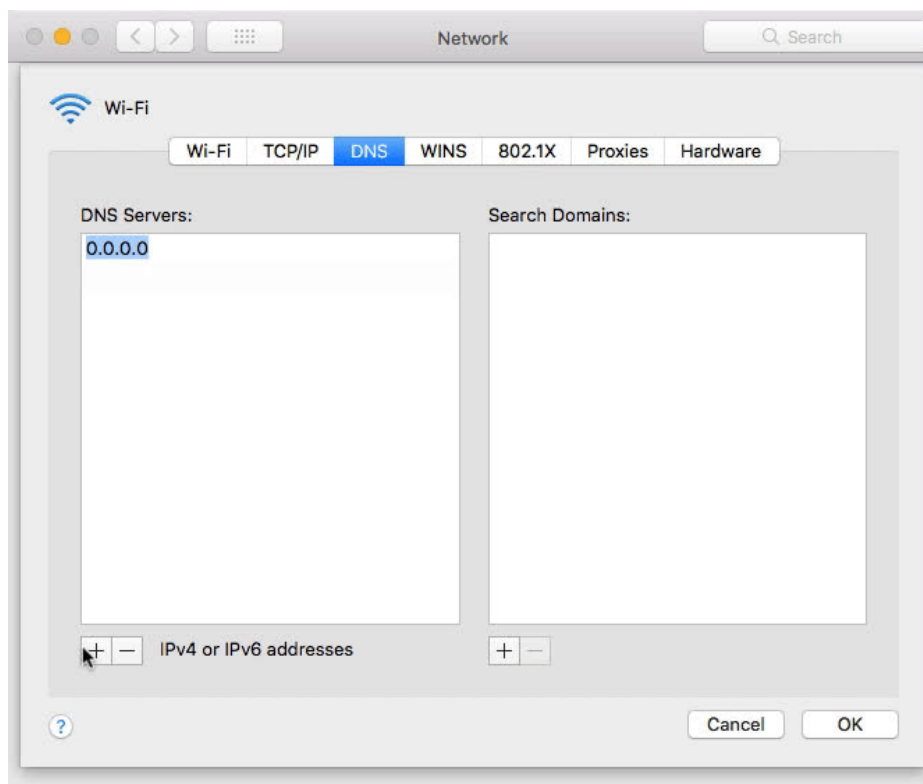
```
NETWORK
```

```
Hostname: pi-hole IPv4: 10.0.1.91/23
IPv6:
DNS: 2 DNS servers DNSSEC: Disabled
```

```
SYSTEM
```

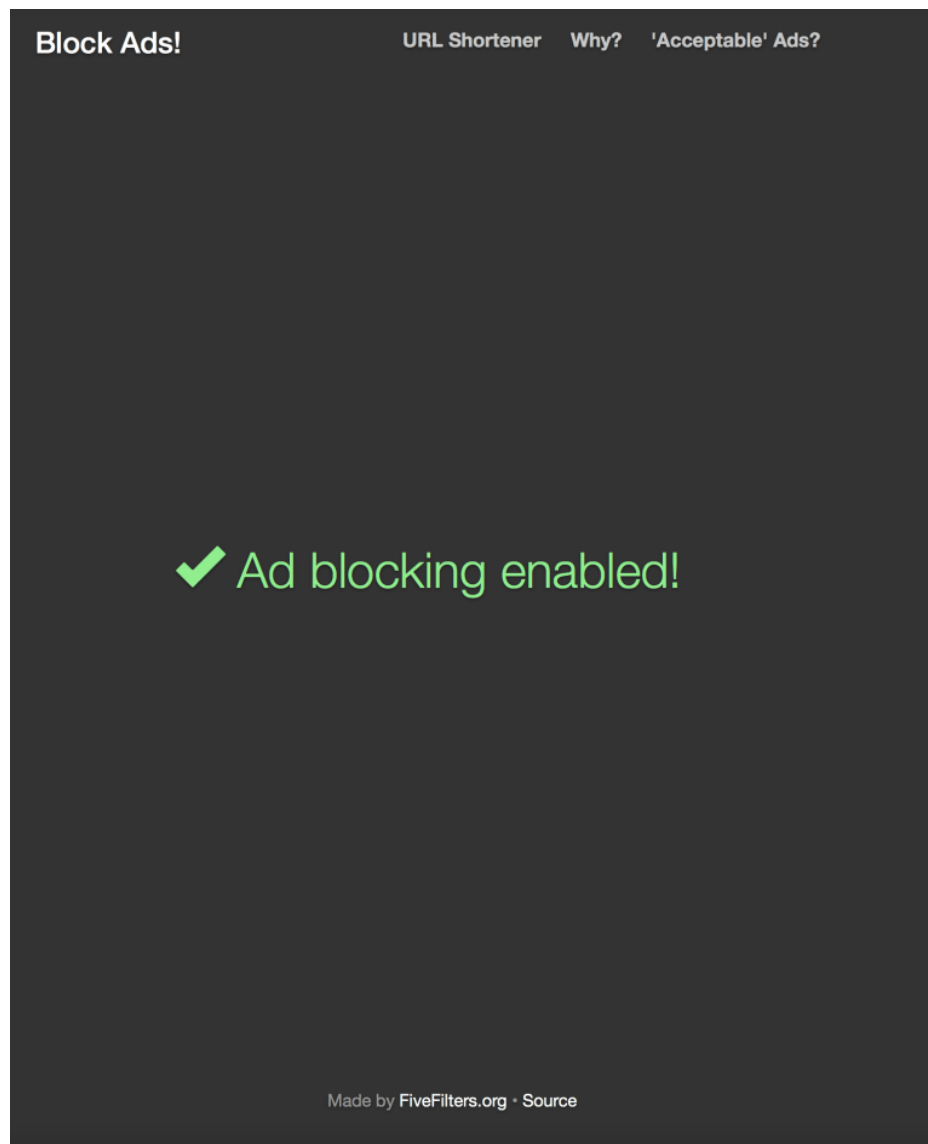
```
Uptime: 0 days, 0 hours, 6 minutes
CPU Temp: 51.5°C CPU Load: 0.27, 0.25, 0.13
Memory: [■.....] 6.9% CPU Load: [■.....] 6.8% AC
```

On your tablet, phone, computer, etc - Set up your **DNS** server in the network settings to be the IP address of the Pi:



You *may* need to restart your network or browser to have it kick in, also there may be some cached ads so don't worry if not everything is blocked.

Not sure if your Pi-hole is configured properly? Visit blockads.fivefilters.org (<https://adafru.it/BHB>) from the device you're configuring to test Pi-hole functionality.



You can also visit some of your favorite sites or load a mobile application which would normally have in-application advertisements to test your Pi-hole.

Router Configuration for Pi-Hole

DHCP Server Setting

Router Name :

DHCP Server: ☒ Enabled ☐ Disabled DHCP Reservation

Start IP Address: . . .

Maximum Number of Users:

IP Address Range: . . . to

Client Lease Time: minutes (0 means one day)

Static DNS 1: . . .

Static DNS 2: . . .

Static DNS 3: . . .

WINS: . . .

Don't want to configure each device on your network separately? Have a device that doesn't allow you to enter DNS settings? [You can configure your router's DHCP options to force clients to use Pi-hole as their DNS server. \(https://adafru.it/BHC\)](https://adafru.it/BHC)

Want to switch back to a terminal? Hit *CTRL+C*

Updating PADD

If your PADD displays *Update avail.*, you'll need to update it. PADD only uses stable builds of Pi-hole and FTLDNS, so you can rest assured that your internet won't break.

We can do this easily by SSH'ing into our Pi-Hole:

```
ssh pi@pi-hole.local
```

Log in. Then, navigate to our home directory:

```
cd ~
```

And update the version of PADD on your Pi by running:

```
wget -N https://raw.githubusercontent.com/jpmck/PADD/master/padd.sh
```

After the update completes, restart your Pi by running:

```
sudo reboot
```

Once restarted, PADD should display *"Pi-hole is up-to-date"*.

Troubleshooting

🟡 My Pi-Hole shows an error: `bash warning: setlocale LC_ALL: cannot change locale (en_US.UTF-8)`

Enter the following in your terminal to launch raspi-config:

```
sudo raspi-config
```

From the menu, select: **Localization Options** -> **Change Locale**.

Select **Generate en_US.UTF-8 UTF-8** , and walk through the prompts.

