# Download Base Image

In general base Rpi images can be found here:

<https://www.raspberrypi.org/downloads/raspbian/>

We will use RASPBIAN STRETCH WITH DESKTOP

<https://downloads.raspberrypi.org/raspbian_latest>

* Need to make sure the SD card is not expanded to use all the space.
* 6 GB is allocated to the root partition.
* 16 GB is allocated for video storage and is formatted using a XFS file system
* See this link for more information on how this was done. <https://www.raspberrypi.org/forums/viewtopic.php?p=1114520>
* A private copy of was made of raspi-config and modified to allocate 6GB to the root partition.

# sudo fdisk -l

Disk /dev/mmcblk0: 29.7 GiB, 31914983424 bytes, 62333952 sectors

Units: sectors of 1 \* 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disklabel type: dos

Disk identifier: 0x020c3677

Device Boot Start End Sectors Size Id Type

/dev/mmcblk0p1 8192 93814 85623 41.8M c W95 FAT32 (LBA)

/dev/mmcblk0p2 94208 12677119 12582912 6G 83 Linux

/dev/mmcblk0p3 12677120 46231551 33554432 16G 83 Linux

# Create Users

The table specifies the default users and passwords that will be part of the image.

|  |  |  |
| --- | --- | --- |
| User | Password | Sudo Priviledges |
| root | r00t | yes |
| pi | pi | yes |
| camera | camera | yes |

The following link gives an overview of how to manage users:

<https://www.raspberrypi.org/documentation/linux/usage/users.md>

1) Change the password for root:

sudo passwd root

2) Change the password for pi:

sudo passwd pi

3) Create the new user camera:

sudo adduser camera

sudo visudo (to add camera as super user)

|  |
| --- |
| # User privilege specification  root ALL=(ALL:ALL) ALL  camera ALL = NOPASSWD: ALL |

sudo usermod -a -G dialout camera

sudo usermod -a -G video camera

# Set Default Editor to VI

sudo update-alternatives --set editor /usr/bin/vim.tiny

To change the default command-line text editor, follow these steps:

1. Log in to your account using SSH.
2. Open the .bashrc file in your preferred text editor.
3. Add the following lines to the .bashrc file. Replace both occurrences of program with the editor you want to set as the default editor:

|  |
| --- |
| export EDITOR='program'  export VISUAL='program'  set -o ‘program’ |

To set vi as the default text editor, replace program with vi.

To set nano as the default text editor, replace program with nano

1. Save the changes to the .bashrc file and exit the text editor.
2. To make the new default text editor settings take effect, log out of your account and then log back in.

This is setup in the default /etc/skel/.bashrc file

This is done for root under /root/.bashrc.

This is done for the pi user in the home directory

This is done for the camera user in the home directory

# Upgrade Raspbian with the latest

Check for Raspian OS and software updates with the following commands:

sudo apt-get update

sudo apt-get dist-upgrade

Check for firmware updates, Raspian UI modifications and clean your installation with the following commands:

sudo rpi-update

sudo apt-get install raspberrypi-ui-mods

sudo apt-get clean

The Raspberry Pi firmware allows the hardware to communicate with the software. On a full size PC, the firmware normally resides on an integrated circuit on the motherboard. On the Raspberry Pi, the firmware resides on an area (partition) of the SD card. This configuration allows firmware updates to be simple and reduces hardware costs.

At the terminal prompt, type the following command to update the Raspberry Pi firmware:

sudo rpi-update

# **Raspian OS and software update**

After a firmware update, update the Raspian OS and software using the commands below:

sudo apt-get update

The apt-get update option connects the Raspberry Pi to the online software repository database and compares available software to installed software. From this comparison, apt develops a list of packages that need an update. It may take up to a minute or two for the update to finish.

After the repository updates, the Raspberry Pi can now determine what Raspian OS and software updates are available. Updates often contain security enhancements and software feature additions. It is always good practice to use this command before you use upgrade commands.

To identify and apply the updates, use the command below:

sudo apt-get dist-upgrade

The Raspberry Pi will display a list of the updates.

If you only want to update software and not the Raspian OS, you can use the commands below:

sudo apt-get update

sudo apt-get upgrade

I recommend using the dist-upgrade option. To me, it just makes sense to update both the OS and all software on the Raspberry Pi.

# **Raspian user interface update**

Occasionally, the Raspian OS receives user interface updates that are not included in the base updates. Check for and install these updates using the commands below:

sudo apt-get update

sudo apt-get install raspberrypi-ui-mods

# **Clean up**

After upgrades, it’s good practice to execute the apt clean option. This will recover additional space on the SD card. During the installation process, aptdownloads .deb files. These are installation files that are no longer needed once the application is installed. Removing them will free space on your SD card. This is especially valuable if you use a 4Gb SD card.

Use the command below to clean the Raspberry Pi SD card:

sudo apt-get clean

# Customize Desktop

- Remove apps off of the top bar.

- Color scheme choice

# Raspberry Pi Configuration

Can be done from the GUI or rapsi-config:

- Set hostname

- Enable camera

- Enable ssh

- set GPU Memory = 256

- Set Localisation to English and USA.

- Set Timezeone, keyboard, and Wifi country.

# Configure HDMI defaults

Edit /boot/config.txt

|  |
| --- |
| disable\_overscan=1  hdmi\_force\_hotplug=1  hdmi\_group=1  hdmi\_mode=16 |

# Enabling the Serial Port for Wiring GPS

# sudo raspi-config

Option P6 - Enable/Disable shell and kernel messages on the serial connection

Set to NO - Would you like a login shell to be accessible over serial?

Set to YES - Would you like the serial port hardware to be enabled?

# Auto-login As Camera User

Edit /etc/lightdm/lightdm.conf

Change the entry for autologin-user

autologin-user=camera

Edit /etc/systemd/system/autologin@.service

Change the entry for the autologin to be the camera user

# Set up browser settings for Chromium

This section to be completed later.

# Install VLC software

sudo apt-get install vlc

# Install GPAC software

sudo apt-get install gpac

# Copy VTE software to camera user

Go to $HOME directory of camera user

git clone <https://github.com/raether/vte.git>

This will create a directory called VTE with the software.

# Install GPS Daemon software

sudo apt-get install gpsd gpsd-clients python-gps

systemctl stop gpsd.socket

systemctl disable gpsd.socket

service gpsd start

Setup listener for GPSD on all IP addresses, not just the local loopback.

/lib/systemd/system/gpsd.socket file:

|  |
| --- |
| [Unit]  Description=GPS (Global Positioning System) Daemon Sockets  [Socket]  ListenStream=/var/run/gpsd.sock  ListenStream=[::1]:2947  ListenStream=0.0.0.0:2947  SocketMode=0600  [Install]  WantedBy=sockets.target |

/etc/default/gpsd file:

|  |
| --- |
| #  # Default settings for the gpsd init script and the hotplug wrapper.  # Start the gpsd daemon automatically at boot time  START\_DAEMON="true"  # Use USB hotplugging to add new USB devices automatically to the daemon  USBAUTO="false"  # Devices gpsd should collect to at boot time.  # They need to be read/writeable, either by user gpsd or the group dialout.  DEVICES=""  # Other options you want to pass to gpsd  GPSD\_OPTIONS="-D3 -S2947 -n -G /dev/ttyS0"  GPSD\_SOCKET="/var/run/gpsd.sock" |

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# Install Navit software

sudo apt-get install navit

install illinois maps

* Copy Illinois.bin under $HOME/vte/maps

install navit.xml configuration under $HOME/.navit

# How to set up SSH keys

Steps to setup secure ssh keys:

1. Create the key pair using ssh-keygen command.
2. Copy and install the public key using ssh-copy-id command.

# Setting up autostart for vte.sh

copy autostart from $HOME/vte/config to $HOME/.config/lxsession/LXDE-pi