**Installing Raspbian on Raspberry Pi for Windows Users.**

* Put SD card into SD reader.
* Download and install SD card formatter: <https://www.sdcard.org/downloads/formatter_4/>
* After installation, run the software. It should automatically detect your SD card and set the format size. Click format.
* Download NOOBS zip from here: <https://www.raspberrypi.org/downloads/noobs/>
* Copy the extracted files onto the SD card that you just formatted, so that this file is at the root directory of the SD card. Please note that in some cases it may extract the files into a folder; if this is the case, then please copy across the files from inside the folder rather than the folder itself.
* After the files are copied, eject the SD card and insert it into the Raspberry Pi’s SD card slot. Boot the RPi. You’ll need an HDMI cable to a TV to view the RPi’s installation. You’ll also need a USB keyboard attached to control the RPi.
* When the OS selection screen pops up, select “Raspbian”. You may also need a mouse for this part. At the top of the screen, select “install” (or press “I” key).
* After the installation is completed, the RPi will reboot. You should see a splash screen. After a few minutes a desktop should appear.

**Configuring Raspberry Pi for our uses**

* In the top right corner, click the raspberry icon. Under preferences, click “Raspberry Pi Configuration”
* In the main tab, change boot to desktop, to boot to CLI. This will boot to the command line and is useful for SSH and will save us memory. When the system boots, to get the desktop just give the command “startx”.
* In the interfaces tab, enable camera and SSH.
* In the performance tab, I put my GPU memory as 32MB. In our application we’re not really using the GPU, so I felt that it would be better to give the memory to the CPU.
* In the localization tab, I set all the fields. (locale, timezone, keyboard, wifi country).
* Press Ok, and select yes to reboot the RPi.

**Configuring RPi wireless network access**

* If you have a WiFi dongle for the RPi, or are using the RPi 3, you can configure wireless access according the this site: <https://www.raspberrypi.org/documentation/configuration/wireless/wireless-cli.md>

## Getting WiFi network details

To scan for WiFi networks, use the command sudo iwlist wlan0 scan. This will list all available WiFi networks, along with other useful information. Look out for:

1. 'ESSID:"testing"' is the name of the WiFi network.
2. 'IE: IEEE 802.11i/WPA2 Version 1' is the authentication used. In this case it's WPA2, the newer and more secure wireless standard which replaces WPA. This guide should work for WPA or WPA2, but may not work for WPA2 enterprise. For WEP hex keys, see the last example [here](http://www.freebsd.org/cgi/man.cgi?query=wpa_supplicant.conf&sektion=5&apropos=0&manpath=NetBSD+6.1.5). You'll also need the password for the wireless network. For most home routers, this is found on a sticker on the back of the router. The ESSID (ssid) for the examples below is testing and the password (psk) is testingPassword.

## Adding the network details to the Raspberry Pi

Open the wpa-supplicant configuration file in nano:

sudo nano /etc/wpa\_supplicant/wpa\_supplicant.conf

Go to the bottom of the file and add the following:

network={

ssid="HomeOneSSID"

psk="passwordOne"

priority=1

id\_str="homeOne"

}

network={

ssid="HomeTwoSSID"

psk="passwordTwo"

priority=2

id\_str="homeTwo"

}

Where the ssid and psk are replaced with the appropriate values for you. If you only have one network, then you only need one network block.

Now save the file by pressing Ctrl+X, then Y, then finally press Enter.

Reconfigure the interface with wpa\_cli -i wlan0 reconfigure.

You can verify whether it has successfully connected using ifconfig wlan0. If the inet addr field has an address beside it, the Raspberry Pi has connected to the network. If not, check that your password and ESSID are correct.

If your RPi has connected to your WiFi, you can now move to controlling the RPi via SSH.

**Logging into the RPi via SSH**

On your RPi, type ifconfig. Under wlan0, the inet addr is the address of the RPi on your network.

This will be the address you use to login via ssh. This could also be obtained via a network scan, but I think this is easier. The login username is pi, and the password is raspberry.

I recommend the Bitvise SSH client because it has a built-in SFTP file manager, so you can transfer files easily between the RPi and your desktop. You could also just use Git.

**Installing our required software packages**

* First, we will need to make sure everything is up to date. This can be done from the command line via this command: “sudo apt-get update && sudo apt-get upgrade”. This may take a while. You may need to periodically approve portions of the process.
* Next, we should install Python 3 and OpenCV.
* This is quite the process, so give it some time…
  + First, get rid of the wolfram engine on the RPi to free space, since we don’t need it.
    - sudo apt-get purge wolfram-engine