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# Raspberry Pi Setup

These instructions detail how to setup the Cannybots software and supporting on a Raspberry Pi.

It's recommended to perform this install on a fresh SD card, or instead use this [pre-made image](#) and skip the install steps (please see below for a link on how to copy the image to an SDCard). Please note that there are some touch testing instructions after the installation steps which you may wish to carry out.

If you are not using the pre-made SD card image then the image used for these instructions was: [2015-05-05-raspbian-wheezy.zip](#)

Please follow [these instruction](#) for how to create an SD Card.

On a Mac the "Apple Pi Baker App" makes this easy, download available here:

<http://www.tweaking4all.com/hardware/raspberry-pi/macosex-apple-pi-baker/>

The install can't easily be done offline, you must be connected to a network.

These instructions were tested on a Model B (512Mb)

## First Boot

If a setup screen does not appear run:

```
sudo raspi-config
```

When the setup screen appears choose:

- Advanced options -> Update
- Expand Filesystem
- Advanced options -> Memory Split -> 64

Optionally:

- Overclock (choose your preference, e.g. High)
- Enable Camera

You may want to consider

- Change User Password
- Advanced Options -> Change Hostname (e.g. to cannybotspi or something else)

Click Finish and then Reboot

Note: Initially don't enable Boot to Desktop so you can easily see the Pi's IP address at the console login prompt.

## Download Cannybots Software

login as the 'pi' user either directly using a keyboard/mouse & monitor or by using ssh  
pi@<IPADDRESS> if connected via Ethernet to a network.

the Pi's IP will appear above the login prompt on the connected HDMI screen

```
mkdir cannybots
cd cannybots
git clone https://github.com/Cannybots/bluebrain.git
```

**For the impatient, run the following, otherwise skip this and go to the next section 'Base Install':**

```
cd ~/cannybots/bluebrain/install/raspbian
sudo ./install.sh
```

```
./scripts/build_bluez.sh
sudo ./scripts/install_bluez.sh
```

```
./scripts/build_pythonpackage.sh
sudo ./scripts/install_pythonlibs.sh
./scripts/install_pythonapps.sh
```

```
sudo ./scripts/install_nodered.sh
```

Open a web browser from the Pi or a PC/Mac : [http://\[Pi IP Address\]:3141/](http://[Pi IP Address]:3141/)

Then have a look to the touch testing pages later in this document.

## Base Install

First we need to install some package dependencies and setup the Cannybots folder structure and system config files.

```
cd bluebrain/install/raspbian
sudo ./install.sh
```

<wait a while>

The install script performs a numbers of tasks

1. performs an upgrade of the Debian packages already installed
2. installs the following package dependencies (roughly):
  - a. ~~Python PExpect (for the older Cannybots BLE integration)~~
  - b. Various 'Build Tools' (for building BlueZ, mjpgstream and others)
  - c. XBox 360 drivers
  - d. Camera Dependencies (e.g. Video4Linux)
  - e. DaemonTools for keeping webserver, camera and bluetooth daemons alive
  - f. SDL for the Joypad and Laptimer GUI's
  - g. PGU which is an SDL UI library used by the Laptimer
3. Copies a folder structure to /opt/cannybots which contains
  - a. Python applications
  - b. Web Application (hosted on NodeJS)
  - c. NodeRED (also hosted the same instance of NodeJS)
  - d. Camera Streaming support files
  - e. Daemon launch scripts
4. Copies files under /etc for configuration of system services depended upon:
  - a. XBox controller driver
  - b. udev rules for bluetooth
  - c. Bonjour (avahi) settings for network auto discovery of ssh, vnc and filesharing)

## Application Install

Once the base script has completed we need to install a few more items:

1. Bluetooth support (bluez) with a custom patch for Joysticks
2. Cannybots Python libraries
3. Cannybots Apps (Lap Timer and Joypad)
4. Camera Streaming Support (mjpgstreamer)
5. Webserver for the Cannybots Web App (Logo Turtle, Cannyblocks, etc)
6. NodeRED for IoT dev & Cannybots Apps (e.g. Maze Solving, Temperature Tweeting)
7. XBox controller Support (xboxdrv)
8. Scratch Agent

In the bluebrain/install/raspbian folder run:

```
./scripts/build_bluez.sh
sudo ./scripts/install_bluez.sh

./scripts/build_pythonpackage.sh
sudo ./scripts/install_pythonlibs.sh
./scripts/install_pythonapps.sh

sudo ./scripts/install_nodered.sh
```

You may see warnings, that are safe to ignore, of the form:

```
gyp WARN EACCES user "root" does not have permission to access the dev
dir "/root/.node-gyp/0.10.36"
gyp WARN EACCES attempting to reinstall using temporary dev dir
"/opt/cannybots/runtime/nodered/cannybox/node_modules/serialport/.node-
gyp"
```

This step is optional (it's if you want to use the camera service)

```
./scripts/build_mjpgstreamer.sh
sudo ./scripts/install_mjpgstreamer.sh
```

## Remote Desktop and Bonjour

There are a couple of added extras that helps working with the Pi remotely:

1. Bonjour networking makes it easy to find and connect to the Pi (ssh, VNC & folders)
2. X11VNC for remote control of the main desktop you see on the monitor

```
sudo ./scripts/install_extra.sh
```

you will be prompted for a VNC password, choose a password for the root user, although you will set for the Pi user later and the root one won't be used (unless you go out of your way to start the pi desktop as the root user)

To set the VNC password for your your type:

```
$ x11vnc -storepasswd
```

Enter a password when prompted, you should see:

```
Enter VNC password:
```

```
Verify password:
```

```
Write password to /home/pi/.vnc/passwd? [y]/n y
```

```
Password written to: /home/pi/.vnc/passwd
```

If your Pi is completely 'headless', e.g. there no monitor attached, then optionally you may want to update the default Pi's HDMI mode so that your remote VNC screen is larger than the default 640x480. You can do this by:

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

and adding your preferred resolution:

```
hdmi_force_hotplug=1
hdmi_group=2
#1440x900 60 Hz
hdmi_mode=47
```

Other modes for reference:

```
#modes (group2) here: http://elinux.org/RPi\_config
#1024x768 60 Hz
#hdmi_mode=16
#1280x1024 60 Hz
#hdmi_mode=35

#1920x1200 60 Hz (max res)
#hdmi_mode=69
```

to save and exit type:

```
CTRL-X
```

and answer yes when prompted.



At this point you may want to enable 'Boot to desktop', by running

```
sudo raspi-config
```

Select option 3 and select "Desktop Log in ..."

You can choose reboot in the config or exit and run this after

Even if you did not enable the desktop, it's time to reboot:

```
sudo reboot
```

## Touch testing

In the URL's below replace 'raspberrypi' with your host name if you changed it in raspi-config or replace 'raspberrypi.local' with the IP address you saw above the login prompt earlier.

On Mac using <hostname>.local should work, if you ran `install_extra.sh`, because the installer installed bonjour/zeroconf support.

On Windows installing the Apple Print Services for Windows is very helpful for locating your Pi. You can download it here [here](#).

On Linux install the 'avahi' daemon for Bonjour support.

## Web Server

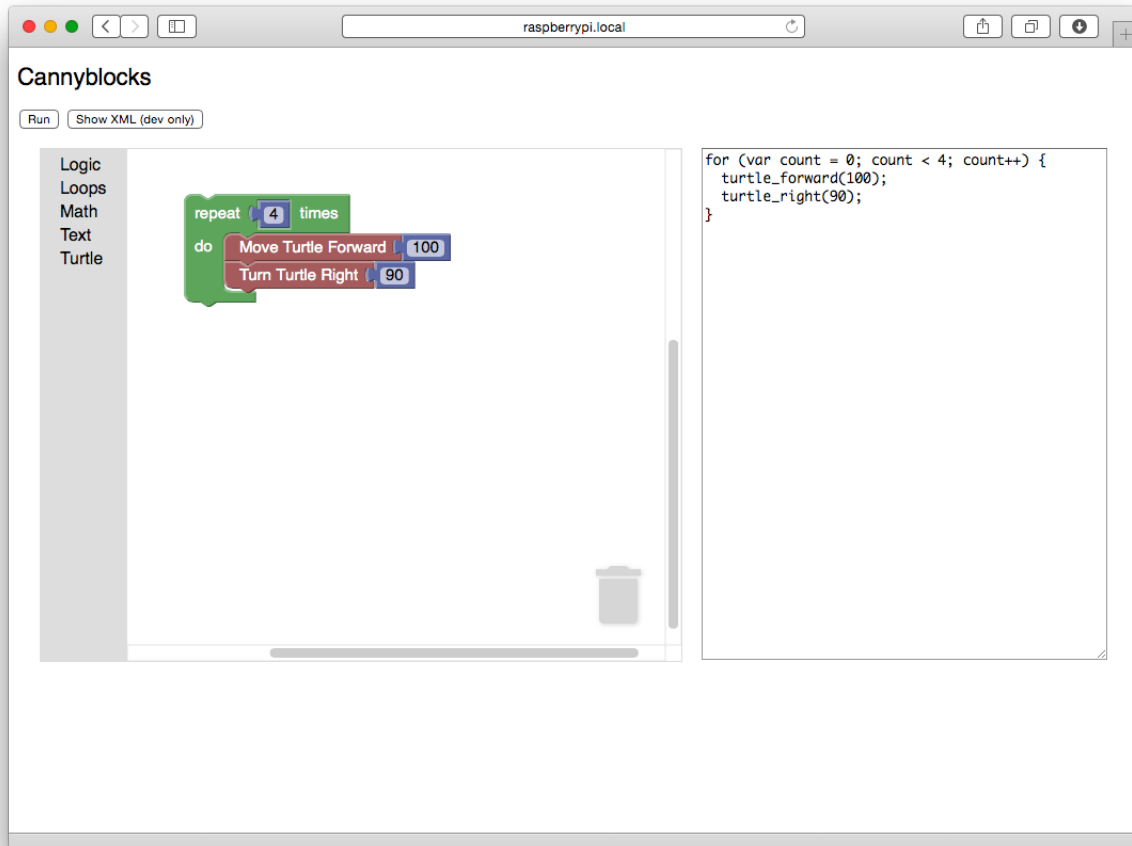
To see if the Web Server is running browse to: <http://raspberrypi.local:3141>

You should see something like the following (development placeholder) page :

[TODO: latest screenshot]

# Cannyblocks

Click on the “Cannyblocks” link and you should see:



## NodeRED

To see if NodeRED is up browse to: <http://raspberrypi.local:3141/red/>

[Add screenshot]

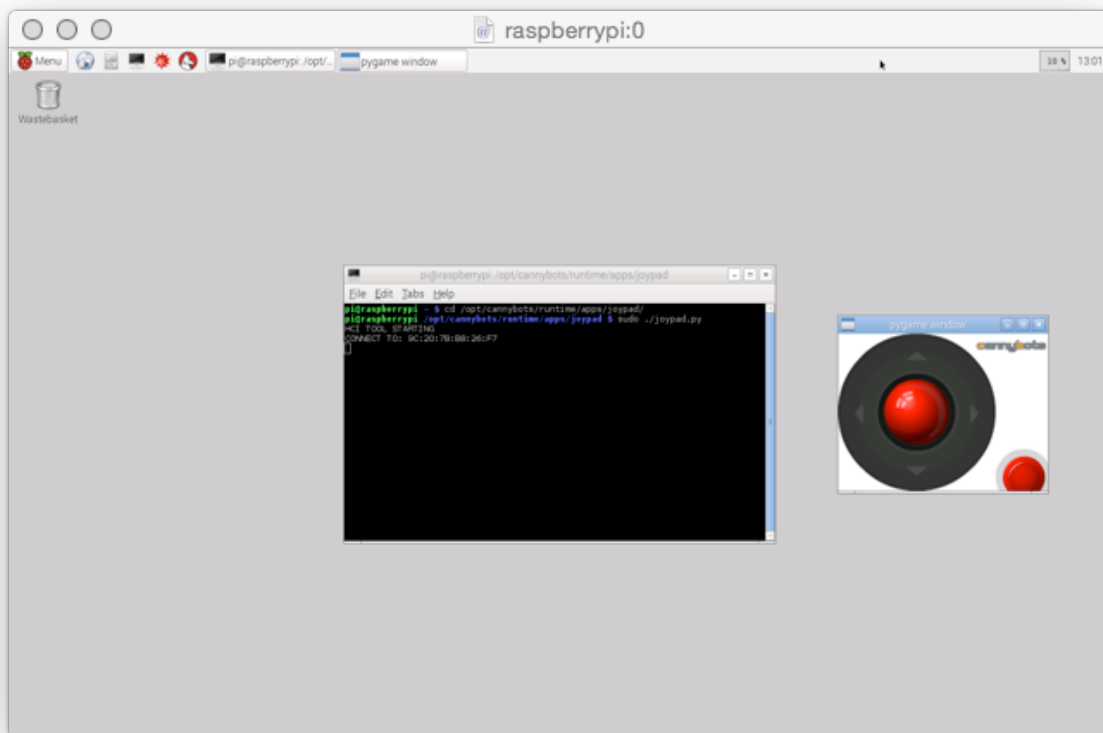
**Joypad app - NEEDS UPDATING, please ignore for now.**

Before running this you should make sure that your BLE dongle is working, follow [these instructions](#), but skip setting up BlueZ as it has been done already here.

Either directly on the Pi using a keyboard and mouse, or remotely via VNC (see Remote Desktop section) open up a “terminal” and type:

```
cd /opt/cannybots/runtime/apps/joypad/  
sudo ./joypad.py
```

You should see:



Close the window or press escape to exit.

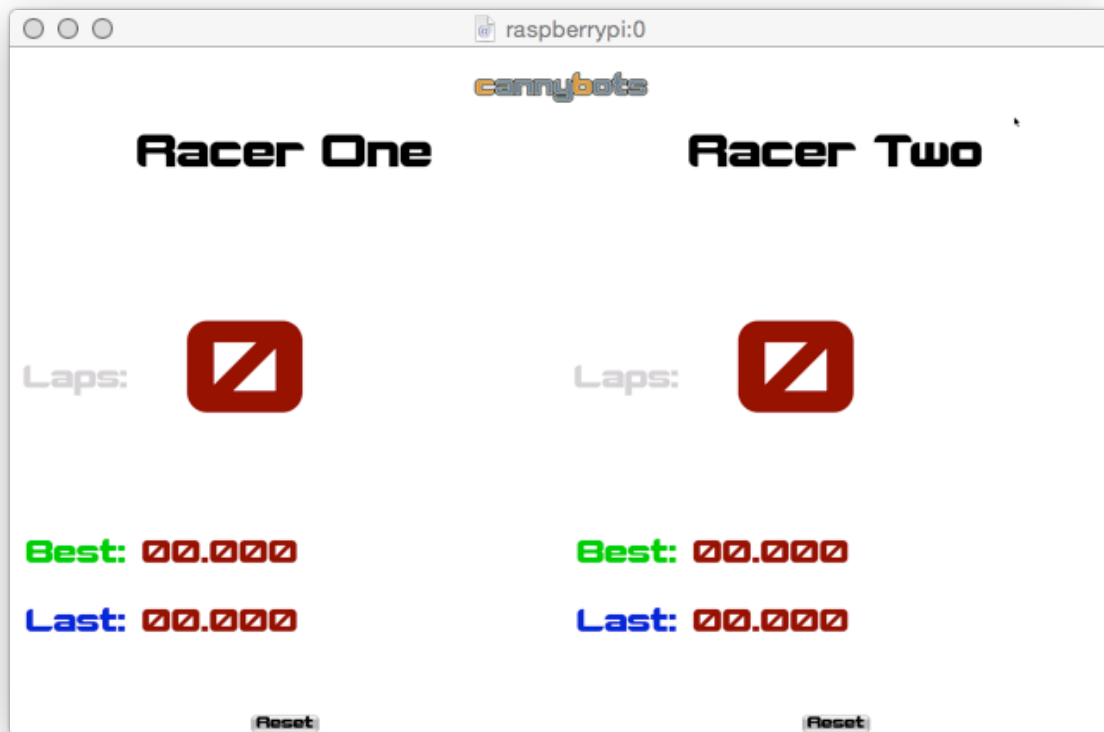
## Laptimer App -NEEDS UPDATING, please ignore for now

Before running this you should make sure that your BLE dongle is working, follow [these instructions](#), but skip setting up BlueZ as it has been done already here.

Either directly on the Pi using a keyboard and mouse, or remotely via VNC (see “Remote Desktop” section) open up “Terminal” and type:

```
cd /opt/cannybots/runtime/apps/racecontroller/  
sudo ./run Cannybot1 Cannybot2
```

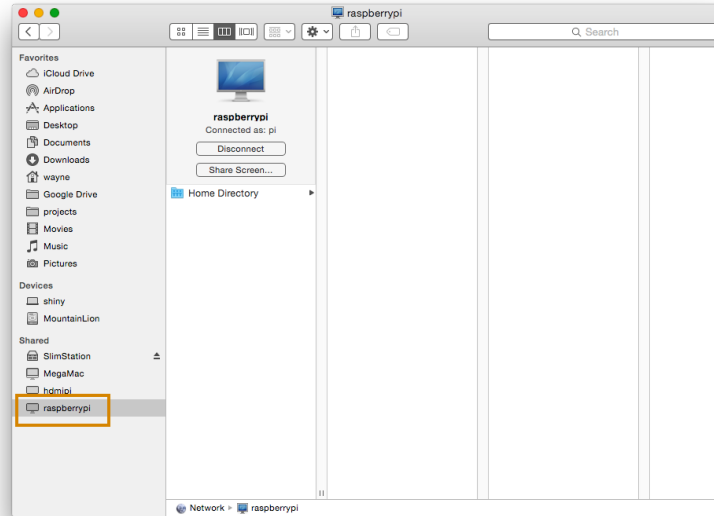
The names Cannybot1 & Cannybot2 need to match the name of 2 available Cannybots, otherwise the GUI will not display.



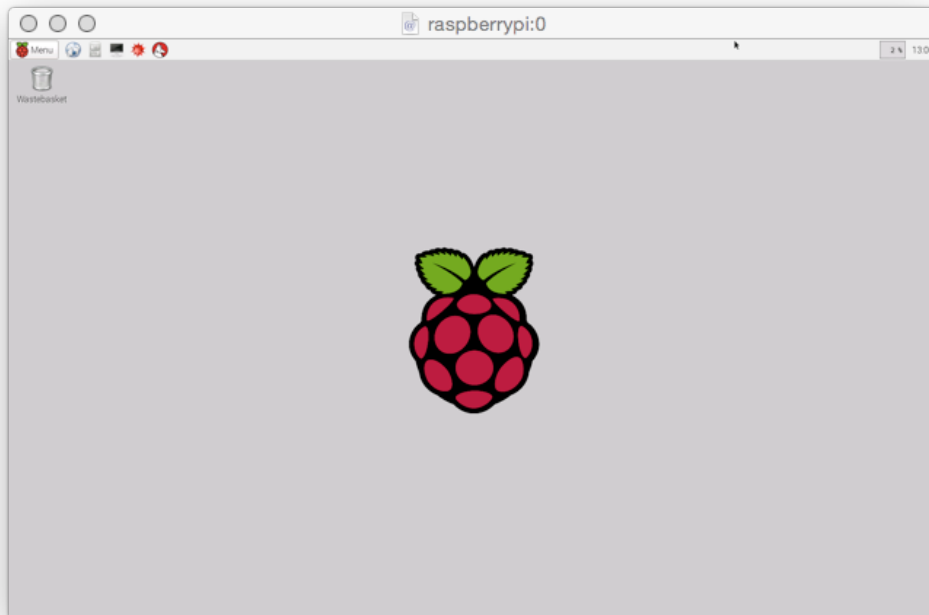
Close the window or press escape to exit.

# Remote Desktop

On a Mac the Pi should appear in the sidebar:



Click on "Share screen", and then enter your password set earlier when installing x11vnc, should show the desktop:





## Disabling Unwanted Services

To temporarily shutdown a service (which will still start at boot or when manually restarted) type:

```
sudo svc -d /etc/service/[servicename]
```

Where [servicename] is the name of one of the folders in /etc/service namely:

bluetoothd

camera

nodered

To (re)start a service type:

```
sudo svc -u /etc/service/[servicename]
```

To disable the service from starting at boot remove the symbolic link in /etc/service

To reinstate the service recreate the symlink.

```
cd /etc/service/
```

```
sudo ln /opt/cannybots/runtime/services/[servicename] .
```