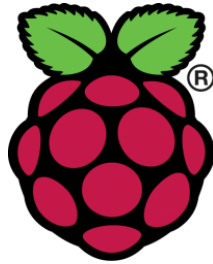
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**Bsc (Hons) Software Development**



**Home SecuriPi**

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**User Manual**

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## Abstract

*The purpose of this document is to provide a description on how to install and use Home SecuriPi in an individual's home.*

# Table Of Contents

<b>1. Introduction</b>	<b>4</b>
<b>2. Installing Home SecuriPi</b>	<b>5</b>
2.1 What you will need	5
2.2 Step-By-Step	5
<b>3. User Guide</b>	<b>11</b>
3.1 The Home Screen	11
3.2 History Screen	13

## 1. Introduction

The Home SecuriPi Device is relatively simple to set up. It will come pre-configured with the motion sensor and camera attached. The ability to turn on/off a light, or open/close a door will not come as default options, and will not be described in this installation manual. For advise on these modules, you can contact the developer through email at: [karlosredmond@gmail.com](mailto:karlosredmond@gmail.com).

## 2. Installing Home SecuriPi

Home SecuriPi has the ability to connect to your home router over Wifi, meaning no wiring is necessary other than that of a power supply.

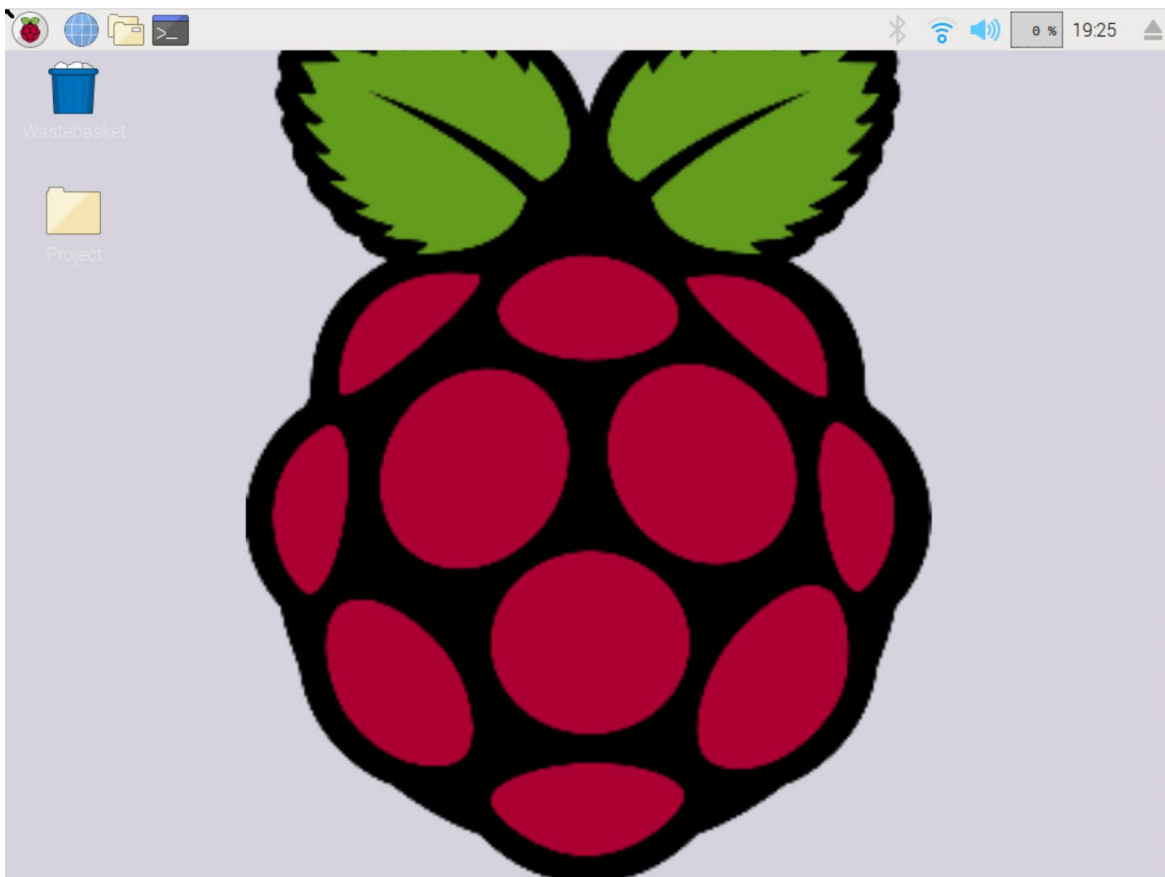
### 2.1 What you will need

For initial setup of Home SecuriPi, you will need a USB keyboard, USB mouse, HDMI cable and a HD ready television or monitor.

### 2.2 Step-By-Step

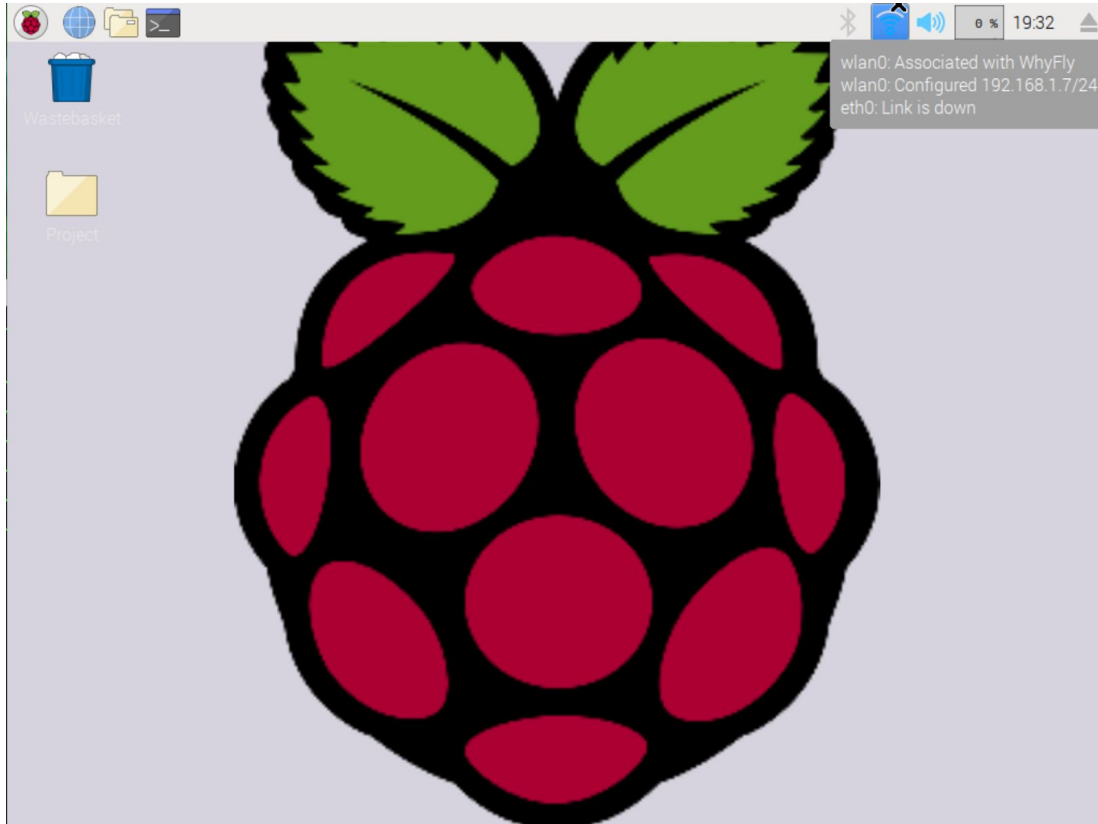
**Step 1.** Attach the keyboard, mouse and HDMI cable to the device and television or monitor.

**Step 2.** Plug in your device, which will boot up with a preinstalled Linux based Operating System called Raspbian. You will be presented with the screen in Fig. 2.1.



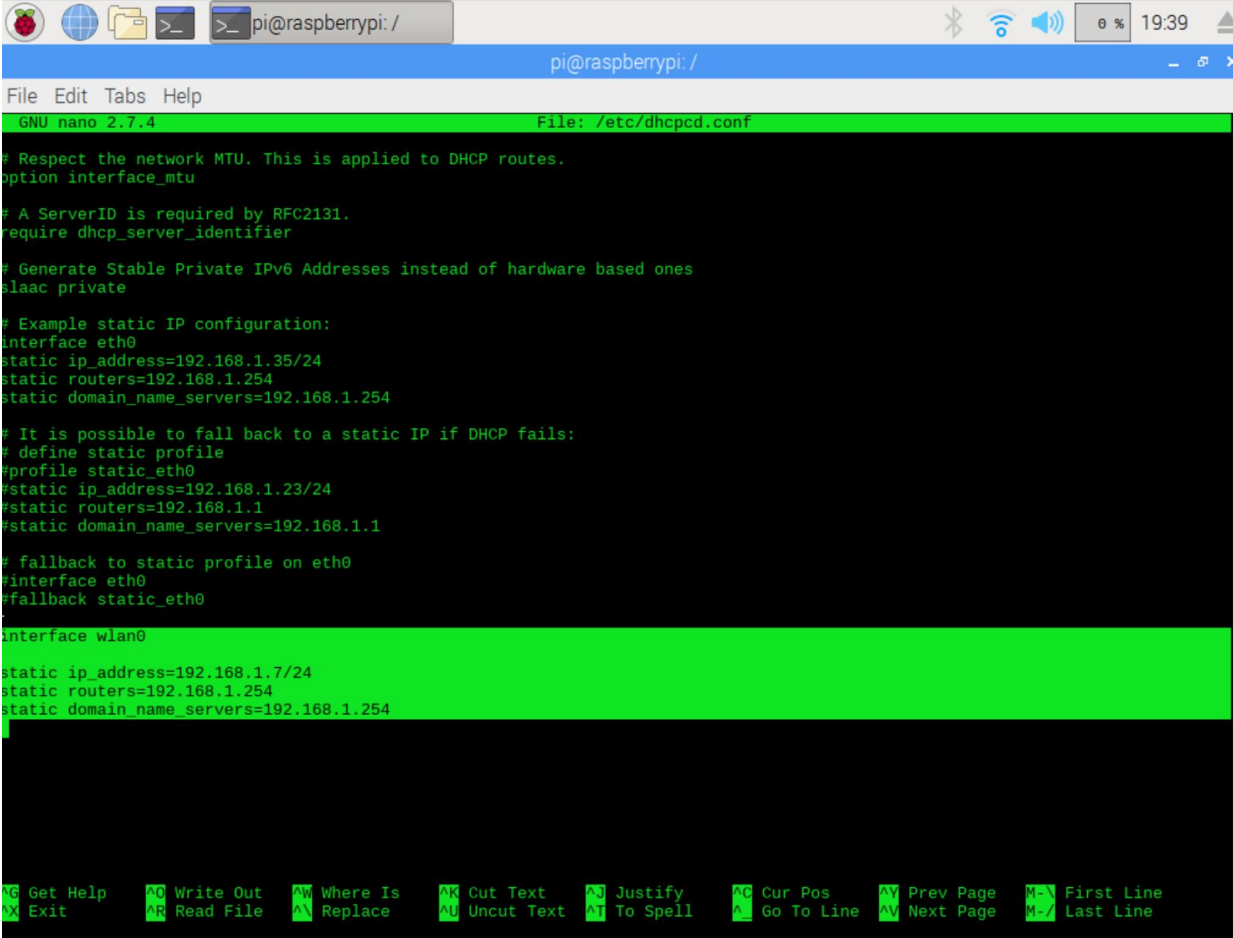
**Fig. 2.1** Raspberry Pi's Raspbian

**Step 3.** Hover the mouse over the WiFi symbol as indicated in Fig. 2.2. This will provide you with the IP address assigned to the device by your routers Dynamic Host Configuration Protocol(DHCP). If the WiFi has not been enabled, simply click the WiFi icon, and provide the normal details needed to connect a device to your WiFi.



**Fig. 2.2** IP address

**Step 4a.** Next you will need to assign this IP address as a static IP, meaning that any time the device is powered on, it will receive this IP address from the router. This requires two steps. The first step is to open a terminal and enter the command: `sudo nano /etc/dhcpd.conf`. From here you will need to change the IP address highlighted to the IP address that has been assigned to the Pi, as shown in Fig. 2.3. It is important to ensure that if connecting over WiFi, you uncomment interface `wlan0` and subsequent lines, by removing the `#` symbol at the beginning of the line. If using ethernet, the same config applies except that you must uncomment interface `eth0` and change the IP address associated with this. `Eth0` is also shown in Fig. 2.3.



```
pi@raspberrypi: /
pi@raspberrypi: /
File Edit Tabs Help
GNU nano 2.7.4 File: /etc/dhcpd.conf
# Respect the network MTU. This is applied to DHCP routes.
option interface_mtu

# A ServerID is required by RFC2131.
require dhcp_server_identifier

# Generate Stable Private IPv6 Addresses instead of hardware based ones
slaac private

# Example static IP configuration:
interface eth0
static ip_address=192.168.1.35/24
static routers=192.168.1.254
static domain_name_servers=192.168.1.254

# It is possible to fall back to a static IP if DHCP fails:
# define static profile
#profile static eth0
#static ip_address=192.168.1.23/24
#static routers=192.168.1.1
#static domain_name_servers=192.168.1.1

# fallback to static profile on eth0
#interface eth0
#fallback static_eth0

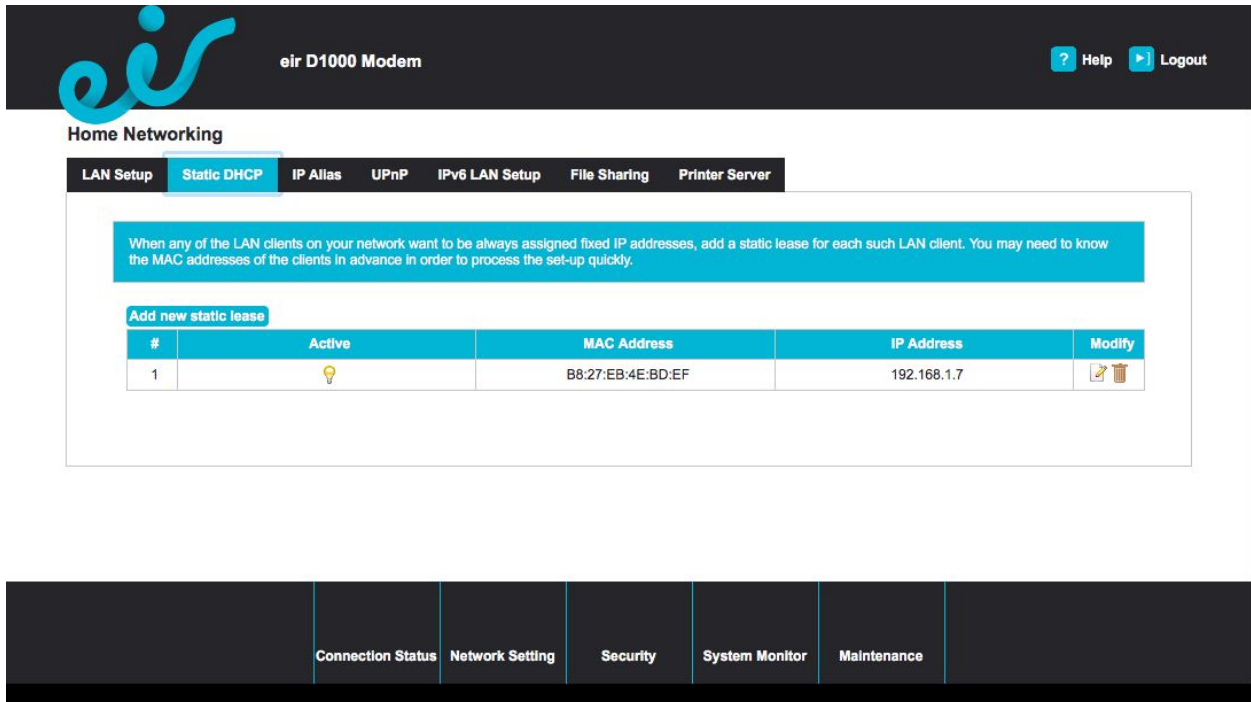
interface wlan0

static ip_address=192.168.1.7/24
static routers=192.168.1.254
static domain_name_servers=192.168.1.254




?G Get Help      ?O Write Out    ?W Where Is    ?K Cut Text    ?J Justify     ?C Cur Pos     ?Y Prev Page   ?M First Line
?X Exit          ?R Read File   ?A Replace     ?U Uncut Text  ?I To Spell    ?G Go To Line  ?N Next Page   ?L Last Line
```

Fig. 2.3 Static IP configuration

**Step 4b.** The next step for configuring a static IP address involves navigating to your router's interface, usually accessible by entering 192.168.1.254 into the URL bar of your chosen browser. Enter your username and password and navigate to the static DHCP section of the interface. This varies with router's, but for reference see Fig. 2.4. From here you can provide a static lease to the Home SecuriPi device, meaning that the router will reserve this IP address for the device allowing no other machine to be assigned this IP address.



The screenshot shows the web interface for an eir D1000 Modem. The top navigation bar includes the 'eir' logo, the text 'eir D1000 Modem', and 'Help' and 'Logout' buttons. Below this is a 'Home Networking' section with a sub-menu containing 'LAN Setup', 'Static DHCP', 'IP Alias', 'UPnP', 'IPv6 LAN Setup', 'File Sharing', and 'Printer Server'. The 'Static DHCP' page features a blue information box stating: 'When any of the LAN clients on your network want to be always assigned fixed IP addresses, add a static lease for each such LAN client. You may need to know the MAC addresses of the clients in advance in order to process the set-up quickly.' Below this is a button labeled 'Add new static lease' and a table with the following data:

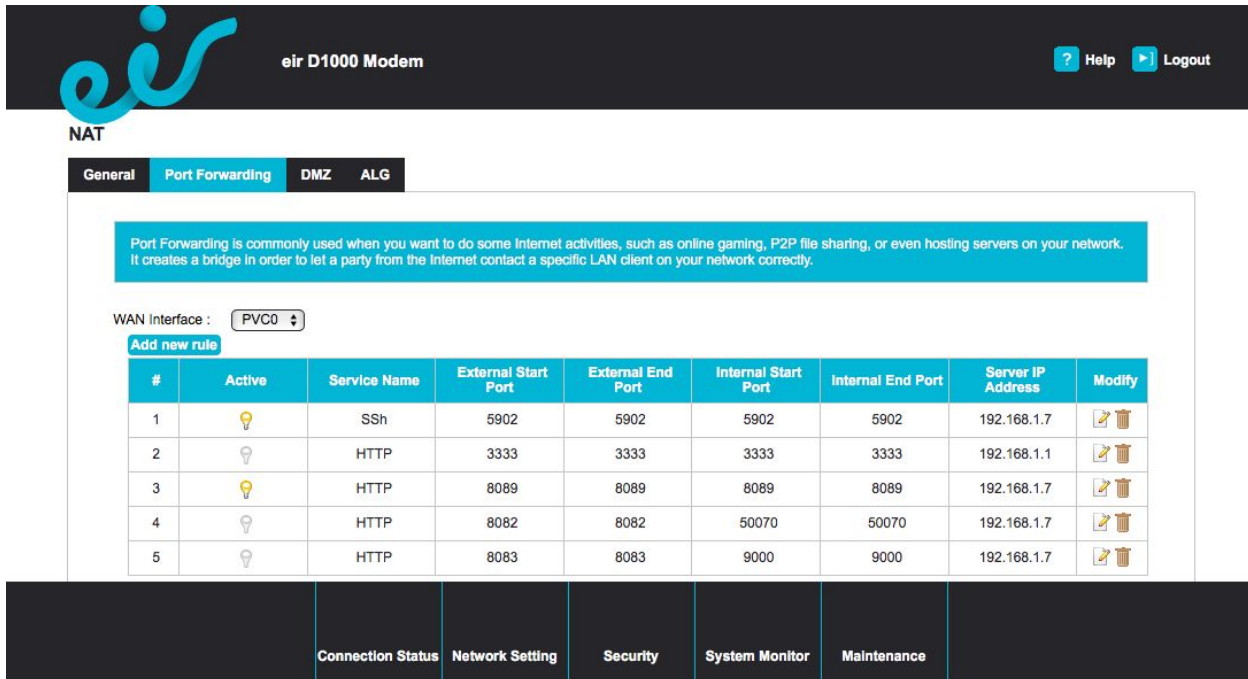
#	Active	MAC Address	IP Address	Modify
1		B8:27:EB:4E:BD:EF	192.168.1.7	 

At the bottom of the interface is a dark navigation bar with buttons for 'Connection Status', 'Network Setting', 'Security', 'System Monitor', and 'Maintenance'.

Fig. 2.4 Static IP reservation



**Step 5.** To enable the outside world to communicate with Home SecuriPi, we need to setup Port Forwarding, as well as a Dynamic Domain Name System(DDNS), which be explained in the next step. The Home SecuriPi system is configured to listen on port 8089. To enable Port Forwarding, navigate to the Port Forwarding section of your router’s interface, usually found under the NAT heading. As previously stated, not all router’s are the same, but a screenshot is provided for reference in Fig. 2.5.



The screenshot shows the NAT configuration page for an eir D1000 Modem. The 'Port Forwarding' tab is selected. A blue informational box explains that Port Forwarding is used for online gaming, P2P file sharing, or hosting servers. The WAN Interface is set to PVC0. Below this is a table of port forwarding rules:

#	Active	Service Name	External Start Port	External End Port	Internal Start Port	Internal End Port	Server IP Address	Modify
1	<input checked="" type="radio"/>	SSh	5902	5902	5902	5902	192.168.1.7	
2	<input type="radio"/>	HTTP	3333	3333	3333	3333	192.168.1.1	
3	<input checked="" type="radio"/>	HTTP	8089	8089	8089	8089	192.168.1.7	
4	<input type="radio"/>	HTTP	8082	8082	50070	50070	192.168.1.7	
5	<input type="radio"/>	HTTP	8083	8083	9000	9000	192.168.1.7	

At the bottom of the page, there are navigation tabs: Connection Status, Network Setting, Security, System Monitor, and Maintenance.

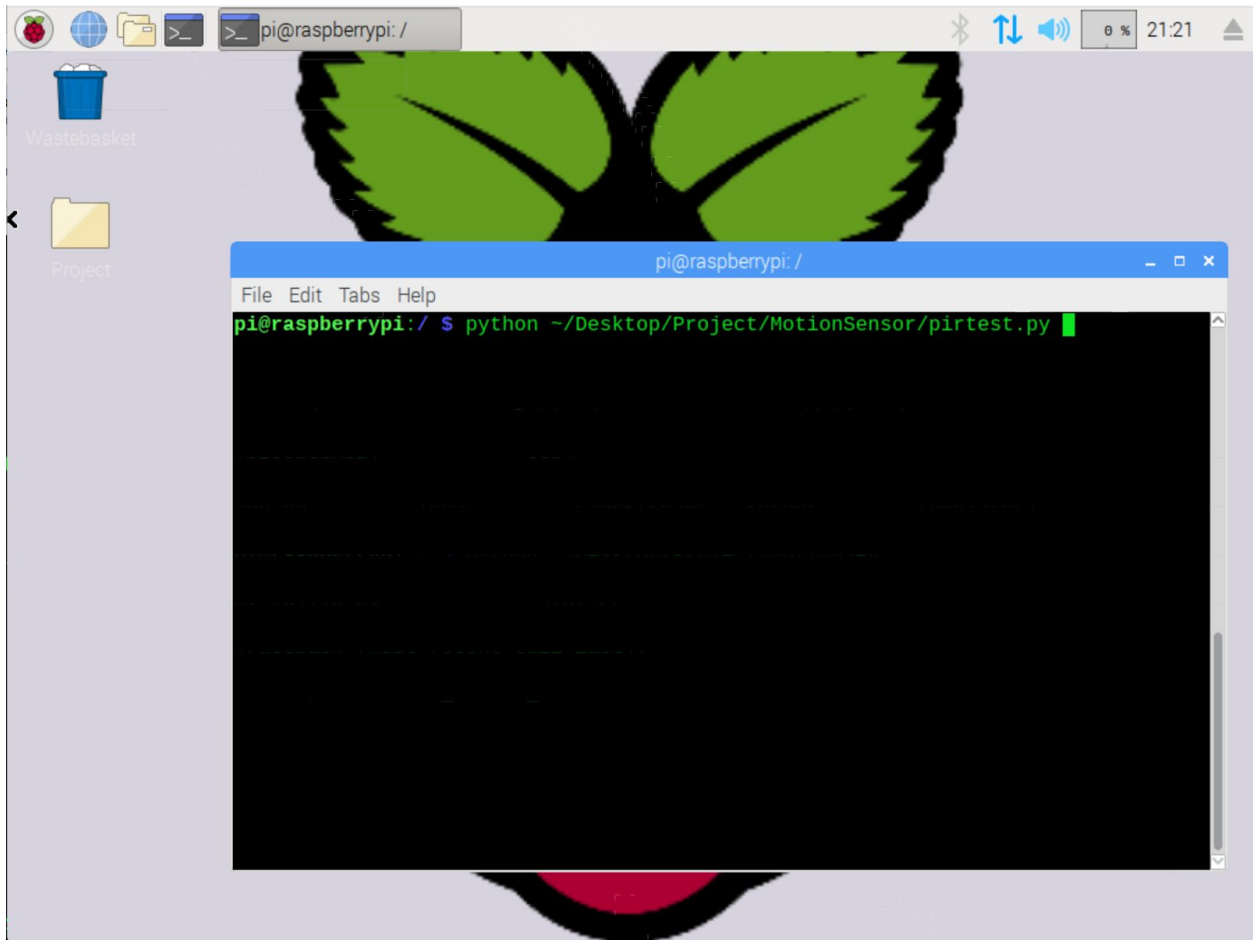
**Fig. 2.5** Port Forwarding

**Step 6.** Click on the add new rule, and fill in the details of the Home SecuriPi device. You can set your “External Port” to anything from 80 to 65535, however the use of port 80 is not recommended. Set the “Internal Start Port” and “Internal End Port” to 8089, and the IP address or “Server Address” to the IP address ascertained from Step 3. Click on the “Active” radio button, and then click “Apply”. Now, by combining your external IP address with the “External Port” eg. xxx.xxx.xxx.xxx:81, the router will forward any traffic coming through this port to the “Internal Start Port” number associated with the Home SecuriPi server.

**Step 7.** Internet Service Providers issue out external IP addresses on a lease basis. Meaning that the external IP address needed for you to communicate with Home SecuriPi may change. To overcome this we need to employ the services of DDNS providers. Each provider will have different setup guides, which are easy to follow. No-IP.com offer a free service, with detailed guides on how to configure the service. Once registered with No-IP you will receive a domain name eg. http://lookatme.noip.com. No-IP will be configured to always be aware what your external IP address is, meaning that to access Home SecuriPi, all you need to do is combine the

hostname with the “External Port” number of your Home SecuriPi server eg. <http://lookatme.noip.com:8089>.

**Step 8.** The final step is to run the Home SecuriPi application. This can be done by opening the terminal and entering the command: `python ~/Desktop/Project/MotionSensor/pirtest.py`. For reference see Fig. 2.6.



**Fig. 2.6** Run Home SecuriPi

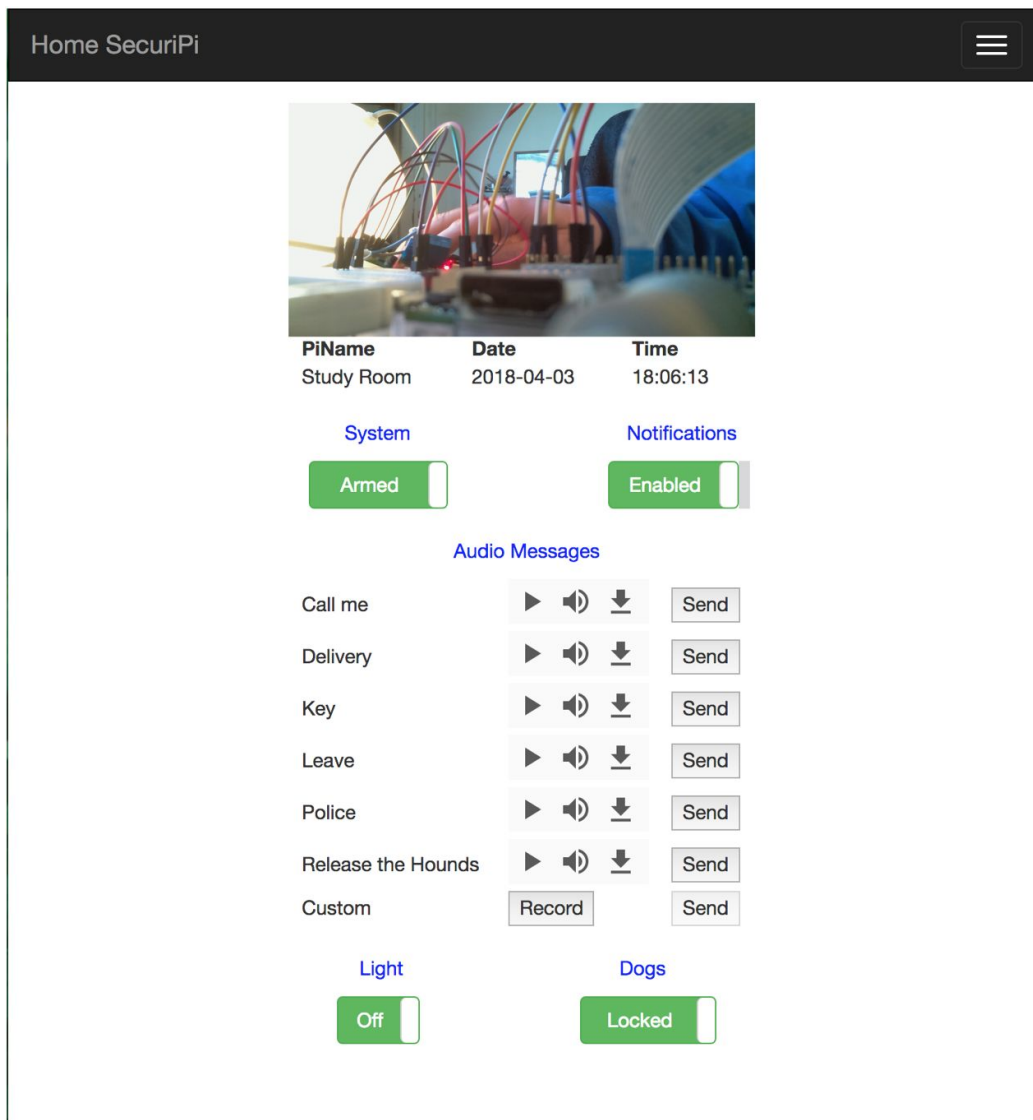
Once all of this is successfully configured, your Home Securi Pi is now accessible from the outside world. However there are some more requirements needed. These requirements are out of scope of this installation guide, but you can proceed from here by contacting the developer at [karlosredmond@gmail.com](mailto:karlosredmond@gmail.com).

## 3. User Guide

To use Home SecuriPi enter your domain name into the URL bar of your browser. If you do not yet have a domain name or DDNS setup, you can enter <http://0.0.0.0:8089> into the URL which will provide all the functionality available.

### 3.1 The Home Screen

The screen shown in Fig. 3.1 is the landing page of Home SecuriPi. From here all the magic happens. How to use this screen is described underneath this image.



**Fig. 3.1** Home SecuriPi Landing Page

**System** – From this screen you can arm or disarm the system, meaning if the system is in a disarmed state it will no longer take pictures or look for motion. You may wish to disarm the system for any number of obvious reasons. Simply clicking the toggle underneath “System” will either arm or disarm your system.

**Notifications** –You also have the option of enabling or disabling notifications, meaning that the system will keep taking pictures, but will not send any notifications. You may wish to do this if you are aware that there will be a lot of motion around your home for any given reason, but you still want to take pictures, which can be viewed in the History section of the application which will be described later in this document. To enable or disable notifications, simply click the toggle underneath “Notifications”.

**Light** – Clicking the “Light” toggle is self explanatory, turning On/Off the light.

**Dogs** – Likewise with the “Dogs” toggle, once clicked, the dogs are released!

**Audio Messages** – There are a number of audio messages visible on the home screen, which include a brief description of the message along with the option to “Send”. From here you can play the message whenever you please, to hear what the message dictates. Once you click the “Send” button associated with a message, the the pre-recorded message will be sent to the Home SecuriPi application, which will play the message through its attached speaker. The option to “Record” a custom message is also given, allowing you to record a unique live message for transmission. When you have finished recording the message, you can click “Send” and the Home SecuriPi application will play the message.

The image displayed on the page is the latest picture taken by Home SecuriPi. This image gets updated live, meaning that you can see a live feed of still images as there is movement discovered around your property, within reach of the motion sensor. The location of the security device is also updated under the heading “Pi Name”, along with the “Time” and “Date”. With this in mind, if more than one device is installed on your property, you can see whereabouts on the property the movement is occurring ie. Study Room, Front Door, Back Door etc.

You are also made constantly aware of the current status of the system, through the toggle switches “System”, “Notifications”, “Light” and “Dogs” which get updated live. To elaborate, if there is more than one user of the system at any given time, and one user decides to “turn on” a light, the other user(s) will be made aware of this action, as the toggle will automatically switch state. The same can be said for each toggle.

## 3.2 History Screen

The application also offers the ability to view all the images that have been taken. As can be seen in Fig. 3.2, Home SecuriPi provides two arrows which can be clicked to scroll through the images from start to finish or vice versa. The location, date and time of the image capture are also displayed. This could be useful for police investigation should they need to identify any individual who has caused damage to your property or otherwise infringed upon your rights.

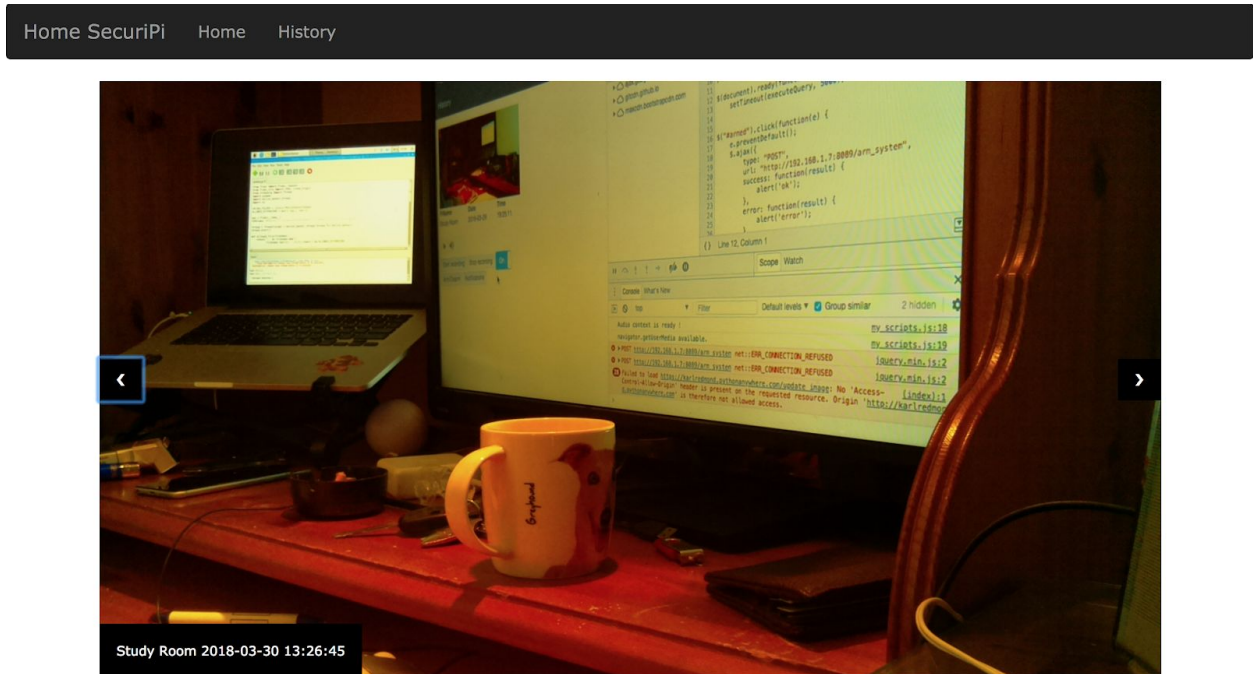


Fig. 3.2 History Screen

## 4. Troubleshooting

If you experience any problems, do not hesitate to contact the developer by email at: [karlosredmond@gmail.com](mailto:karlosredmond@gmail.com) .