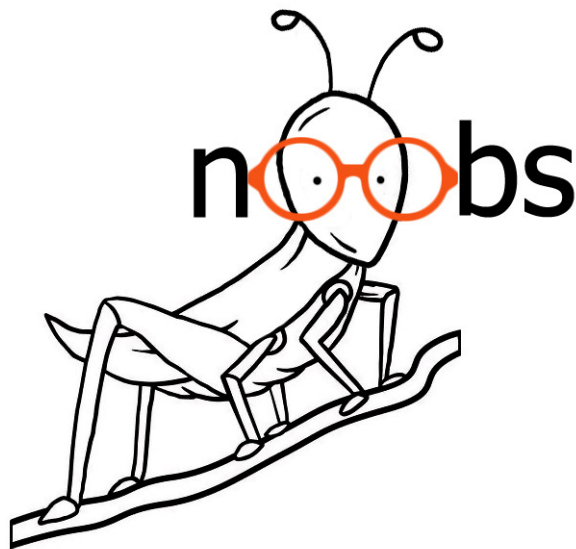


Grasshopper V5

For



--- Installation and configuration guide ---

Conceived and realised by: Bozzy, Dan Knight and That Grasshopper Guy



Powered by: **DietPi**

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1. INTRODUCTION

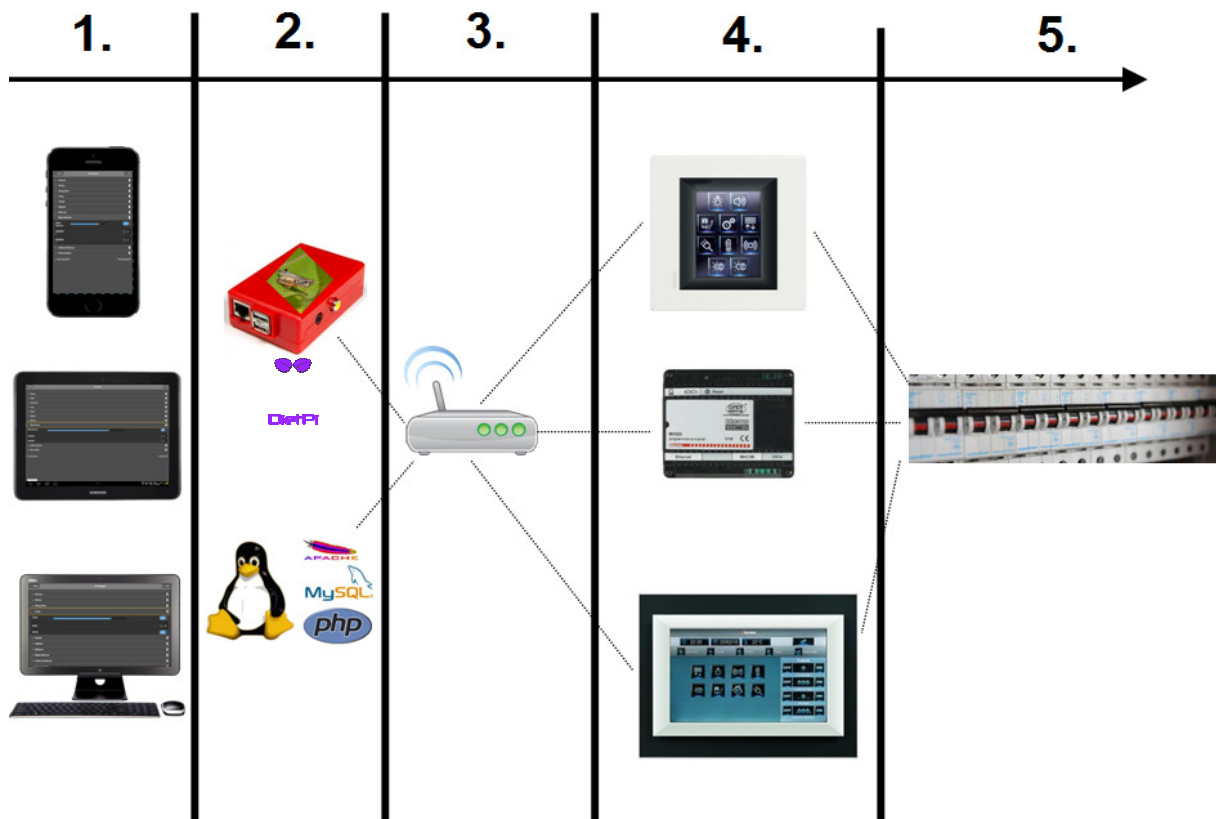
1.1. What is Grasshopper

Grasshopper is an open source and free (speech & beer) responsive-design **web application** to control **Bticino MyHome**.

This project is managed from <https://sourceforge.net/p/grasshopperwebapp>

1.2. How does it work

1.2.1. Architecture



1. Use any device

Since Grasshopper is a browser-based application, you can use a browser on any device to access Grasshopper. Thanks to its responsive-design support, the Grasshopper interface will adapt to the screen-size of your device.

2. Choice of server-platform

Grasshopper is a web application that can run from different web servers.

The Grasshopper **appliance** runs on DietPi with Lesp (Nginx+SQLite+PHP).

The Grasshopper **application** has been tested on Lesp and LAMP+SQLite. (Both documented in following chapters).

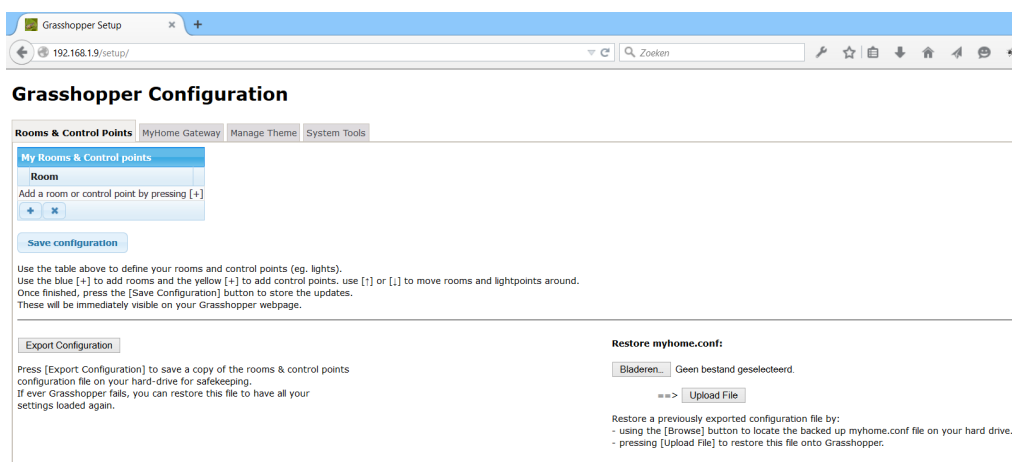
The only requirement is that SQLite is used as a database. You can read more about this in following chapters.

4. Choice of MyHome Gateway

Grasshopper can communicate not only through the official Bticino Gateways (eg. MH20x / F452 / F454) but also network-connected touchscreens can be used (eg. 3,5" / 10")

1.2.2. Configuration

Configuration of Grasshopper is easy-peasy. Once an IP address has been assigned to Grasshopper, configuration is done through a web-interface.



1.2.3. Use

We developed it using the 3S principle: **S**exy / **S**traightforward / **S**uperfast



1.3. How do I get started?

You have 2 choices:

1.3.1. The appliance way - quick and easy

- When you are not interested in technology and want to be up-and-running ASAP
- When you have a Raspberry Pi (See: Appendix - 4.3 How to buy a Raspberry Pi)

Just follow the instructions in

==> 2. Installing and Configuring the Grasshopper Appliance Image

1.3.2. The application way - choice, choice, choice

- When you are interested in the workings of Grasshopper
- When you have a Linux machine at your disposal on which you want to run Grasshopper

We tested out the Grasshopper application with Debian on intel, but we know of users who run it on embedded devices such as a Synology NAS.

Just follow the instructions in

==>3. Installing and Configuring the Grasshopper Application

2. INSTALLING AND CONFIGURING THE GRASSHOPPER APPLIANCE IMAGE

2.1. Introduction

This chapter describes how to get started with Grasshopper as an end-user. Using the Grasshopper appliance will require little configuration work and NO coding work.

To be able to use the Grasshopper appliance image, you are required to have a Raspberry Pi, which is the only cost to get Grasshopper up-and-running.

(See: Appendix - 4.3 How to buy a Raspberry Pi)

Dan Knight, who runs the DietPi project in parallel has been VITAL in delivering the Grasshopper appliance. Please check out - 4.1 Kudos - for more information.

2.2. Put the image on the SD card



When the Grasshopper appliance is installed, it uses less than 1GB.

To give enough headroom (for log files etc.) we recommend to use an SD card of at least 4GB. This will give you peace-of-mind after you have deployed it. :-)

2.2.1. Extract the Grasshopper .img Zip-file



If you haven't got the image file yet, find it on Sourceforge:
<https://sourceforge.net/p/grasshopperwebapp/>

You will find **grasshopper_v5_appliance_rpi.zip** there.

Use your favourite zip-application to unzip **grasshopper_v5_appliance_rpi.zip** on your hard disk.

This will result in a **grasshopper_V5_appliance_rpi.img** file.

2.2.2. Write the image to an SD-card

- insert an SD Card into a card reader on your PC
- Download <http://sourceforge.net/projects/win32diskimager/>
- Install and Run win32diskimager
- Click open (blue folder) and select the grasshopper_V5_rpi.img file you extracted
- Select the Drive Path to your SD card (eg: d:) underneath "Device".
- Click Write. Verify this is your SD card, then confirm by clicking "Yes".

2.3. Grasshopper first boot

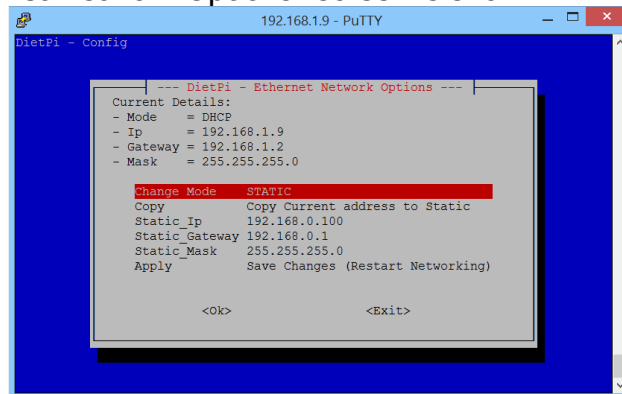


Before giving the raspberry pi its final destination (eg. in the basement, connected to the router), you need to connect it to a screen/tv and attach a keyboard when you first boot it up. This is needed because we need to configure the network settings.

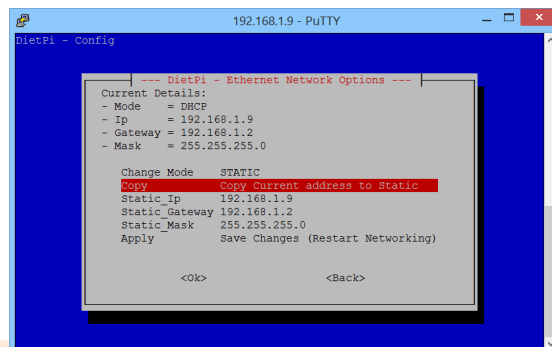
- Plug the SD card into your Raspberry Pi and turn it on by plugging in the power cable
- Once started up (this will take a few minutes, during which you see a lot of white text on a black screen), the login screen will appear
- Log in with:
dietpi login: **root**
password: **raspberry**
- The Grasshopper appliance now updates the Operating System (DietPi) to the latest release and reboots.

2.3.1. Configure the IP settings

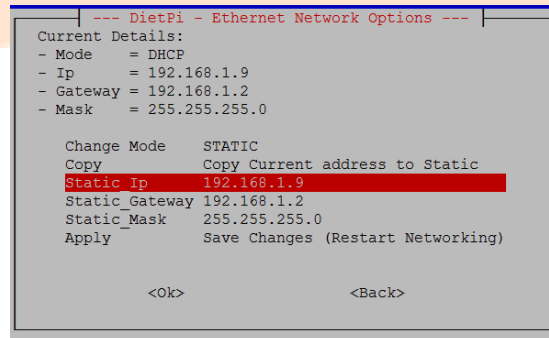
- Log into the Grasshopper appliance again:
dietpi login: **root**
password: **raspberry**
- The "DietPi - Ethernet Network Options" screen is shown



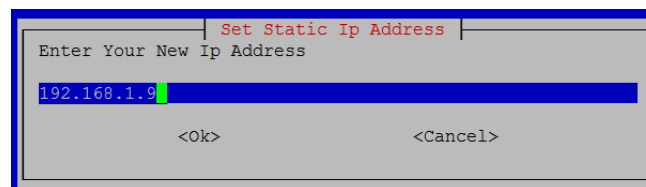
- Choose "**Copy** **Copy Current address to Static**" and press "ENTER"



- Arrow down, until "**Static_IP**" lights up and press "ENTER"

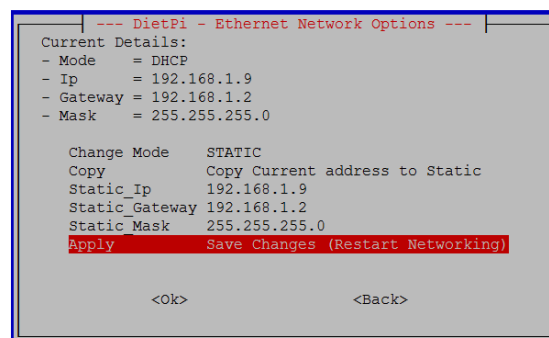


- Enter an IP address in your home-network range which you want to assign as the fixed IP address for Grasshopper and press "ENTER"

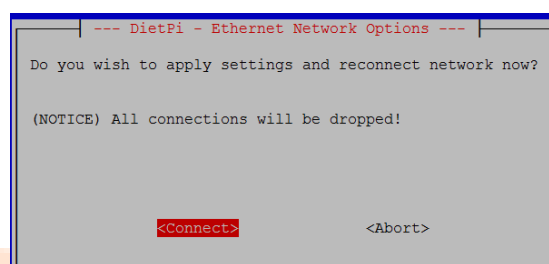


REMEMBER this IP address, this will be the IP address by which you will approach the Grasshopper application in the future.

- Select "Apply Save Changes (Restart Networking)"



- Select "<Connect>" in the next screen by pressing "ENTER"



- Press "Esc" key on your keyboard. This will show the "Exit DietPi-Config?" screen, choose "<Yes>" and press "ENTER".
- The Grasshopper appliance installation is now finalised. This may take a few minutes, during which a lot of white text passes on the black screen. When finished, the machine will reboot... **be patient, the magic is happening!**

2.3.2. Connect Grasshopper to the Bticino Gateway

open a web browser on your PC and go to:

<http://IPADDRESSOFOURPI/setup>



Remember: IPADDRESSOFOURPI should be replaced by the IP address we configured during setup.

- Open the tab "Myhome Gateway"

The screenshot shows a web browser window with the title "Grasshopper Setup" and the address bar displaying "192.168.1.9/setup/". The page content is titled "Grasshopper Configuration" and has a navigation bar with tabs: "Rooms & Control Points", "MyHome Gateway" (selected), "Manage Theme", and "System Tools".

Under the "MyHome Gateway" tab, there is a section titled "Myhome Gateway Configuration". It contains a table with three columns: "MyHome Gateway IP address", "Port Number", and "Password". The first row shows the IP address "192.168.1.40" and the Port Number "20000". Below the table is a button labeled "Save Gateway configuration".

Below the button, there is a text prompt: "Enter your Bticino Gateway IP address / Port number / Password." followed by explanatory text for the fields:

- Bticino Gateway IP address:** this is the IP address of eg. MH20x / Bticino Touchscreen 3,5" or 10" / Other network-connected Bticino device.
- Bticino Port number:** this is the port on which the Bticino Gateway listens for openwebnet commands. Usually this is 20000.
- Password:** This is the Open password for the Bticino Gateway.**

A note at the bottom states: "**MIND: if the Grasshopper IP address is in the range of authorised IP addresses defined in your gateway, leave the password field empty."

- Enter the Gateway settings as instructed on the web page
- Press "Save Gateway Configuration"

2.3.3. Power off the Pi



Rebooting the Pi is needed, even if you decide not to move the device to another location. This, to pick up the connection with the Bticino gateway (defined in step 2.3.2).

- Log into the Grasshopper appliance again:
dietpi login: **root**
password: **raspberry**
- In the terminal, type

```
poweroff
```

and press "ENTER".



Now you can re-locate the Raspberry Pi to its final destination. For it to work, it only needs power and wired network connection. So you can put it next to your internet router, wherever it is located.

MIND:

first connect the network cable between Pi and router
then plug in the power
(Otherwise it may not pick up the network)

2.4. Grasshopper second boot

When the Raspberry Pi is installed at its final location, it is time for the fun stuff. To get to the fun stuff open a web browser on your PC and go to

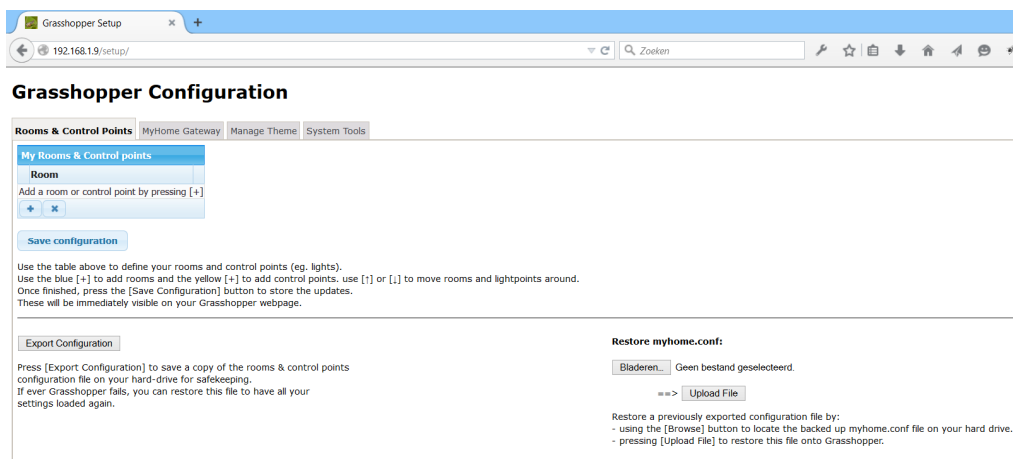
`http://IPADDRESSOFOURPI/setup`




Remember: IPADDRESSOFOURPI should be replaced by the IP address we configured during setup.

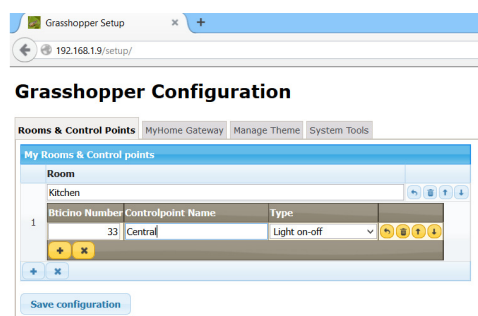
2.4.1. Configure Rooms & Control Points

- Open the tab "Rooms & Control Points"



Adding New Rooms:

- Press the  button to add a room and a first control point.



Adding New Control points:

- If you want to define more control points in the room, press 

Change the order of rooms and control points on Grasshopper:

- Moving rooms & control points up and down can be done with:

for rooms: 

for control Points in a room: 



This will result in the rooms and control points being shown in that new order on Grasshopper afterwards.

Controlpoint definition:

A control point is defined by:

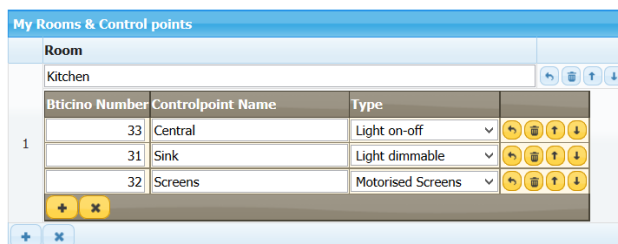
- Bticino Number: this is the address the control point has been assigned in the Bticino environment.

- Controlpoint Name: this is the name that defines the control point on the Grasshopper website. You can choose the name freely. It is advisable to choose a clear descriptive name. (eg. Night light / Sink / Wall / Central / ...)

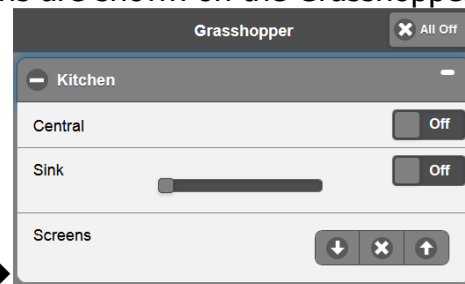
- Type: in Grasshopper V5, 3 controlpoint types can be defined.

- * Light on-off
- * Light dimmable
- * Motorised screens
- * Push button (see appendix 4.4)

This has an impact on how buttons are shown on the Grasshopper site.



Room	Bticino Number	Controlpoint Name	Type
Kitchen	33	Central	Light on-off
	31	Sink	Light dimmable
	32	Screens	Motorised Screens



When finished:

- Press the [Save Configuration] button to store your configuration on Grasshopper.
- In your browser, go to <http://IPADDRESSOFTYOURPI> and enjoy the result!



MIND: notice that on the Setup page, on the "Rooms and Control Points" tab; you have the possibility to export the room and control point configuration.

Export Configuration

After putting much work in configuring your entire house, you can export the myhome.conf file and store it somewhere (USB stick / NAS) for safekeeping. If ever your Grasshopper appliance must be re-installed, you can restore the file by uploading it using the other buttons on that page:

Restore myhome.conf:

Bladeren...

Geen bestand geselecteerd.

==>

Upload File

This way you won't need to configure manually again.

3. INSTALLING AND CONFIGURING THE GRASSHOPPER APPLICATION

3.1. Introduction

When you have your own Linux environment, be it a server or an embedded device (NAS, maybe a router, ...) you can use that platform to run Grasshopper from. This chapter describes how to go about installing Grasshopper as an application on such platform.



There are as many flavours of Linux as there are types of fruit. Therefore this can not be a one-size-fits-all manual. This installation procedure has been tested on a clean Debian 7.8.0 i386 image in VirtualBox, which does not mean it doesn't work on other Linux flavours, but commands (and results) may differ.

Explore and conquer :-)

3.2. Download the source files



If you haven't got the Grasshopper files yet, find them on Sourceforge:

<https://sourceforge.net/p/grasshopperwebapp/>

You will find **grasshopper_v5_application.zip** there.

Use your favourite zip-application to unzip **grasshopper_v5_application.zip** on your hard disk.

This will result in the Grasshopper files which are to be put in /var/www on your webserver.

3.3. Installing a web server

3.3.1. Introduction

Grasshopper can be installed on different web servers. We tested with Apache and Nginx, but probably others will work as well.

It is important the web server can work with PHP and SQLite.

In this chapter, we will demonstrate how to install on:

- LESP (Nginx / SQLite / PHP)
- LASP (Apache / SQLite / PHP)

3.3.2. Install an SSH server on your server (optional)

This step is only included to make your life easier during installation of the Grasshopper application. This will allow you to make a terminal session to the Linux server, so you can perform the installation steps.

This step is optional if you have another way of entering terminal commands on your linux device.

- Open a terminal on your server:

- change to root user

```
su -
```

=> when prompted for the root password, enter it.

- install openssh-server

```
apt-get install openssh-server
```

3.3.3. Configure your non-root user to enter sudo commands (optional)

This step is only included since sudo was not installed by default on Debian. If sudo is installed on your linux device or you are logged in as root to execute terminal commands, you can skip this step.

- edit the sudoers configuration

```
visudo
```

- allow your own non-root user (*USERNAME*) to perform run commands as root by adding following to the sudoers configuration:

```
USERNAME ALL=(ALL:ALL) ALL
```

Save & close the file.

On your server, log out and back in for this change to be picked up.

3.3.4. Install preparation

You can now use PuTTY to open an SSH session to your server.

From a terminal session, run:

```
sudo apt-get update  
sudo apt-get upgrade
```


3.3.5. LESP OR LASP installation process



MIND:

If you already have a web server running, skip this task.
If you haven't got a web server installed yet, choose either Nginx **OR** Apache.

Nginx:

```
sudo apt-get install nginx php5-fpm php5-sqlite php-apc sqlite3 python python-mysqldb
```

=> continue with "3.3.6 Configure NGinx default site"

Apache:

```
sudo apt-get install apache2 php5-fpm php5-sqlite php-apc sqlite3 python python-mysqldb libapache2-mod-php5
```

=> continue with "3.3.7 Finalise LASP installation"

3.3.6. Configure NGinx default site

- Edit the default site settings file:

```
sudo nano /etc/nginx/sites-available/default
```

In this file, uncomment or change following parameters to match below. !!!!!!!Don't remove anything!!!!!!!, just update if a parameter doesn't match:

```
server {
    listen 80;

    root /var/www;
    index index.php index.html index.htm;

    location / {
        try_files $uri $uri / index.html;
    }

    location ~ \.php$ {
        fastcgi_split_path_info ^(.+\.php)(/.+)$;
        fastcgi_pass unix:/var/run/PHP5-fpm.sock;
        fastcgi_index index.php;
        include fastcgi_params;
    }
}
```

- Restart Nginx

```
sudo service nginx restart
```

=> Continue with 3.4 Put the Grasshopper files on your server

3.3.7. Finalise LASP installation

Restart Apache:

```
sudo service apache2 restart
```

=> Continue with 3.4 Put the Grasshopper files on your server

3.4. Put the Grasshopper application files on your server

3.4.1. Introduction

We will use an SFTP connection using Filezilla to your linux server to copy all the Grasshopper files over. You can of course use a usb-stick / NAS as a transfer method for the files....

3.4.2. Copy Grasshopper files



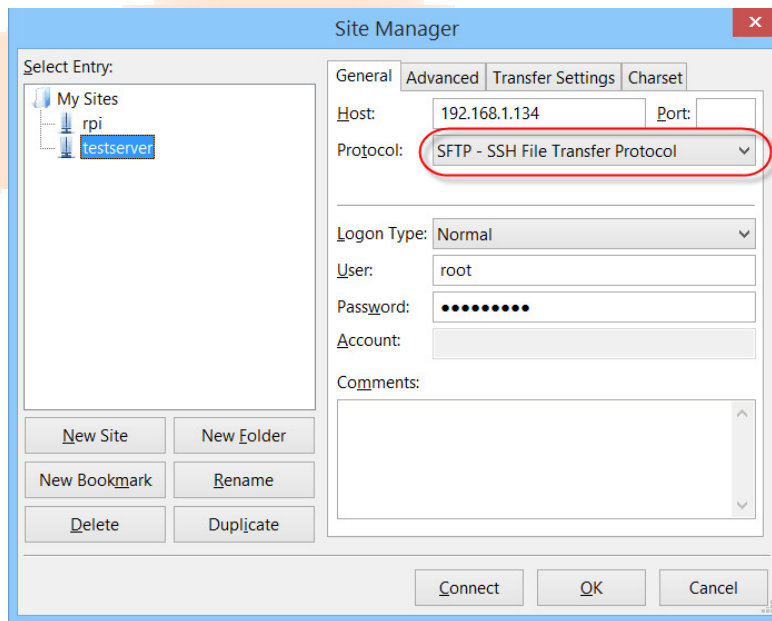
See 3.2 Download the source file if you haven't got them yet.

- Start an SSH session with your server using PuTTY

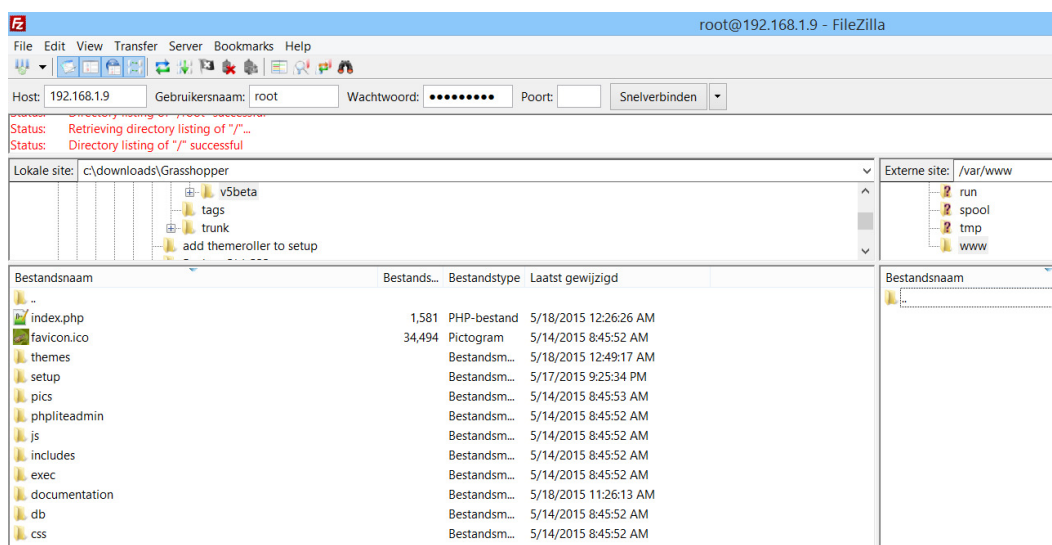
```
sudo mkdir /var/www  
sudo chmod 777 /var/www
```

(Don't worry, we'll fix security later)

- On your client PC, open FileZilla & make an SFTP connection to your server



- go to /var/www and delete index.html
- locate the Grasshopper files on your harddrive and copy them to your server in the /var/www folder



3.4.3. Set the correct access levels for your Grasshopper files



MIND: we created a .sh (executable) file to automate the setting of the correct access levels for all Grasshopper files.

****We hardcoded following in this file:**

- /var/www is the home directory for your webserver
- www-data is both the user- and groupname under which the webserver runs

If your config is different, just update the file and find/replace all of these with your settings.

```
cd /var/www/install  
sudo chmod 777 install.sh  
sudo ./install.sh
```

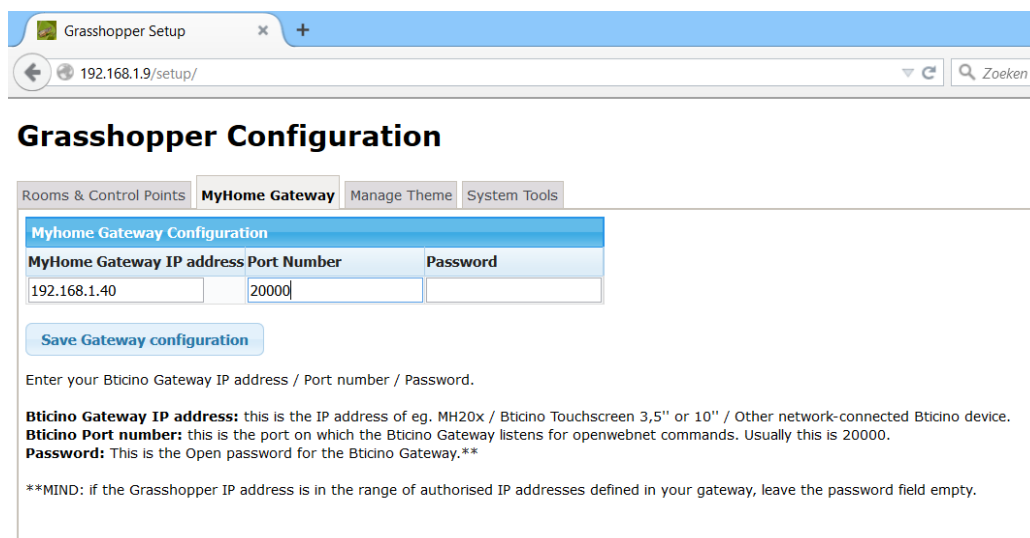
3.5. Configuring Grasshopper

3.5.1. Introduction

To get to the fun stuff open a web browser on your PC and go to
<http://IPADDRESSOFOURSERVER/setup>

3.5.2. Connect Grasshopper to the Bticino Gateway

- Open the tab "Myhome Gateway"



The screenshot shows a web browser window titled "Grasshopper Setup" with the address bar displaying "192.168.1.9/setup/". The page has a search bar with the text "Zoeken". Below the browser window, the "Grasshopper Configuration" page is shown with tabs for "Rooms & Control Points", "MyHome Gateway", "Manage Theme", and "System Tools". The "MyHome Gateway" tab is active, displaying a "Myhome Gateway Configuration" section with a table for "MyHome Gateway IP address", "Port Number", and "Password". The IP address is "192.168.1.40" and the Port Number is "20000". A "Save Gateway configuration" button is below the table. Below the button, there is a note: "Enter your Bticino Gateway IP address / Port number / Password." followed by three lines of instructions: "Bticino Gateway IP address: this is the IP address of eg. MH20x / Bticino Touchscreen 3,5'' or 10'' / Other network-connected Bticino device.", "Bticino Port number: this is the port on which the Bticino Gateway listens for openwebnet commands. Usually this is 20000.", and "Password: This is the Open password for the Bticino Gateway.**". A final note at the bottom states: "**MIND: if the Grasshopper IP address is in the range of authorised IP addresses defined in your gateway, leave the password field empty."

- Enter the Gateway settings as instructed on the web page
- Press "Save Gateway Configuration"

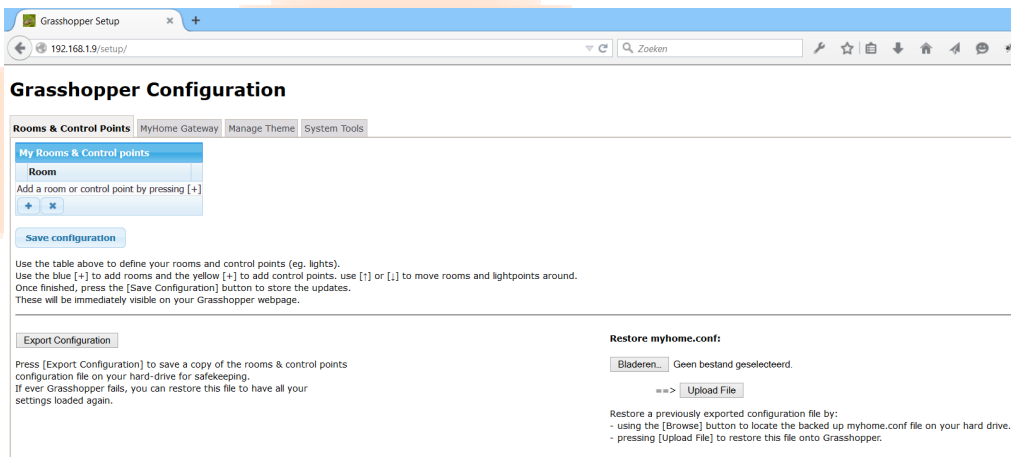
Open PuTTY for the last time:

- Reboot your server to get the monitor started.


```
sudo shutdown -r now
```

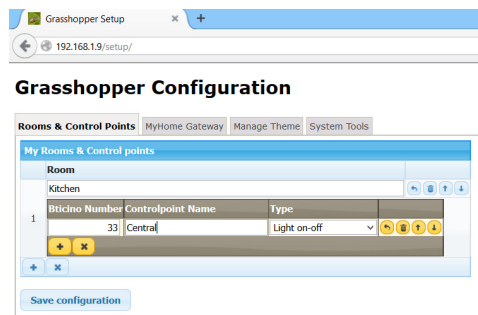
3.5.3. Configure Rooms & Control Points

- Open the tab "Rooms & Control Points"



Adding New Rooms:

- Press the  button to add a room and a first control point.




Adding New Control points:

- If you want to define more control points in the room, press .

Change the order of rooms and control points on Grasshopper:

- Moving rooms & control points up and down can be done with:

for rooms: 

for control Points in a room: 



This will result in the rooms and control points being shown in that new order on Grasshopper afterwards.

Controlpoint definition:

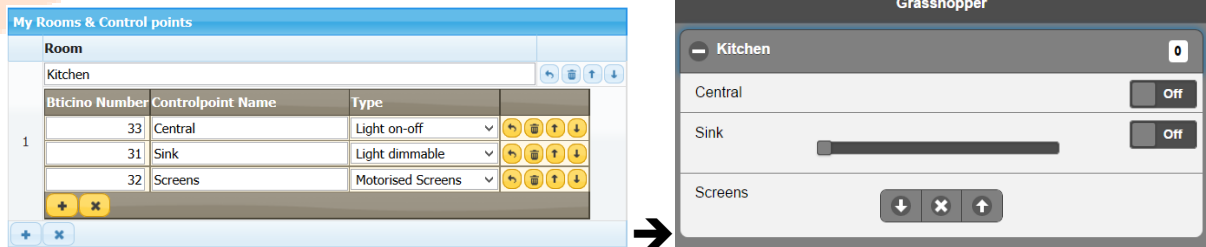
A control point is defined by:

- Bticino Number: this is the address the control point has been assigned in the Bticino environment.
- Controlpoint Name: this is the name that defines the control point on the Grasshopper website. You can choose the name freely. It is advisable to choose a clear descriptive name. (eg. Night light / Sink / Wall / Central / ...)

- Type: in Grasshopper V5, 3 controlpoint types can be defined.

- * Light on-off
- * Light dimmable
- * Motorised screens
- * Push button (see appendix 4.4)

This has an impact on how buttons are shown on the Grasshopper site.



When finished:

- Press the [Save Configuration] button to store your configuration on Grasshopper.
- In your browser, go to <http://IPADDRESSOFOURPI> and enjoy the result!



MIND: notice that on the Setup page, on the "Rooms and Control Points" tab; you have the possibility to export the room and control point configuration.

Export Configuration

After putting much work in configuring your entire house, you can export the myhome.conf file and store it somewhere (USB stick / NAS) for safekeeping. If ever your Grasshopper appliance must be re-installed, you can restore the file by uploading it using the other buttons on that page:

Restore myhome.conf:

Bladeren... Geen bestand geselecteerd.

==> Upload File

This way you won't need to configure manually again.

4. APPENDIX

4.1. Kudos



First and foremost, KUDOS to **the wife of Bozzy**, who must have been very patient while waiting (in vain) in bed for Bozzy, while he was behind his PC conceiving Grasshopper V5.

4.1.1. Stofke - Grasshopper V3

Stofke: (<http://www.myopen-legrandgroup.com/members/stofke/default.aspx>)
Without his Grasshopper Monitor, Grasshopper V3 would never have materialised. The monitor makes instantaneous updates from the Bticino Gateway to the Grasshopper UI possible.
A Python monitor session in the backend updates the database when an event happens on the Bticino network.
Browserbased javascript monitors the database for changes and updates the Grasshopper UI.

4.1.2. Bozzy - Grasshopper V4

Bozzy: (<http://www.myopen-legrandgroup.com/members/bozzy/default.aspx>)
This version enables Grasshopper to communicate with the myhome environment through eg. a Bticino touchscreen (such as MyHOME_Screen 10 or MyHOME_Screen 3,5. This, because Bozzy re-engineered the way Grasshopper connects to a Bticino Gateways (using open password).
So it is no longer a requirement to have an official gateway to connect to the Bticino environment. If you have a network-connected Bticino touchscreen, you are off :-)

4.1.3. DietPi

Dan Knight: Dan Knight has been very helpful in getting us on the road using his DietPi as the basis for Grasshopper.
Thanks to his DietPi distribution, we were able to create a lean and mean Grasshopper appliance. If you have other Raspberry Pi projects, do not hesitate to try it out. Using the dietpi-software tool (included with his image) you can turn your Pi into almost anything.
For more information: <http://www.fuzon.co.uk/phpbb/viewtopic.php?f=8&t=6>

4.1.4. AppendGrid

Thanks to this opensource advanced table framework, we were able to create a setup UI for Rooms & Control Points.
Check out their project on: <http://appendgrid.apphb.com/>

4.2. Grasshopper project is hiring

4.2.1. Introduction

The Grasshopper project is currently run by 4 guys.

Name	Role	mail
Bozzy	program manager lead architect lead developer	unda.maris@gmail.com
Dan Knight	Appliance leader	daniel_haze@hotmail.com
Fedo	Innovation leader	
That Grasshopper Guy	program manager lead marketing lead documentation	That.grasshopper.guy@gmail.com

Special mention for Dan Knight: DietPi is a completely separate project, owned and run by Dan. Nevertheless, he didn't spare any efforts to make sure the Grasshopper appliance runs completely automated and stable on the DietPi platform. Collaboration with Dan is very fruitful, mainly due to his attitude of getting it DONE. Thanks Dan, you have brought Grasshopper yet again to another level.

4.2.2. Who are we looking for?

We are searching for bright people who want to be part of the Grasshopper success story and bring value in (one or more of) these areas:

Skill	Value
Development (HTML/PHP/CSS/Python/js/...)	- You can help realise the existing exciting plans for next releases of Grasshopper - You can bring your exciting plans and code to the table to add value to Grasshopper
Web graphics	- with the increasing complexity of our project, UI layout and usability will become an important aspect
Linux security	tighten security on Grasshopper
Testing	try out beta versions and feed back findings
Enthousiasm	Make this the best-documented & -marketed opensource project
Domotics	bring ideas on where development could go (where is the market going / how can this project be a leader)

When you feel you have the energy, time and expertise to assist in bringing this project yet again to a new level, please reach out to Bozzy and That Grasshopper Guy.

4.3. How to buy a Raspberry Pi (estimated total cost: €80)

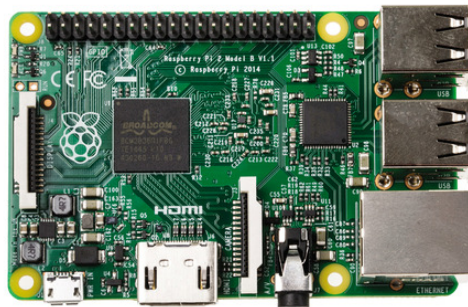
I checked on <http://uk.rs-online.com/web/generalDisplay.html?id=raspberrypi>

4.3.1. Where to buy

On <https://www.raspberrypi.org/products/> you see a link to the distributors reselling Raspberry Pi.

4.3.2. What

- Raspberry Pi (2 Model B or 1 Model B+) (the motherboard)



This will cost around €45 (on rs-online)



Choose a Raspberry Pi with an ethernet (network) port:

- Pi1 Model B / B+
- Pi2 Model B

So NOT: Pi1 Model A+

- Case (you have to buy this separately)



This will cost around €10



Make sure you buy a case that matches the raspberry pi model you chose! The drilled holes will be different for different types.

- Micro USB (if you don't have a spare one at home)



This will cost around €10

- SD card (+4GB)



This will cost around €15



Some SD cards don't work well on Raspberry Pi, for more info:
<http://www.raspberry-pi.co.uk/2012/06/07/compatible-sd-cards/>

- Network cable



This will cost around €2

4.4. Push-button button type

This button was a last-minute "easter egg". Therefore the description is put here.

The push-button behaves like a real-life pushbutton, eg. to "ring the bell", or to open a gate, one with a simple electric lock that needs only a short electric pulse to open, or a motorized one that needs a "trigger" signal to open and then closes itself after some time.

This pushbutton is a source for a trigger signal: it sends a *1*18*address## command, that is "go ON for 0.5s, then OFF", this is perfect for the purpose of opening gates or ringing the bell.

If you attach this AS IS to a light, you'll see a 0.5s "flash". If you put a general or ambient address, it will flash all lights (of that ambient).



This button is not suitable to function as an all-off button. We are aiming for this type of functionality in Grasshopper V6.

4.5. Software and versions used for Grasshopper

Below is a list of software we used to create Grasshopper.
Versions used are also mentioned. Newer versions will work the same / similarly.
... I presume. :-)

4.5.1. Appliance

Dietpi 6.1 => <http://fuzon.co.uk/phpbb/viewtopic.php?f=8&t=9>
Win32 Disk Imager 0.9.5 => <https://sourceforge.net/projects/win32diskimager/>
PuTTY 0.63 => <http://www.chiark.greenend.org.uk/~sgtatham/putty/>
FileZilla Client 3.10.3 => <https://filezilla-project.org/>
Linux Mint 17.1 => <http://www.linuxmint.com/>
7-zip 9.38 => <http://www.7-zip.org/>
Inkscape 0.91 => <https://inkscape.org/>
Sozi 13 => <http://sozi.baierouge.fr>

4.6. License agreement

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