DESCRIPTION DOCUMENT FOR WIFI SINGLE TRIAC MODULE

HARDWARE REVISION 0.3

Department	Name	Signature	Date
Author			
Reviewer			
Approver			

Revision History

Rev	Description of Change	Effective Date
A	Initial Release	01/FEB/2019
B	Updated with Alexa, Google Assistant and OpenHab	12/JUL/2020

ABSTRACT:

This document is a detailed product description that describes the effective features of the product. It includes a functional hardware description of the product with its internal block diagram and product images.

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1. ABBREVIATIONS

Term	Description
A	Ampere
AC	Alternating Current
COM	Communication
DC	Direct Current
GPIO	General Purpose Input Output
HTTP	Hypertext Transfer Protocol
Hz	Hertz
I2C	Inter Integrated Circuit
IDE	Integrated Development Environment
IP	Internet Protocol
LED	Light Emitting Diode
MCU	Microcontroller Unit
MQTT	Message Queue Telemetry Transport
PCB	Printed Circuit Board
PWM	Pulse Width Modulation
SPI	Serial Peripheral Interface
SSID	Service Set Identifier
UART	Universal Asynchronous Receiver Transmitter
V	Volts
ZCD	Zero Crossover Detection

2. REFERENCES

Company Website link	https://www.armtronix.in
Youtube link	https://www.youtube.com/channel/UCr3QNs65jDSxKDX4QPc03oQ
Intractable's Weblink	https://www.instructables.com/member/Armtronix/
Github's Weblink	https://github.com/armtronix

3. PURPOSE

The purpose of this document is to outline the design description for the Wifi Single TRIAC Module. It provides a high-level summary of the product.

4. SCOPE

This document describes system architecture which includes Power supply, Microcontroller, WiFi Module and Triac.

5. SAFETY AND WARNING

Note that, this board to be powered with AC 230V with required current. Work and handle carefully with AC power is a harmful and danger for human beings. Touching live wire or board when it is ON is danger and not advisable, it may cause to death, please avoid it.

Even a 50 V AC supply is sufficient to kill you. Please Switch off the mains before you make or change connections, be very careful. If you are not sure of anything related to the AC supply lines, please call an electrician ask and him to help you with it. Do not attempt to interface to mains unless you have adequate training and access to appropriate safety equipment. Never work on high voltages by yourself when you are alone. Always ensure that you have a friend/partner who can see and hear you and who knows how to quickly turn off power in case of an accident. Use a 1A Fuse in series with the input to the board as

a safety measure. Basic Wiring diagram is available on our instructables page and github. Please refer it.

Fire Hazard: Making wrong connections, drawing more than rated power, contact with water or other conducting material, and other types of misuse/overuse/malfunction can all cause overheating and risk starting a fire. Test your circuit and the environment in which it is deployed thoroughly before leaving it switched on and unsupervised. Always follow all fire safety precautions.

6. INTRODUCTION

BA004: Wifi Single Dimmer Module, is a WiFi based smart switch/dimmer product. Designed and developed to control a light. Load can be controlled through any Wifi enabled Smartphone with or *without internet* depends on loaded firmware. This module can be used to switch ON/OFF the lights like regular LED or florescent bulb. If incandescent bulb or traic dimmable LED bulbs are being used, you can vary its intensity from 0 to 100%. It also has feature to connect physical selector switch externally to vary the intensity of light in two-way mode with respect to Smartphone.

7. PRODUCT FEATURES

- Works directly with AC power 100 - 240 V AC 50-60 Hz.
- Product firmware can be updated/reloaded/changed as per user requirement.
- One Triac outputs to control a light.
- It is Arduino IDE compatible.
- Triac output can handle up to 1 Amperes of current.
- WiFi with MQTT or HTTP protocol.
- A header is available on board can be used to connect Potentiometer/switch as virtual switch. It can also be used as GPIO.
- Basic Firmware to enter SSID and password to connect to the router
- Firmware has ability to control device through HTTP and MQTT mode.
- Push Button on board Provided to Reset the board.
- Does not require external neutral for output.
- Product comes with wall mount plastic enclosure.

8. PRODUCT DESCRIPTION

a. PHYSICAL DESCRIPTION

- AC to DC Power supply module
- Triac 1-Nos.
- Wifi Module
- Microcontroller

b. FUNCTIONAL DESCRIPTION

Block Diagram

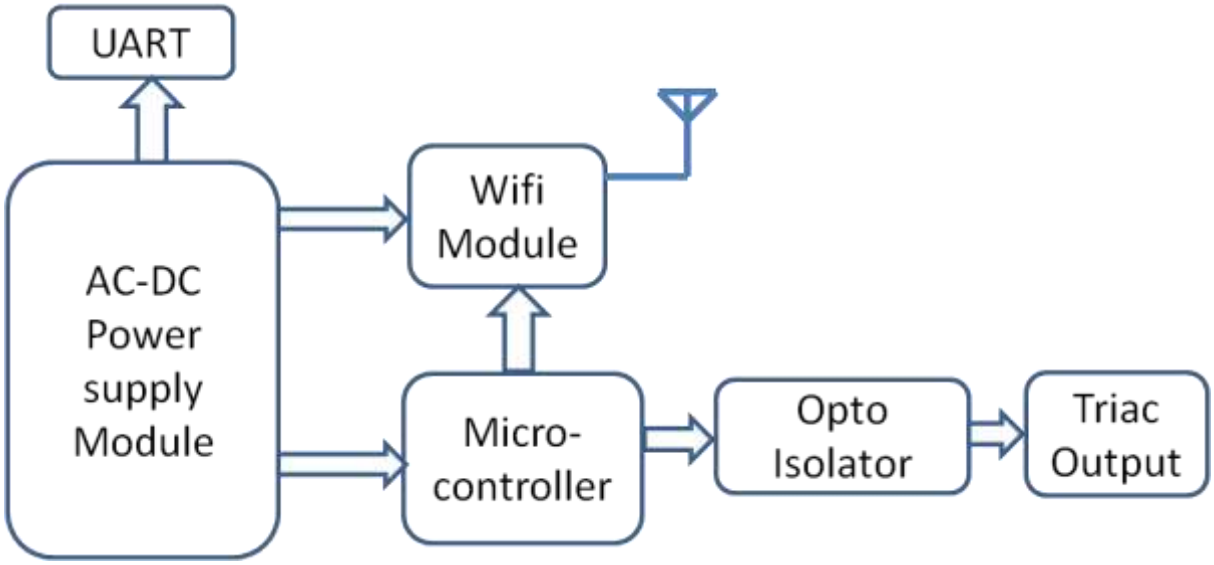


Figure 1: Block Diagram

One Triac one Ampere board has an on-board power supply module which takes standard AC power as input and provides required DC power as output. The DC power is used to power-up microcontroller and Wifi module incorporated on board to run a dimmer algorithm and to establish Wifi communication with Smartphone respectively. There is a triac used on board to control ON/OFF and dimming of light intensity from a Smartphone application using MQTT/HTTP protocol.

9. SYSTEM OVERVIEW

1. AC to DC Power supply module
   AC to DC converter is power supply module manufactured from Hi-Link part number HLK-PM01. This power supply module rectifies and regulates voltage from 230 V AC to 5 V DC with output current capacity of 0.6A DC. The power of HLK-PM01 is at maximum of 3W. The 5V output can be accessed to connect any external sensors.

   The DC-DC converter on board is used to regulate voltage from 5 V DC to 3.3 V DC to supply power to complete digital part.

2. Wifi Module
   Wifi module used on the board is ESP12 with all its required GPIOs are easily accessible to user for their own application. Wifi module is powered by through 3.3 V DC. It works on both MQTT / HTTP protocol.

3. Zero Crossover Detection
   Zero cross over detection is used to detect the zero crossing of AC phase to fire the Triac synchronously to get the smooth output. Optically isolated ZCD circuit is implemented to protect device from unwanted signals due t o AC lines.

4. Triac
   TRIAC is driven through optically isolated TRIAC drivers with reference to zero crossover

detection. Synchronous switching method is used to regulate the power to loads. PWM signal will drive the TRIACs, and switches AC mains power from 0% to 100% of its total cycle. The PWM signal pulses can be configured in code with respect to AC mains frequency and voltage level. BT136 Triac is used in this board to act as dimmer or switch.

5. Microcontroller

   The Microcontroller executes the dimmer algorithm to drive the TRIAC switch, by receiving ZCD signal. Along with this, it has three LEDs to indicate the status of loads. Controller communicates with Wifi module through UART mode of communication to send and receive data to to-and-from respectively with connected Wifi network. ATmega328P microcontroller is used in the product to execute the algorithm, which is manufactured by Atmel incorporation and is compatible with Arduino.

   Control processor has the capability for software up-gradation through Arduino and contains enough memory to upgrade and store the software for its own application.

10. TECHNICAL SPECIFICATION

a. ELECTRICAL SPECIFICATION

Input Specifications				
Description	**Min**	**Typ**	**Max**	**Unit**
Voltage AC	100	220	230	Volts
Current AC	0.6	2.6	-	Amps
Power AC	-	3	-	Watts
Frequency	50	-	60	Hz

Table 1: Input Specification

Triac Output Specifications (Maximum)				
Description	**Min**	**Typ**	**Max**	**Unit**
Voltage AC	-	-	240	Volts
Current AC	-	-	1	Amps
Power AC	-	-	240	Watts

Table 2: Triac Output Specification

b. MECHANICAL SPECIFICATION

- Mechanical Dimensions of PCB are approximately 62 x 32 x 18 mm (Length x Width x Height)
- Mounting Holes (M3) at distance of 4.5mm for edges of board

11. ELECTRICAL CONNECTIONS

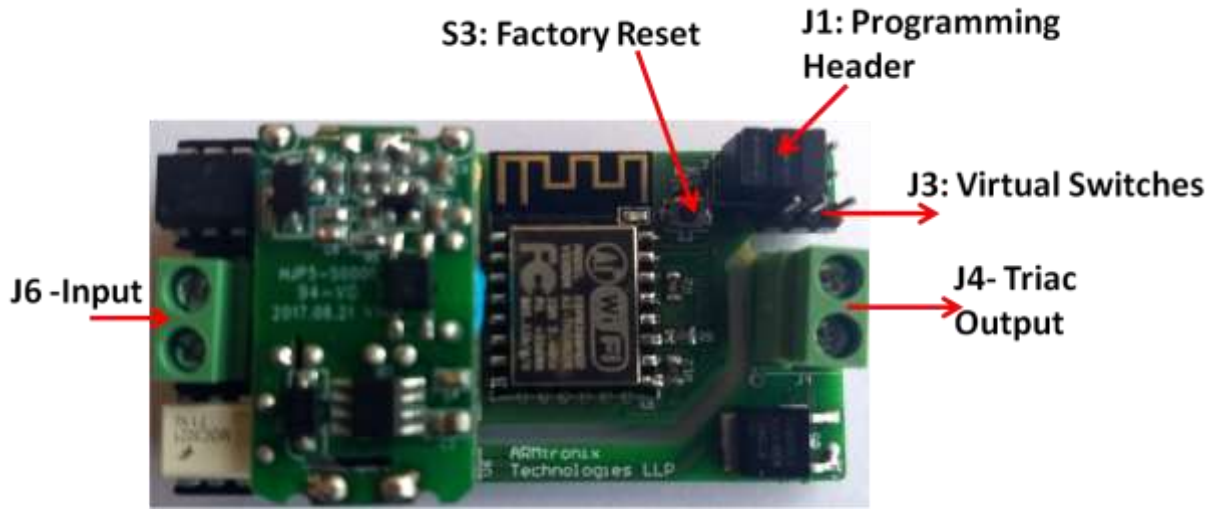


Figure 2: Header and Switch Details

Description of Header and Switches shown in Figure 2:

1. S3 Button is to reset the ESP and controller.
2. J1 UART programming header for both MCU and ESP.
3. J3 Header is for virtual switch
4. J4 Output Terminal Block.
5. J6 Input terminal block

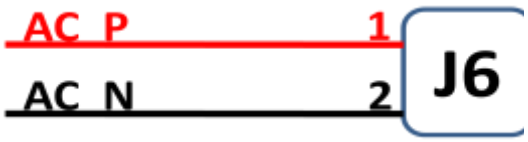


Figure 3: AC Input connection

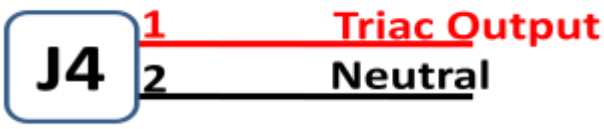


Figure 4: Triac pin-out

Figure 3, shows pinout and connection of AC Phase and Neutral connection to J6 input connector. Figure 4, shows J4 output load connector.

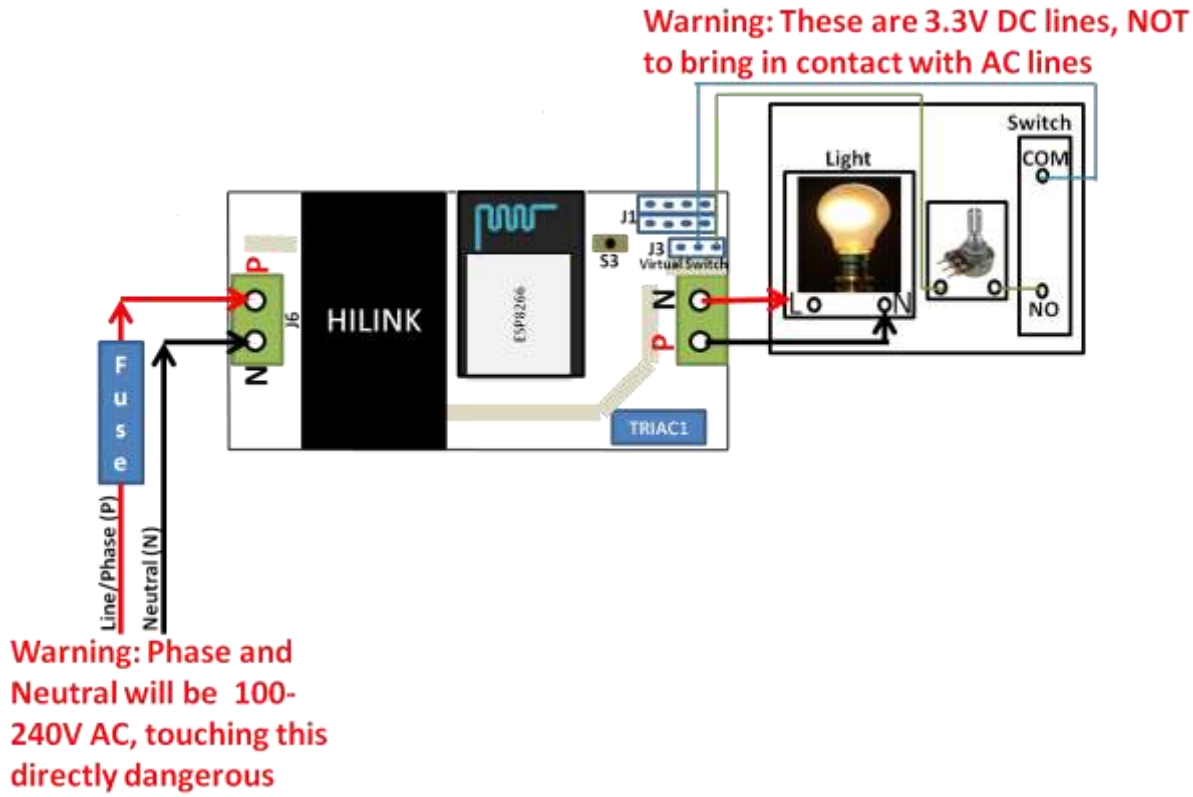
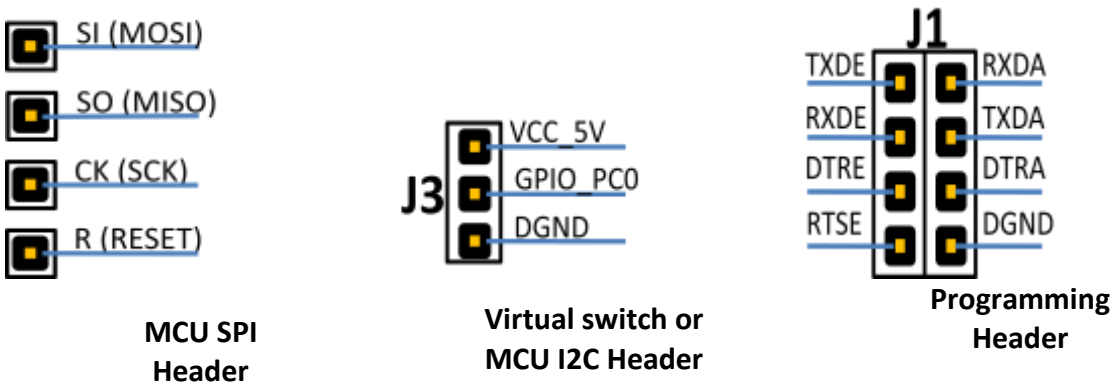


Figure 5: Load connection

Figure 5 represents about connection between load and triac output (J4) connector. Phase and neutral both are available at connector J4 for load connection.



MCU SPI Header

Virtual switch or MCU I2C Header

Programming Header

Figure 6: Other Header

Figure 6, shows the J3 and J1 headers in which J3 has GPIO and can be used for Virtual switch. J1 header is for programming purpose. Board also provides access to MCU SPI pins through open pads for loading boot-loader and any other purpose.

12. PWM Waveforms

Channel 1 Yellow Color: AV

Channel 2 Blue Color: PWM

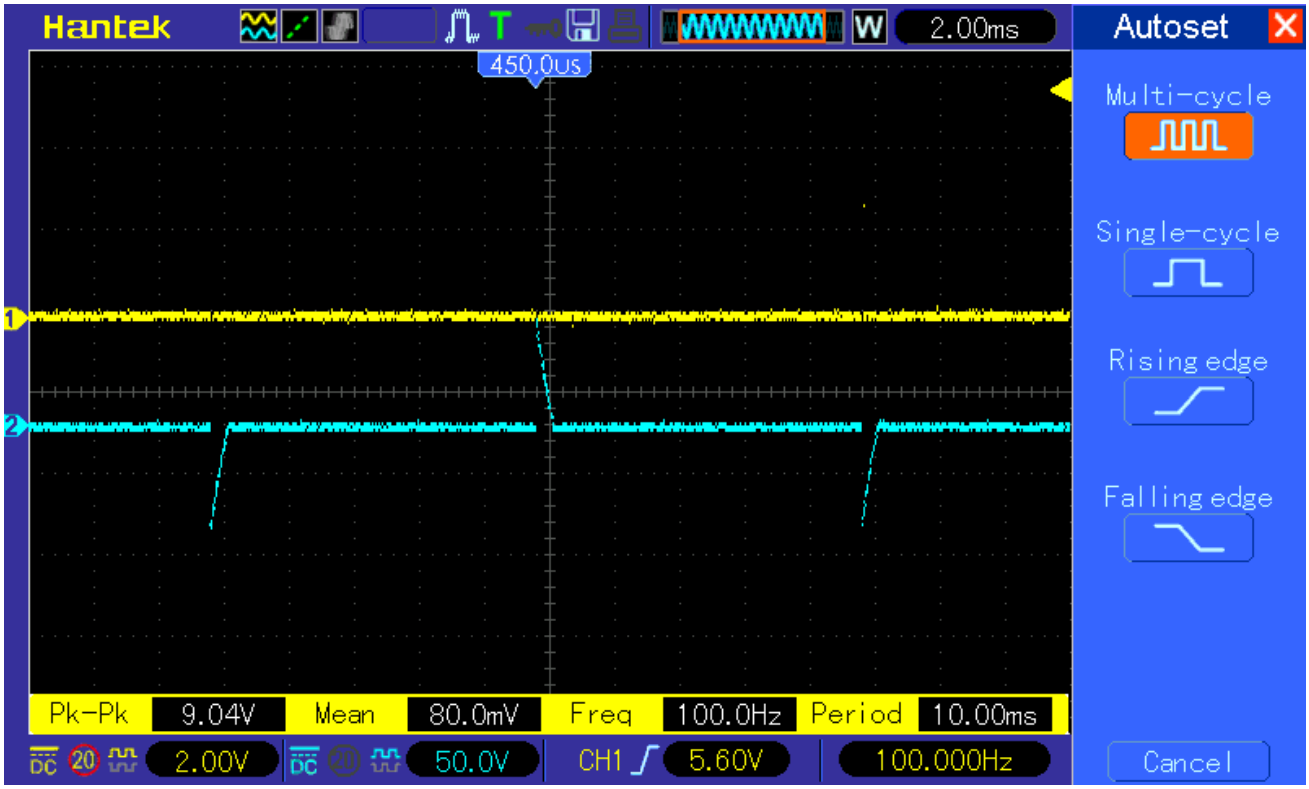


Figure 7: PWM at 0%

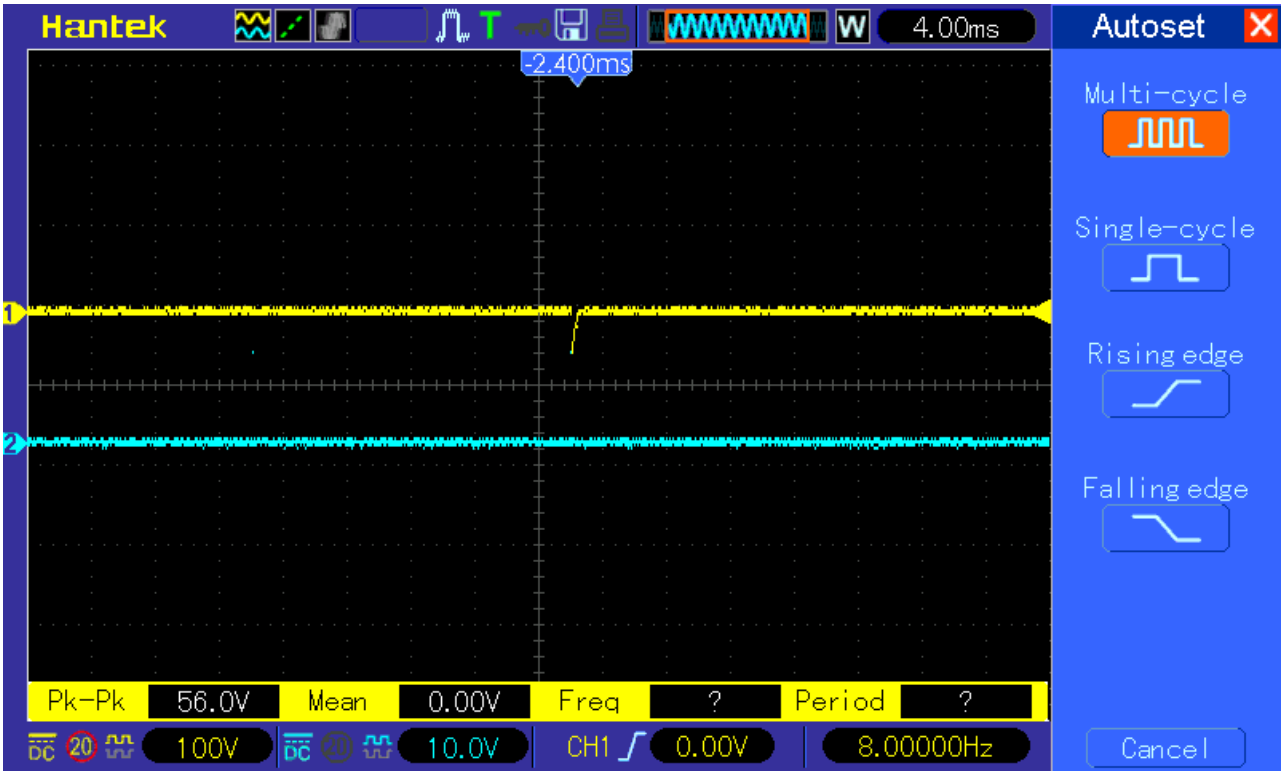


Figure 8: PWM at 5%

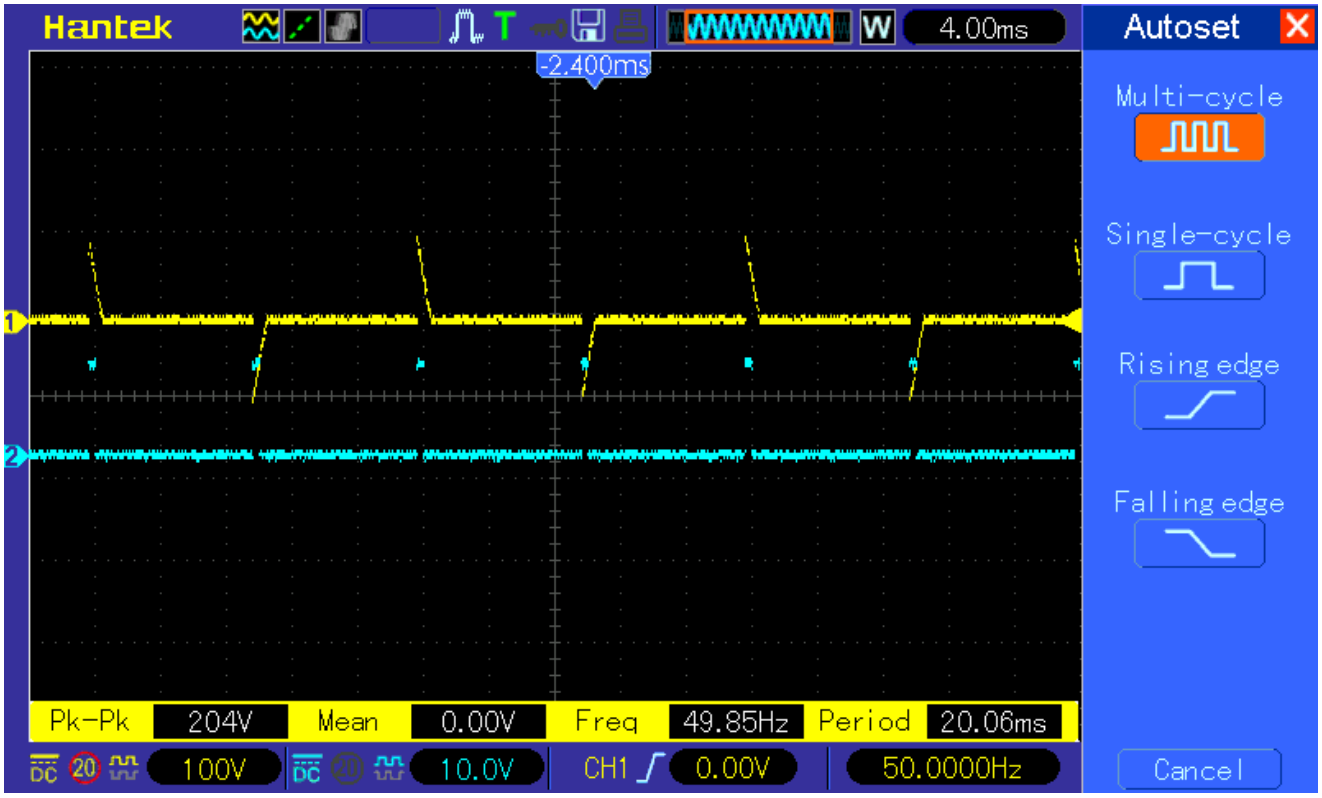


Figure 9: PWM at 10%

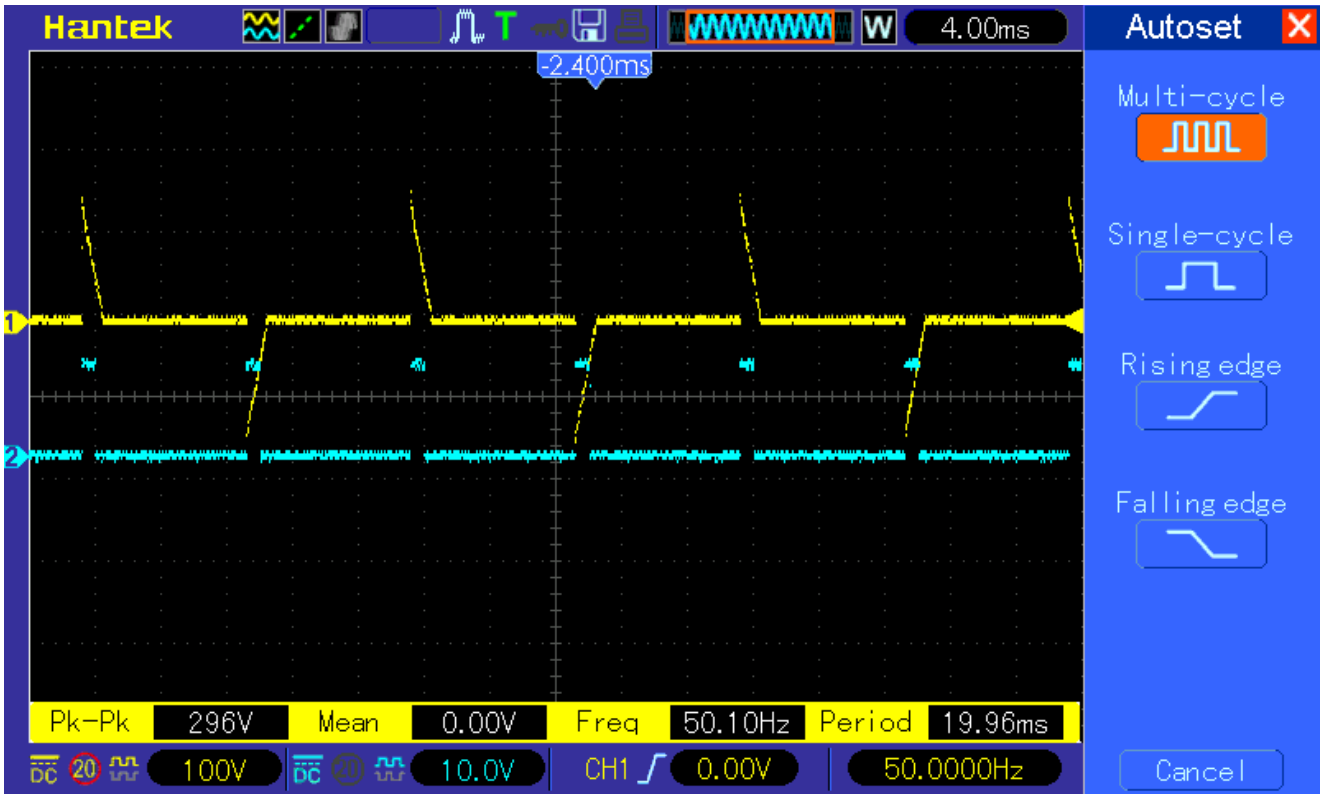


Figure 10: PWM at 15%

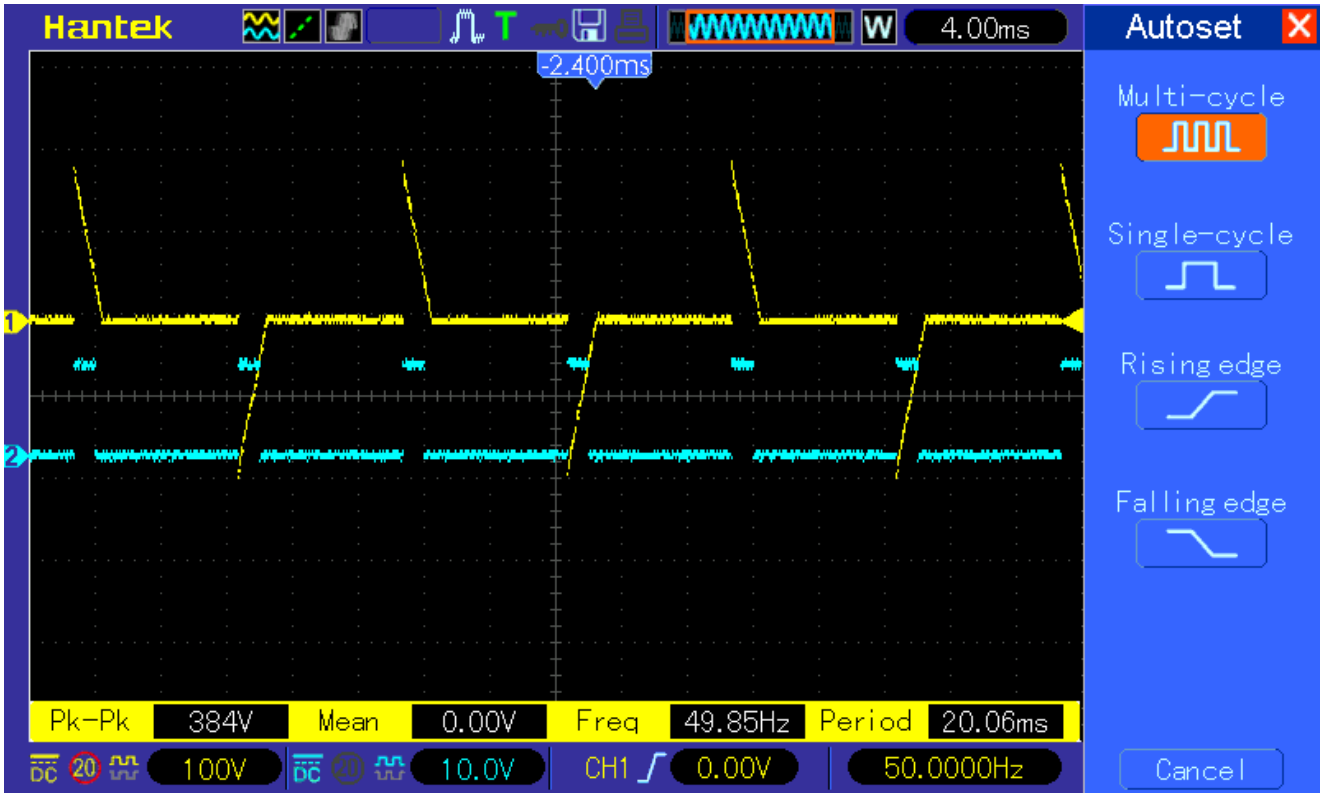


Figure 11: PWM at 20%

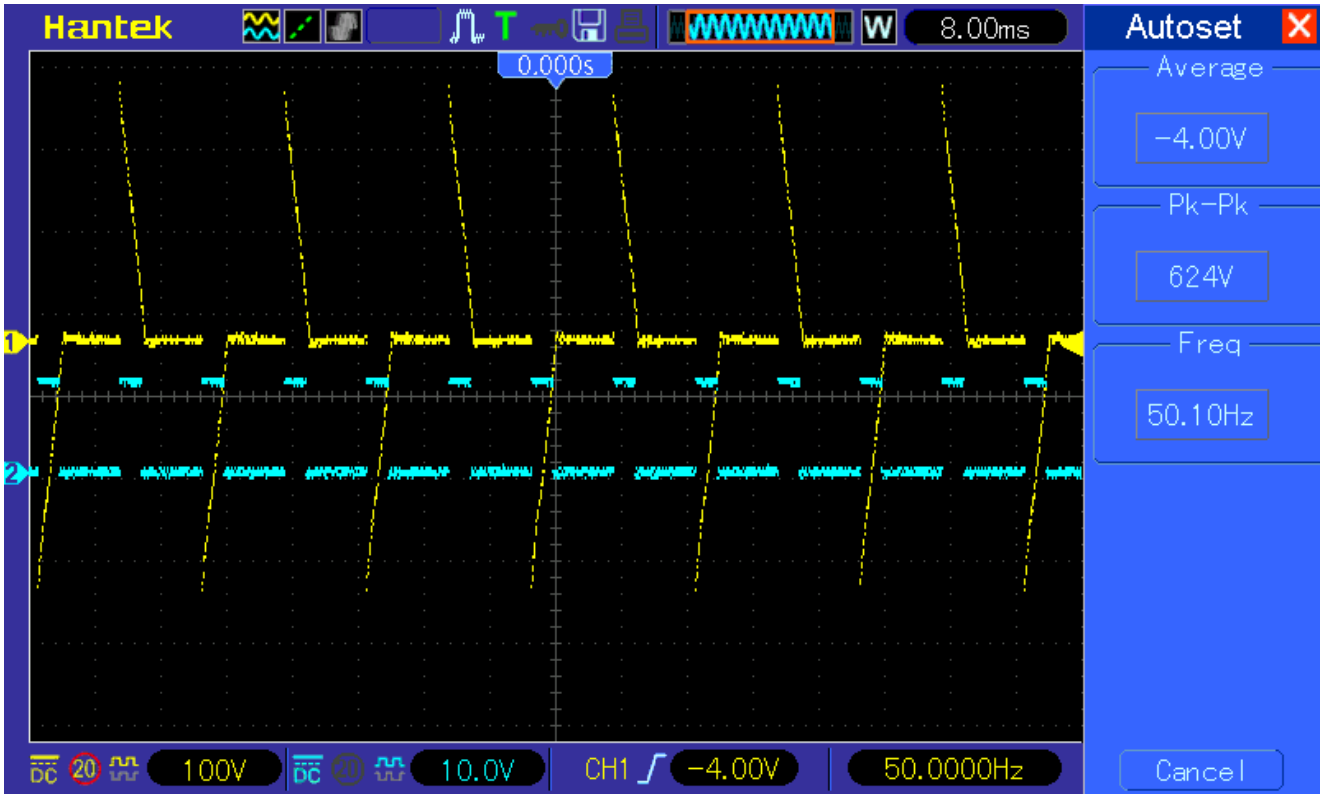


Figure 12 : PWM at 30%

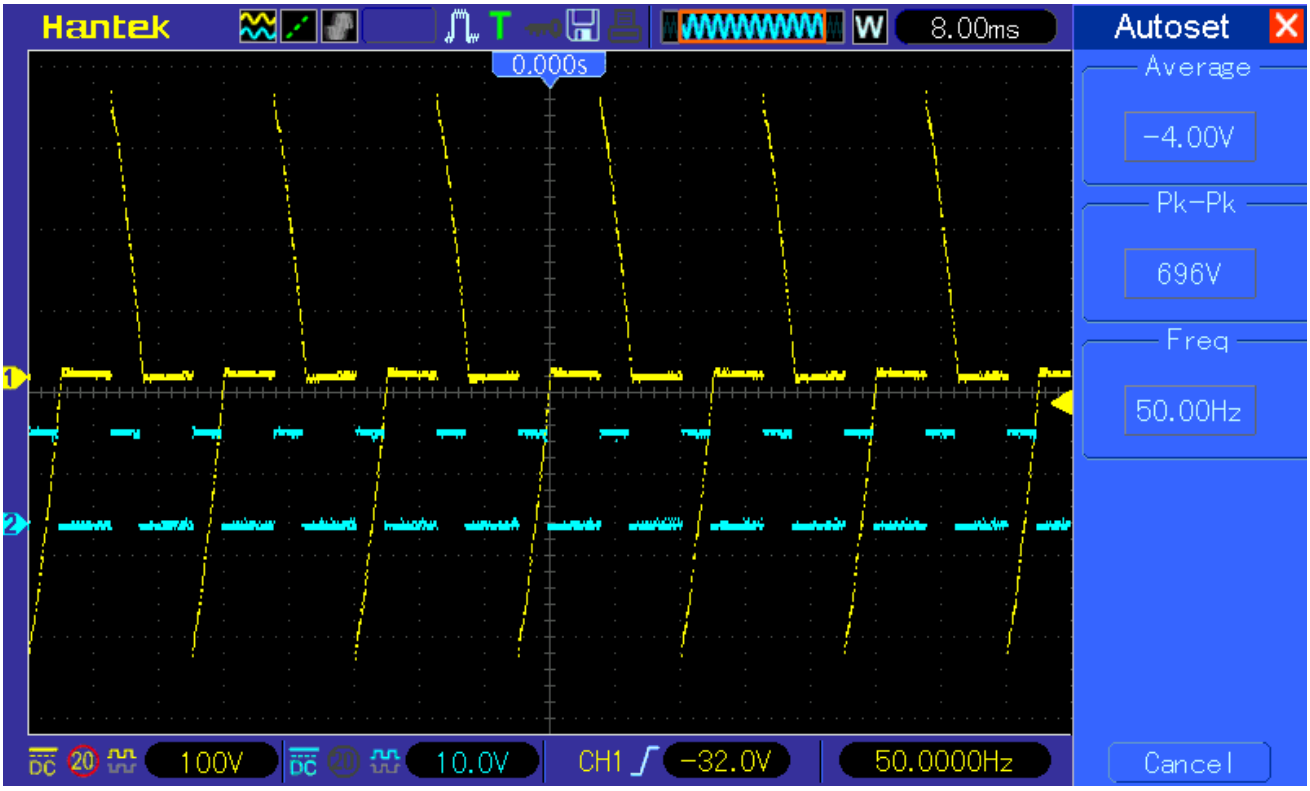


Figure 13: PWM at 40%

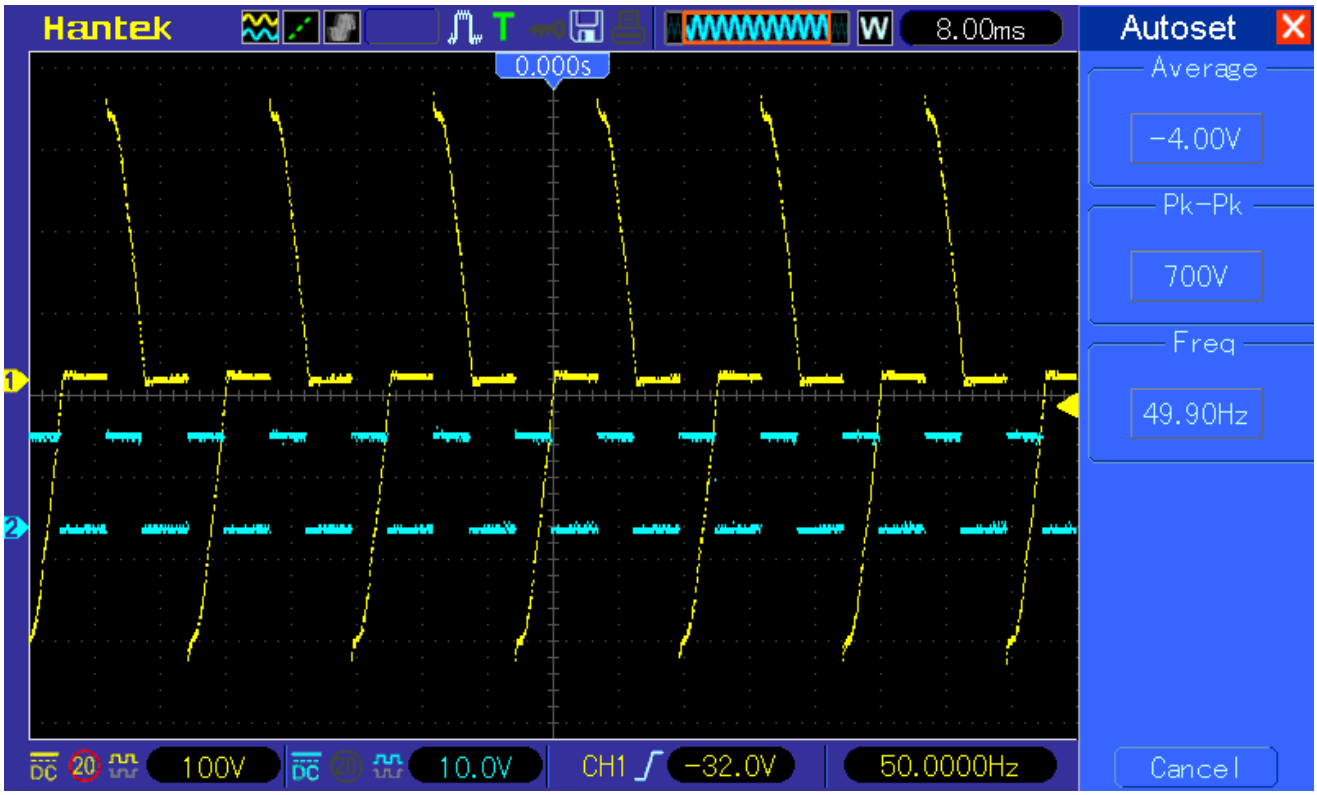


Figure 14: PWM at 50%

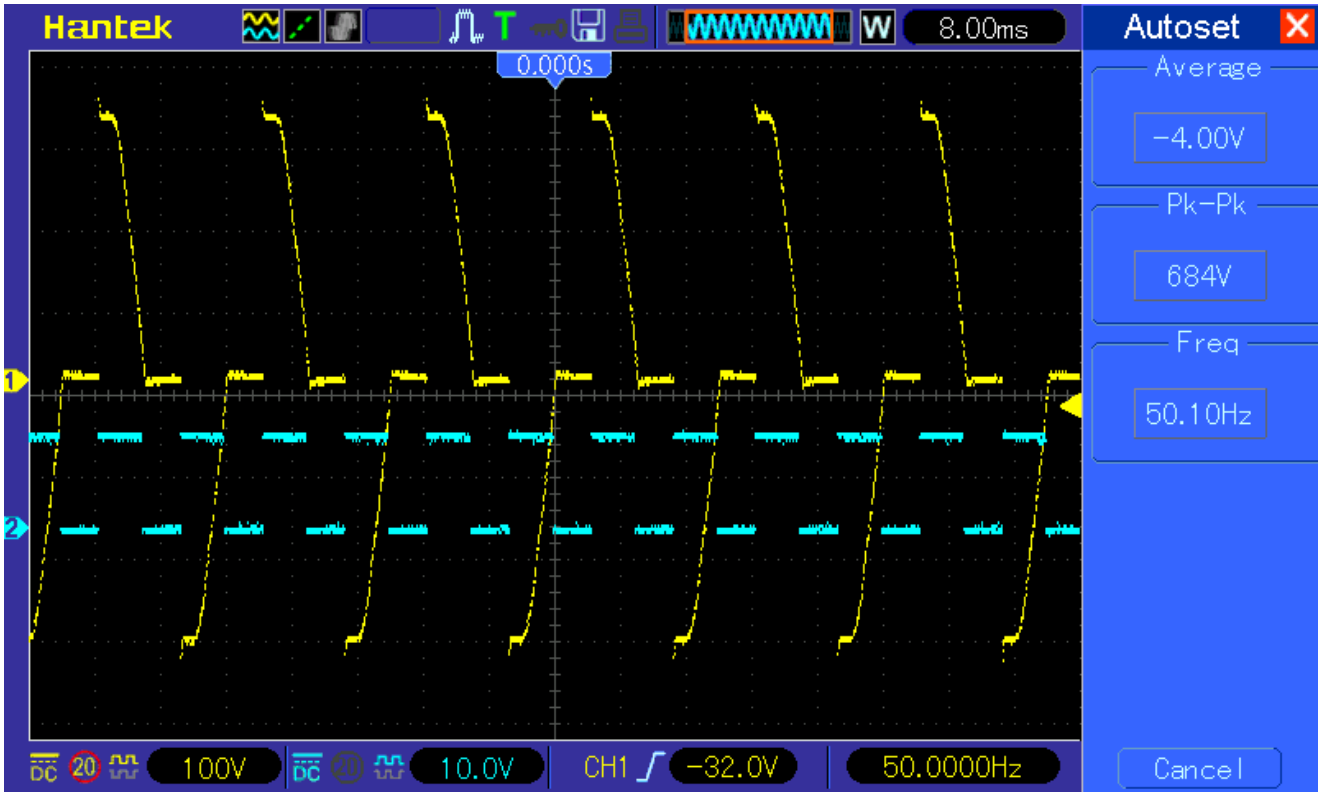


Figure 15: PWM at 60%

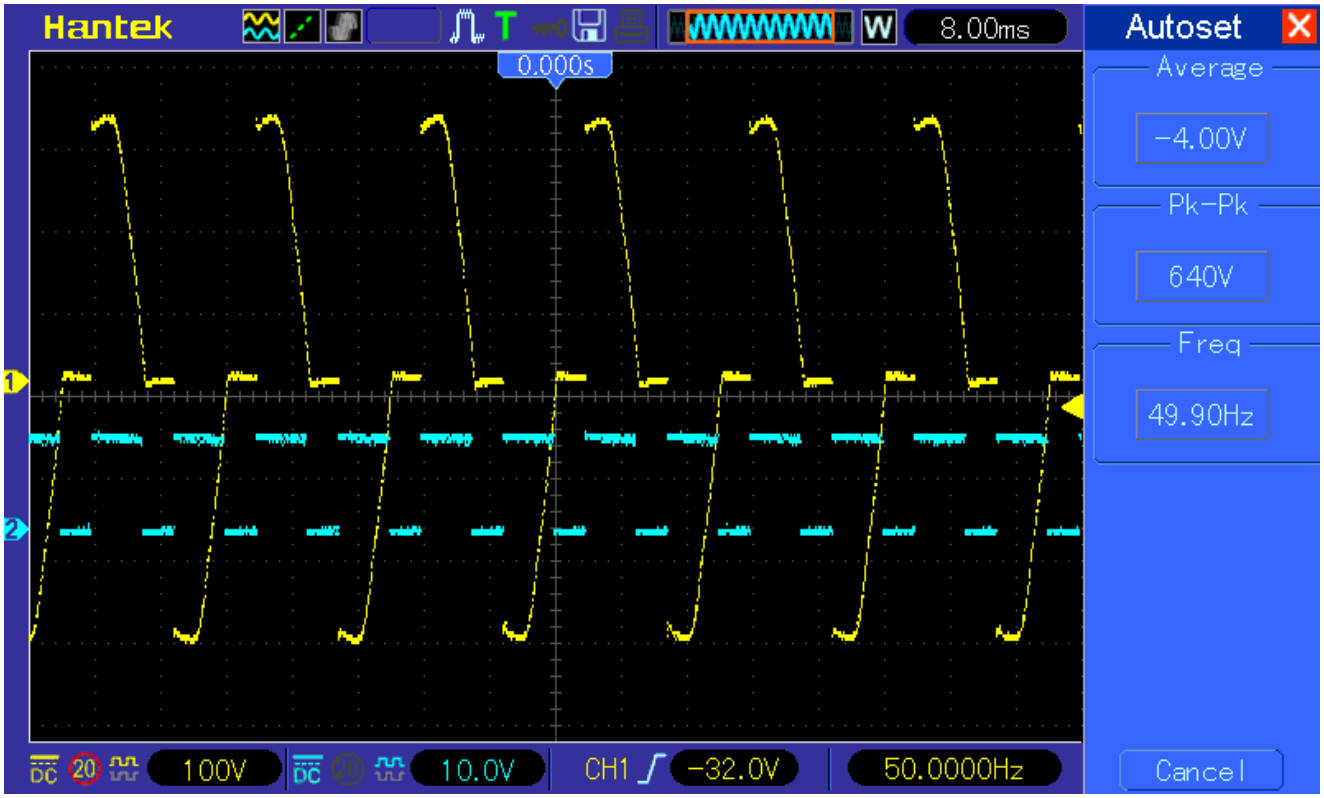


Figure 16: PWM at 70%

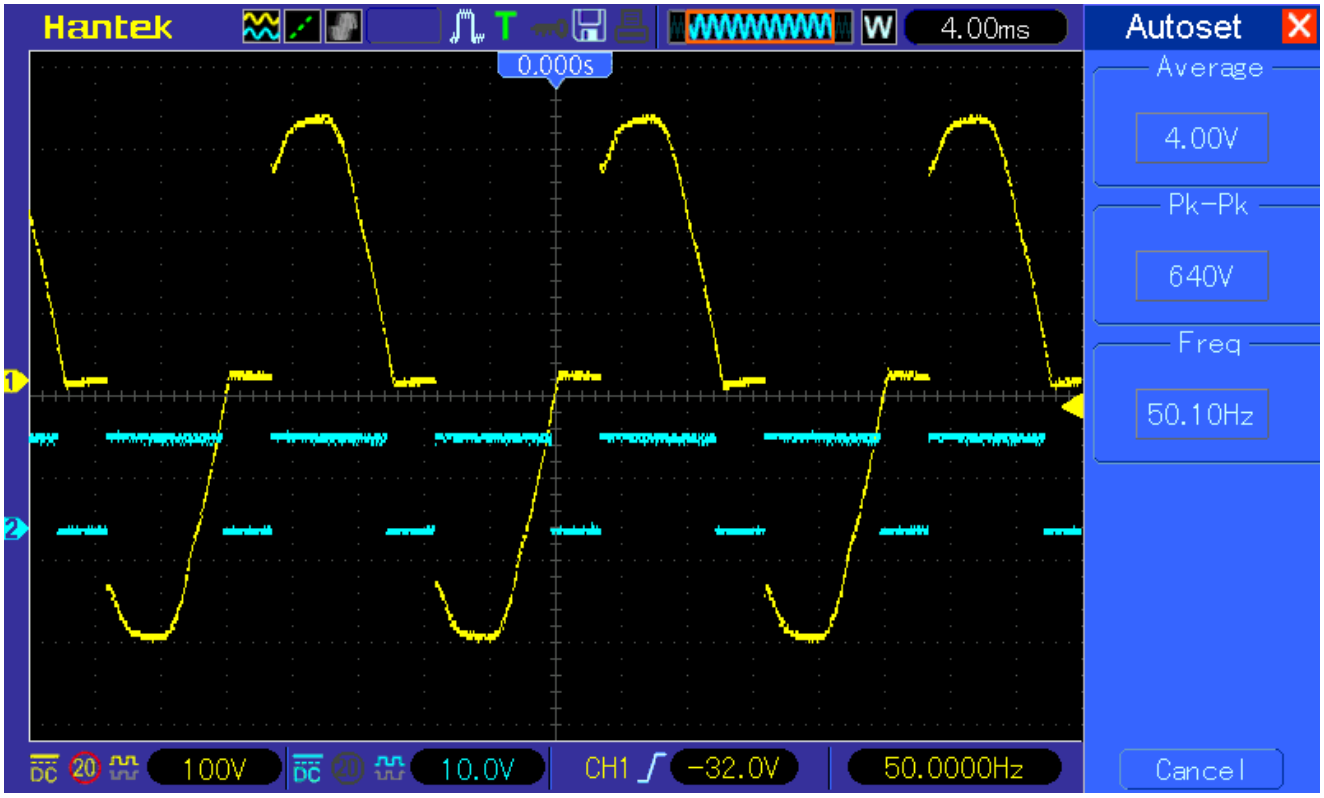


Figure 17: PWM at 80%

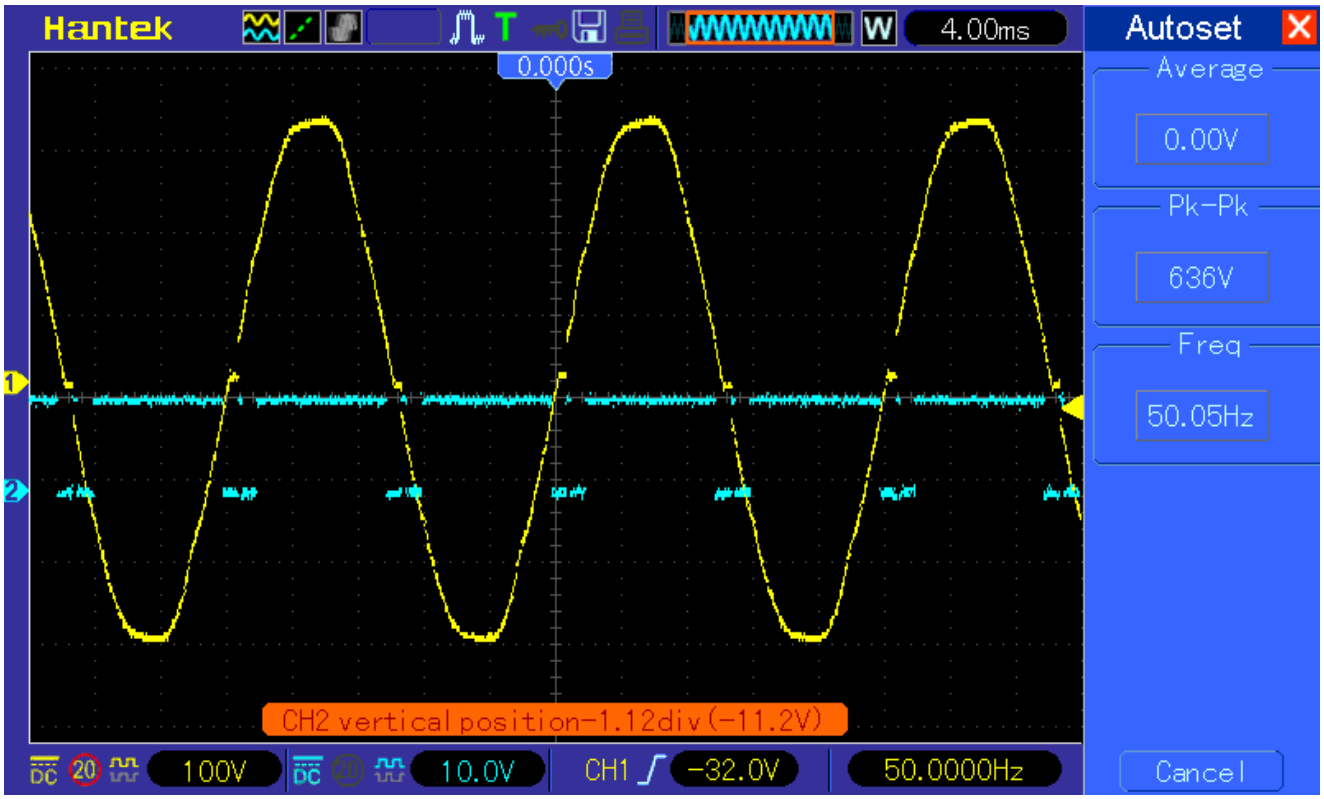


Figure 18: PWM at 90%

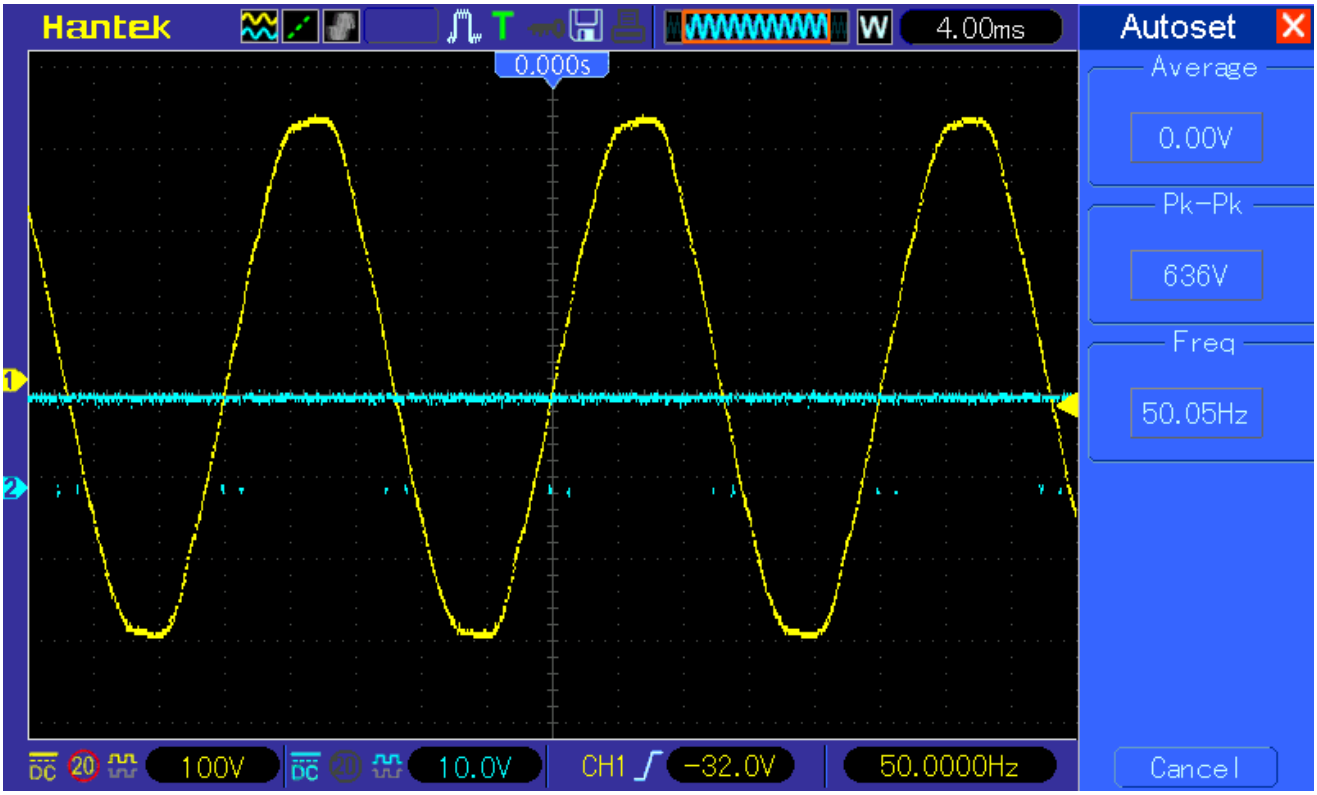


Figure 19: PWM at 99%

13. HOW TO USE THE PRODUCT

Power ON the device, so that, it will host the access point as shown in Figure 20,

Figure 20: Device hosting Access point

Connect the mobile to access point with Armtronix-(MAC ID). EX: Armtronix-1a-65-7 as shown in Figure 21.

Figure 21: Access point name

After connecting, open browser and enter 192.168.4.1 IP address, it will open the web server as shown in the Figure 22,

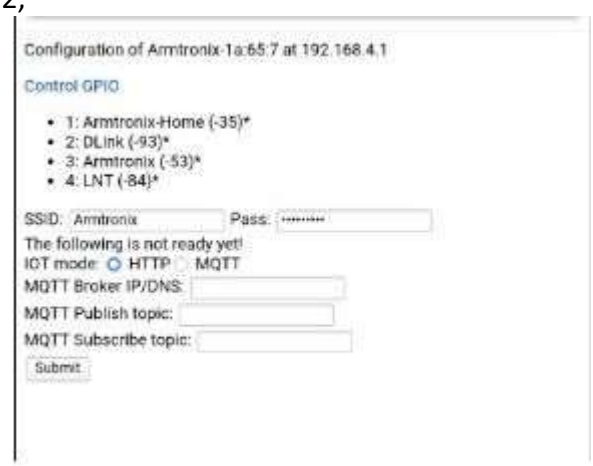


Figure 22: Web server

fill the SSID and password and select HTTP, if user wants to connect to MQTT then he has to

select MQTT radio button, enter MQTT broker IP address, enter MQTT publish topic then MQTT subscribe topic and submit.

After submitting configuration, the ESP 8266 will connect to the router and router assigns IP address to the ESP. Open that IP address in the browser to control the switch (Relay).

Without configuring the SSID and Password we can control the Wifi Switch by connecting to the access point of the device and open the IP address of device i.e 192.168.4.1 the web server page will show the link with the name Control GPIO as shown in the Figure 8, by clicking this link we can control the Wifi Switch board but the response will be slow.

14. HOW TO CUSTOMISE FIRMWARE

You can program this board using Arduino IDE. Please follow the below steps to program the board by yourself with easy steps as mentioned below:

a. STEPS TO LOAD PROGRAM TO ESP8266:

1. Use external USB-UART converter between computer and this board.
2. Connect VCC of converter to “Pin-1.VCC_5V” of J3.
3. Connect RX pin of converter to “Pin-1.TXDE” of J1.
4. Connect TX pin of converter to “Pin-3.RXDE” of J1.
5. Connect DTR pin of converter to “Pin-5.DTRE” of J1.
6. Connect RTS pin of converter to “Pin-7.RTSE” of J1.
7. Connect GND of converter to “Pin-8.DGND” of J1.
8. Open your code in Arduino IDE as shown.
9. Click on Tools Tab, move mouse pointer on “Board: xxxxxxxxxx” and click on “NodeMCU0.9 (ESP-12 Module)” as shown in figure 23.

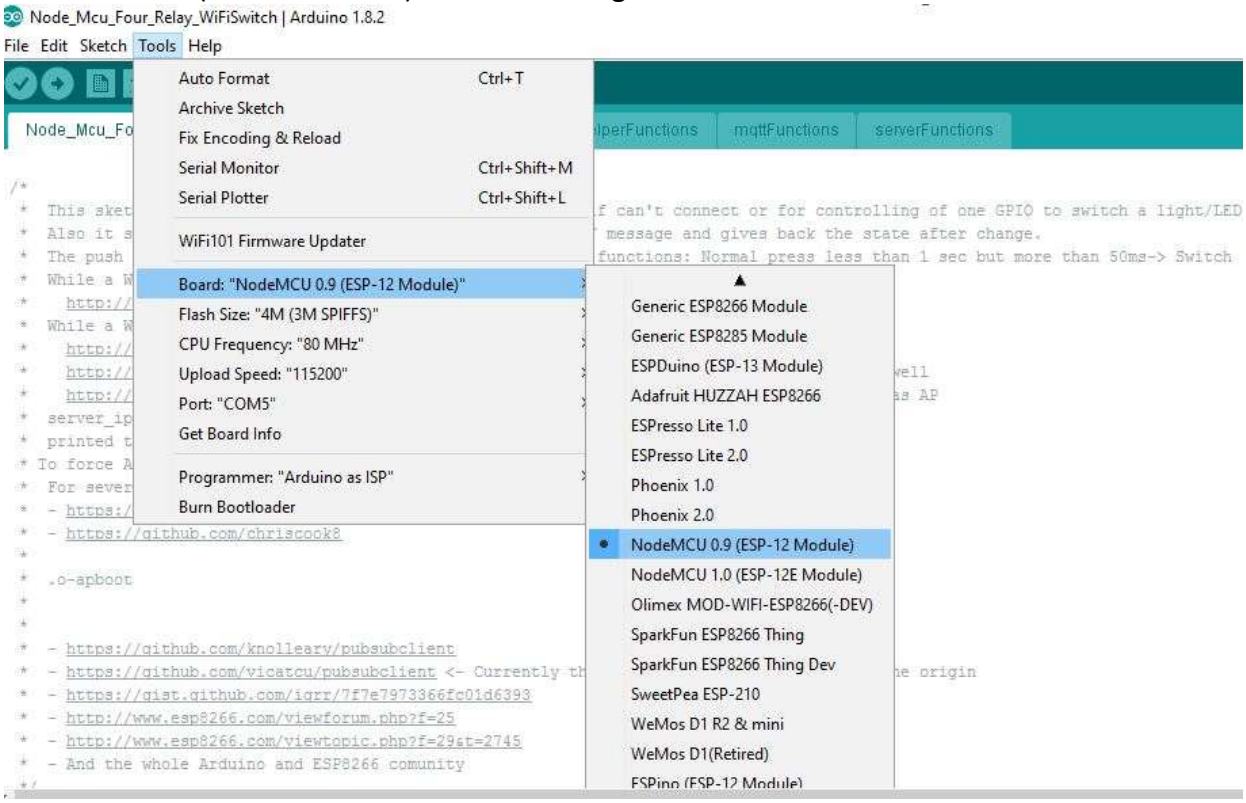


Figure 23: Board Selection

10. Click on tools tab, move mouse pointer to “Programmer: “Arduino as ISP’”, under this click on “Arduino as ISP” to select. Refer to figure 24.

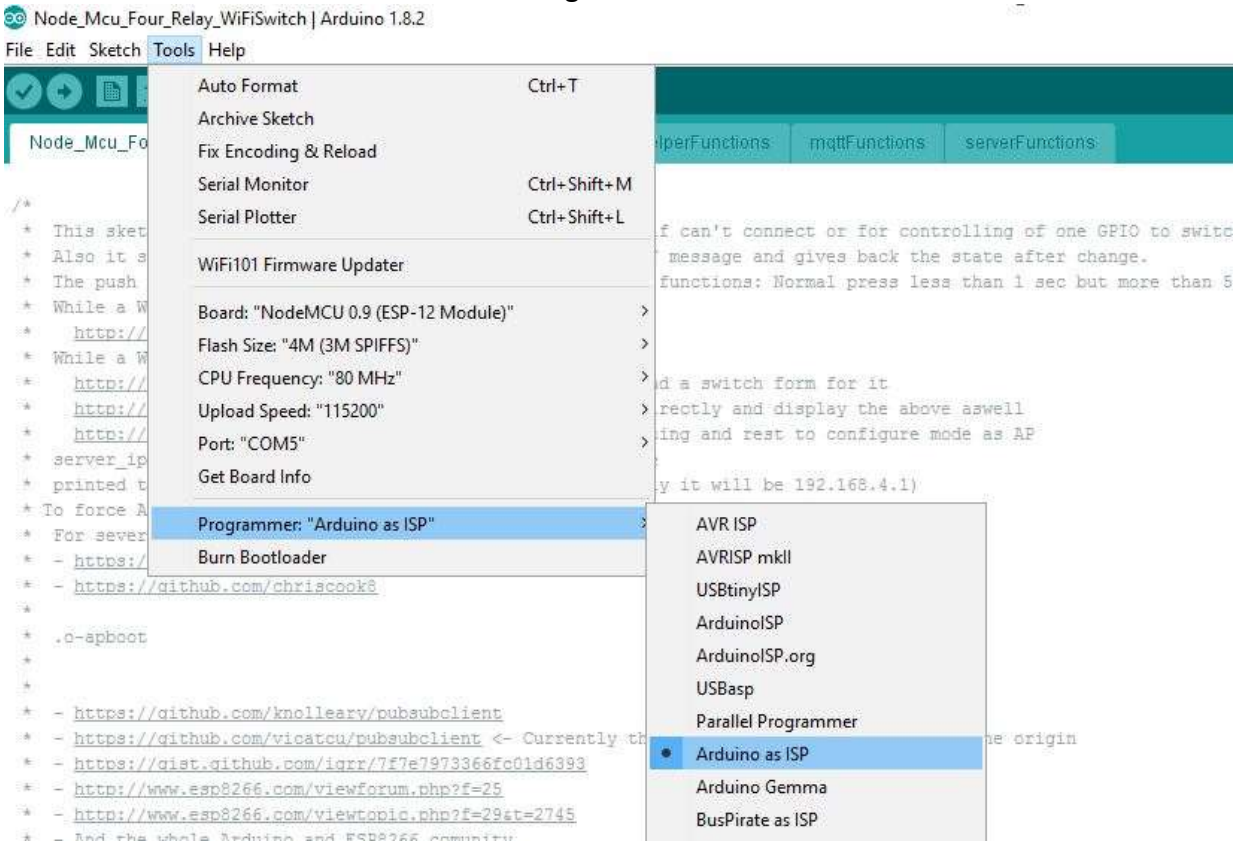


Figure 24: IDE Selection

11. Click on tools tab, move mouse pointer to “Port: “COMx”, under this click on “COMx” to select. (“x” refers to port number available in your computer) Refer to figure 25.

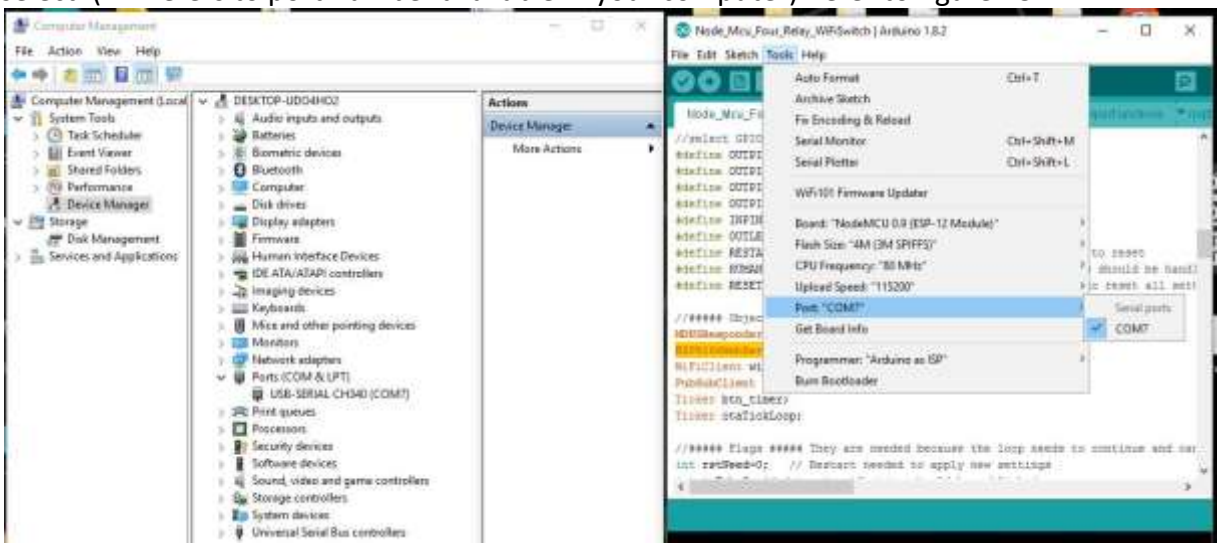


Figure 25: COM port selection.

12. Run the program. Refer to Figure 26.

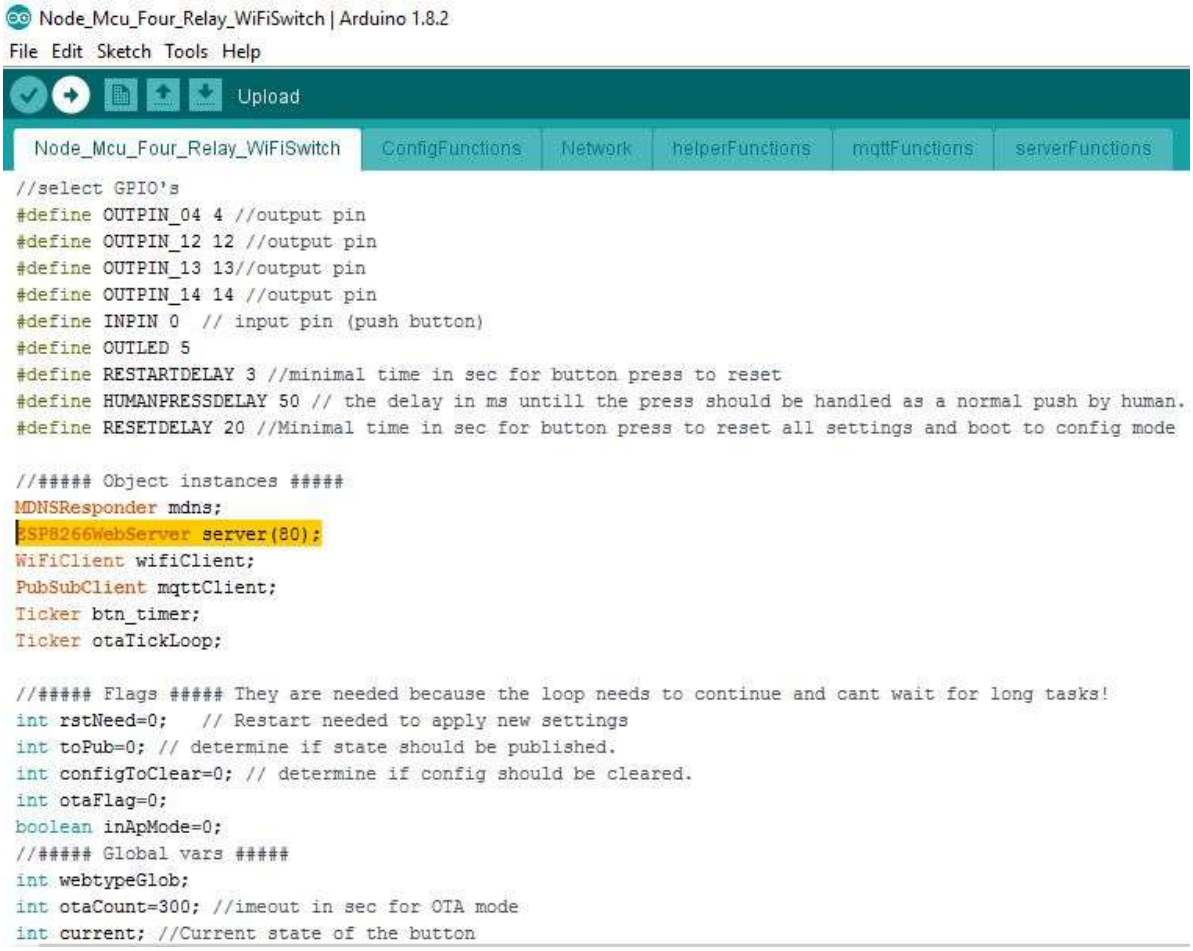


Figure 26: Executing code

b. STEPS TO LOAD PROGRAM TO ATMEGA328P:

1. Use external USB-UART converter between computer and this board.
2. Connect VCC of converter to “Pin-1.VCC_5V” of J3.
3. Connect TX pin of converter to “Pin-2.RXDA” of J1.
4. Connect RX pin of converter to “Pin-4.TXDA” of J1.
5. Connect DTR pin of converter to “Pin-6.DTRA” of J1.
6. Connect GND of converter to “Pin-8.DGND” of J1.
7. Follow same steps as shown in section from “13.a Steps to Load Program to ESP8266”, except Step 10. In step 2, you need to select “Arduino Uno” instead of “NodeMCU0.9 (ESP-12 Module)”. Follow the remaining steps as they are.

Once your loading of program is completed, disconnect converter from board and short Pin-1.TXDE to Pin-2.RXDA, short Pin-3.RXDE to Pin-4.TXDA, to check the board functionality and use. If the board is working as per your code, then you can install it for your application.

15. HOW TO USE THE PRODUCT

a. IF DEVICE LOADED WITH ARMTRONIX FIRMWARE:

1. Make an input AC phase and Neutral connection as shown in Figure 5.
2. Use an external electrical fuse and MCB with rating 2A/250V, in series to input connections for the purpose of safety.
3. Make sure that there is no short circuit between phase and neutral.
4. Ensure that, required safety precautions are taken care.
5. Once the device Powered ON, it will host an access point as shown in Figure 27 below:

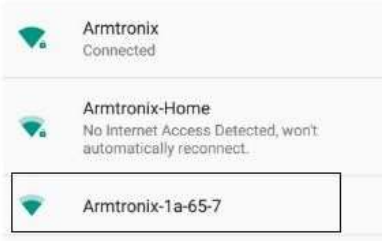


Figure 27: Device hosting Access point

6. Connect the mobile to access point with Armtronix-(MAC ID). EX: Armtronix-1a-65-7 as shown in Figure 28.

Figure 28: Access point name

7. After connecting, open browser and enter 192.168.4.1 IP address, it will open the web server as shown in the Figure 29,

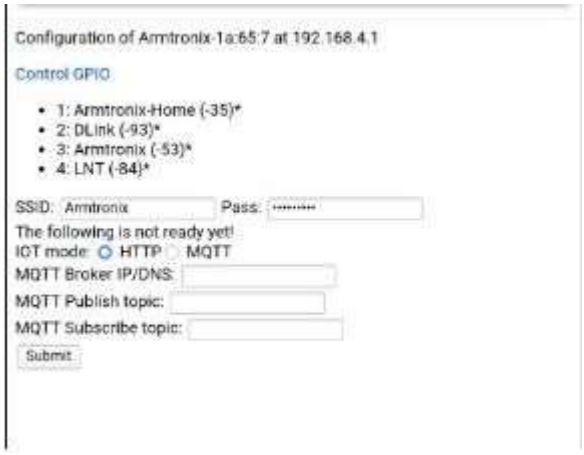


Figure 29: Web server

fill the SSID and password and select HTTP, if user wants to connect to MQTT then he has to select MQTT radio button, enter MQTT broker IP address, enter MQTT publish topic then MQTT subscribe topic and submit.

After submitting configuration, the ESP 8266 will connect to the router and router assigns IP address to the ESP. Open that IP address in the browser to control the switch (Relay).

Without configuring the SSID and Password we can control the Wifi Switch by connecting to the access point of the device and open the IP address of device i.e 192.168.4.1 the web server page will show the link with the name Control GPIO as shown in the Figure 8, by clicking this link we can control the Wifi Switch board but the response will be slow.

b. IF DEVICE LOADED WITH TASMOTA FIRMWARE:

1. Make an input AC phase and Neutral connection as shown in Figure 5.
2. Use an external electrical fuse and MCB with rating 2A/250V, in series to input connections for the purpose of safety.
3. Make sure that there is no short circuit between phase and neutral.
4. Ensure that, required safety precautions are taken care.
5. Once the device Powered ON, it will host an access point as shown in Figure 30 below:

Figure 30: Hosting device with tasmota name

8. After connecting, open any browser and enter the IP address as 192.168.4.1 on your Smartphone it opens the Web Server as shown in the Figure 31 below, then enter the SSID and Password and you can give the Host name of your choice (just for your reference) then click on SAVE button.

Figure 31: Web Server

Once the **Configuration** is done it displays the message as shown in the figure 32 below,

Figure 32: Saving Configuration

Then user get access to control the load i.e he can Switch ON / OFF using TOGGLE button as shown in the figure 33 below.

Figure 33: Controlling a load

9. One more advantage is that the user can easily **Configure** and **Upgrade** his **Firmware** through smartphone and an option also provided to choose file directly from the phone if it is available as shown in figure 34.

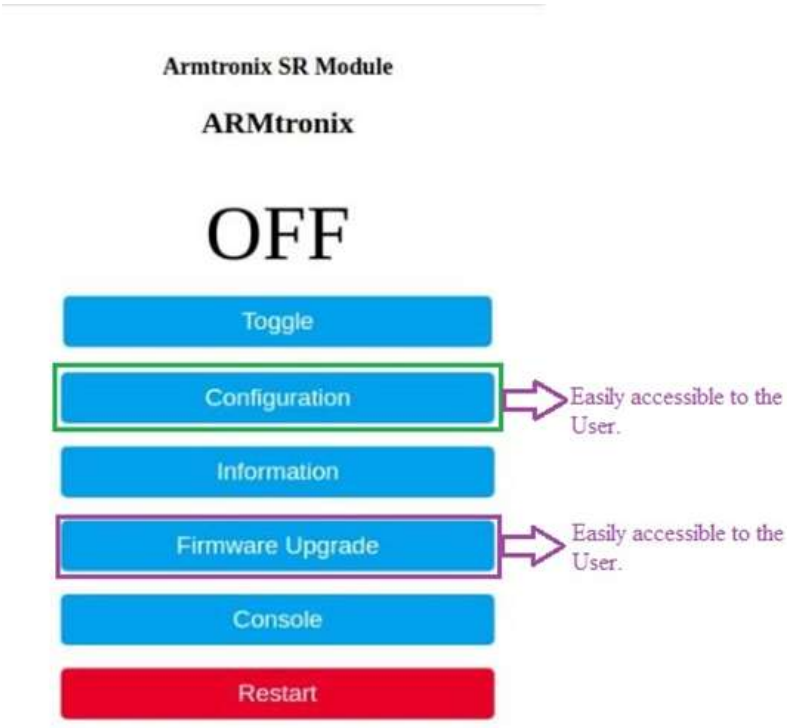


Figure 34: Main Menu

i. CONFIGURING DEVICE FOR MQTT MODE:

10. click on the Configuration option as shown in the figure 15,

Figure 35: Configuration Option

11. Click on Configure MQTT option provided as shown in the figure 16 below,

Figure 36: Option to configure to MQTT

12. User shall click on the SAVE button as shown in figure 17 below, once after entering required details to get access to MQTT protocol from the web server.

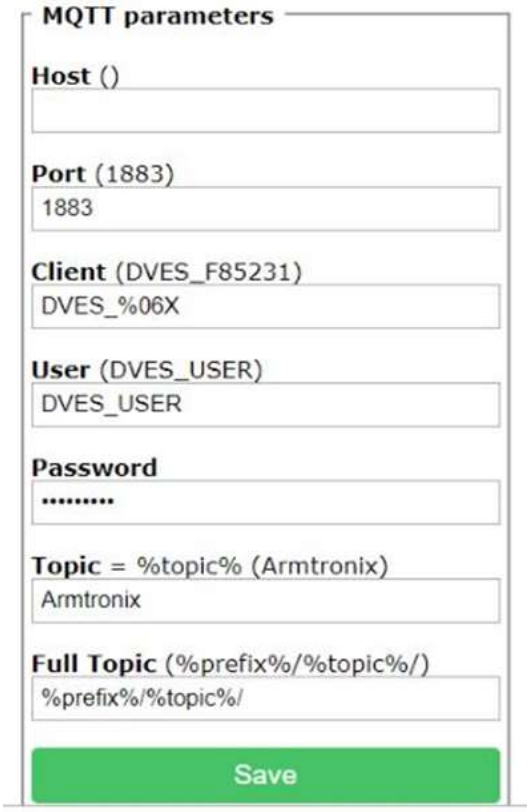


Figure 37: Option to enter required MQTT details

16. INTEGRATION WITH "OPENHAB"

i. THINGS REQUIRED TO INSTALL OPENHAB ON RASPBERRY PI:

- Raspberry Pi 3 X 1
- SD Card 16 Gb X1
- 2A Power Supply 5V with USB data cable (micro)/USB Charger X1
- Raspberry Pi Case (Optional)
- SD Card Reader
- Monitor
- Keyboard
- Mouse
- HDMI to VGA Cable (optional in case Monitor is of VGA type
- Amazon echo/ Amazon echo dot

ii. Important things to be downloaded:

- NOOBS from Raspberry Pi Website
- (https://www.raspberrypi.org/downloads/noobs/)
- SD Card Formatter (https://www.sdcard.org/downloads/formatter_4/eula_windows/index.html)
- You should have active internet connection to update the OS and install Java updated version
- Putty for SSH in case you are using windows (http://www.putty.org/)
- FileZilla (optional) in case you want to transfer some demo files directly to pi (https://filezilla-project.org/download.php)

iii. Installing Raspberry Pi OS and Updating it:

- First Step is to setup your Raspberry Pi. To do that, NOOBS should be extracted into a folder, example let's say folder "NOOBS".
- In this folder you will find around three folders (defaults, OS, overlays) and around fourteen files (Not mentioned here).
- Plug in your SD card reader with the 16GB SD card inserted to your computer USB. Format it using the SD card formatter (FAT32 format)
- Dump/Copy the contents of NOOBS folder into the formatted SD card(3 Folders + around 14 files)
- Eject the SD card reader, plug out the SD card and place it on your Raspberry Pi SD card holder
- Connect Power Supply/Charger, Monitor via HDMI /VGA(HDMI to VGA Cable required in case monitor is of VGA type), Keyboard, Mouse to the raspberry pi.
- Power on the Charger/Power supply
- Raspberry Pi takes you through the setup process and it is quite simple and intuitive.
- A few points to be considered while installing are, select Debian/Raspbian OS while installing, select Us keyboard /Language for most of the countries except UK and give access to the internet, you have to set up your SSID and Password.
- Once the installation is done please cross check that you are connected to the internet.
- If you are not connected to the internet then on the right-hand corner of the computer you will see an icon/Wifi icon (something like a computer icon) click it, it will show you

various Wifi connections available.

- Pick the appropriate SSID. It will ask you to enter its Key (password).
- Once that is done open the terminal (greyish black color monitor image) found on left hand side mid corner.
- Type "**sudo apt-get update**"
- After the source list is updated on the same terminal type "**sudo apt-get upgrade**"
- This will take some time but will update your raspberry pi OS
- This will setup your Raspberry Pi
- Now we have few things to install and will be discussed in the next step.

iv. Installing/Updating required sotware/drivers:

a) To update Java please follow the instructions mentioned below:

- Check Java version by typing "java -version" in the terminal
- If your java version is lesser than "1.8.0_101" please follow the below commands

- First remove openjdk
- sudo apt-get purge openjdk*
- add packet source
- sudo nano /etc/apt/sources.list
- add the following lines at the end of the sources.list file
- deb http://ppa.launchpad.net/webupd8team/java/ubuntu trusty main
- deb-src http://ppa.launchpad.net/webupd8team/java/ubuntu trusty main

b) Install Java 8

- sudo apt-get update sudo apt-get install oracle-java8-installer sudo apt-get install oracle-java8-set-default
- remove old Java
- sudo apt-get purge openjdk*
- sudo apt-get purge java7*
- sudo apt-get autoremove
- check success of upgrade by typing
- java -version
- Check if it is above "1.8.0_101"

c) Install Mosquitto Mqtt Broker by using the following command

- sudo apt-get install mosquitto
- To install mqtt client use
- sudo apt-get install mosquitto_client

d) Activating SSH if it is not Open in your Raspberry pi's terminal Type

- sudo raspi-config
- Go to Interfacing Options and press enter
- There you will find P2 SSH Enable/Disable SSH
- Select that by using up/down arrow key and press enter
- We are basically enabling the ssh option for further use.

e) Installing OpenHab

We can now continue to install OpenHab on raspberry pi. To do this, open terminal again and type the following commands

- sudo apt-get update
- sudo apt-get upgrade
- sudo apt-get install screen mc vim git htop
- First, add the openHAB 2 Bintray repository key to your package manager and allow Apt to use the HTTPS Protocol:
- Wget -qO - 'https://bintray.com/user/downloadSubjectPublicKey?username=openhab' | sudo apt-key add - sudo apt-get install apt-transport-https
- echo 'deb https://dl.bintray.com/openhab/apt-repo2 stable main' |
- sudo tee/etc/apt/sources.list.d/openhab2.list
- sudo apt-get update

f) Now install OpenHAB with the following commands

- sudo apt-get install openhab2
- When you choose to install an add-on, openHAB will download it from the internet on request. If you plan to disconnect your machine from the internet, then you have to install the add-ons package.
- sudo apt-get install openhab2-addons
- If everything goes well, you can start openHAB and register, it will be automatically executed at system startup.
- sudo systemctl start openhab2.service sudo systemctl status openhab2.service
- sudo systemctl daemon-reload
- sudo systemctl enable openhab2.service
- The first start may take up to 15 minutes, you should be able to reach the openHAB 2 Dashboard at http://your_raspberry_pi_ip:8080 at this point from any computer in the same network, any browser.
- Once you open it, click on the Paper UI and then go to addons.
- Inside addons click on bindings.
- Here go the Http Binding and install it (here instead of mqtt we are configuring armtronix boards under Http mode).

After installing the http binding go to the tab MISC and install openHAB Cloud Connector, This is required for internet access and to interface it with Alexa.

You can also go to the USER interface tab and install the Basic/Classic UI to control your appliances after integration.

a. STEPS EXPLAINED ON, HOW TO USE OPENHAB IN WINDOWS

Step 1: Open Putty Configuration application and enter the IP address 193.168.1.33 as shown in the figure below and make sure to select the connection type as SSH and click on OPEN.Putty for SSH in case you are using windows (http://www.putty.org/)

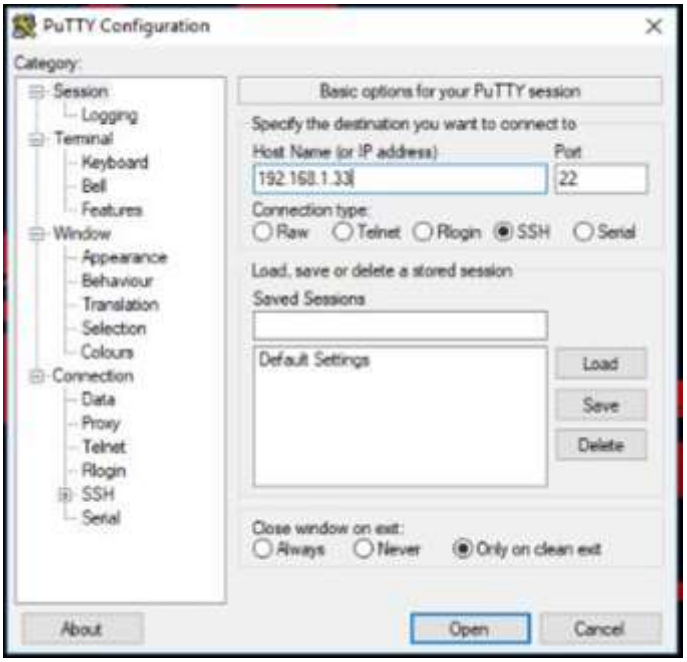


Figure 38: Putty application for Raspberry Pi

Step 2: Login as Pi and enter the password as raspberry.
Login as : pi
root@192.168.1.33's
Password : raspberry

Step 3: Type the command as etc/openhab2 on the Terminal (greyish black color monitor) to enter into Openhab2 file as shown in the figure below.

Figure 39: Path for the file

Step 4: cd /etc/openhab2/sitemaps/ You will be in the site map folder you need to create a file with extension as .sitemap, To do that
Type nano
Amtronix_Office.sitemap Example: "Armtronix_Office.sitemap" is the name of that file . Once you press enter, it will give you a blank file for editing. Site map is basically a layout.

```
Group item=w10 label="Single relay" icon="group"
{
        Switch item=w101 label="Relay"
}
```

Step 7: Next thing is to create the file with **.item** as an extension. To do this change to your item directory by typing **cd /etc/openhab2/items**. For http mode, the URL http://(**IP address of the board**)/ay?0=1, (IP address is different for different boards) for toggling (**ON** / **OFF**).

Example: http://192.168.1.22/ay?0=1

Figure 40: OpenHAB sub folders, Accessing item folder

Group w101

Switch w101 "Relay"(w10,Lights)
{http=">[ON:POST:http://192.168.1.22/ay?o=1] >[OFF:POST:http://192.168.1.22/ay?o=1]"}

```
Switch w101 "Relay" (w10,Lights) {http=">[ON:POST: http://192.168.1.22/ay?o=1] >[OFF:POST: http://192.168.1.22/ay?o=1] "}
```

Step 8: Code for Item file in MQTT mode, where 'sub' indicates the subscribe topic which is mentioned during the configuration.
Switch sr "Relay"(w10)
{mqtt">[broker:test_sub/test/:command:ON:D2_ON],>[broker:test_sub/test/:command:OFF:D2_OFF],>[broker:/w10:state:MAP(w10d2.map)]",autoupdate="false"}

Step 9: You can Register yourself in OpenHAB by typing the URL https://myopenhab.org, if you have already registered then you can enter the E-mail address and password and then click on **Sign in**, as shown in the figure below.

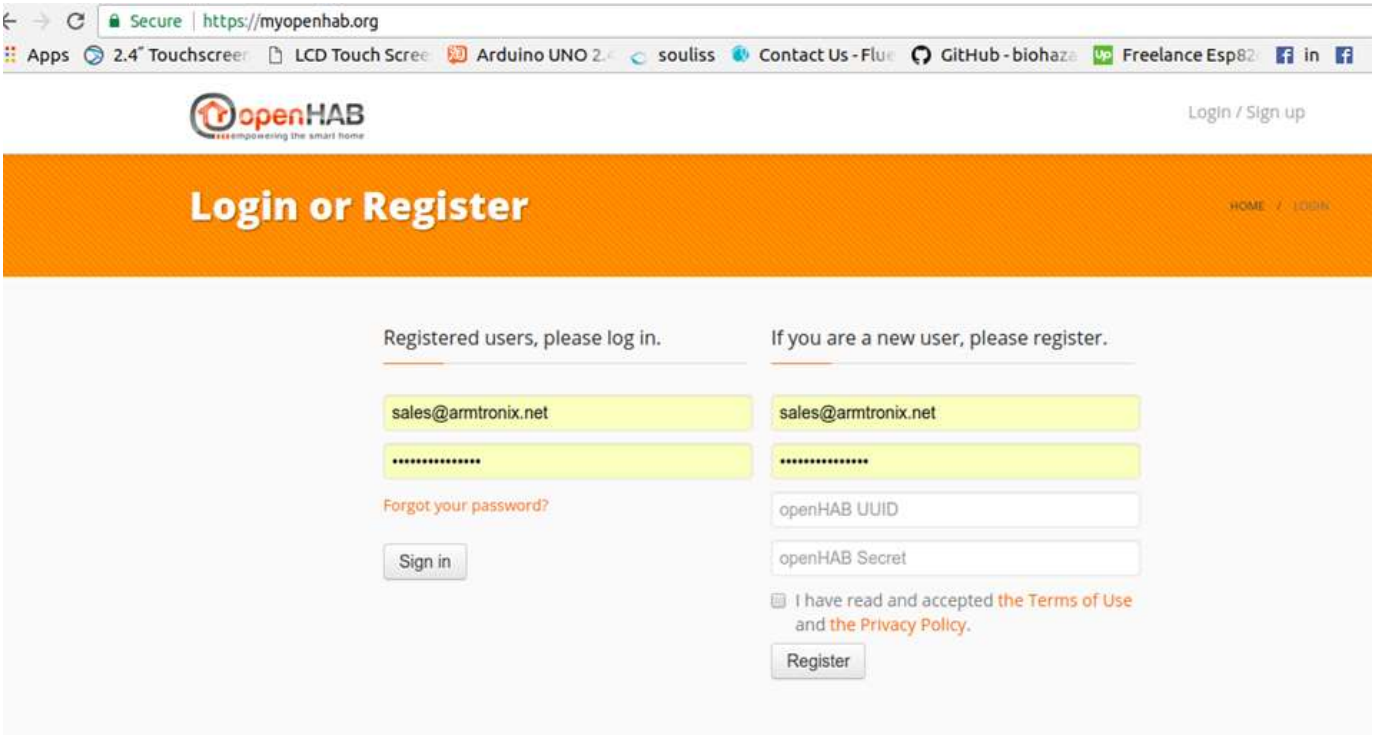


Figure 41: Login page of OpenHab

Step 10: Once you register yourself with the OpenHab you will be taken to the following page as shown in the figure below.

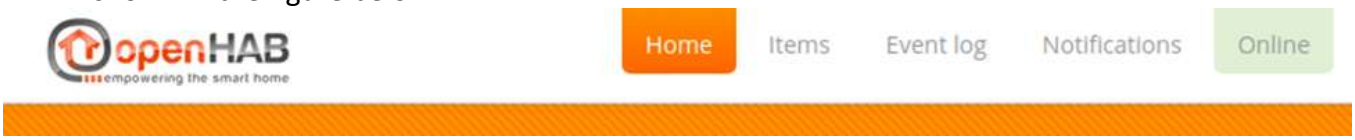


Figure 42: Menu bard of OpenHab

Step 11: Enter the IP address for which your Board is configured, then you will be taken to the following page as shown in the figure below.
Example: 192.168.1.11

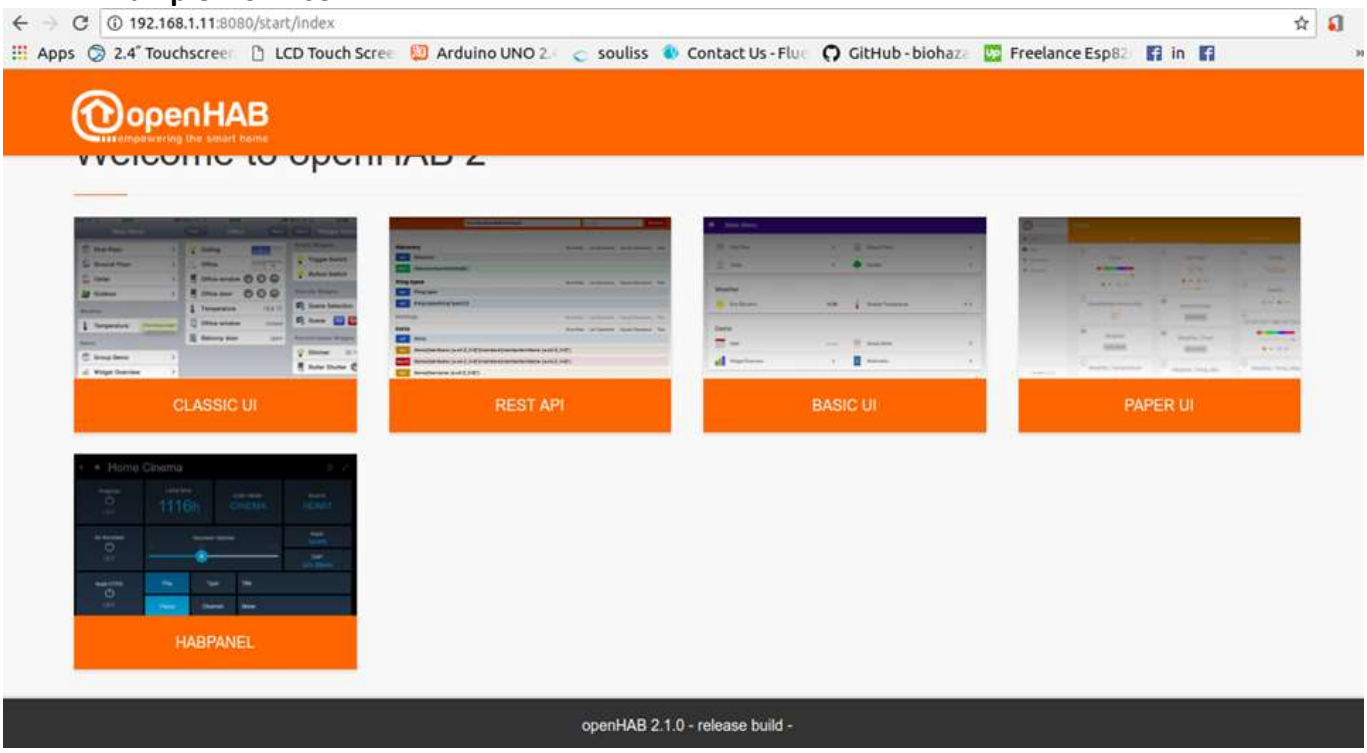


Figure 43: Home page of device with entered IP

Step 12: After creating the Sitemap file in **.sitemap** extension and Item file in **.item** extension as mentioned in the previous steps, the external appearance in OpenHab application is as shown in the figure below.
Example: ARMtronix Office.

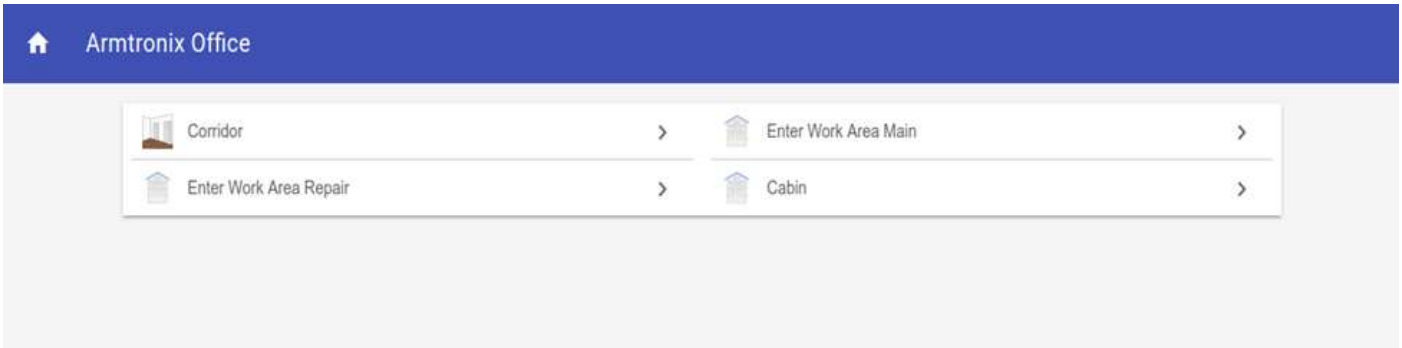


Figure 44: Devices are categorized as Groups under frame

Step 13: In OpenHab application you will be provided with the options such as Control, Inbox, Configuration, Add-on and Preferences. If you click on Add-on option then you will be provided with many options as shown in the figure below.

Example: Add-on option in that Binding option and you can select any binding of your choice and install it (basically ARMtronix boards are configured for HTTP mode), which is suitable for your application.

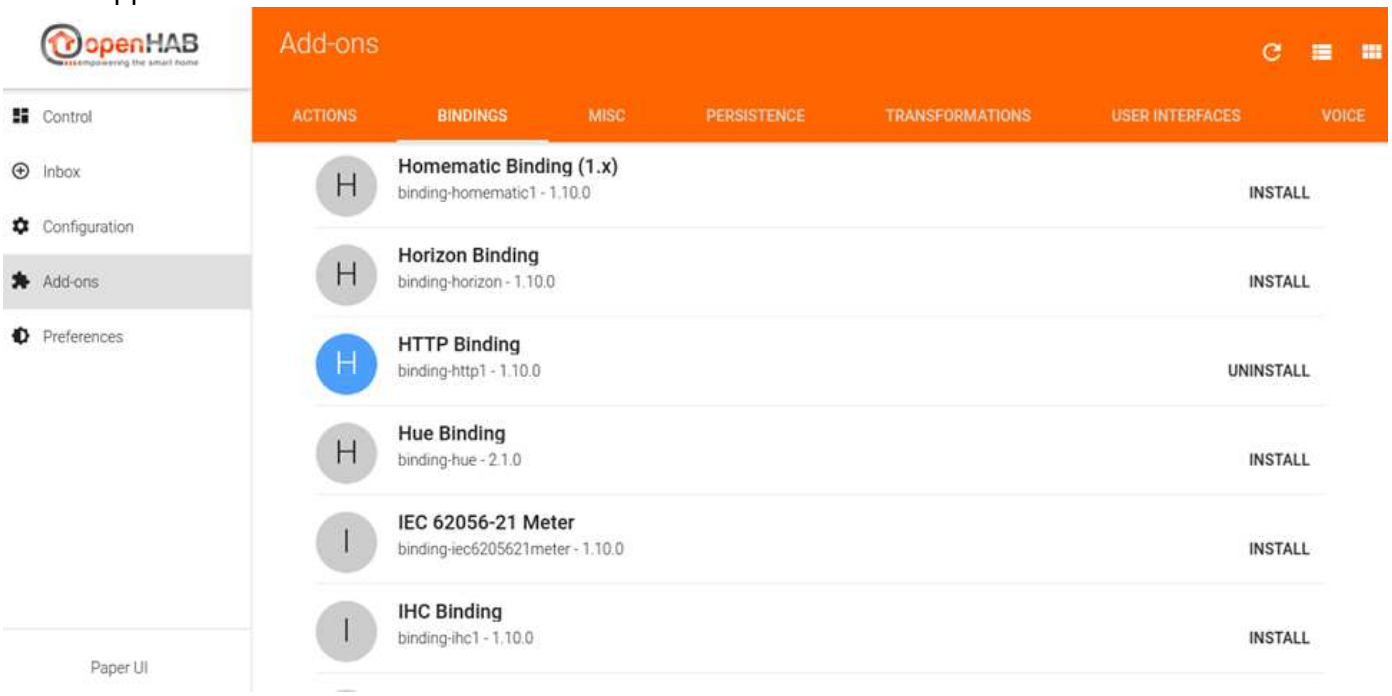


Figure 45: OpenHAB Add-ons binding option selection

17. FAQ ON OPENHAB

i. How To Configure OpenHab Application?

Consider the following steps to configure your OpenHab application.

Step 1: Make sure that your Smartphone is connected to the OpenHab cloud connector, if not then click on Add-on option in that you have to select the MISC option under that check whether OpenHab cloud connector is installed first, if not install it (It is required basically to interface with Alexa).

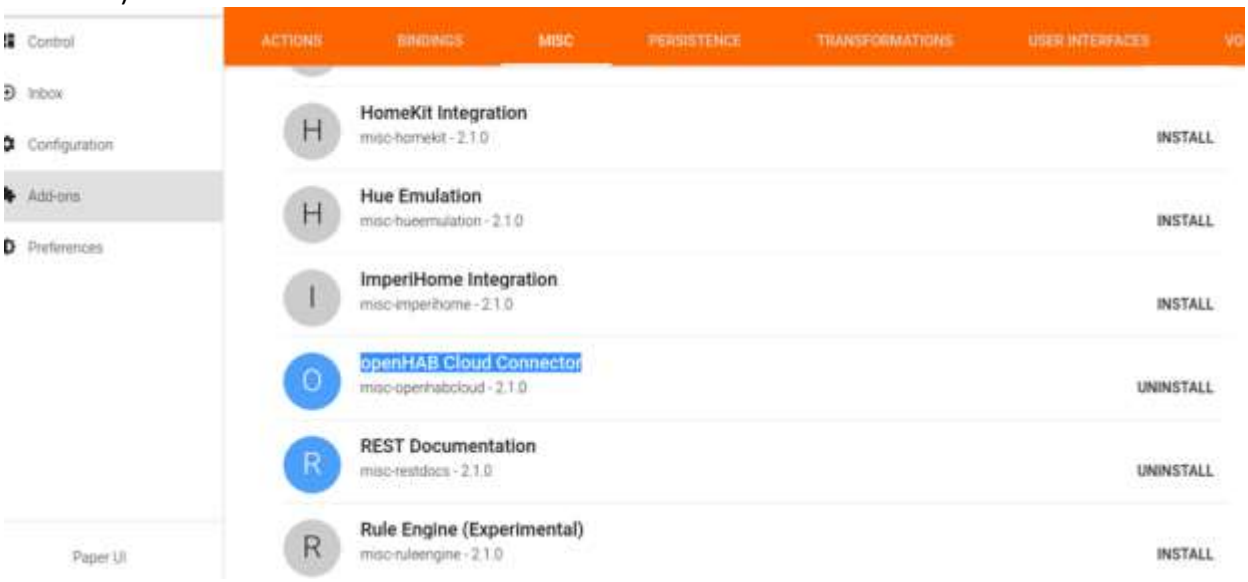


Figure 46: Binding option selected as OpenHAB

Step 2: In OpenHab application there is Configuration option under that select the option Services then a dialog box appears where you are able to see Configure OpenHab cloud and you can check the Mode, for that you will be provided with the dropdown where you can select the suitable Mode for your application, Base URL for OpenHab cloud server and items to expose to apps and you can select by clicking on the checkboxes provided in front of the options and you can save it by clicking on the SAVE option, as shown in the figure below.

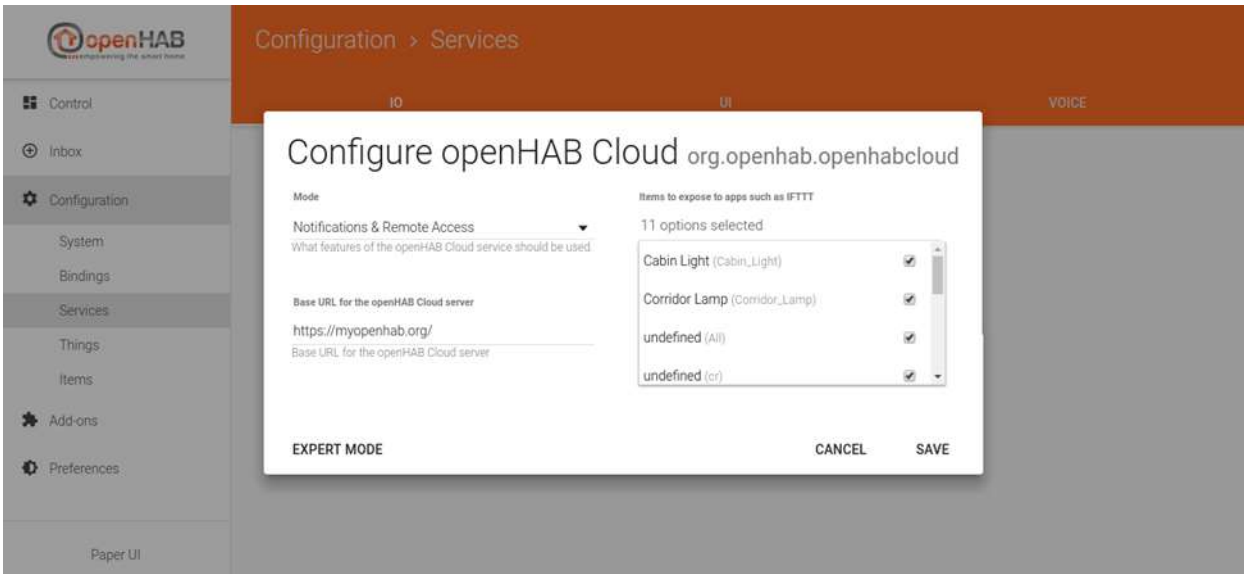


Figure 47: Device selection to configure with OpenHAB

18. INTEGRATION WITH "AMAZON ALEXA"

a. STEPS TO INSTALL ALEXA APP IN SMARTPHONE

- Download the Amazon Alexa app from the Google Play Store.
- Open it and sign in to your Amazon account.
- Open Settings on your Android phone
- Open Apps
- Tap "Default Apps"
- Select "Assist & voice input"
- Choose Alexa instead of Google Assistant.

After you've followed the steps above, you'll see a prompt to talk to Alexa. It'll ask for permissions, so tap "Allow" to let Alexa hear your requests and control devices in your smart home.

Now you'll be able to hold the home button to pull up Alexa. You can use Alexa to turn on smart lights at home ("Alexa, turn on the living room lights," for example)

Following steps explain how to use Amazon Alexa through your Smartphone
Step 1: Click on Amazon Alexa app installed in your Smartphone.

Figure 48: Alexa app bootup screen

Step 2: Click on the  icon which is present on the right-bottom corner of your Smartphone as shown in the figure below.

Figure 49: Alexa app home screen

Step 3: Click on **All Devices** option to check which devices are connected to the Amazon Alexa as shown in the figure below.

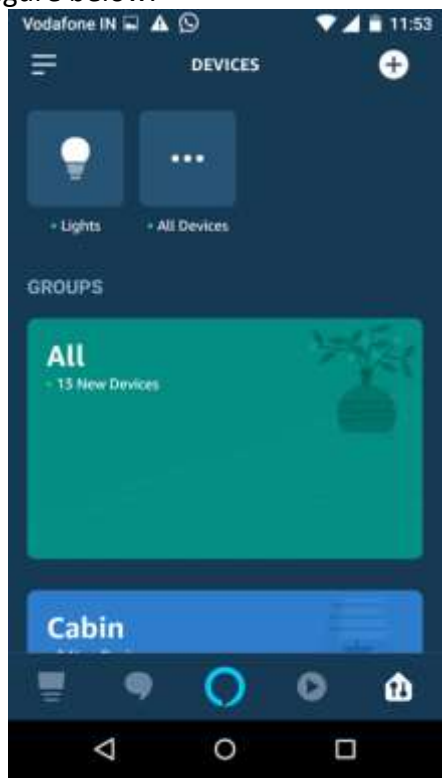


Figure 50: Check # of devices connected

Step 4: You can make groups of your choice and it shows how many devices are connected to that particular group as shown in the figure below,

Example: Cabin, Lab, Entrance, Office etc.

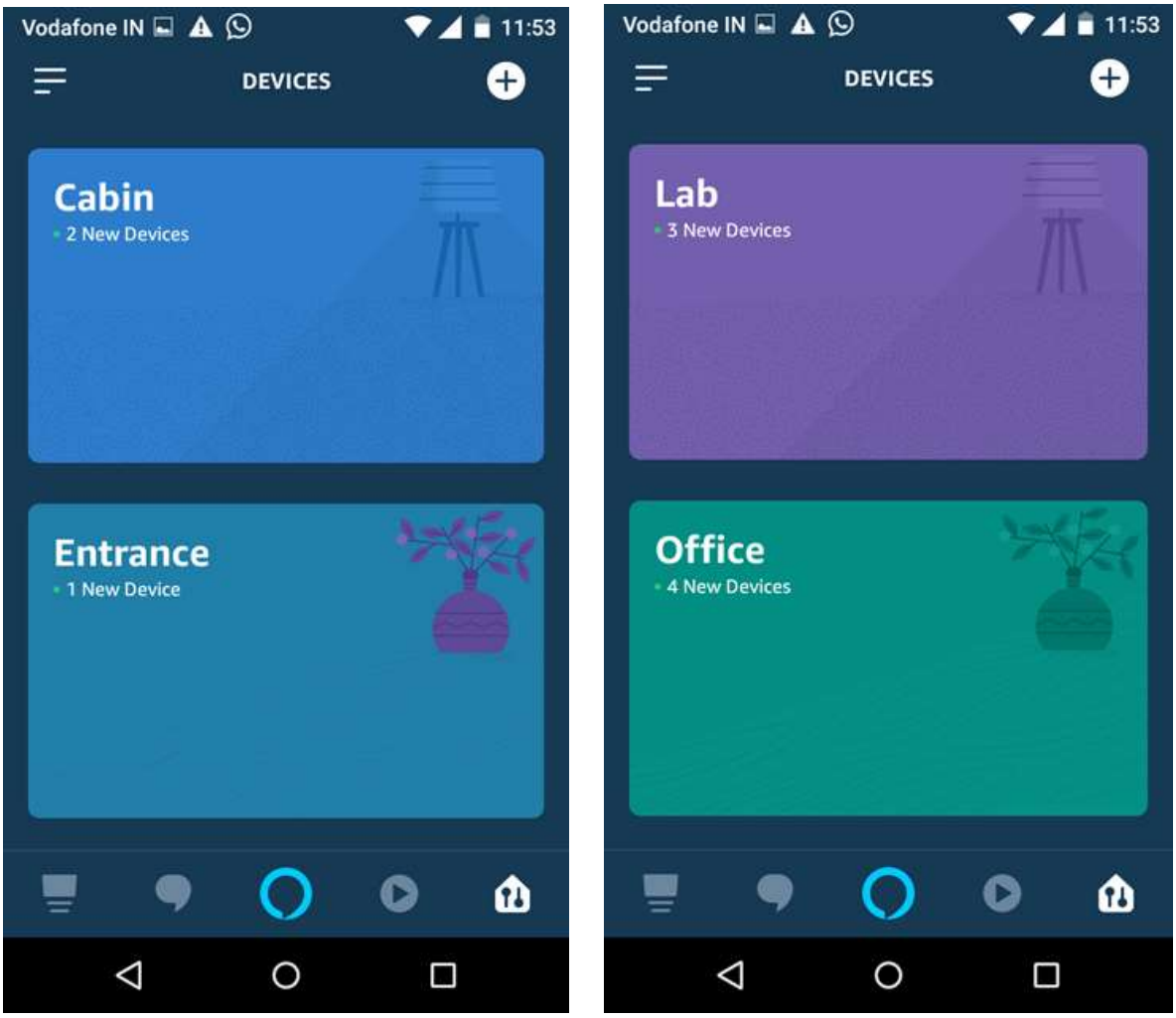


Figure 51: Devices devided as groups in Alexa app

Step 5: Upon voice recognition by Alexa you can control Loads (Fan, Lights) by giving commands.

Example: **Alexa turn ON Cabin Lights**
Alexa turn OFF Cabin Lights

Alexa turn ON Office Lights
Alexa turn OFF Office Lights

Note: Ensure that to interface with Alexa you are connected to the ”OpenHAB Cloud Connector”.

Step 6: Ensure that when you click on All option under groups, it displays the device name which you have mentioned during the configuration time as shown in the figure below.

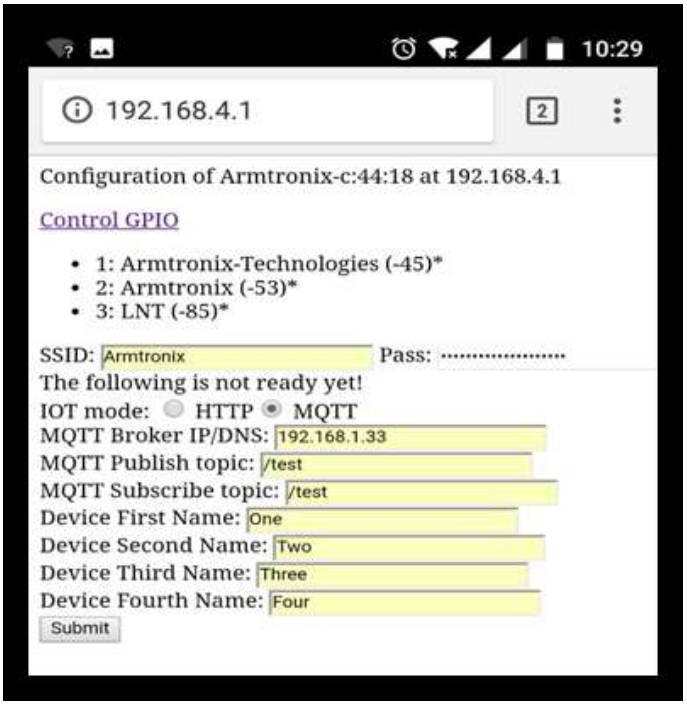


Figure 52: Names are defined for loads

19. INTEGRATION WITH "GOOGLE HOME"

a. FOLLOWING STEPS EXPLAIN, HOW TO INTEGRATE GOOGLE HOME WITH OPENHAB

To use the OpenHab integration for Google Assistant on your smartphone, you will need the Google Assistant or Google Home app (iOS or Android)
Before you start integration, make sure that the OpenHAB is installed and configured with our devices.

Step 1: Make sure Google Play Services is up to date

- Visit "Google Assistant" app entry in Google Play Store on Android
- Set up the voice-activated speaker, Pixel, or Android phone (version 6+) with the *same test account*
- Make sure you're the correct user
- Start the updated Google Assistant app on your phone

Step 2: Open Google Assistant app in your Smartphone as shown in the figure below

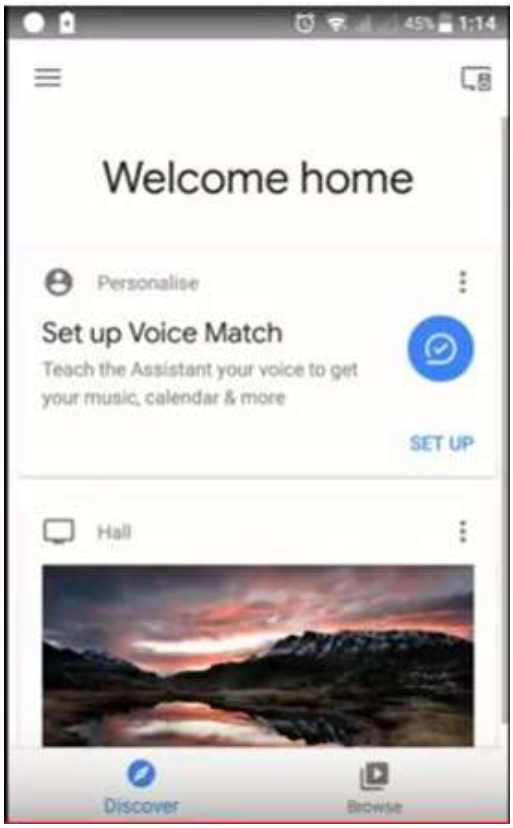


Figure 53: Google Home app's Home screen

Step 3: Go to Settings, under that go to services there you will be able to see the option Home control, click it.

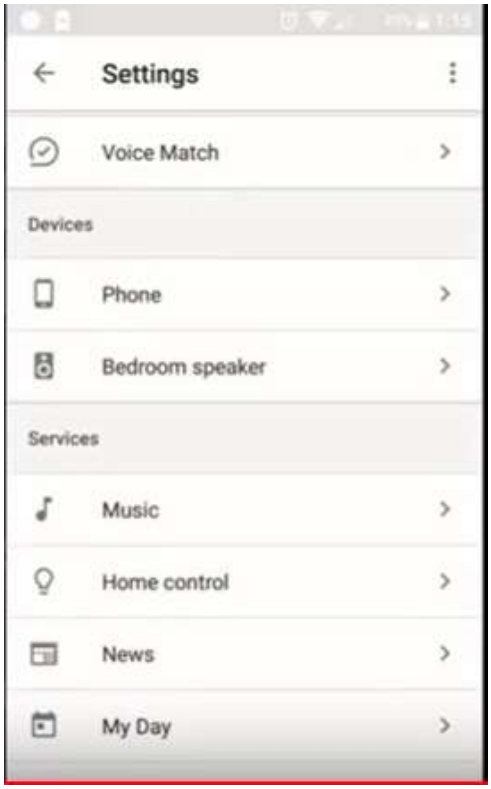


Figure 54: Google Home app's Settings screen

Step 4: Click on the "+" sign under Home control which will take you to the Add devices

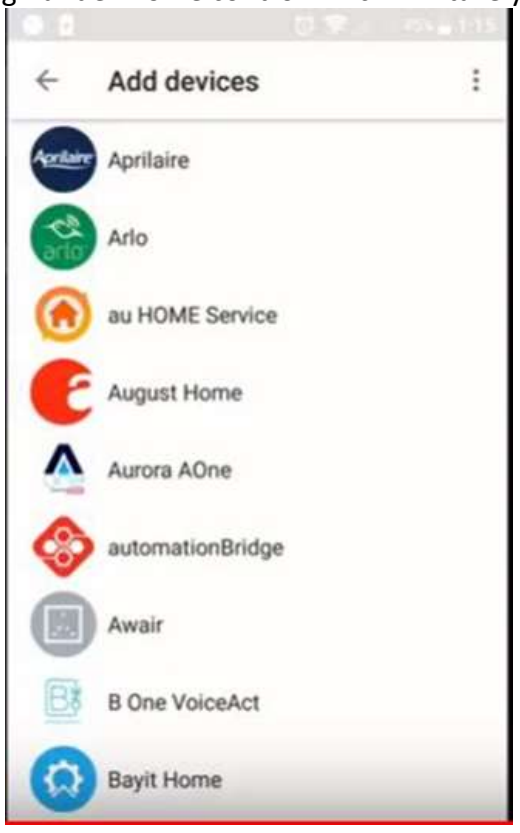


Figure 55: Google Home app's screen to Add IoT devices

Step 5: Under Add devices select the option OpenHab as shown in the figure below
Note: Ensure that your Smartphone is connected to the OpenHab cloud connector

Figure 56: Screen to Add cloud service provider

Step 6: Click on OpenHab and enter the E-mail ID and Password.

Figure 57: Login Screen

Step 7: Click on Allow button as it is asking permission for Authentication with Google home.

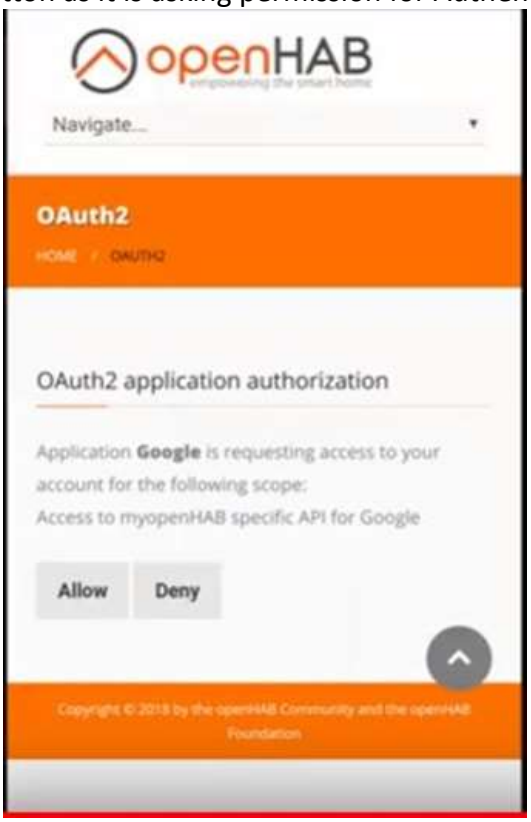


Figure 58: Apps's permission athentication screen

Step 8: It will display the devices connected with the OpenHab as shown in the figure below.

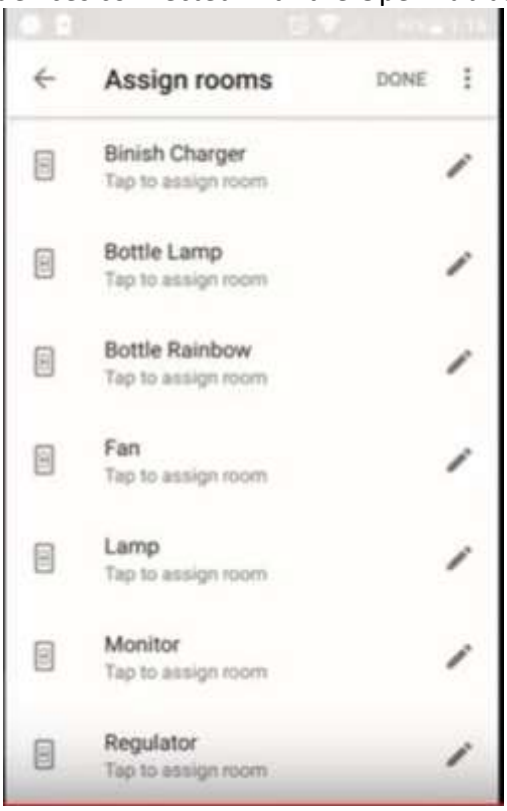


Figure 59: List of added devices

Step 9: Now it is ready to give commands and upon voice recognition Google home respond to the commands given.

Example: **Google turn on fan**

Google turn off fan

Google turn on Lights

Google turn off Lights

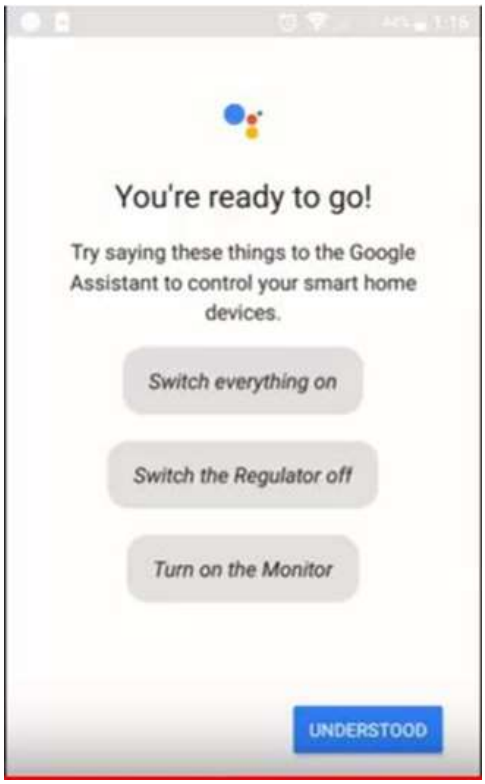


Figure 60: Device control screen

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