# A
# Project Report
# on
# "HOME AUTOMATION USING MQTT SERVER"

**Prepared by**

Mudra Barhate (16EC007)
Bhavin Bamwani(16EC008)
Raj Mandani(16ec082)

**Under the guidance of**

Dr. /Prof. Hitesh Patel

**Submitted to**

Charotar University of Science & Technology

for Partial Fulfillment of the Requirements for the

Degree of Bachelor of Technology

in Electronics & Communication

EC408 - Project

of 8th Semester of B.Tech

**Submitted at**

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION
Faculty of Technology & Engineering, CHARUSAT
Chandubhai S. Patel Institute of Technology
At: Changa, Dist: Anand – 388421
May 2020

# A
# Project Report
# on
# "HOME AUTOMATION USING MQTT SERVER"

**Prepared by**

Mudra Barhate (16EC007)
Bhavin Bamwani(16EC008)
Raj Mandani(16ec082)

**Under the guidance of**

Dr. /Prof. Hitesh Patel

**Submitted to**

Charotar University of Science & Technology

for Partial Fulfillment of the Requirements for the

Degree of Bachelor of Technology

in Electronics & Communication

EC408 - Project

of 8th Semester of B.Tech

**Submitted at**

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS & COMMUNICATION
Faculty of Technology & Engineering, CHARUSAT
Chandubhai S. Patel Institute of Technology
At: Changa, Dist: Anand – 388421
May 2020

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

# CERTIFICATE

This is to certify that the report entitled "H**ome Automation Using MQTT Server**" is a bonafide work carried out by **Mudra Barhate(16ec007)** under the guidance and supervision of **Prof. Hitesh Patel** for the subject **Project (EC408)** of 8th Semester of Bachelor of Technology in Electronics & Communication at Faculty of Technology & Engineering (C.S.P.I.T.) – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

Under the supervision of,

Prof. Hitesh Patel
Assistant Professor
Department of Electronics & Communication,
C.S.P.I.T., CHARUSAT-Changa.

Dr. Trushit K. Upadhyaya
Head of Department,
Department of Electronics & Communication
C.S.P.I.T., CHARUSAT- Changa, Gujarat.

**Chandubhai S Patel Institute of Technology (C.S.P.I.T.)**

**Faculty of Technology & Engineering, CHARUSAT**

At: Changa, Ta. Petlad, Dist. Anand, Gujarat - 38842

अमृतं तु विद्या

CHARUSAT

CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

# CERTIFICATE

This is to certify that the report entitled "**Home Automation Using MQTT Server**" is a bonafide work carried out by **Bhavin Bamwani(16EC008)** under the guidance and supervision of **Prof. Hitesh Patel** for the subject **Project (EC408)** of 8th Semester of Bachelor of Technology in Electronics & Communication at Faculty of Technology & Engineering (C.S.P.I.T.) – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

Under the supervision of,

Prof. Hitesh Patel
Assistant Professor
Department of Electronics & Communication,
C.S.P.I.T., CHARUSAT-Changa.

Dr. Trushit K. Upadhyaya
Head of Department,
Department of Electronics & Communication
C.S.P.I.T., CHARUSAT- Changa, Gujarat.

**Chandubhai S Patel Institute of Technology (C.S.P.I.T.)**

**Faculty of Technology & Engineering, CHARUSAT**

At: Changa, Ta. Petlad, Dist. Anand, Gujarat - 38842

CHARUSAT
CHAROTAR UNIVERSITY OF SCIENCE AND TECHNOLOGY

# CERTIFICATE

This is to certify that the report entitled "H**ome Automation Using MQTT Server**" is a bonafide work carried out by **Raj Mandani(16ec082)** under the guidance and supervision of **Prof.Hitesh Patel** for the subject **Project (EC408)** of 8th Semester of Bachelor of Technology in Electronics & Communication at Faculty of Technology & Engineering (C.S.P.I.T.) – CHARUSAT, Gujarat.

To the best of my knowledge and belief, this work embodies the work of candidate himself, has duly been completed, and fulfills the requirement of the ordinance relating to the B.Tech. Degree of the University and is up to the standard in respect of content, presentation and language for being referred to the examiner.

Under the supervision of,

Prof. Hitesh Patel
Assistant Professor
Department of Electronics & Communication,
C.S.P.I.T., CHARUSAT-Changa.

Dr. Trushit K. Upadhyaya
Head of Department,
Department of Electronics & Communication
C.S.P.I.T., CHARUSAT- Changa, Gujarat.

**Chandubhai S Patel Institute of Technology (C.S.P.I.T.)**

**Faculty of Technology & Engineering, CHARUSAT**

At: Changa, Ta. Petlad, Dist. Anand, Gujarat - 38842

# ABSTRACT

In the era of Internet of things and digital technology automation of everything has become more popular. Internet of things conceptualizes the idea of remotely connecting and monitoring real world objects (things) through the Internet. When it comes to our house, this concept can be aptly incorporated to make it smarter, safer and automated. This Internet of things project focuses on building a smart home Automation by using WIFI in case. and Command sent by the Mobile Phone. whether mobile phone is connected to the WI-FI.

This paper explains a cloud based home automation system using MQTT protocol. It enable users to control and monitor home appliances using a mobile app or a web page. Using cloud technologies became cost effective because most cloud developers are offering their services freely.The proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

# ACKNOWLEDGEMENT

Inspiration and Motivation has always played a key role in the success of any venture.

I express my sincere thanks to my guide, **Mr Hitesh Patel, Assistant Professor**,V.T. Patel Department of Electronics and Communications, for his exemplary guidance, monitoring and constant encouragement throughout the course of this project.

I extend my sincere thanks to **Dr. Trushit K. Upadhyaya, Head of Department**,V.T. Patel Department of Electronics and Communication, for providing me an opportunity to work on the project.

I also wish to express my gratitude to my parents, friends and colleagues who supported me for the successful completion of the project, both implicitly and explicitly.

**Mudra Barhate**
**16EC007**

# Table of Contents

# LIST OF FIGURES

# ABBREVIATIONS

| | | |
|---|---|---|
| 1. | IOT | Internet of Things |
| 2. | MQTT | MQ Telemetry Transport |
| 3. | HAS | Home Automation System |
| 4. | IR LED | Infrared Light Emitting Diode |
| 5. | SSL | Solid State Lighting |

# CHAPTER 1: INTRODUCTION

Homes of the 21st century will become more and more self-controlled and automated. Simple devices such as a timer to turn on one's coffee maker in the morning have been around for many years, but much more sophisticated mechanisms will soon be prevalent in homes around the world.

This project presents the overall design of HAS wireless system. This system was designed to be flexible and generally programmable, extensible such that adding additional features is relatively simple, and modular and forward compatible, so that new components can be added without redesigning the entire system. This system is designed to assist and provide support in order to fulfill the needs of elderly and disabled in home.

Also, the smart home concept in the system improves the standard living at home. The system intended to control electrical appliances and devices in house with Relatively design, user-friendly interface and ease of installation. The "Home Automation" concept has existed for many years. The terms "Smart Home", "Intelligent Home" followed and has Been used to introduce the concept of IOT.

HASs Represents great research opportunity in Creating new fields in engineering, and Computing. HASs includes centralized control of lighting, appliances, security locks Of gates and doors and other systems, to provide improved comfort, energy efficiency And security system. HASs becoming popular Nowadays and enter quickly in this Emerging market. Overview The main overview for the project is to be able to communicate with different electrical devices within the home wirelessly.

## 1.1 Problem Description

Many home devices now have Wi-Fi and can interact with other home devices, smart phone applications and home computers. An issue is that these devices cannot communicate with each other or require an additional device to do so and need an individual application on the smart phone to be controlled. A much better option is to unify these devices into one program/device that controls them.

As an example, one can control the lights, microwave, oven, TV, air-conditioning and door locks through one application on the smart phone. This gives the consumer more control of their home, for example, it allows them to set up conditions for when the lights turn on, or if they are on their way home, to preheat the oven before they get home. Therefore, home automation can simplify many manual actions.

# CHAPTER 2 : LITERATURE ANALYSIS

## 2.1 Arduino Based Home Automation System Using MQTT Protocol Incorporating Internet of Things (IOT)

**Author :** E.Saraswathi,
Ajay Kumar
Jaspal Singh
Janak Mohanty
Yatharth Mishra

**Published in :** May(2017)

**Published by :** Journal of Network Communications and Emerging Technologies (JNCET)

**URL :** https://www.jncet.org/Manuscripts/Volume-8/Issue-5/Vol-8-issue-5-M-08.pdf

**Abstract :**In recent years, the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Home automation refers to control of home appliances using information technology. With the help of rapid expansion of the Internet, there is the potential to control and automate the home appliances. It is achieved by interfacing the internet with embedded systems. This paper deals with the idea of implementing the Arduino based interactive home automation system through internet of things inorder to measure temperature, smoke, light and intrusion . Through this project we will be able to secure our home, reduce the wastage of water and electricity.In this project, we will also use the MQTT(Messaging Queuing Telemetry Transport) protocol which is considered a safe and secured protocol.It is an ISO Standard (ISO/IEC PRF 20922 ) publish-subscribe based messaging protocol. It works on top of TCP-IP protocol.

## 2.2 Implementation of Home Automation System using MQTT Protocol and ESP32

**Author :**V. Thirupathi, K. Sagar

**Published in :** December 2018

**Published by :** Blue Eyes Intelligence Engineering & Sciences Publication

**URL :**https://www.researchgate.net/publication/334657137_Implementation_of_Home_Automation_System_using_MQTT_Protocol_and_ESP32

**Abstract :** In the era of Internet of Things (IOT) and digital technology automation of everything has become more popular. People are very smart, they want to control and monitor everything from working places. This paper explains a cloud based home automation system using MQTT protocol. It enable users to control and monitor home appliances using a mobile app or a web page. Using cloud technologies became cost effective because most cloud developers are offering their services freely.
Keywords IOT, Cloud, Mobile App, MQTT, ESP32

## 2.3 Wireless home automation and security system using MQTT protocol

**Author :**J Prabaharan
Ashvith Swamy
Aditya Sharma
Kumar N. Bharath
Palak R. Mundra
Khurram J Mohammed

**Published in :** May 2017

**Published by :** IEEE

**URL :** https://ieeexplore.ieee.org/document/8256958

**Abstract :** With the development in technology, it is now becoming a common practice to communicate with your day-today interacting appliance remotely using a portable device like a Smartphone which has internet connectivity. This has been made easier by the concept of Internet of Things (IoT). In this paper, we present such a system where household interactions is made easier by implementing automation and security along with the Internet of Things to create a system which will enable someone to remotely monitor and control some areas of a house remotely from anywhere.

## 2.4 Design, Implementation and Practical Evaluation of an IoT Home Automation System for Fog Computing Applications Based on MQTT and ZigBee-WiFi Sensor Nodes

**Author :**Iván Froiz-Míguez
Tiago M. Fernández-Caramés
Paula Fraga-Lamas
Luis Castedo

**Published in :** July 2018

**Published by :** Universidade da Coruña

**URL :** file:///C:/Users/mudra/Downloads/sensors-18-02660.pdf

**Abstract :** In recent years, the improvement of wireless protocols, the development of cloud services and the lower cost of hardware have started a new era for smart homes. One such enabling technologies is fog computing, which extends cloud computing to the edge of a network allowing for developing novel Internet of Things (IoT) applications and services. Under the IoT fog computing paradigm, IoT gateways are usually utilized to exchange messages with IoT nodes and a cloud. WiFi and ZigBee stand out as preferred communication technologies for smart homes. WiFi has become very popular, but it has a limited application due to its high energy consumption and the lack of standard mesh networking capabilities for low-power devices. For such reasons, ZigBee was selected by many manufacturers for developing wireless home automation devices. As a consequence, these technologies may coexist in the 2.4 GHz band, which leads to collisions, lower speed rates and increased communications latencies. This article presents ZiWi, a distributed fog computing Home Automation System (HAS) that allows for carrying out seamless communications among ZigBee and WiFi devices. This approach diverges from traditional home automation systems, which often rely on expensive central controllers. In addition, to ease the platform's building process, whenever possible, the system makes use of open-source software (all the code of the nodes is available on GitHub) and Commercial Off-The-Shelf (COTS) hardware. The initial results, which were obtained in a number of representative home scenarios, show that the developed fog services respond several times faster than the evaluated cloud services, and that cross-interference has to be taken seriously to prevent collisions. In addition, the current consumption of ZiWi's nodes was measured, showing the impact of encryption mechanisms.

# CHAPTER 3 : HARDWARE DESIGN

## 3.1 BASIC STRUCTURE

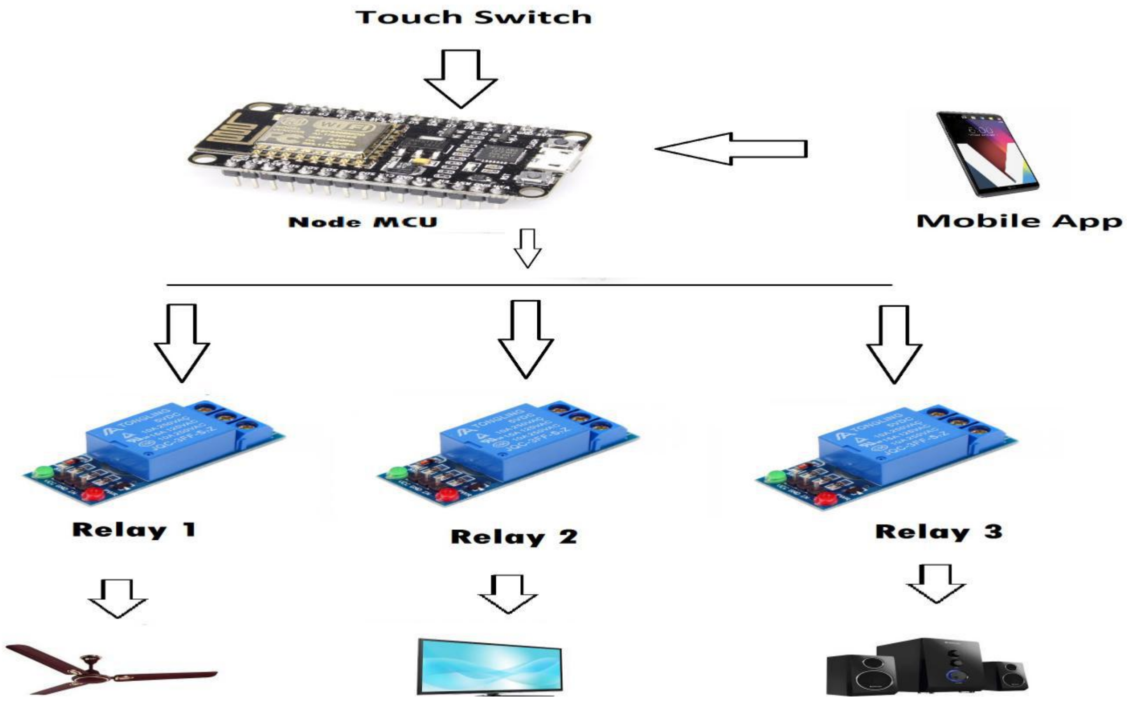


Fig 3.1.1 Basic Structure

## 3.2 DETAIL STUDY OF COMPONENTS

### 3.2.1 ESP-32:

ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC ultra-low-power 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios. The predecessor of ESP32, the ESP8266 has a builtin processor. However due to multitasking involved in updating the WiFi stack, most of the applications use a separate micro-controller for data processing, interfacing sensors and digital Input Output. With the ESP32 you may not want to use an additional micro-controller. The ESP32 will run on breakout boards and modules from 160Mhz upto 240MHz . That is very good speed for anything that requires a microcontroller with connectivity options.

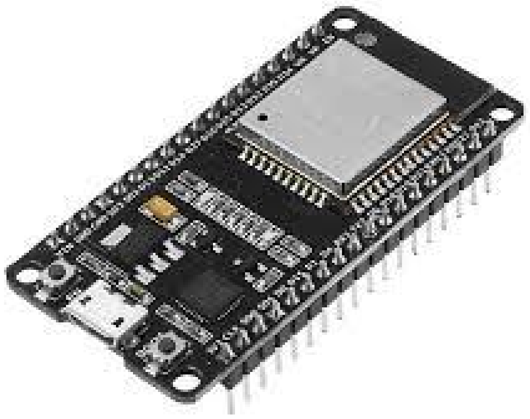


**Fig 3.2.1 (1) ESP-32**

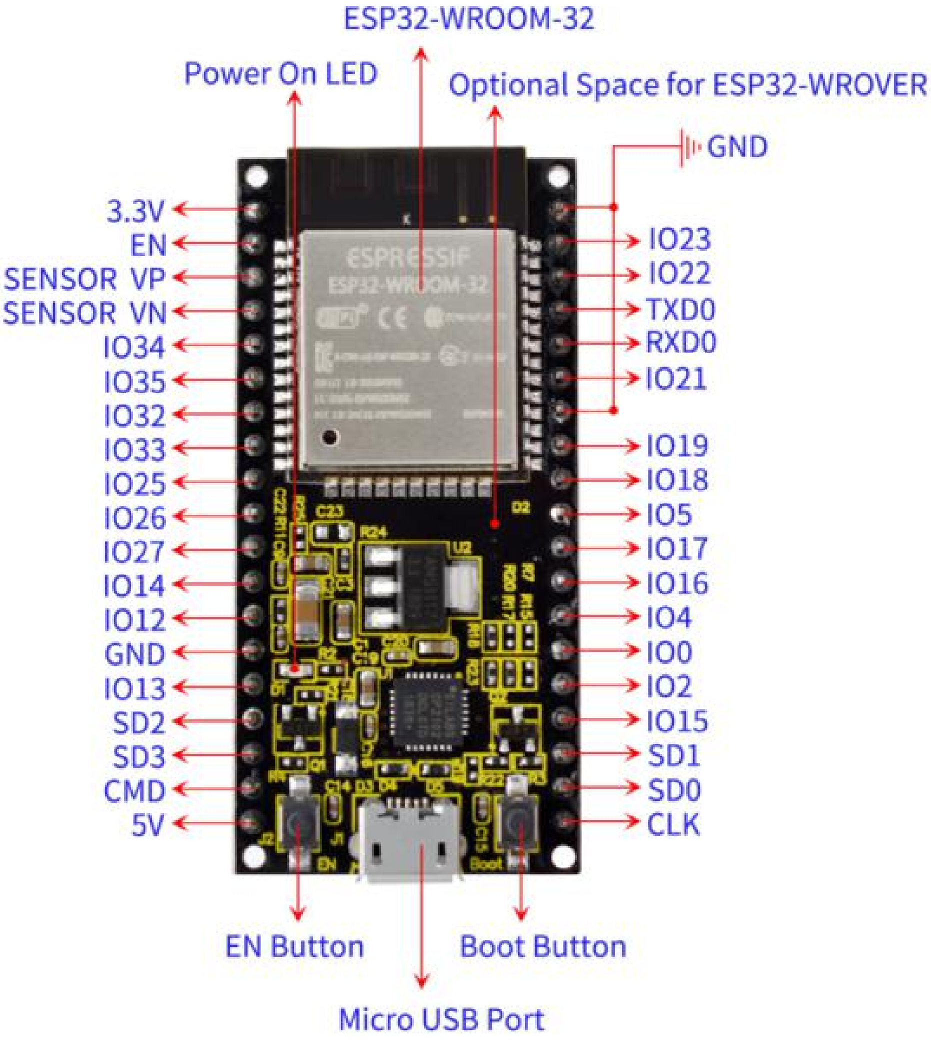


**Fig 3.2.1(2) pin diagram of ESP32**

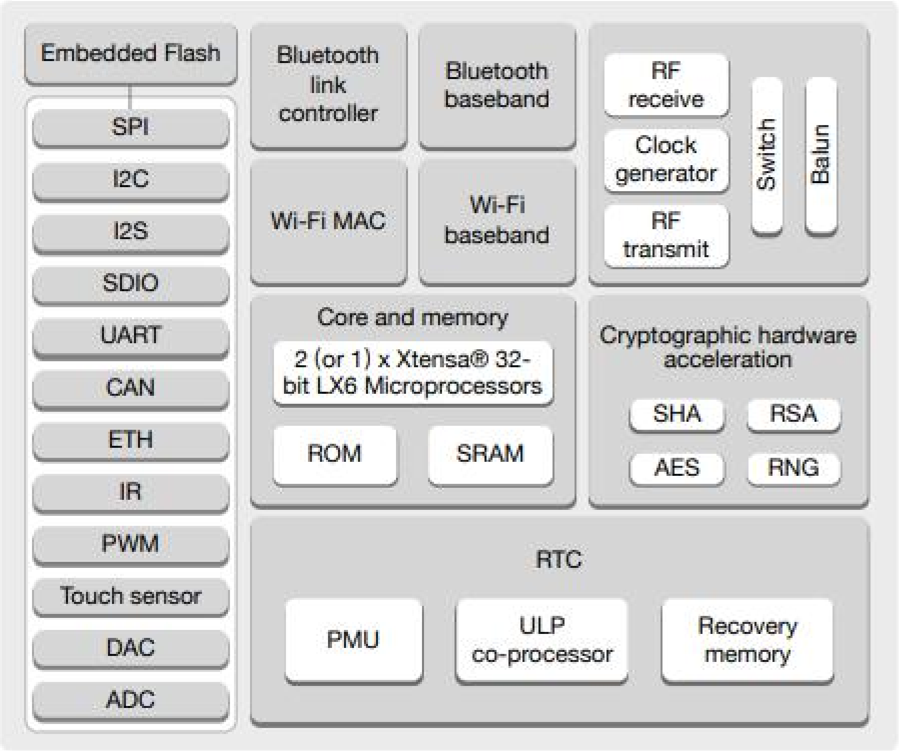


**Fig 3.2.1(3) Functional Block Diagram**

As you can see in fig 3.2.1(3)

- The ESP32 is dual core, this means it has 2 processors.
- It has Wi-Fi and bluetooth built-in.
- It runs 32 bit programs.
- The clock frequency can go up to 240MHz and it has a 512 kB RAM.
- This particular board has 30 or 36 pins, 15 in each row.
- It also has wide variety of peripherals available, like: capacitive touch, ADCs, DACs, UART, SPI, I2C and much more.
- It comes with built-in hall effect sensor and built-in temperature sensor.

### 3.2.2 Relay

Relay is an electromagnetic device which is used to isolate two circuits electrically and connect them magnetically. They are very useful devices and allow one circuit to switch another one while they are completely separate. They are often used to interface an electronic circuit to an electrical circuit which works at very high voltage. For example, a relay can make a 5V DC battery circuit to switch a 230V AC mains circuit. Thus a small sensor circuit can drive, say, a fan or an electric bulb.

A relay switch can be divided into two parts: input and output. The input section has a coil which generates magnetic field when a small voltage from an electronic circuit is applied to it. Commonly used relays are available in different configuration of operating voltages like 6V, 9V, 12V, 24V etc. The output section consists of connectors which connect or disconnect mechanically.

In a basic relay there are three connectors: normally open (NO), normally closed (NC) and common (COM). At no input state, the COM is connected to NC. When the operating voltage is applied the relay coil gets energized and the COM changes contact to NO.

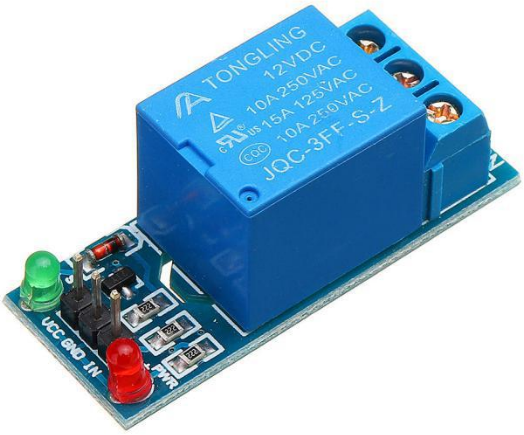


**Fig 3.2.2(1) Relay**

## 3.2.3 IR LED (INFRARED LIGHT EMITTING DIODE)

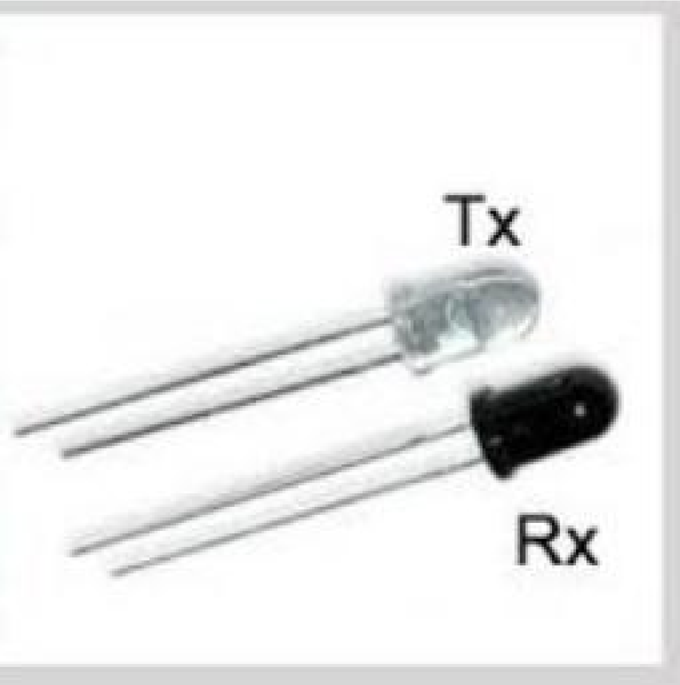


**Fig 3.2.3(1) IR LED**

An IR LED is a solid state lighting (SSL) device that emits light in the infrared range of the electromagnetic radiation spectrum. IR LEDs allow for cheap, efficient production of infrared light, which is electromagnetic radiation in the 700 nm to 1mm range.

These are mostly use in the remote control of TV’s, cameras and different types of electronic instruments. The semiconductor material used to make these LEDs are gallium arsenide or aluminum arsenide. Mostly used in IR sensor as it is the combination of IR receiver and IR transmitter (IR LED).

# CHAPTER 4:SOFTWARE LOGIC

## 4.1 SOFTWARE PLATFORM

### 4.1.1 Arduino IDE:

Arduino IDE is an open source software that is mainly used for writing and compiling the code into the Arduino Module. It is an official Arduino software, making code compilation too easy that even a common person with no prior technical knowledge can get their feet wet with the learning process. It is easily available for operating systems like MAC, Windows, Linux and runs on the Java Platform that comes with inbuilt functions and commands that play a vital role for debugging, editing and compiling the code in the environment. The main code, also known as a sketch, created on the IDE platform will ultimately generate a Hex File which is then transferred and uploaded in the controller on the board. The IDE environment mainly contains two basic parts: Editor and Compiler where former is used for writing the required code and later is used for compiling and uploading the code into the given Arduino.

### 4.1.2 Android Studio :

Android Studio is the official integrated development environment (IDE) for Android application development. It is based on the IntelliJ IDEA, a Java integrated development environment for software, and incorporates its code editing and developer tools. Android Studio supports all the same programming languages of IntelliJ (and CLion) e.g. Java, C++, and more with extensions, such as Go and Android Studio 3.0 or later supports Kotlin and "all Java 7 language features and a subset of Java 8 language features that vary by platform version." External projects backport some Java 9 features. While IntelliJ that Android Studio is built on supports all released Java versions, and Java 12, it's not clear to what level Android Studio supports Java versions up to Java 12 (the documentation mentions partial Java 8 support). At least some new language features up to Java 12 are usable in Android

# 4.2 WHAT IS MQTT SERVER?

### 4.2.1 OVERVIEW

MQTT is one of the most commonly used protocols in IoT projects. It stands for Message Queuing Telemetry Transport.

In addition, it is designed as a lightweight messaging protocol that uses publish/subscribe operations to exchange data between clients and the server. It is useful for connections with remote locations where a small code footprint is required and/or network bandwidth is at a premium. Automated activity includes the A.C. to an energy saving setting when the house is vacant and get back to the normal setting when the resident is getting ready to come back. Furthermore, its small size, low power usage, minimized data packets and ease of implementation make the protocol ideal of the "machine-to-machine" or "Internet of Things" world.

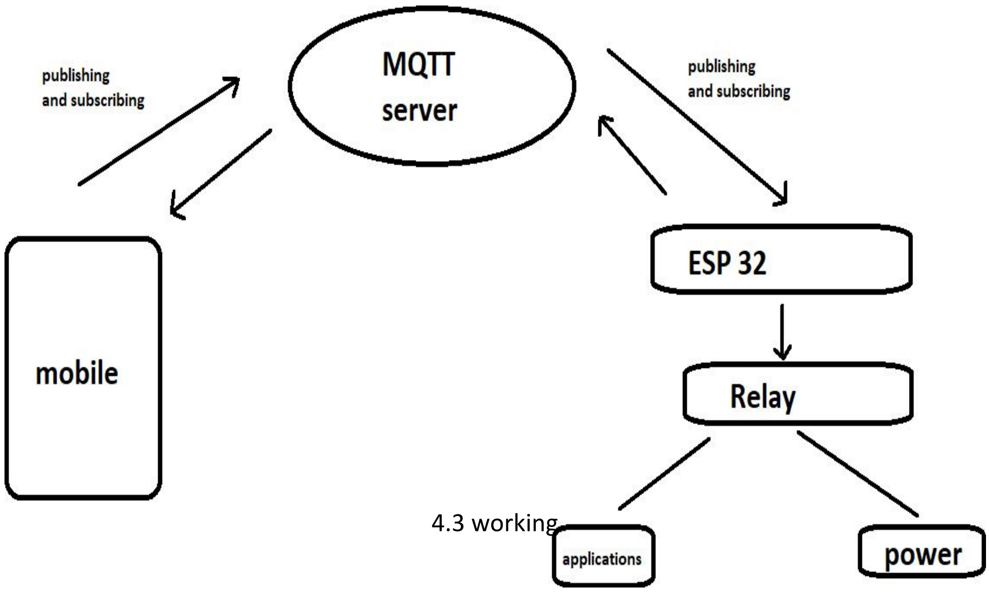
- It's based on a messaging technique. Of course, you know how fast your messenger/WhatsApp message delivery is. Likewise, the MQTT protocol.
- Minimized data packets. Hence, low network usage.
- Low power usage. As a result, it saves the connected device's battery.
- It's real time! That's is specifically what makes it perfect for IoT applications.

### 4.2.2 MQTT COMPONENTS

There are 5 components which are given below.

- Broker : which is the server that handles the data transmission between the clients.
- A topic : which is the place a device want to put or retrieve a message to/from.
- The message : which is the data that a device receives "when subscribing" from a topic or send "when publishing" to a topic.
- Publish : is the process a device does to send its message to the broker.
- Subscribe : where a device does to retrieve a message from the broker.

## 4.3 How it works?



4.3 working

An MQTT session is divided into four stages: connection, authentication, communication and termination.

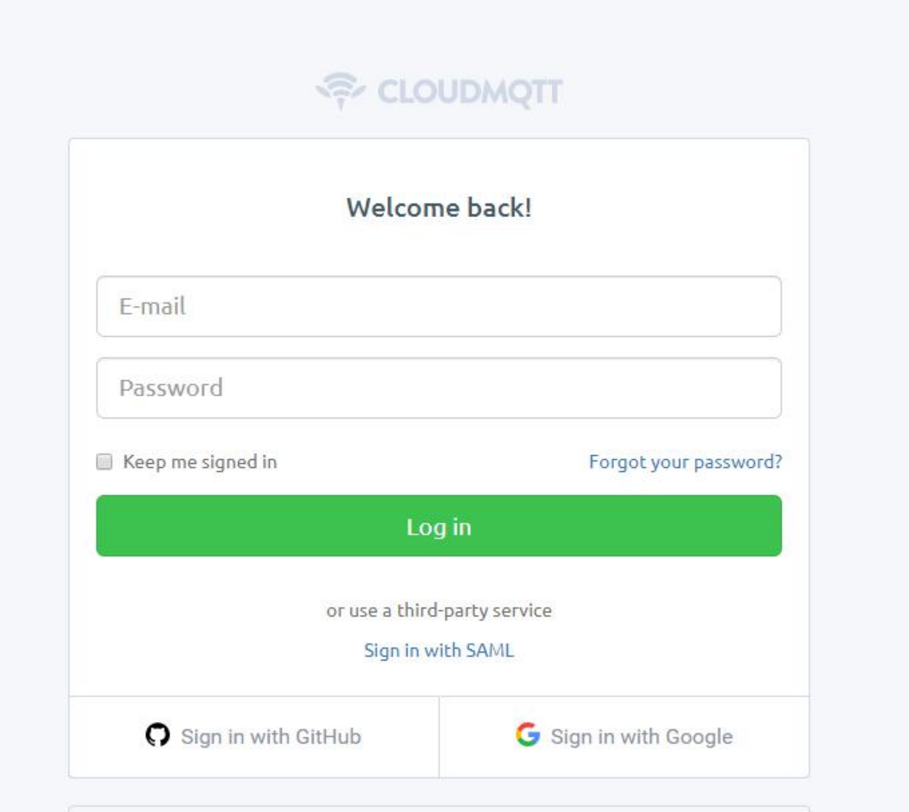
A client starts by creating a TCP/IP connection to the broker by either using a standard port or a custom port defined by the broker's operators. When connecting, it is important to recognize that the server might continue an old session if provided with a re-used client identity. The standard ports are 1883 for non-encrypted communication and 8883 for encrypted communication using SSL/TLS. During the SSL/TLS handshake, the client validates the server certificate to authenticate the server.

The client may also provide a client certificate to the broker during the handshake which the broker can use to authenticate the client. While not specifically part of the MQTT specification, it has become customary for brokers to support client authentication with SSL/TLS client-side certificates. Because MQTT aims to be a protocol for resource-constrained devices, SSL/TLS might not always be an option and in some cases, might not be desired.

In such cases,authentication is presented as a clear-text username and password that is sent by the client to the server as part of the CONNECT/CONNACK packet sequence. Some brokers, especially open brokers published on the Internet, will accept anonymous clients.

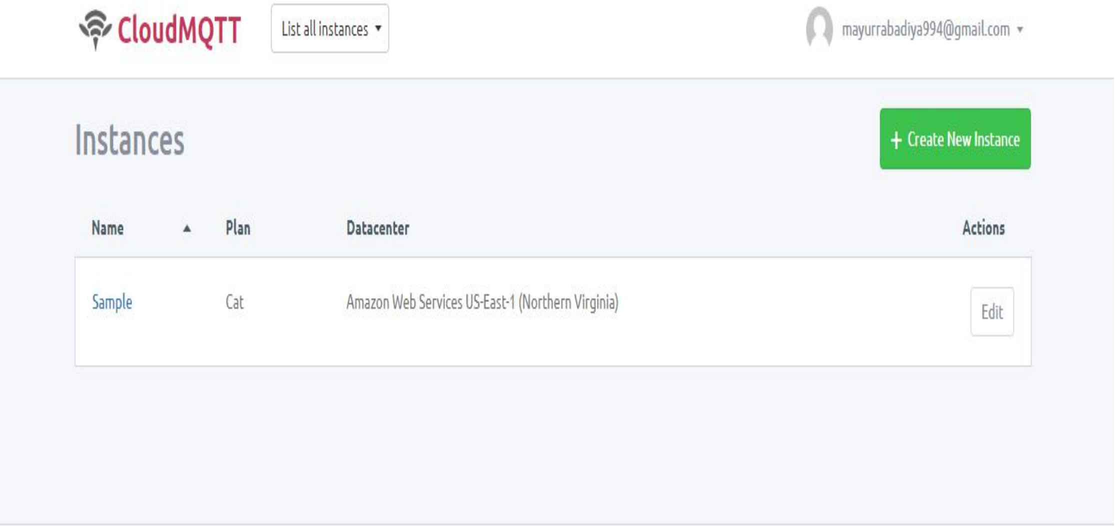
## 4.4 Application

**Step 1: Open CloudMQTT website and sign up for Cute Cat plan**



4.4.1 Step 1

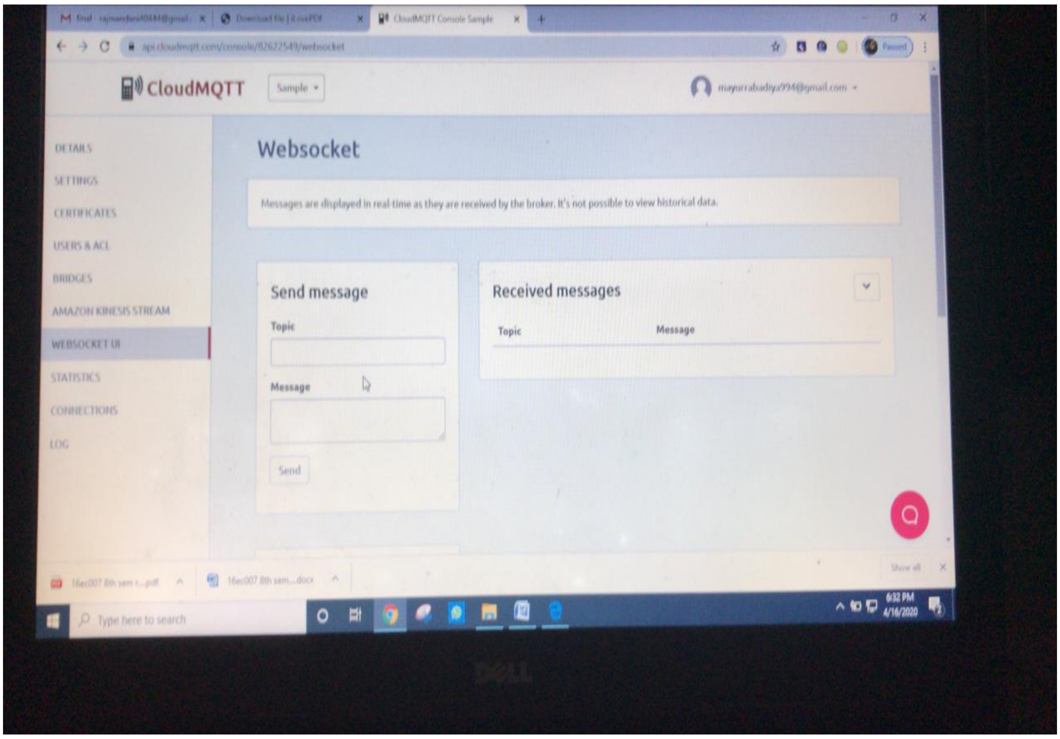
## Step 2 : Click the button sample of created CloudMQTT instance.



Instances

| Name ▲ | Plan | Datacenter | Actions |
|---|---|---|---|
| Sample | Cat | Amazon Web Services US-East-1 (Northern Virginia) | Edit |

4.4.2 Step 2



Websocket

Messages are displayed in real-time as they are received by the broker. It's not possible to view historical data.

Send message

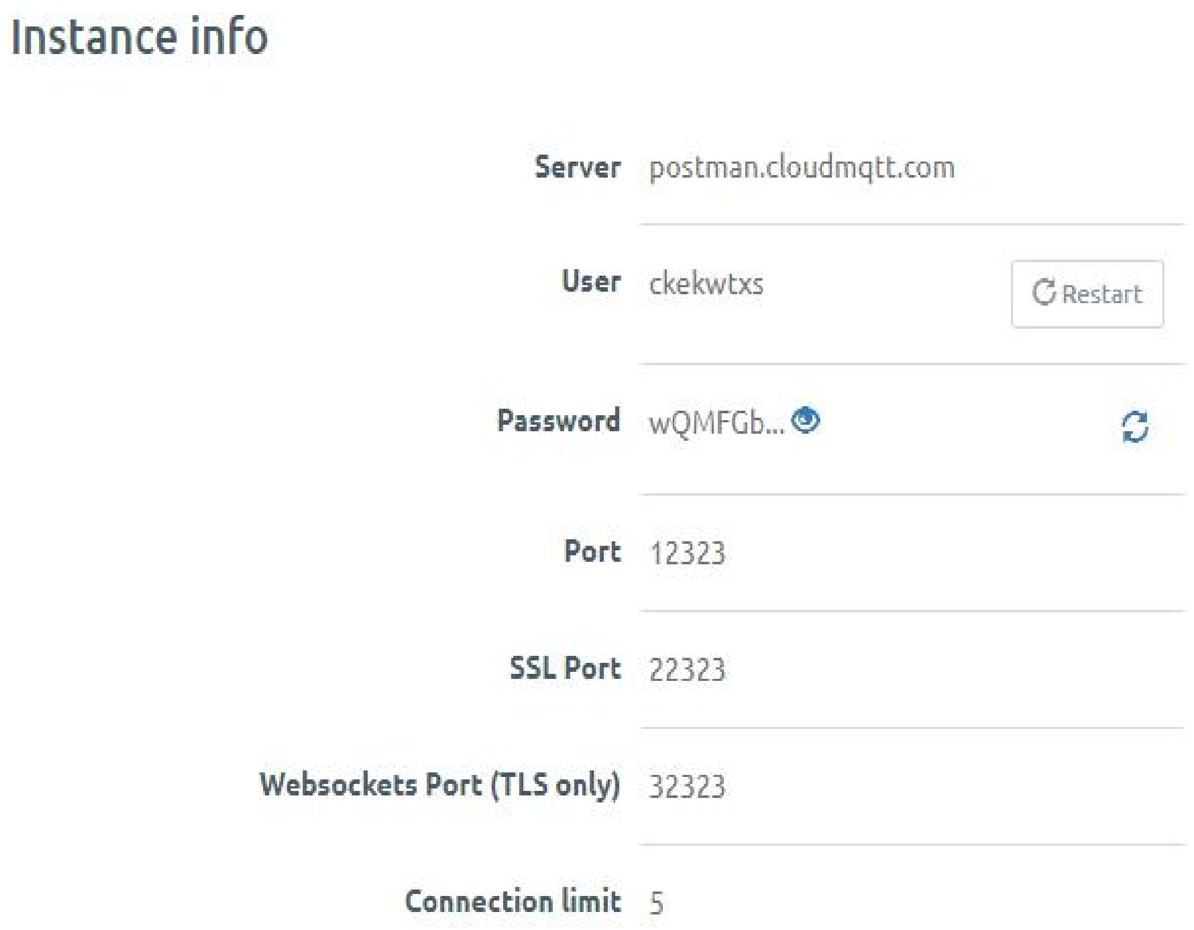
Topic

Message

Received messages

| Topic | Message |
|---|---|

**Step 3 : we will use following details from CloudMQTT console to connect to the CloudMQTT broker from clients (ESP8266 device and IoT MQTT Dashboard android app) to publish and consume messages.**

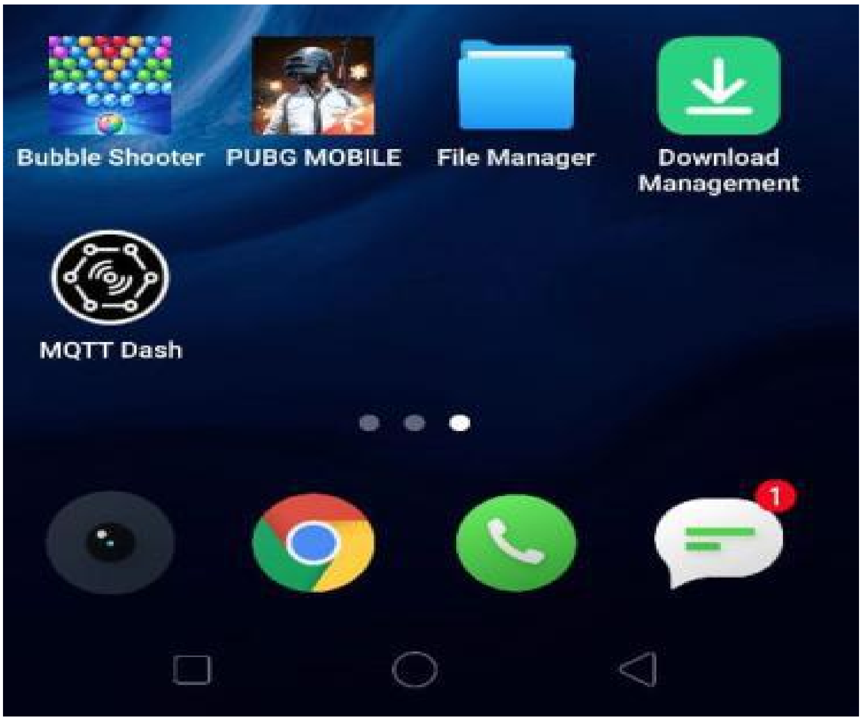


Instance info

| | |
|---|---|
| Server | postman.cloudmqtt.com |
| User | ckekwtxs |
| Password | wQMFGb... |
| Port | 12323 |
| SSL Port | 22323 |
| Websockets Port (TLS only) | 32323 |
| Connection limit | 5 |

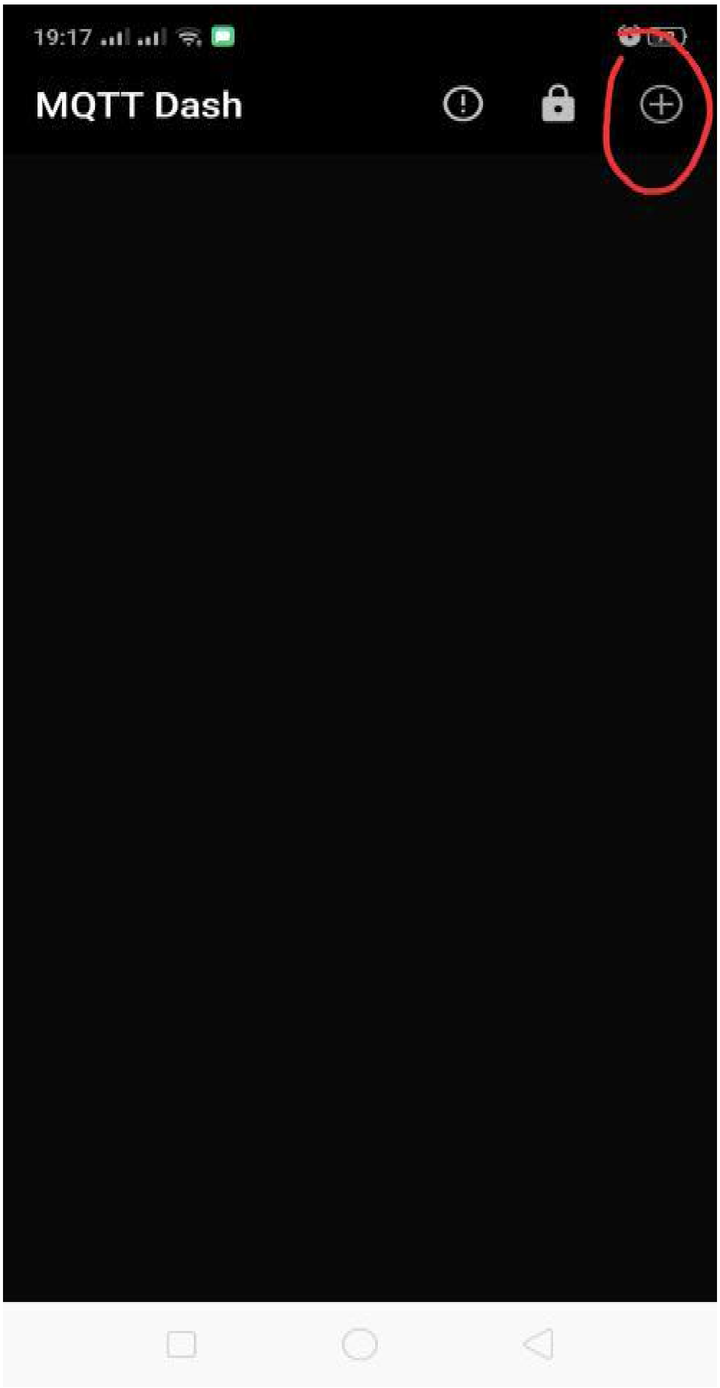
4.4.3 Step 3

**Step 4 : Download MqttDashboard in Android from Google playstore**



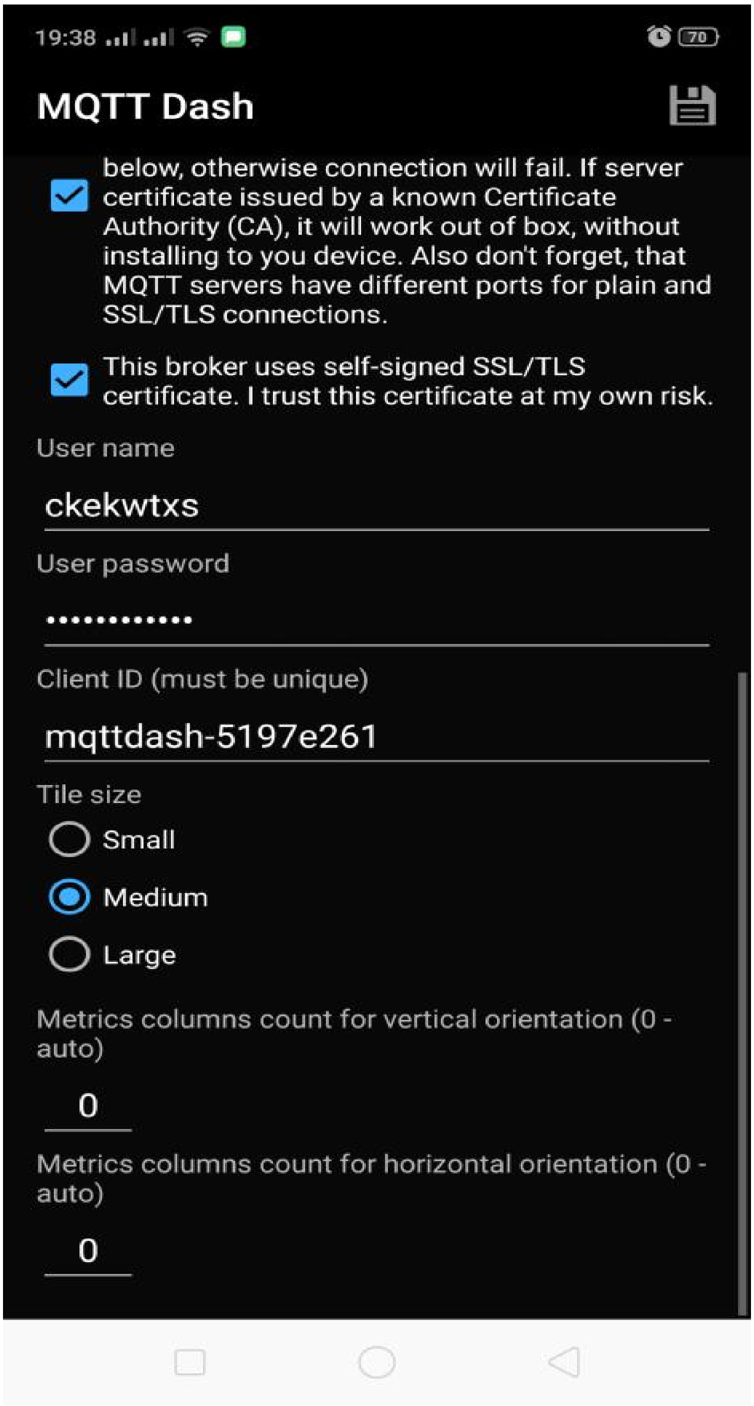
4.4.4 Step 4

**Step 5 : Open the application and click the Plus Sign (+) button to create a connection.**



4.4.5 Step 5

**Step 6: Enter all the details of CloudMQTT instance and click "Save" button.**



19:38

MQTT Dash

☑ below, otherwise connection will fail. If server certificate issued by a known Certificate Authority (CA), it will work out of box, without installing to you device. Also don't forget, that MQTT servers have different ports for plain and SSL/TLS connections.

☑ This broker uses self-signed SSL/TLS certificate. I trust this certificate at my own risk.

User name

ckekwtxs

User password

••••••••••••

Client ID (must be unique)

mqttdash-5197e261

Tile size

○ Small

● Medium

○ Large

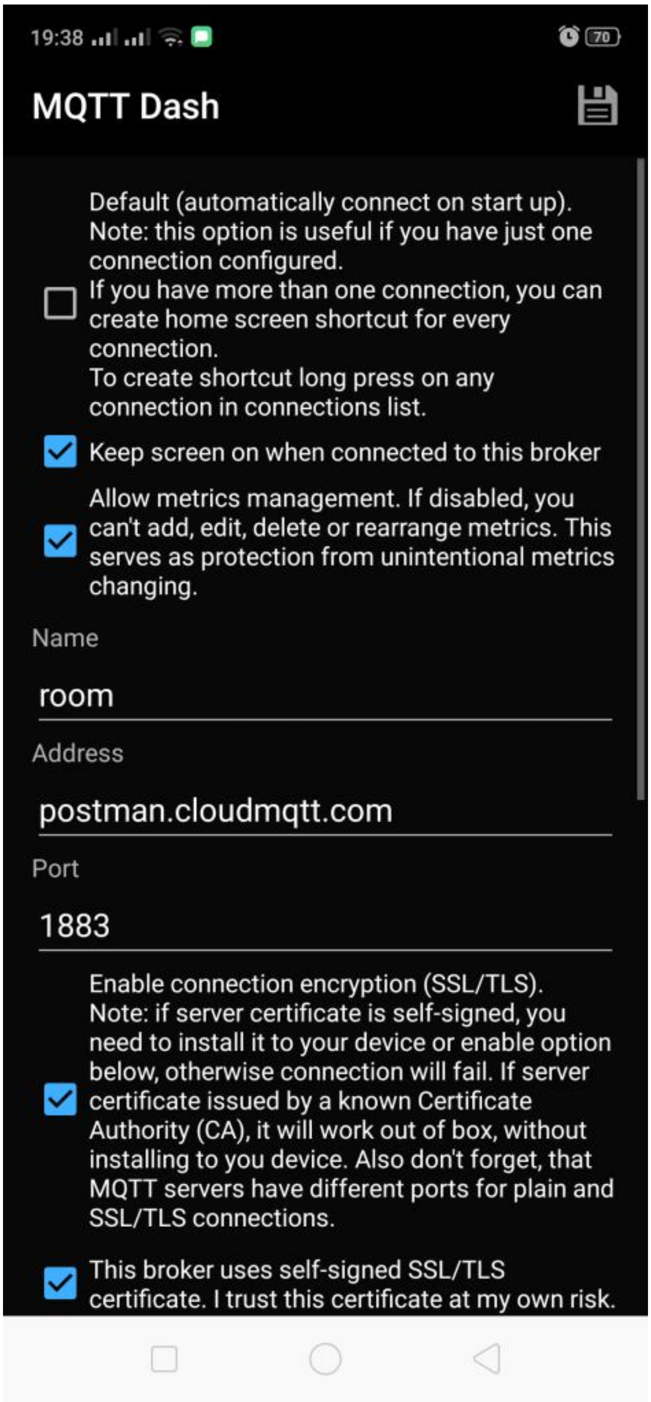
Metrics columns count for vertical orientation (0 - auto)

0

Metrics columns count for horizontal orientation (0 - auto)

0

4.4.6 (1) Step 6



MQTT Dash

□ Default (automatically connect on start up). Note: this option is useful if you have just one connection configured.
If you have more than one connection, you can create home screen shortcut for every connection.
To create shortcut long press on any connection in connections list.

☑ Keep screen on when connected to this broker

☑ Allow metrics management. If disabled, you can't add, edit, delete or rearrange metrics. This serves as protection from unintentional metrics changing.

Name: room

Address: postman.cloudmqtt.com

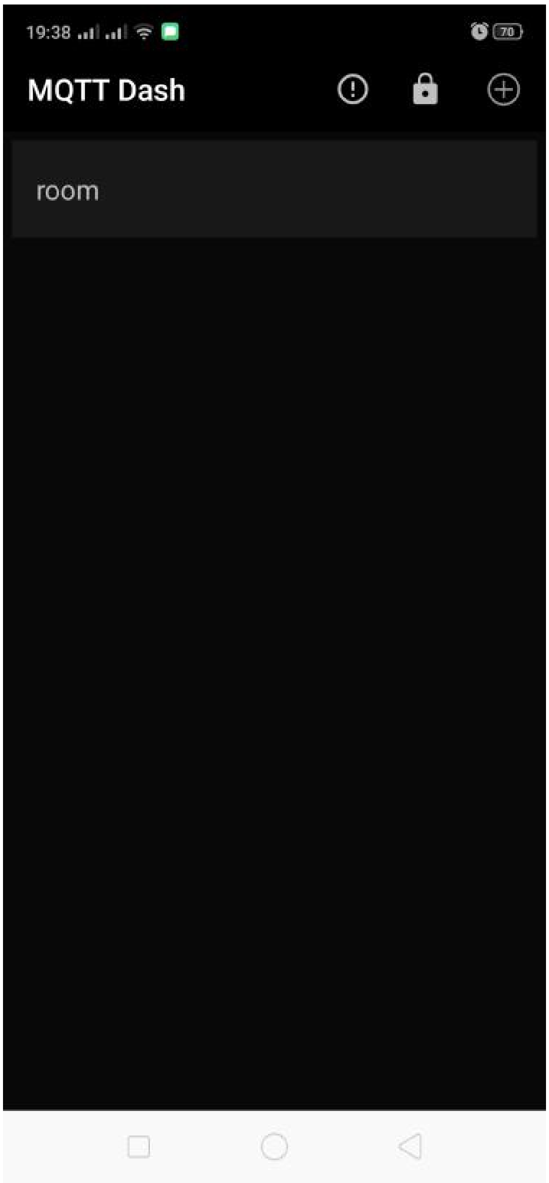
Port: 1883

☑ Enable connection encryption (SSL/TLS). Note: if server certificate is self-signed, you need to install it to your device or enable option below, otherwise connection will fail. If server certificate issued by a known Certificate Authority (CA), it will work out of box, without installing to you device. Also don't forget, that MQTT servers have different ports for plain and SSL/TLS connections.

☑ This broker uses self-signed SSL/TLS certificate. I trust this certificate at my own risk.

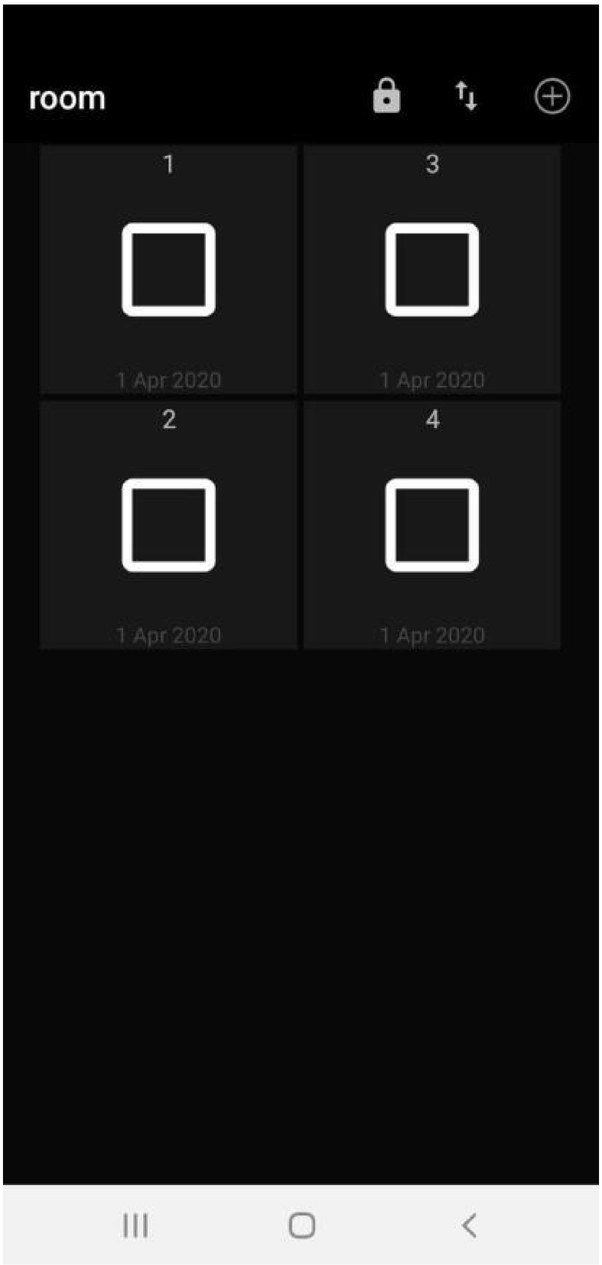
4.4.6(2) Step 6

**Step 7:That connection will appear in the dashboard. Open that connection.**



4.4.7 Step 7

**Step 8: so we create 4 button in room.**



4.4.8 Step 8

# CHAPTER 5 : ADVANTAGES&LIMITATIONS

## 5.1 Advantages:

- Convenient
- Customizable
- User-friendly
- Efficient
- Easy installation

## 5.2 Limitations:

- Connect Only 5 device at a time
- Dependency on Internet

## 5.3 Future enhancement:

Future scope for the home automation systems involves making homes even smarter. Homes can be interfaced with sensors including motion sensors, light sensors and temperature sensors and provide automated toggling of devices based on conditions.

More energy can be conserved by ensuring occupation of the house before turning on devices and checking brightness and turning off lights if not necessary. The system can be integrated closely with home security solutions to allow greater control and safety for home owners. The next step would be to extend this system to automate a large scale environment, such as offices and factories. Home Automation offers a global standard for interoperable products. Standardization enables smart homes that can control appliances, lighting, environment, energy management and security as well as the expand-ability to connect with other networks

# CHAPTER 6 : RESULT AND CONCLUSION

## 6.1 Result

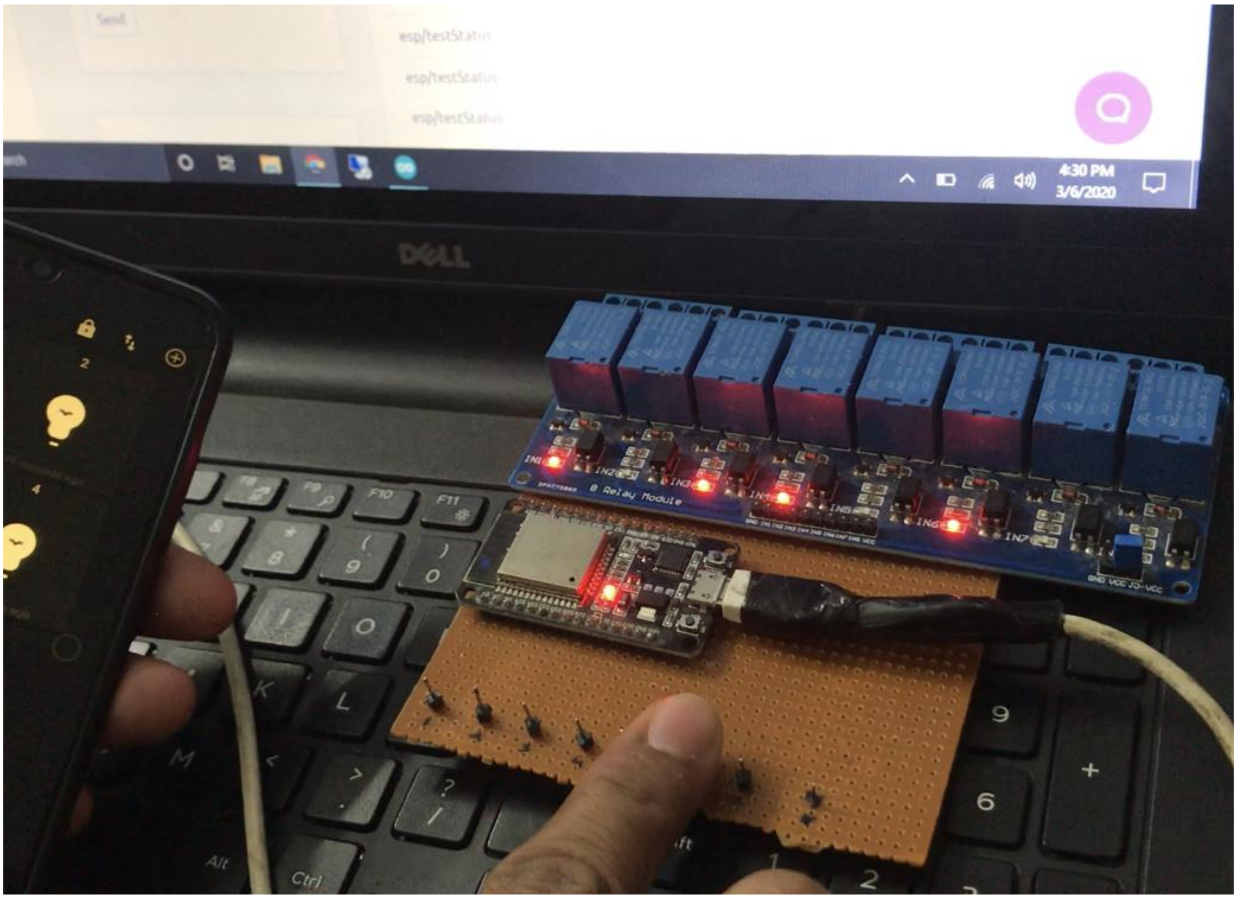


**Fig 6.2.1 Hardware**

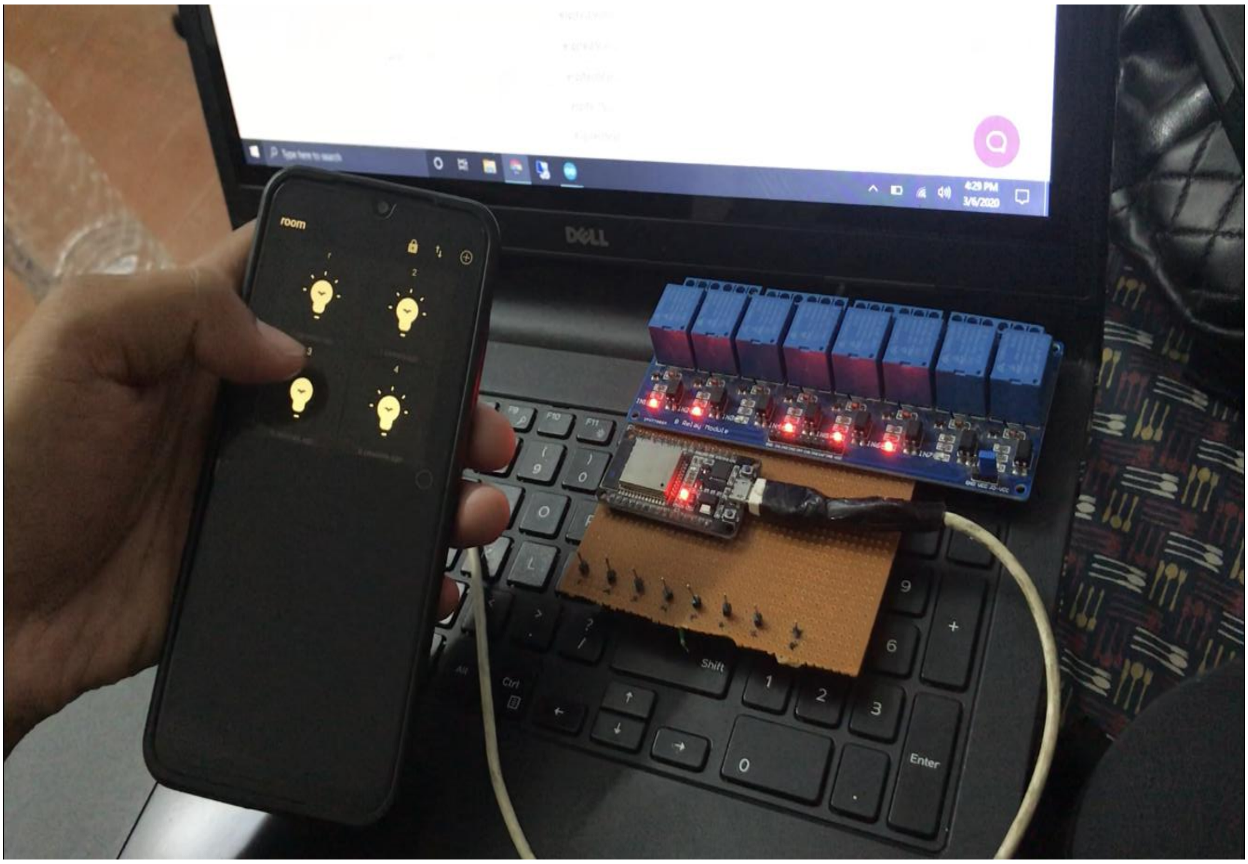
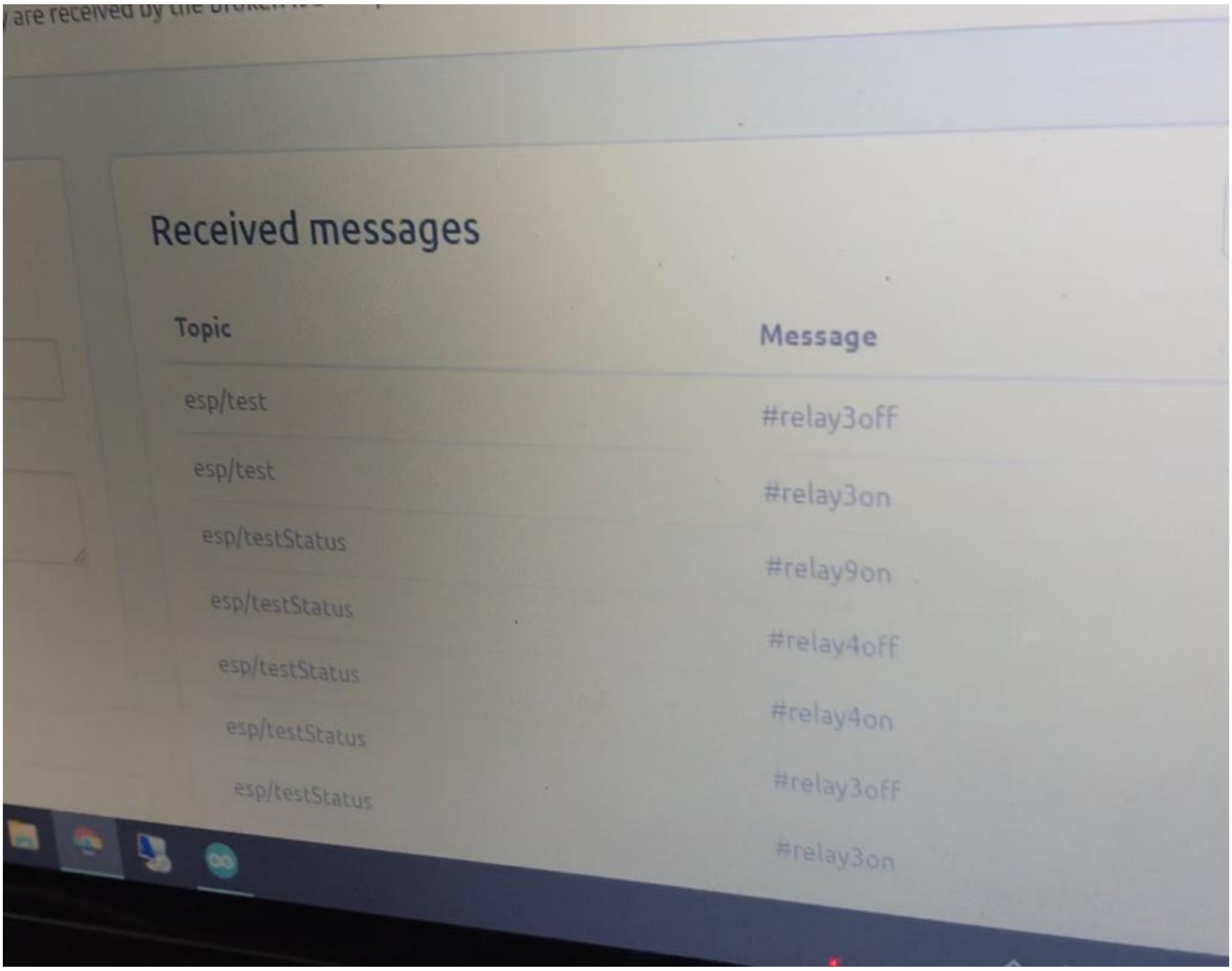


**Fig 6.1.2 Led Control Using Application**



are received by the

## Received messages

| Topic | Message |
|---|---|
| esp/test | #relay3off |
| esp/test | #relay3on |
| esp/testStatus | #relay9on |
| esp/testStatus | #relay4off |
| esp/testStatus | #relay4on |
| esp/testStatus | #relay3off |
| esp/testStatus | #relay3on |

**Fig 6.1.3 Status Update In MQTT Cloud**

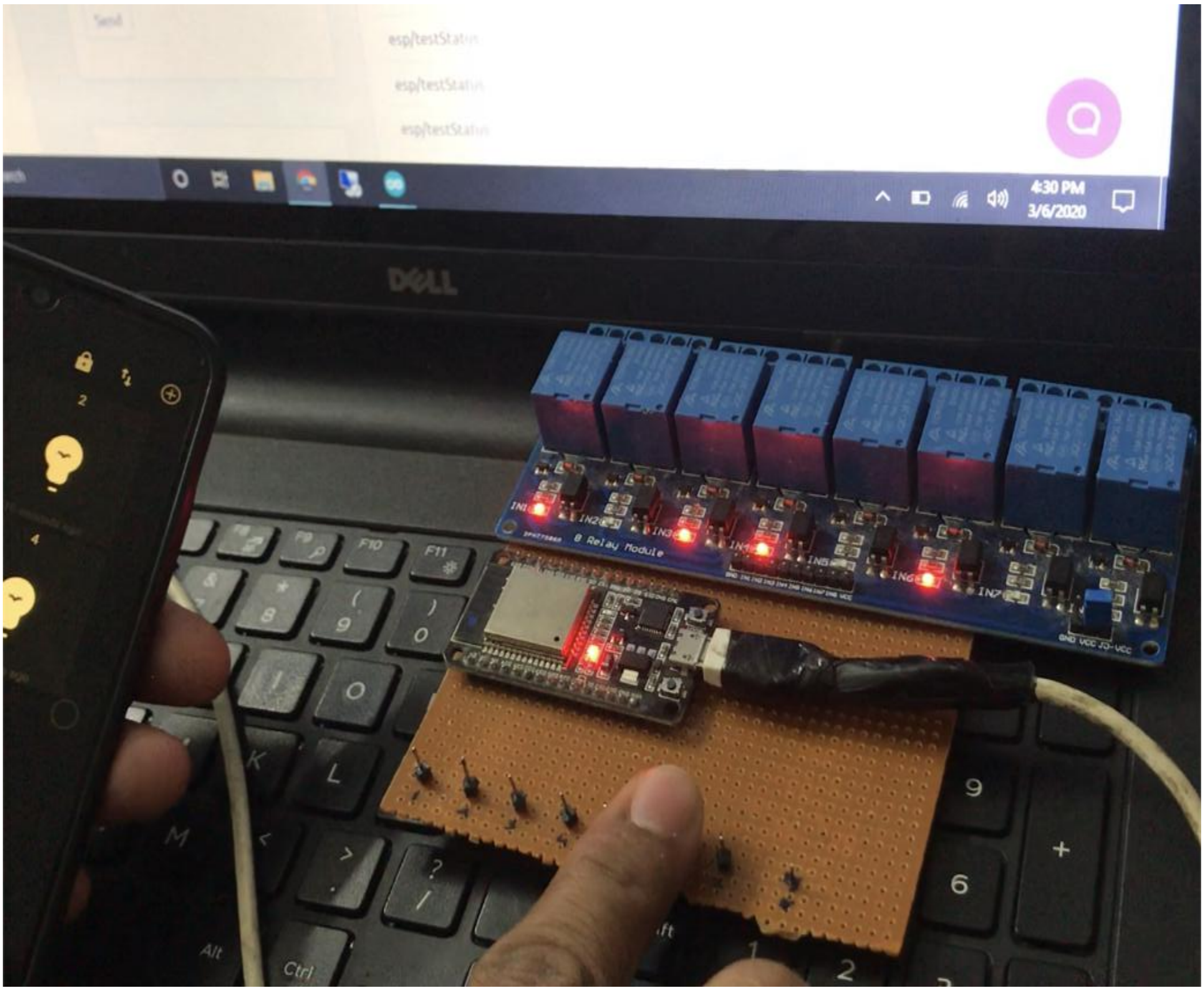


**Fig 6.1.4 LED Control Using Touch Panel**

## 6.2 Conclusion

We have developed an user friendly android application to achieve an easy control of home appliance from your android mobile.It is not only for simple controlling purpose it can also give the status of home appliance and also it offers you to control from multiple devices.

# Reference

1. https://www.hackster.io/najad/home-automation-4d76ab
2. https://smarthomeinformer.com/19139/home-automation/
3. http://openrb.com/applications-for-smart-living/
4. https://www.jncet.org/Manuscripts/Volume-8/Issue-5/Vol-8-issue-5-M-08.pdf
5. https://www.srccodes.com/p/article/61/mqtt-cloudmqtt-mqtt-dashboard-android-esp8266-mycropython-home-automation-blub-internet-of-things-iot-m2m
6. https://www.instructables.com/id/Home-Automation-Using-MQTT-and-NodeMcu-or-Arduino/