HOME AUTOMATION USING MQTT SERVER

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Abstract: This project offers a new move toward to organize home appliances from a android application with the help of Wi-Fi module, which can provide controlling over longer range.we are using Wi-Fi technology with a software touch which is simple to implement and which is more advanced. The communication between the smart phone application and the processor will be using the Wi-Fi technology, which is the wireless technology based on the 802.11(b / g / n) is the wireless LAN (WLAN) protocol. The basic vision of the system is to provide a convenient access to the user, which would aid the high degree of mobility.

The projected system consists of two main mechanism; the primary component is the server (MQTT server), which presents system core that manages, controls, and monitors user's home. Users and system administrator can remotely (internet) manage and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. structure supports a wide variety of home automation devices. The proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

Index Terms-- Wi-Fi, Local Area Network, Message Queening Telemetry Transport

I. INTRODUCTION

Home automation is developing automation systems for a home, called a smart house or smart accommodation. It consists the control and automated operations of lighting, heating, ventilation, air conditioning, and safety, as well as home appliances such as washer/dryers, ovens or freezers. Wi-Fi is used for distant monitoring and control. Home appiances, when distantly monitored and controlled through the Internet, are an important component of the IOT. current systems generally consist of switches and sensors connected to a central hub sometimes called a "gateway" from which the system is controlled with a user interface that is interacted either with a wall-mounted terminal, mobile phone software, tablet computer or a web interface, often but not always through Internet cloud services.

As there are so many challenging vendors, there are very few worldwide accepted industry standards and the smart home space is heavily disjointed. Well known communications protocol for products include X10, Ethernet, RS-485, 6LoWPAN, Bluetooth , ZigBee and Z-Wave, or other protocols all of which are unsuited with each other. Manufacturers often put off independent implementations by maintenance of documentation and by litigation.

Nowadays home and building automation systems are heavily used. On the one hand, they provide increased flexibility, especially when employed in a independent home. The automation systems which are installed in commercial buildings not only increases comfort, but also allow central control of home applianced. Hence, they contribute to an overall reductionof cost and also to energy, which is certainly a main issue now a days.

We have used MQTT server in this project to get an efficient system as it well known for its fastness, Due to it efficience the famous social medias like facbook messenger and whatsapp messenger also using this MQTT Server. **MQTT** is a machine-to-machine (M2M)/"IOT" connectivity protocol. It was designed as an extremely lightweight publish/subscribe messaging transport. 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. The classy system preserve a list of products, records the usage through bar codes or an RFID tag and replaces the order automatically.
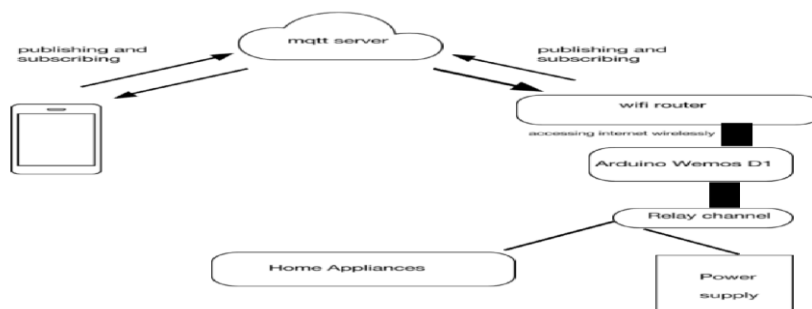
II. METHODOLOGY

FIG:2.1 Communication Process

In the above modular diagram the arduino wemos D1 is connected to wifi router by its inbuilt wifi module to access the internet and on the other side it is connected to relay which can controll home appliances directly by taking power supply apart this thing the whole communication among the anodroid application and the hardware is completely depends on **MQTT (MQ Telemetry Transport).**

MQTT (Message Queuing Telemetry Transport) is a lightweight messaging protocol that provides resource-constrained network clients with a simple way to distribute telemetry information. The protocol, which uses a publish/subscribe communication pattern, is used for machine-to-machine (M2M) communication and plays an important role in the Internet of Things (IoT).
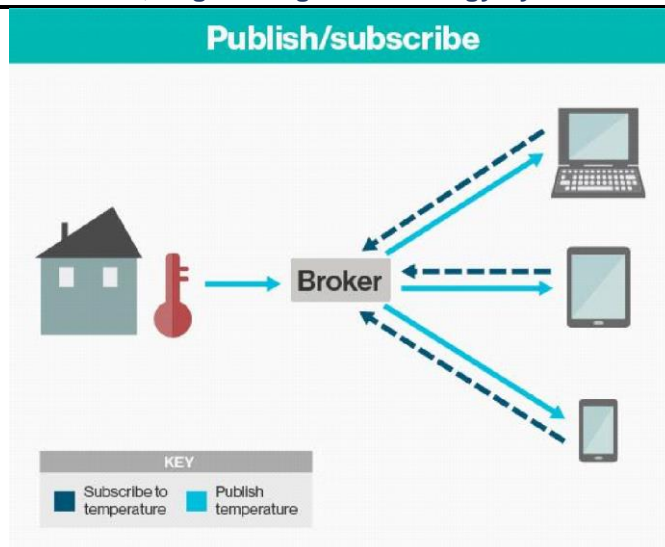
FIG:2.2 Working of MQTT

2.1 How MQTT Works:

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. In such cases, the username and password is simply left blank.

2.2 MODULES & DESCRIPTION :

2.2.1 Android Application : This application module is controlled by the user. The user is the one who can only see the front end of the project. Through this application the user can control the devices. He is not able to make any changes in the backend, and also the can get the status of the home appliances by the switch color assigned to it as the whole system is designed to send the commands and can also get the acknowledgement back which contains information about trhe status of the home appliances.

2.2.2 Arduino Wemos D1 and 4 Channel Relay : They are collectively called as module because of their role in the project. Arduino board receives the signals and then they are sent to 4 channel relay to execute the task. Their operation cannot be changed but can be controlled. They are the front end of the project as materialistic contribution. The arduino wremos also have an inbulit wifi modul so that it can be easily programmed to connect to the wifi router in the home.

2.2.3 Home Appliance : It is the module which we want to control using all other modules. It is connected to the relay. It receives the signal either to become on/off according to the user wish.

2.2.4 MQTT Server : This server module acts as a mediator between the application and the arduino client. It receives the user signals from the android application and then it transmits it to the arduino board. This is an interface. It is neither front end nor back end. It is introduced into this process by backend. It has a subscribe and publish mechanism. And also this protocal is very fast as it is a light weight process like thread.

2.3 PROPOSED SYSTEM

1. The proposed system is a distributed home automation system, consists of server, hardware interface modules. Server controls hardware interface module, and can be easily configured to handle more hardware interface module.
2. System can be accessed from the android application from any where in the world using an unique id assign to module in your home.
3. WiFi technology is selected to be the network infrastructure that connects server and hardware interface modules. WiFi is chosen to improve system security (by using secure WiFi connection), and to increase system mobility and scalability.
4. As well Home automation systems face four main challenges, these are high cost of ownership, inflexibility, poor manageability, and difficulty achieving security so, we can satisfy above mentioned challenges with this project.

III. RESULTS AND DISCUSSION

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 controll from multiple devices.
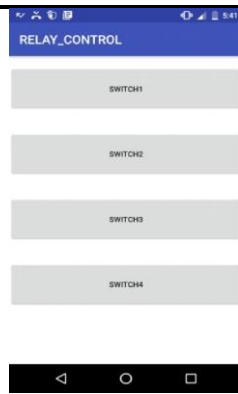
FIG:3.1 *Arduino circuit is switched off.*   FIG:3.2 *Arduino circuit is switched on.*
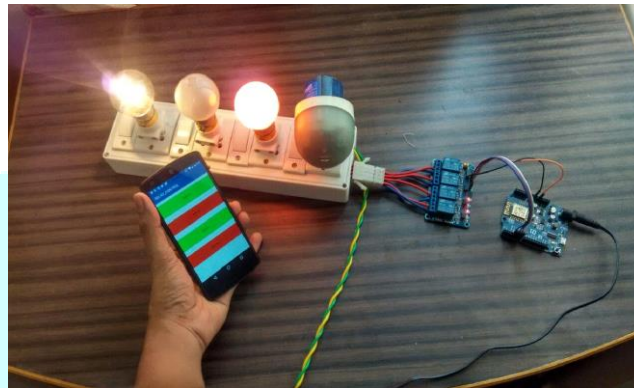*Green indicates on and Red indicates off.*

OUTPUT

FIG:3.2 *Desired output*

IV. CONCLUSION

This presentation proposes easy accessiblity, auto-configarble, remotely controlled solution for home automation with your smart phone through the android application which is at your fingertips. The wifi interface between your smart phone and the device has made the process time even more less. Therefore the goal was to design a system, which should be easy to implement, and short ranged.

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