

Voice & Touch Controlled Home Automation Using IOT

Shafeek, Lohith G¹, Ismail Mubharakh², Prof. Biju Balakrishnan³

Department of Computer Science and Engineering,

JCT College of Engineering and Technology, Pichanur (P.O), Coimbatore^{1,2,3,4}

Abstract: Today's life rolls around the concept of automation and the things that are automated are said to be of the next generation because they reduce the interference of human beings. The home automation system technology using IoT is unique from other systems that give the ability to the user to control the system from any location around the world through an internet connection. This project offers a new way of organizing home appliances using IoT by controlling the device by voice (Google Assistant), Android App and a Website with the help of a Wi-Fi Module and MQTT server. The primary component is the MQTT server or a cloud server that supports MQTT protocol. Here we use Adafruit IO as the cloud server and it supports MQTT protocol. The second part is the hardware module which provides an appropriate interface for the home appliances. This system is designed to be low cost and expandable allowing a variety of devices to be controlled.

Keywords: Home automation System, Internet of Things (IoT), Cloud Server, MQTT (MQ Telemetry Transport), Adafruit IO, Wi-Fi network

I. INTRODUCTION

There is rapid growth in the development of home automation technologies. With the advancement of Automation Technology, life is getting simpler and easier in all aspects. In today's world, Automatic systems are being preferred over manual systems. These home automation systems are enhancing by changing existing features like communication medium, features or making it cost-effective.

Smart home automation systems enable users to control and monitor every home appliance from remote places. Many wireless technologies have introduced and enhanced the implementation of home automation systems in recent days. The available wireless technologies are Bluetooth, Infrared, ZigBee, Wi-Fi, RFID and GSM are used to develop a commercially viable smart home system.

The paper discusses how a system has been implemented to make use of IoT for controlling home appliances using the NodeMCU and Adafruit Server.

II. RELATED WORKS

A. Survey on Internet of Things Based on Home Automation (Pooja N.Pawar, Shruti Ramachandran, Nisha P.Singh and Varsha V.Wagh)

A low cost and user friendly smart home system, which uses an Android application to communicate with the cloud and provides switching functionalities, is presented. The System eliminates the use of Personal Computer (PC) and other Computer Peripherals which leads to overall reduction in the cost of the system. Unlike the similar system which uses either of the Bluetooth module network, the proposed system uses Internet of Things (IoT) for monitoring and controlling the Electrical/Electronic Appliances, remotely. Switches of Electrical /Electronic appliances are integrated to the system in order to demonstrate the effectiveness and feasibility of the system.

B. Review Paper on Home Automation Using Internet of Things (Aarti and Pooja Mittal)

It is Internet of Things (IOT) which allows objects to be sensed & controlled remotely across existing network infrastructure, creating opportunities for more direct integration of physical world into computer-based systems, & resulting in improved efficiency, accuracy & economic benefit. End-to-end health monitoring IoT platforms are coming up for antenatal & chronic patients, helping one manage health vitals & recurring medication requirements. In this paper we use IOT for energy efficient Environmental Conditions sensing and in Home Automation. We have discussed the roles of IOT in automation in this papers and we have also discussed that integration of solar based energy system with IOT for home automation. Integration of sensing & actuation system by connecting to internet is discussed here. Efficient power balance and generation & energy usage is the objective of research.

C. Zigbee based home automation system using cell phones (Yadnya Adhiya, Shriya Ghuge)

To monitor and control the home appliances the system is designed and implemented using Zigbee. The device performance is record and store by network coordinators. For this the Wi-Fi network is used, which uses the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. The message for security purpose first process by the virtual home algorithm and when it is declared safe it is re-encrypted and forward to the real network device of the home. Over Zigbee network, Zigbee controller sent messages to the end. The safety and security of all messages that are received by the virtual home algorithm. To reduce the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is helpful.

III. EXISTING SYSTEM FEATURE

Most of the home automation system that exists nowadays is very expensive and has less interface to communicate with the home devices. There are many systems available that aim to automate using NFC, Bluetooth, and Wi-Fi. The existing system consists of less range and connectivity. Most of them are not based on IoT and the devices cannot be controlled over the internet. Many existing systems still use Bluetooth modules instead of the Wi-Fi module so the area of operation is greatly reduced.

IV. PROPOSED SYSTEM FEATURE

1. The proposed system is a distributed home automation system consisting of a cloud server(adafruit), hardware module(NodeMCU, 4-relay module). The server controls the hardware interface module and the module controls the home devices or appliances.
2. The system can be accessed and controlled by voice(Google Assistant), Android app and website
3. The network medium used here is Wi-Fi which is the fastest and reliable for connecting the module to the Internet as it is IoT.
4. The main advantage of this project compared to others is cost-effective as well as flexible and secure.

V. SYSTEM DESIGN AND IMPLEMENTATION

The block diagram of the system is shown in Fig -1. The module is controlled by Google assistant, Android App and website.

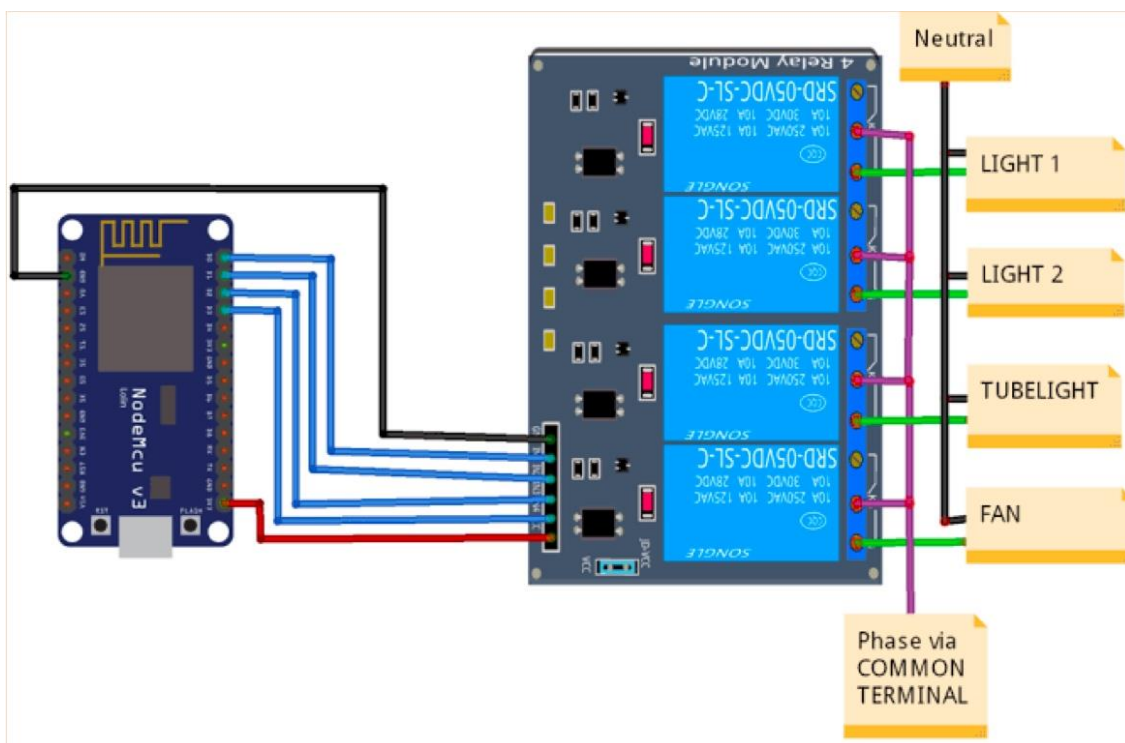


Fig.1

A. HARDWARE IMPLEMENTATION

The predominant part of this system is the NodeMCU (ESP8266). NodeMCU is shown in the Fig. 2.

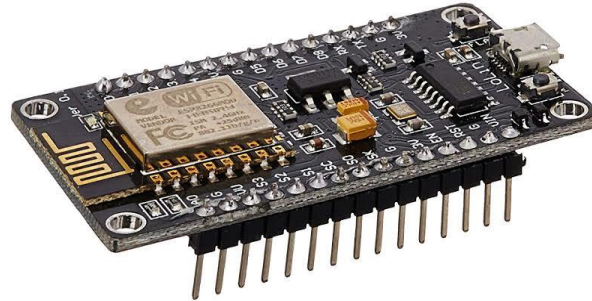


Fig.2

The NodeMCU is programmed using the Arduino software.

The Esp module is connected with the 4-relay module where the home devices or the devices that are to be automated are connected.

A. Software Implementation

The module is controlled by a cloud server. There are many cloud server that supports MQTT protocol. Here we use Adafruit IO which is very cost-effective. By Adafruit we can communicate and control the Arduino.

VI. RESULTS

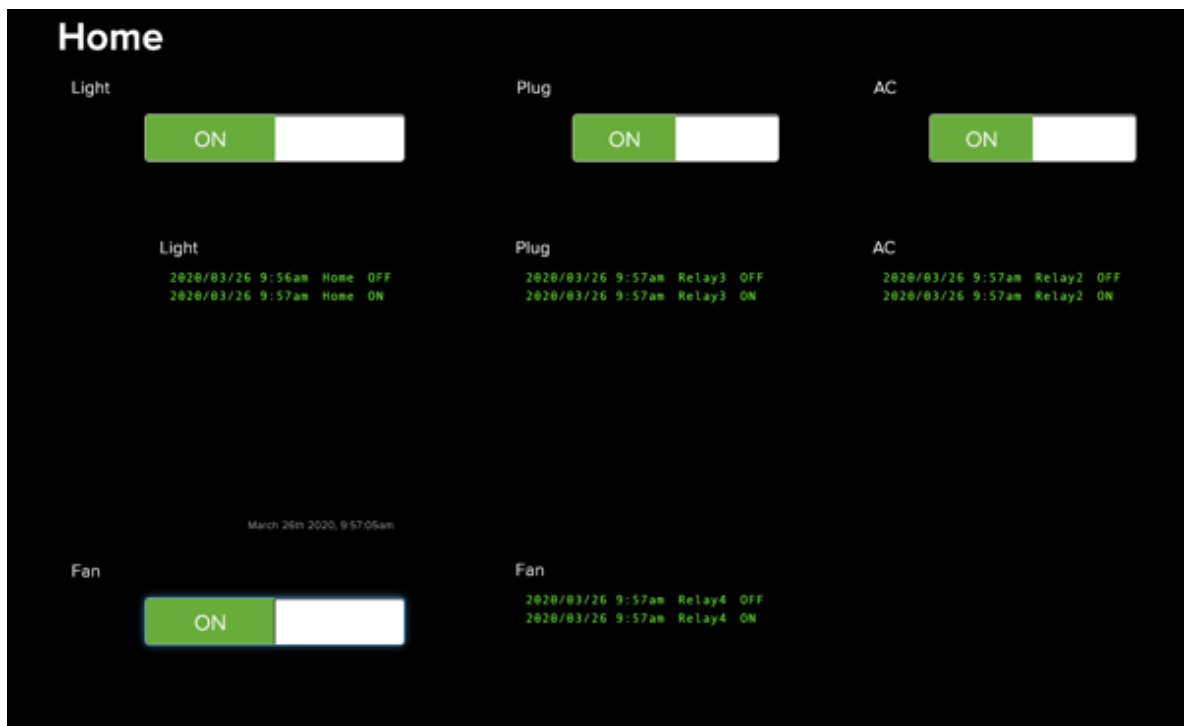


Fig.3. Website View

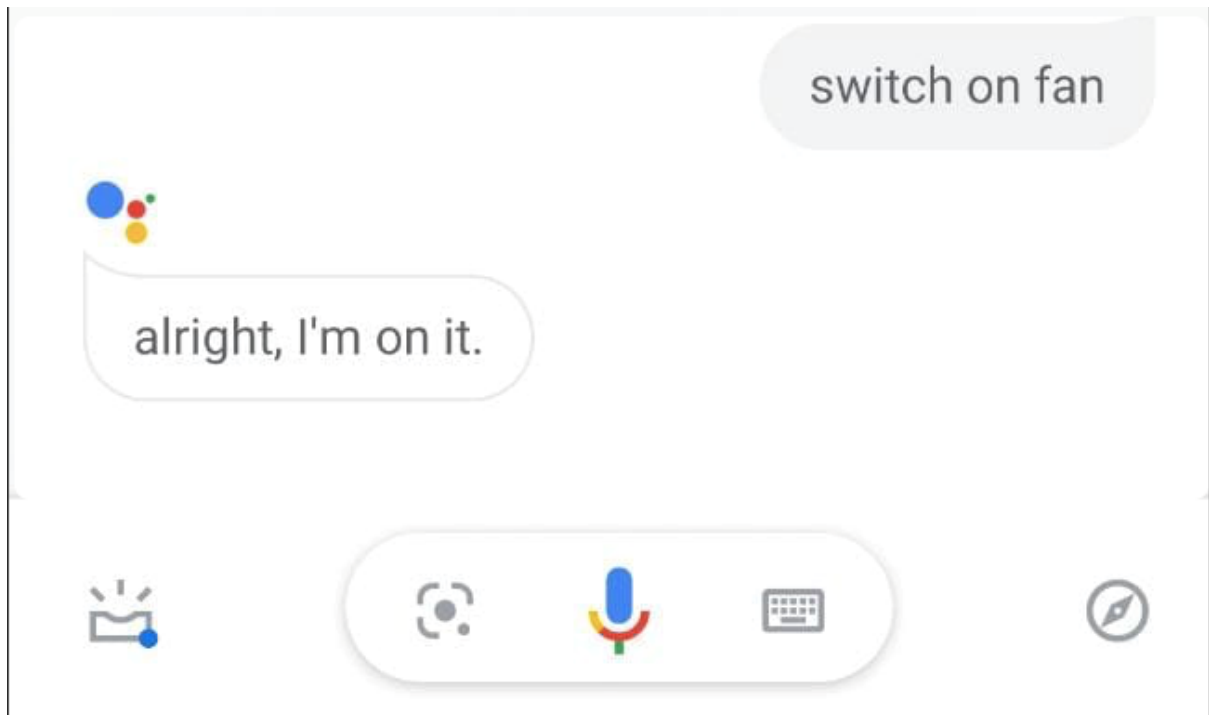


Fig.4 Google Assistant

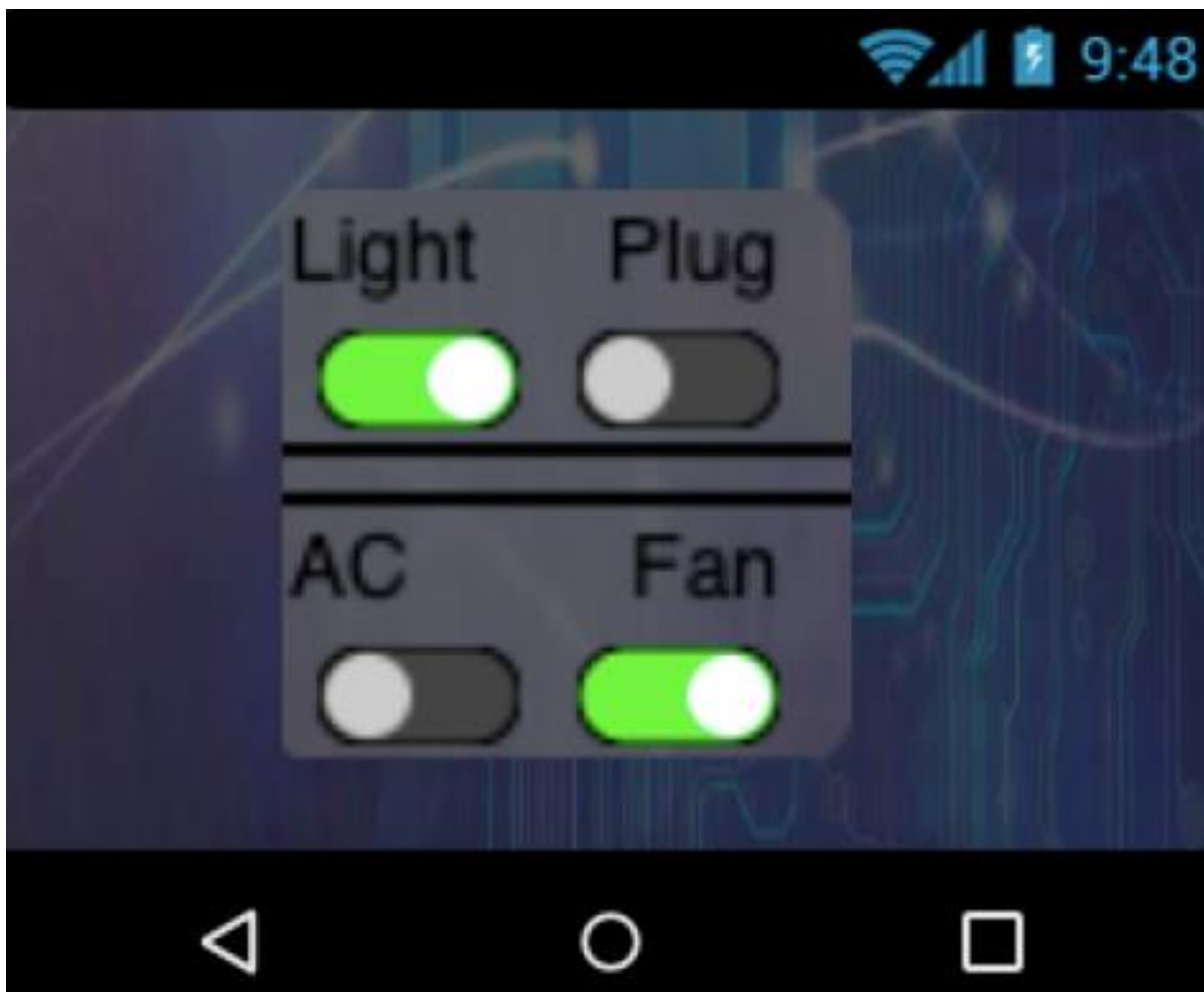


Fig.

Android App

VII. FUTURE ENHANCEMENT

The future enhancement for the home automation systems involves making home even automated. 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 of lights if not necessary. The system can be integrated closely with home security solution 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 enable smart homes that can control appliances, lighting, environment, energy management to connect with other networks.

VIII. CONCLUSION

The project has proposed the idea of smart homes that can support a lot of home automation systems. Smart homes are a huge system that includes multiple technologies and applications that can be used to provide control of the home easily. Process of operating or controlling electrical and electronic appliances remotely with the help of ESP. This method of controlling such applications is referred to as automation. The experimental setup which we designed has its focal point on controlling different home appliances providing 100% efficiency. Due to advancement in technology, network is easily available in all places like home, Office Building and Industrial Building so proposed wireless network easily controlled using any Wi-Fi network. The wiring cost is reduced. Since less wiring is required for the switches. This also eliminates power consumption inside the building when the loads were in off conditions. This system is also platform independent allowing any web browser in any platform to connect ESP

REFERENCES

- [1]. Ahmed ElShafee, Karim Alaa Hamed, "Design and Implementation of a WiFi Based Home Automation System", International Journal of Computer, Electrical, Automation, Control and Information Engineering Vol: 6, No: 8, 2012.
- [2]. HayetLamine and Hafedh Abid , "Remote control of a domestic equipment from an Android application based on Raspberry pi card", IEEE transaction 15th international conference on Sciences and Techniques of Automatic control & computer engineering - STA'2014, Hammamet, Tunisia, December 21-23, 2014.
- [3]. YunCui, MyoungjinKim, YiGu, Jong-jinJung, and HankuLee, "Home Appliance Management System for Monitoring Digitized Devices Using Cloud Computing Technology in Ubiquitous Sensor Network Environment", Hindawi Publishing Corporation International Journal of Distributed Sensor Networks Volume 2014, Article ID 174097
- [4]. Jain Sarthak, Vaibhav Anant and Goyal Lovely , "Raspberry Pi based Interactive Home Automation System through E-mail. ", IEEE transaction, 2014 International Conference on Reliability, Optimization and Information Technology ICROIT 2014, India, Feb 6-8 2014.
- [5]. Shih-Pang Tseng, Bo-Rong Li, Jun-Long Pan, and Chia-Ju Lin, "An Application of Internet of Things with Motion Sensing on Smart House", 978-1-4799-6284-6/14 c ? 2014 IEEE.
- [6]. Kim Baraka, Marc Ghobril, Sami Malek, Rouwaida Kanj, Ayman Kayssi "Low cost Arduino/Android-based Energy-Efficient Home Automation System with Smart Task Scheduling" , 2013 Fifth International Conference on Computational Intelligence, Communication Systems and Networks.