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QR CODE BASED SYSTEM FOR CONTROLLING LIGHT USING IOT

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ABSTRACT

The term Home Automation refers to the automatic control of household features activity and appliances. It means this features of activity are controlled by using internet to make life more convenient. It is a set of hardware electronic and communication that work to integrate devices with one another by the use of internet. This paper describes a smart home automation system with the help of QR codes. QR Code has been used to switch "on" and "off" the light bulb by using mobile scanner application. A Mobile Scanner application has been designed for this project to scan QR codes, and this application has been designed for android mobile. The NodeMCU has been used to control the light bulb. After scanning QR code the Android application sent the command to web based application. NodeMCU is already connected with the internet and fetching command in real time with web based application. The two types of commands are used with the help of programming I.e. on and off. So what type of command has been received by NodeMCU, depending upon what type of QR code has been scanned by the user. This system and project is very unique and can be easily process anywhere in the world while scanning the QR Code with develops secure application.

KEYWORDS: ***IoT, QR Codes, Automation System***

I. INTRODUCTION

IOT is called internet-of-things which is a system that connects with the internet. Today's time is of the Internet and it is spread all over the world. In today's time all People use the Internet. People's use of the Internet is called the Internet of Humans and the devices that communicate with the Internet are called Internet of Things. In other words internet-of-things can also be called that whatever physical devices are there, if they share and communicate their data with internet they are called internet of things. Along with sharing the data, these physical devices can also collect their data by using the Internet. By using IOT, anyone who works in their daily life can control all those things such as Smart Watches, Mobile Phone, Fan, Tube, TV etc. [1][2]. To connect all these things together, a physical device are needed, that physical devices connects with the internet. So talking about today's time, the use of IOT in today's time is being used in big industries and also being used in schools and colleges. The human life becomes very easier by the coming the concept of IoT. All the things like to Fan, Tube, TV etc. are easily control by the mobile phones. Suppose if we are outside the house we can use our mobile to turn "on" and "off" all the lights of our house. There are many benefits of IoT as well but along with it also has some disadvantages. If the Physical devices have to work in a proper way, then they will have to be connected with the internet, if the physical devices are not connected with this internet, then system will not be able to work. So all these physical devices need internet to work [3][4].

II. METHODOLOGY

This paper describes a smart home automation system with the help of QR codes. QR Code has been used to switch "on" and "off" the light bulb by using mobile scanner application. The basic design and development of this project has been divided into two parts the first is Hardware Architecture and second is software Architecture. In hardware part design of this project is constructed, while for this software part a complete development of this project is operated by using a programming code.

a. Hardware Architecture

NodeMCU

NodeMCU is an open-source platform used for IoT. It has a chip of esp8266. So basically it's WIFI module. It is type of module that is used to connect the with IOT sensors. Any type of sensor can be connected with NodeMCU. It comes under in a different versions like 0.9 and 1.0. It has widely used for the many applications of IoT. It contains a lot of pins and these pins are used for connecting the sensors. It can easily operates under the voltage of 5 volts and 3.3 volt [5][6]. For the connection of analogue and digital Pins, it has only one analogue pin. The Image of NodeMCU as shown in figure 1.

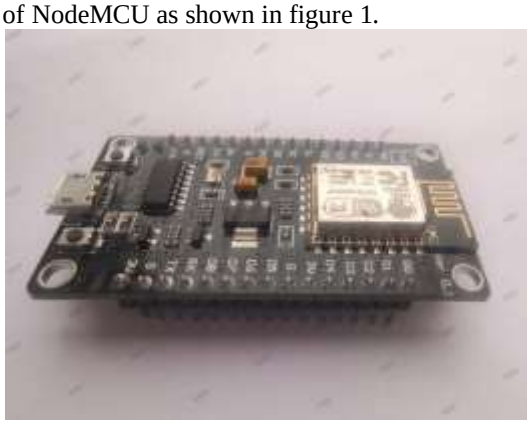

Figure 1: Image of NodeMCU

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Working of NodeMCU

NodeMCU can be easily programmed with the help of arduino IDE software. A simple Micro USB cable is required for the power to NodeMCU. Arduino IDE software has been used to program to this module with the help of ESP 8266 library. So the job of NodoMcu is that it's Wi-Fi module that is connected to the internet, without internet it can't work. For example, if we have connected the light of the house with NodeMCU. With the help of mobile, it can turn that light "on" and "off". When you turn on the light on the mobile, the signal will go to the server. The server that will be connected with NodeMCU, then with the help of this NodeMCU will turn off the light.

Relay Module

Relay module is an electrical switch it has been used for the many applications of IOT and also being used for general purpose. It has many types like single, Two, Four channel etc. by depending upon the type of use. The input voltage of this module ranges from 0 to 10 volt. Relay module has both input and output terminals. It has been applicable for both AC and DC load and it has generally six pins. For the working of relay module it consists of electric current to open and close the contacts. These contacts are control by the switch with the help coil. This coil attracts the contacts of switch and pulls them together when activated and small spring inside in this module pushes them apart when the coil is not excited. The image of relay module as shown in figure 2.

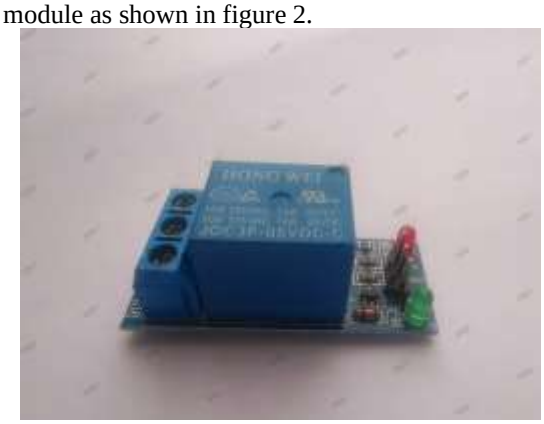

Figure 2: Image of Relay Module

Connecting Wires

Connecting wires are the wires which have been used for the connections of Electrical equipment and Small sensors.

Light Bulb

A general purpose light bulb has been used for this project. It is a type of light bulb in which, filament off the light when heated to Incandescence by an electric current passes through it. Image of light bulb has been used in research has shown in figure 3.

Figure 3: Image of light bulb placed on the wall

b. Software Architecture

Arduino IDE

Arduino IDE is an open source software programming software used to control controllers. it supports C language and also provides many libraries for different types of controller boards. After written the programming code in Arduino IDE, then this programming code loaded into board by using micro USB. The layout of this Arduino IDE as shown in figure 4.

Figure 4: Layout of Arduino IDE

Android Application

Android application has been designed for this project. This Android application has been designed using MIT app inventor and size of this application is a size of only 2 MB. The basic purpose of this Android application is to scan the QR code and transmit the signal to web based application. Figure 5 shown developed Android application to scan QR code.

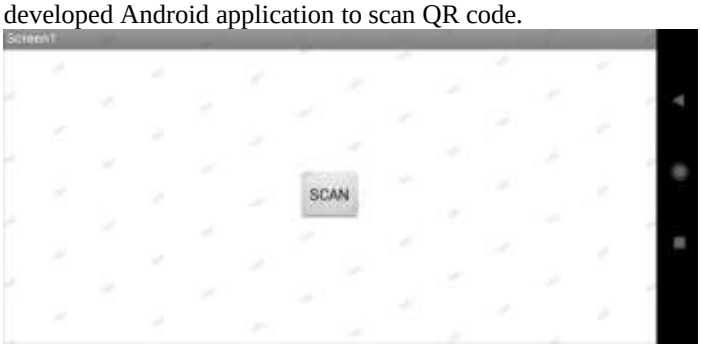

Figure 5: Layout of Android application to scan QR code by taping SCAN button

QR Codes

The two QR code has been made to switch "on" and "off" the light by using online local website. After generating the QR code, the print has been taken out for both "on" and "off". Figure 6 shown, QR codes has been used in research and the flowchart of this project and show in figure 7.

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Figure 6: QR Codes placed on wall

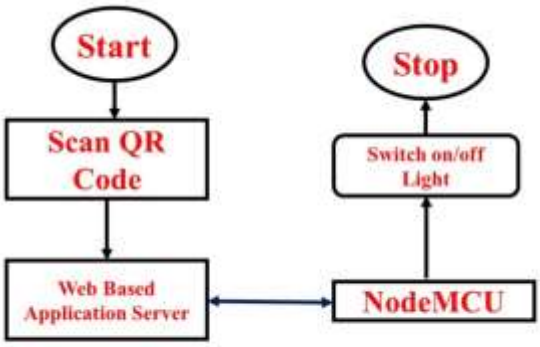

Figure 7: Flowchart

III. RESEARCH WORK

The system includes NodeMCU, Relay Module, light bulb, Android application and QR codes. The block diagram of this system and show in figure 8. The NodeMCU has been connected with light bulb and relay module. It's can easily operate with the voltage of 5v and battery has been used to power supply to NodeMCU. Voltage has been applied to this wife module between 5v to 10v. It has been compiled by using Arduino IDE. QR codes are scan by using an android application. This android application is connected with a web based application. Google sheet has been used as a web based application. After scanning QR code the android application sent the command to Google sheet. Node MCU is already connected with the internet and fetching command in real time from Google sheet. The two types of commands are used with the help of programming I.e. “on” and “off”. So what type of command has been received by NodeMCU, depending upon what type of QR code has been scanned.

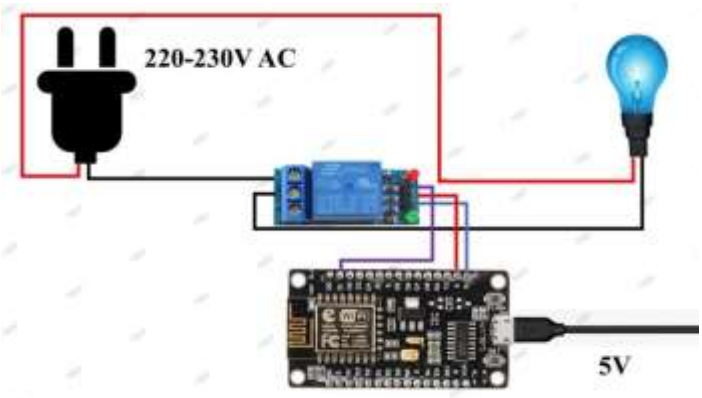

Figure 8: Block diagram of the system

IV. CONCLUSION

Scanning the QR code and control the light by using IoT makes this research is very unique, secure and suitable for daily life. Nowadays the lights can be easily control with the help of IoT based technology anywhere in the world. But sometimes this technology gives many limitations. But the research as a shown in this paper makes this IoT Technology more secure and convenient. Because for scanning of code requires an android application, that is connected with the based application server, and NodeMCU is already connected with web based application server with the help of internet. This research project and system is suitable for all classrooms, households, hotels, offices and building etc. Finally the main advantage of this system is very easy to use, low cost, unique and Secure. For future research, more QR codes can be used with the help of IoT to make the research uniquely and secure for human life.

REFERENCES

1. *Mani Raj Paul, “An IOT-based smart jacket for health monitoring with real-time feedback,” Harnessing the Internet of Things (IoT) for a Hyper-Connected Smart World, pp. 63–90, 2022.*
2. *S. K. Vishwakarma, P. Upadhyaya, B. Kumari and A. K. Mishra, "Smart Energy Efficient Home Automation System Using IoT," 2019 4th International Conference on Internet of Things: Smart Innovation and Usages (IoT-SIU), 2019, pp. 1-4, doi: 10.1109/IoT-SIU.2019.8777607.*
3. *T. Chaurasia and P. K. Jain, "Enhanced Smart Home Automation System based on Internet of Things," 2019 Third International conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC), 2019, pp. 709-713, doi: 10.1109/I-SMAC47947.2019.9032685.*
4. *S. Somani, P. Solunke, S. Oke, P. Medhi and P. P. Laturkar, "IoT Based Smart Security and Home Automation," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018, pp. 1-4, doi: 10.1109/ICCUBEA.2018.8697610.*
5. *L. K. P. Saputra and Y. Lukito, "Implementation of air conditioning control system using REST protocol based on NodeMCU ESP8266," 2017 International Conference on Smart Cities, Automation & Intelligent Computing Systems (ICON-SONICS), 2017, pp. 126-130, doi: 10.1109/ICON-SONICS.2017.8267834.*
6. *R. Jayaysingh, J. David, M. Joel Morris Raaj, D. Daniel and D. BlessyTelagathoti, "IoT Based Patient Monitoring System Using NodeMCU," 2020 5th International Conference on Devices, Circuits and Systems (ICDCS), 2020, pp. 240-243, doi: 10.1109/ICDCS48716.2020.243588.*

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