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Real Time Iot Based Office Automation System Using Nodemcu Esp8266 Module

Mr.B.S.S.V.Ramesh Babu[1] B.Anudeep[2] M.Yugma[3] M.S.Meghana[4]S.Swami[5]
[1]Assistant Professor, Department of ECE, Raghu Institute of Technology, Visakhapatnam.
[2,3,4,5] Students, Department of ECE Raghu Institute of Technology, Visakhapatnam.
India.

Abstract:

The design and implementation of this paper is going to make IOT based office automation system using NodeMCU ESP8266 Wi-Fi module and by developing this system we can able to control office appliances through any smart phones in real time. The control commands will be instructed by the user's smart phones. And the voice command by the IFTTT Google Assistant. The system consists of two major faces Hardware and Software. The hardware consists of NodeMCU, Relay driver module, Power supply. The software requirements for this project are Arduino IDE, Blynk App and IFTTT. NodeMCU Wi-Fi module will transmit and receive the input data given by the user's smart phone.

.Keywords

Office Automation, NodeMCU, Wi-Fi module, Google Assistant, Blynk App

1. Introduction

Office automation is a process of controlling system that controls office appliances smartly by using various controlling system techniques [1-3]. In this paper we have used one of the major and trending technologies which have greater features, than any other technology i.e. the internet of things (IOT), it is the inter-networking of physical devices and converts the devices to the internet [5]. The office appliances will control with wireless communication (Wi-Fi-communication). The physical layer of the wireless communication is TCP/IP protocol stack [2]. The embedded devices NodeMCU and wireless devices Wi-Fi will get interface. The controlling device of this project NodeMCU, it will transmit and receive the data from the user [6]. And it will decide the switching operation of appliances through Wi-Fi-module by user's as smart phone. This paper is organized into five parts.

2. Hardware Module

2.1 NodeMCU

NodeMCU (fig.1) is an open source IOT platform and it built in the ESP8266 integrated Wi-Fi module. It also involves with firmware which runs on ESP8266 Wi-Fi system on chip and it consists of 17 general purpose input/output pins in that, 10 pins are digital pins and 1 analogy pin. By using NodeMCU it develops a communication platform for hardware and software modules.

Figure.1: NodeMCU ESP8266 Wi-Fi Module

2.2 Power Supply

Power supply (fig.2) is a unit which converts AC to the lower regulated DC power to the internal components of a computer power supply always provides 5v stand by voltage. This is a power input connection, which is used as receives energy in the form of electric current from a source.

Figure.2: Hi-link Power Supply Module

2.3 Relay Driver

Relay Driver (fig.3) acts as an electromagnetic switch. It is connected to 220v mains. The relay drivers are the components that allows allow power circuit to control signals. In this load is connected to battery power directly and it cannot travel through voltage regulator in battery devices.

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Figure.3: Relay Driver Module

3. Software Module

3.1 Arduino IDE

In the fig.4 Arduino IDE (Integrated Development Environment) is an open source software library. Arduino IDE is a programming platform, where we can program the code. The programming is developed with C, C++ language. The Programmed code is dumped in to micro controller of the NodeMCU Esp8266. According to the code, the micro controller will operate the functionality of the office appliances.

Figure.4: Arduino IDE Compiler

3.2 Blynk Appilication

Blynk App (fig.5) is an platform which has both IOS and Andriod support. Blynk is an digital dashboard where we can build an graphical interface for this project. In Blynk we have simple desiged widgets. It is easy to create a project with simple settings. Blynk server is an open source Netty developed with java server, which can forward the messages from Blynk application to micro controller of the NodeMCU, which is a wireless communication of TCP/IP protocol stack

Fig.5: Blynk with Widgets

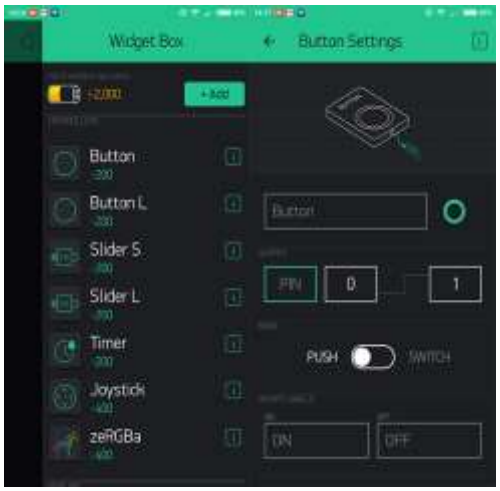

Fig.6: Blynk App Button Settings

3.3 IFTTT-Google Assistant

In fig.7 IFTTT (IF THIS THEN THAT) is a web-based application, this service works on both IOS and Android Applications. IFTTT is having set of triggering actions. Triggers refer to the “THIS” part of the applet. Actions refer to the “THAT” part of the Applet. By using this we can control hundreds of smart devices and service through voice command. IFTTT acts as a messenger between two services. By commanding “OK GOOGLE” by doing this we can trigger the required action, then the Google Assistant will perform the triggered action. It is used in office for accessing the switching operation of the office appliances.

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Figure.7: Google Assistant App

4. System Design and Implementation

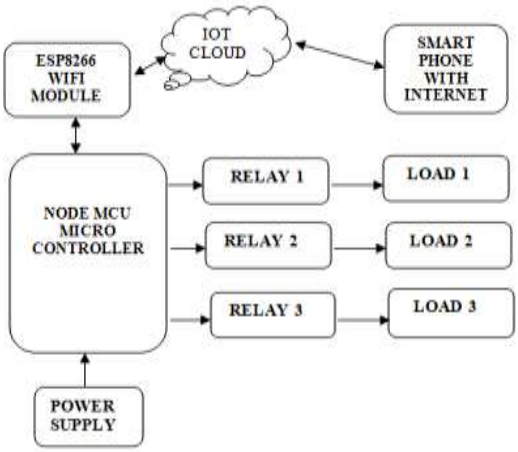

Figure.8: Block Diagram of Office Automation System

Block diagram of this paper as given in fig.8, the office automation system contain two main modules: Hardware and software modules. NodeMCU micro controller is the heart of this project. This has capable of handling both web server and interfacing the hardware module. In the IOT cloud all the IP address, port numbers of the electrical appliances and mainly Blynk application data will be stored in that cloud. When the user commands an action through his/her smart phone with internet connectivity, it directly reaches to the Iot cloud, where the Blynk and IFTTT libraries are presented. Through this library server the switching action is performed by the Esp8266 module in two ways: voice control and Android app. All the electrical appliances will be controlled by relay driver module and this relay module is used to send the signal from the micro controller to electrical appliances. The relay module is controlled by the digital pins of the Node MCU Esp8266 Module.

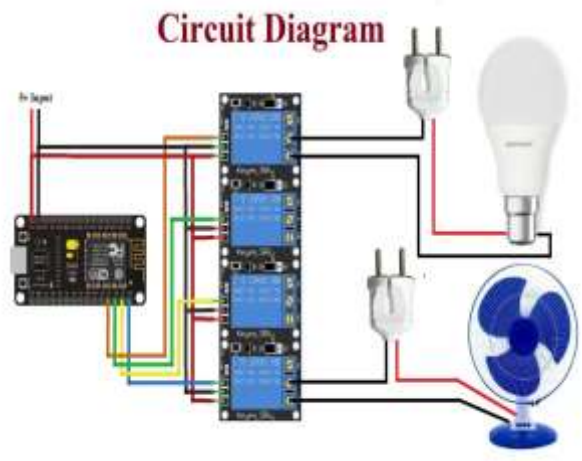

Figure.9 Circuit Diagram of Office Automation System

5. Methodology

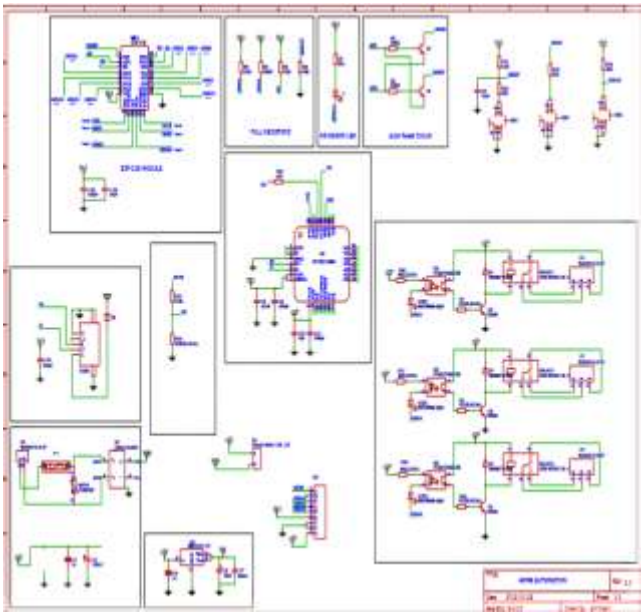

Figure.10 Schematic Diagram of OAS

In fig 10 the schematic diagram representation is shown, by sketching this schematic diagram we can able to reduce the size and complexity, and increases the flexibility of the device. In fig 9 The low cost and efficient smart office is develop in this design through main socket, the main load supply one wire is connected to office appliances and other wire is connected to relay drivers and similar operation for another two appliances. The 5v input power supply is connected to NodeMCU VIN and Ground pins, the digital pins also connected to the relay driver. The same input supply is parallely connected to inputs of the relay

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driver. The output pins of relay driver are connected electrical load (Switch). So, when the user commands the switching action with help of internet and from Blynk App it reaches to the micro controller of the NodeMCU through Wi-Fi-module. The NodeMCU performs the switching action according the software program dumped in the micro controller of the NodeMCU. Similarly the voice command triggers the required action using Google Assistant.

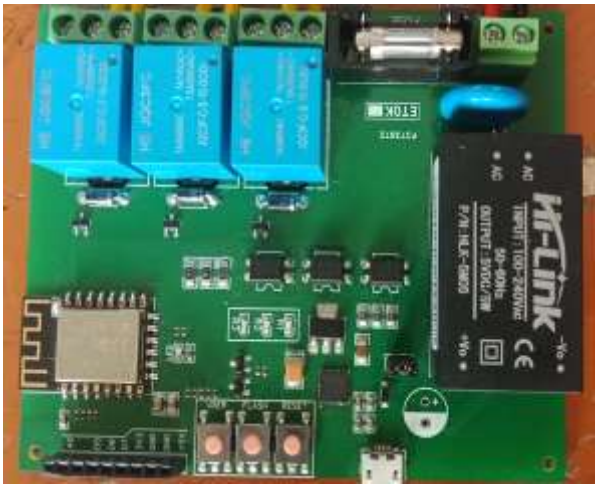

Figure.11 PCB Board Design of OAS

In fig.11 the office automation system is designed with the help of schematic diagram, other components which we used in this system are UART Bridge, MOV (Metal Oxide Variastor), jumper, IC's, Fuse, Regulator, USB cable, and micro components are Resistors, Capacitors, Diodes, Push Buttons, Transistors, LED's (by this micro components it will help in reducing the size and complexity of the circuit).

6. Result and Discussion

Turn on Office Appliance

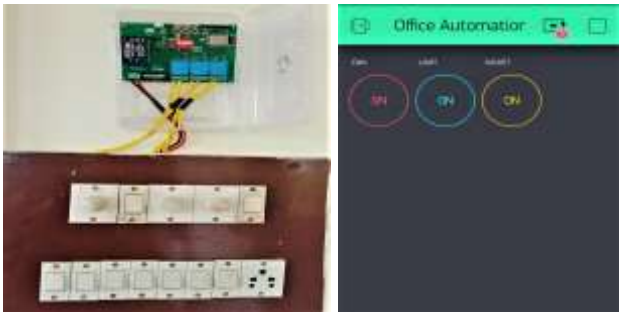

Fig 12 Mobile app turn on Office Appliance

Fig 13 Output for above fig.12

Turn off Office Appliance

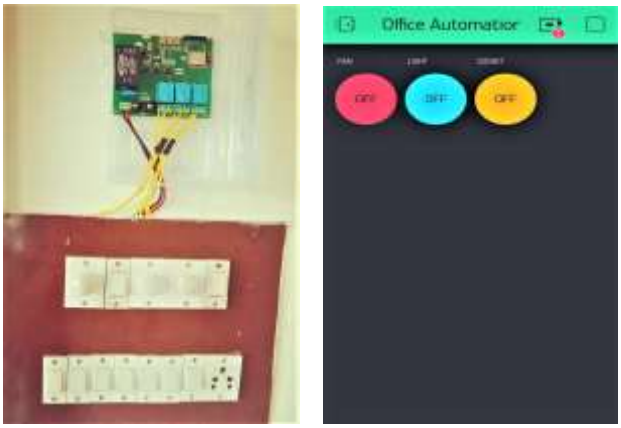

Fig 13 Mobile App turn off Office Appliance

Fig 14 Output for above fig 13

6. Conclusion

The Internet of things brought a new face in IT technologies and with more trending systems. This paper deals with the remotely , smartly controlled office appliances with less price and more flexibility and luxurious life this office automation systems can also installed in domestic activities. After studying and installing we can develop many more security systems and in industrial purpose maintenance system. By developing

these kind of smart controlling devices by using IOT technology brings more comfort and protective environment and reduces the power consumption in every ones office.

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