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IOT Based Home Automation Using Node MCU

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Abstract:
The present paper was about IOT based home automation by using Node MCU. The Electrical equipment in the house was communicate with the network devices like Wi-Fi, Zigbee Bluetooth ect., for allowing users to control through smart phones. This devices uses Node MCU microcontrollers and several sensors like temperature sensor, Humidity, fire sensors and motion sensors and also this utilizes the 4 Chanel Relay Module which functions as a switch to turn off or turn on electrical equipment in the home. One of the key benefits of IOT-enabled home automation is the ability to control and monitor a wide range of devices and systems from a single, centralized location, such as a smart phone or tablet. We can enable or disable the functionality of appliance by means of IOT from remote environment.

Keywords: Internet of Things (IOT), Node MCU controller and Smart Home

Introduction:
Automation industry was rapid growing technology, for human life it provides more comfort. The Automated systems are preferred over the non-automated system. Internet of things plays an important role in the human life. The electrical devices that are linked by means of internet, that allows remote automation in mobile phone. The appliances are include light switches that can be turned on and off by using a smart phone or by voice command. The smart devices can be communicated with the centralized systems by using wireless protocols such as Wi-Fi, Zigbee and Bluetooth. In the home automation there are many benefits those are to increased convenience and security [1].
Hardware was integrated with Node MCU consisting Wi-Fi for controlling home appliances for controlling to multiple users of home, with smart phones. This system is one of the best methods for controlling home devices with different users also one of the methods for an energy management system [2]. This system can expandable for controlling different appliances used at home until Wi-Fi network available.

Block diagram:
In the home electrical appliances was connected by using a Node MCU microcontroller that is link with the application server via a Wi-Fi network that is connected to the internet. Smart home controller that is built is divided into 2 parts, the first part is in charge of monitoring the condition of the house, and the second part is in charge of the system to control electrical home appliances [3]. In the electrical control system home appliances control the electrical appliances will be simulated by using 2 lamps and 2 fans. The block diagram of the proposed system consisting the following blocks.

1. **Node MCU**
2. **Four channel Relay module**
3. **Electrical appliance**

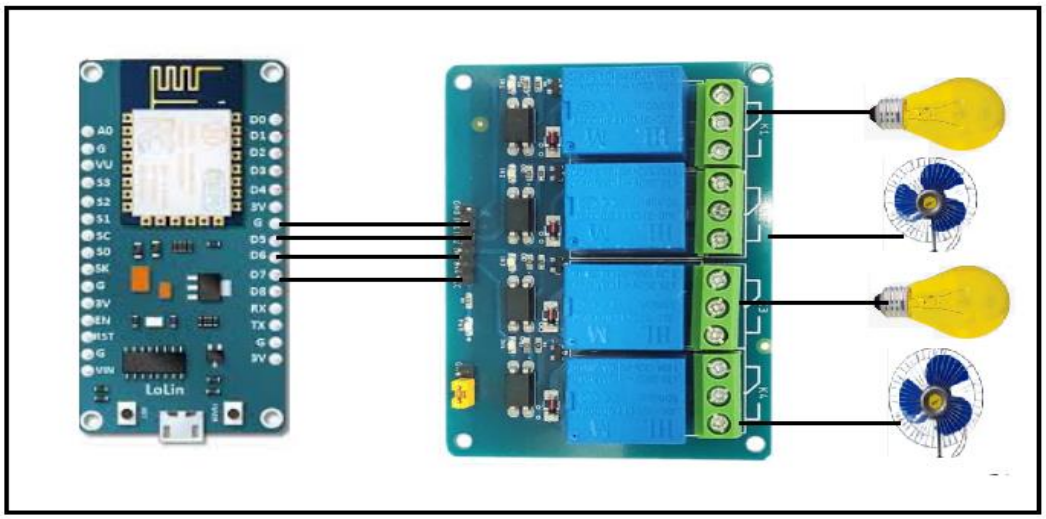


Figure1: Block diagram

1. Node MCU:

Node MCU was the best microcontroller to develop an IoT application with less Integrated circuit It is an open-source firmware, with low-cost Wi-Fi microchip incorporating both a full TCP/IP stack and microcontroller capability [4]. The Node MCU is a complex device, which is connecting to the internet, it has 17 GPIO pins which can be assigned to functions such as I2C, I2S, UART, PWM, IR Remote Control, LED Light and Button programmatically. Each digital enabled GPIO can be configured to internal pull-up or pull-down, or set to high impedance. When configured as an input, it can also be set to edge-trigger or level-trigger to generate CPU interrupts The Node MCU is embedded with a 10-bit precision SAR ADC.

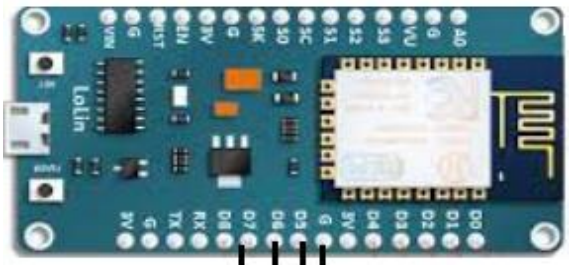


Figure2: Node MCU

2. Four channel Relay nodule:

To control electronic devices that requires higher power. But controller work on 5 V, it cannot directly control high-voltage electrical appliances, in This relays are quite useful. Connecting a relay with Node MCU enables us to control high voltage (120-240V) devices like bulbs, heaters, fans, motors and other home appliances. Interfacing a 5V relay module with a Node MCU is a simple and efficient way to control AC/DC appliances.

The relay is an electrically operated switch that consists of an electromagnet, mechanically movable contact, switching points and spring. It can be switched on with a relatively small electric current that can turn ON or OFF another circuit. Relay works on the principle of electromagnetic induction. The four-channel relay module contains four 5V relays and the associated switching and isolating components. The pin out of a four-channel relay module typically consists of multiple pins, each serving a specific purpose as shown in the figure 3,

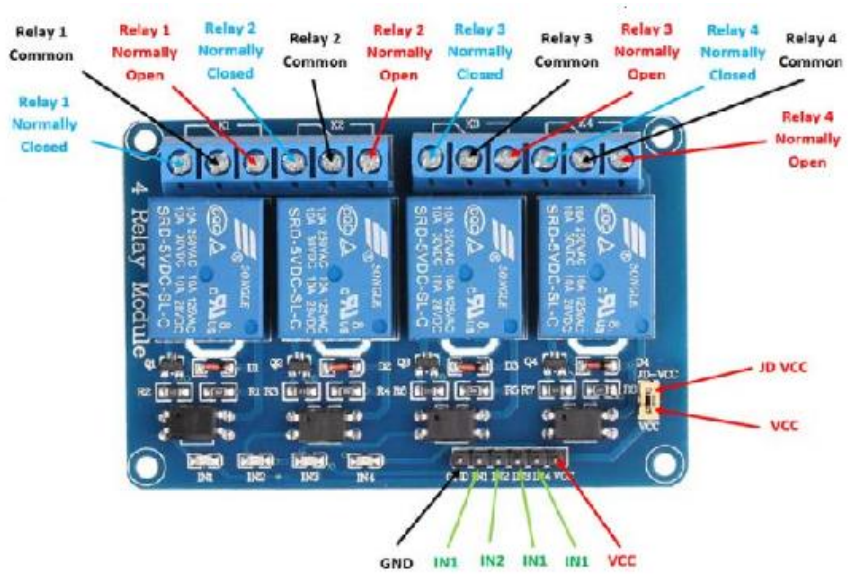


Figure3: 4 channel relay module

3. Electrical Appliances:

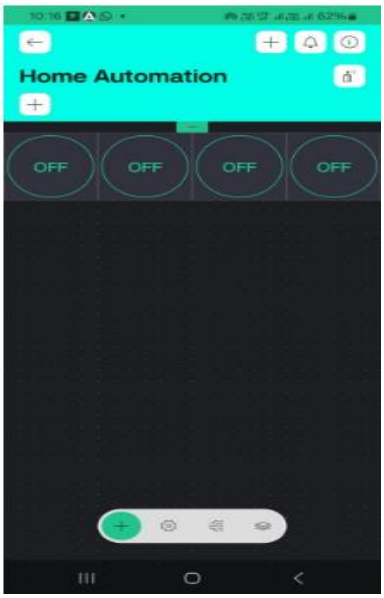
Electrical appliances are devices that use electricity to perform a specific task, ranging from small gadgets like fan, Bulb to larger ones like air conditioners and washing machines. These was connected to Node MCU via relay connector and programmed to on/off the relay so that the appliance was also turn on/off.

Software:

The programming software was arduino and application and mobile monitoring purpose blynk software was used. The user connected to the Wi-Fi password. The data received from the Node MCU was Configured and connected to Wi-Fi and web server application in the mobile.

Blynk:

The Blynk App provides a platform for the user to design your own application. Blynk server provides a way to communicate between the host and controller using the Blynk mobile app. The hardware is monitor and control by this app which enables hardware can communicate with a server using a command given to Blynk libraries [5]. The picture 1 represents the blynk app i.e web application in the mobile for easily operated by the user from remote location.



Picture 1: mobile Application.

Conclusion:

The present system can make easier for users to control home appliances like lights, fan, air conditioners, TVs, etc. on real time anywhere and anytime. the result of the development of previous research in which connections have not been able to control home electrical equipment or monitor the condition of the house in real time anywhere and anytime.

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