

Controlling of Power and Performing Operations in Home Automation Devices

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DOI: 10.5281/zenodo.7977611

ABSTRACT

Different electrical devices can be automatically controlled by moving into ON and OFF state by programming the devices using google assistant and IOT. Different Components of the system use different transmission modes that are implemented through communicate user control of devices through the NodeMCU to the actual appliance The main control system implements wireless technology to allow remote access from Smart Phone. The case like Industries where several Number of devices are in ON state for long time even after the industrial task is completed which consume IoT of power. An alternate solution is Monitoring some devices OFF state and some into ON state so that the industries can perform the task by effective utilization of power. IOT is an important technology which helps to communicate one device to another device. In this paper we controlling the devices based on the LDR.

Keywords: Power, Scaling, Active, Consume, Microcontroller, Cluster, Task, Automation.

Cite as: V. Shavali. (2023). Controlling of Power and Performing Operations in Home Automation Devices. *LC International Journal of STEM* (ISSN: 2708-7123), 4(1), 27–40.
<https://doi.org/10.5281/zenodo.7977611>

INTRODUCTION

Recent technological developments affecting the using wireless control environments such as Bluetooth and Wi-Fi, which have different functions devices that have the ability to connect to each other. Using a Wi-Fi shield to act as a mic Web server for the Arduino that eliminates the need for wired connections between the Arduino board and computer, reducing cost and allowing operation as a standalone device. The Wi-Fi Shield requires a connection to the internet from a Wi-Fi router or Wi-Fi hotspot and this would act as a gateway for the Arduino to communicate with the internet. Due to increasing of technology with respect to Integrated circuit design where many devices are interfaced and interconnected it is necessary to Automatically built the new system so that the human interaction is minimized. This can be achieved by using Internet of Things (IOT) which utilizes IP address for identification and serves the unique identifiers for utilizing device. Multi environment like IOT, Google assistant, web based application, Arduino made less user interaction and deices are Automatically controlled by enabling and disabling the devices. Artificial intelligence with the combination of embedded system makes quick automation approach where n number of devices can be controlled under one roof which simplified the complex problems into easy mode approach and makes the human life better with interaction of hardware components.

More Technology with sensors, actuators, semiconductor devices, integrated circuits will make low power for Artificial intelligence approach which will integrate more number of devices in an available memory. Industry 4.0 will still makes the Artificial intelligence more and more wider parameters and decided can be integrated by using data science where n number of inputs can be applied to the automation system. Proposed a method by using Google assistant, web based assistant and cloud where a devices are connected and devices can be operated by Controllers and IFTTT tools. All the devices have to be uploaded to the cloud for the solicited operations.

This method reduces the human interaction and it has energy monitoring system but the heat concept is not focused. Proposed homely automation and security system using zeus actuators and sensors which can operated based on the actions of specified parameters this method discuss about homely devices and security some requirements like Heat, distance and mode of action as alternative approach is not focused [1] presented google assistant for domestic household automation based on the smart light controlled eight devices can be connected [2] IoT based homely control of devices with routers and Wi-Fi module to control devices and power management is also included. [3] number of switches and devices is operated with IFTTT voice command and controller is utilized for transmission of data power management is not implemented [4] explained low cost home automation by blue tooth and controller embedded and PCB model is designed for home automation but power management and hear concept has not included [5] proposed a technique for smart home automation using mobile devices and cloud computing routers are also taken for creating application interfacing with different devices. "A home sensor network dynamically distributed power management algorithm Automation System", by Tui-Yi Yang, Chu-Sing Yang, Tien-Wen Sung [6].

The dynamics home sensor network distribution power management algorithm for home automation systems proposes an optimization of home power consumption based on PLC (Power Line communication) for easily accessible energy consumption at home. That also suggests a Zigbee and PLC-based renewable energy gateway for monitoring renewable energy power generation energies.

ACS and DDEM algorithms are proposed for the design of an intelligent distribution of Power management system to ensure the continuous power supply of home networks. Provide Efficient power management Home Sensor Network power supply models are classified Groups respectively main supply only, main supply and backup battery, rechargeable battery power and non-rechargeable battery power. Devices with special properties are assigned to these groups. It aims to create a real- time processing scheme to address variable sensor network topologies.

EXISTING METHODS

Bluetooth Based Home Automation System using Cell Phones

In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device.

Zigbee Based Home Automation System using Cell Phones

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 W1-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.

Home Automation using RF Module

The important goal of Home Automation System is to build a home automation system using a RF controlled remote. Now technology is accelerating so homes are also getting smarter. Modern homes are deliberately relocating from current I switch to centralized control system, containing RF controlled switches. Today traditional wall switches situated in various parts of the home makes it laborious t for the end user to go near them to control and operate. Even further it turns into more problematic for the old persons or physically handicapped people to do so. Home Automation using remote implements an easier solution with RF technology. In order to accomplish this, a RF remote is combined to the microcontroller on transmitter side that sends ON/OFF signals to the receiver where devices are connected. By operating the stated remote switch on the transmitter, the loads can be turned ON/OFF globally using wireless technology.

Cloud Based Home Automation System

Home automation with cloud based system focuses on home design and implementation Gateway to collect data about data from home appliances and then send to the cloud-based data server on Hadoop Distributed File System, it is processed and used with Map Reduce implement monitoring tasks for remote users. Currently, the home automation system is permanent to develop its resilience by assimilating the current traits that satisfy the insurgency interest of the people. This paper introduces the design and evolution of home automation systems that use cloud computing as a service. The current system consists of three important ones Units: The first part is a cloud server that processes and controls the data and information from clients Users and the status of devices The hardware interface module is the second part that Implement the appropriate connection to the actuators and sensors that give the physical Service. The last part is the home server that builds the hardware device and makes it available to the user Interface. This paper focuses on building web services using the cloud required for security and security Data storage and availability. The current system is cost-effective, reliable and convenient which also provides a secure home automation system for the whole family.

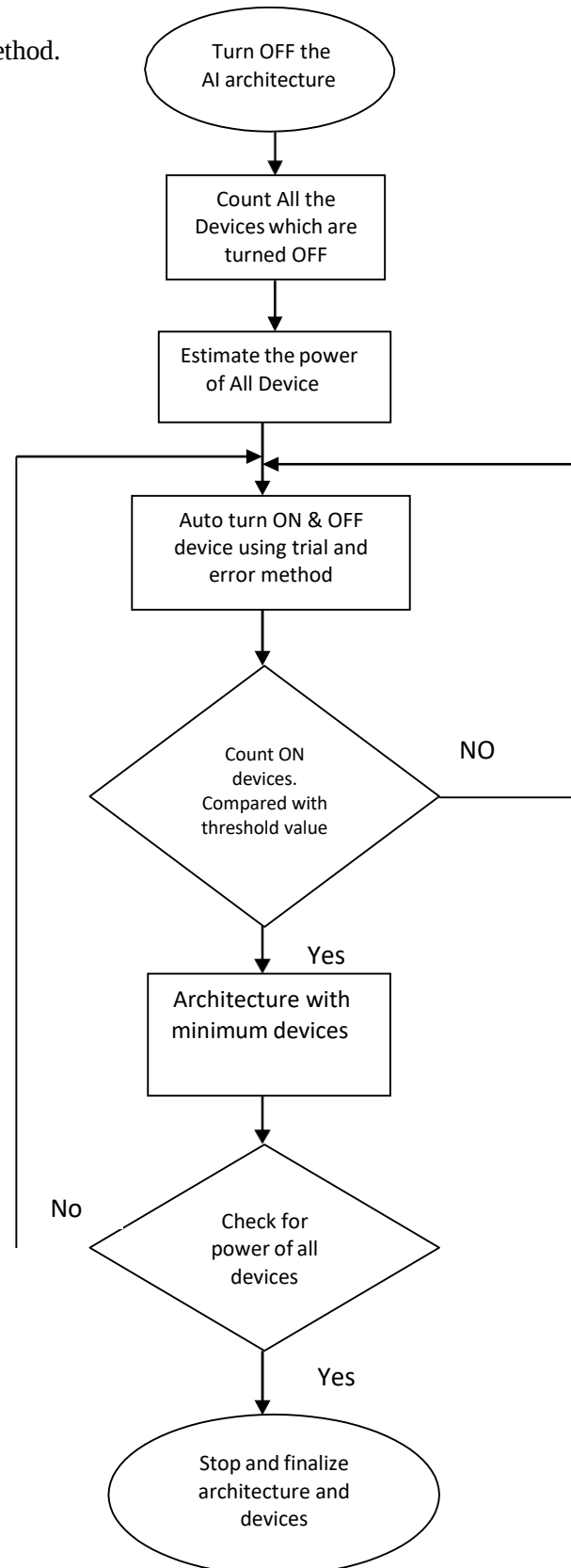
PROPOSED CONCEPTS OF HOME AUTOMATION WITH NODE MCU

Node MCU

Node MCU (Node Microcontroller Unit) is a low-cost, open-source IOT platform. It first included firmware running on Espressif Systems' ESP8266 Wi-Fi SoC and hardware which was based on the ESP-12 module. Support for the ESP32 32-bit MCU was later added. Node MCU is an open source firmware for which open source prototyping board designs are available. The name "Node MCU" is made up of "node" and "MCU" (microcontroller unit). That the term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits. Both the firmware and prototyping board designs are open source. The firmware uses the Lua scripting language. The firmware is based on the eLua project and based on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as luacjson and SPIFFS. Due to resource limitations, users must select the modules they are relevant to their project and build a firmware tailored to their needs. Support for the 32-bit ESP32 also has been implemented.

The prototyping hardware typically used is a circuit board that acts as a dual in-line package (DIP) that integrates a USB controller with a smaller surface mount board that contains the MCU and antenna. The choice of DIP format allows for easy prototyping on breadboards. The design was originally based on the ESP8266's ESP-12 module, a Wi-Fi SoC integrated into a Tensilica Xtensa LX106 core, widely used in IoT applications.

PROPOSED METHO: Flowchart of Proposed Method.



Below is the process of creating an account in the Blynk application and generating it unique ID for a specific device. This ID serves as an identifier for the respective device on the Blynk Server.

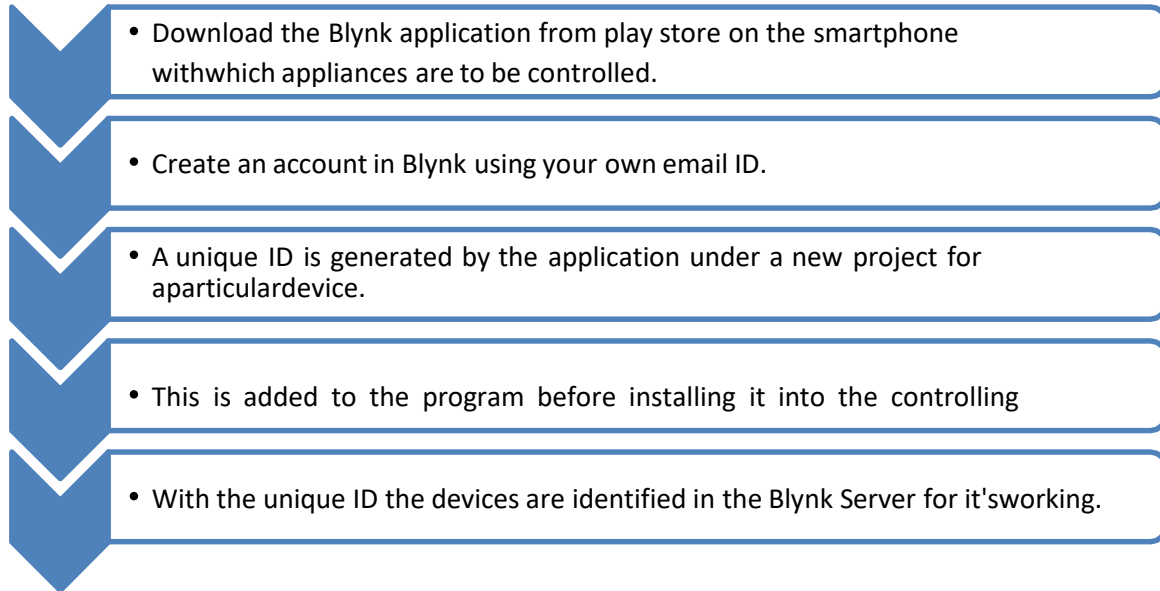


Figure 2: Creating an Account and Generating unique ID in Blynk Server

Once the unique ID is generated, the next step is to include that key in the written encoding in Embedded C to establish communication between Node MCU and Blynk Server. This process is described below.

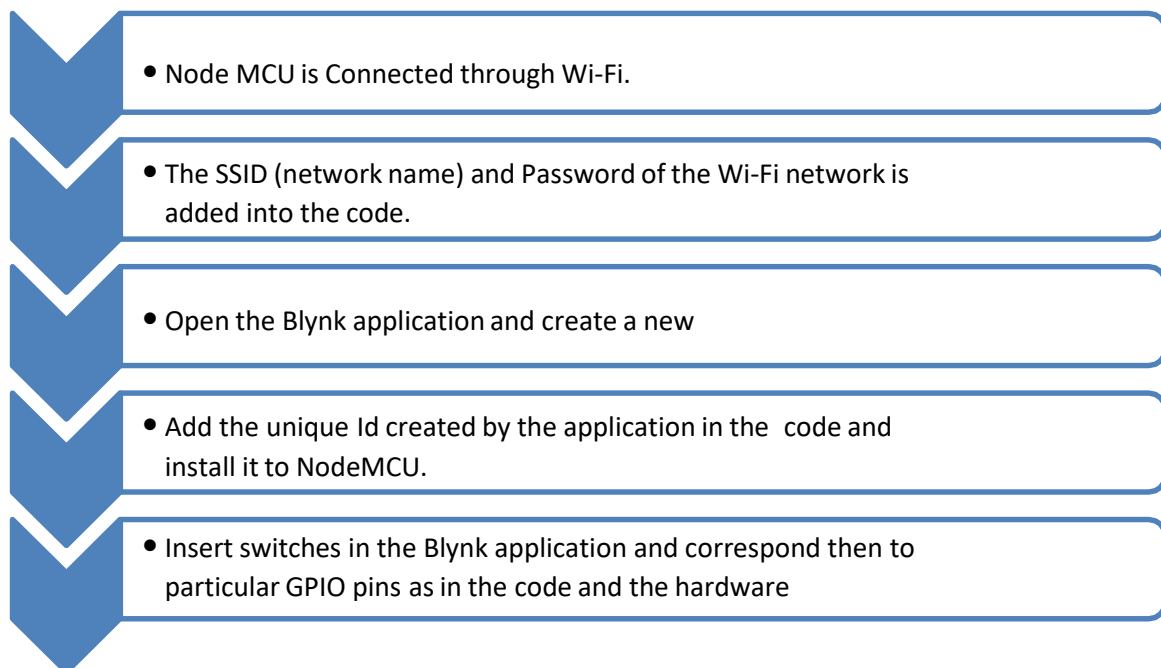


Figure 3: Setup to Control Node MCU from Blynk Application

ARCHITECTURE

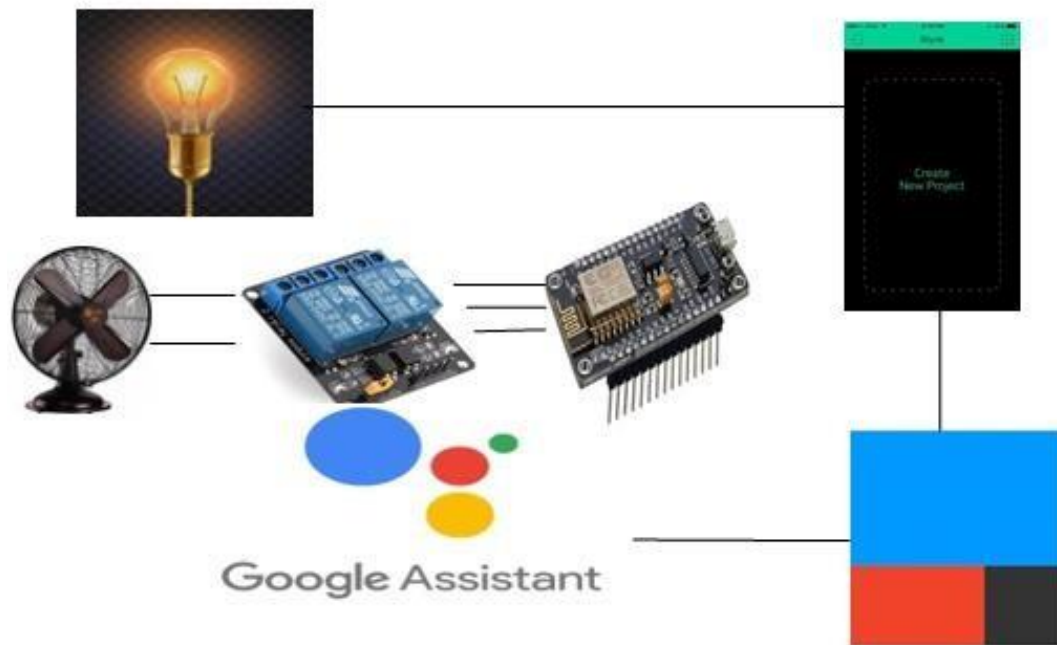


Figure 5: Basic Architecture of Proposed System

BLOCK DIAGRAM

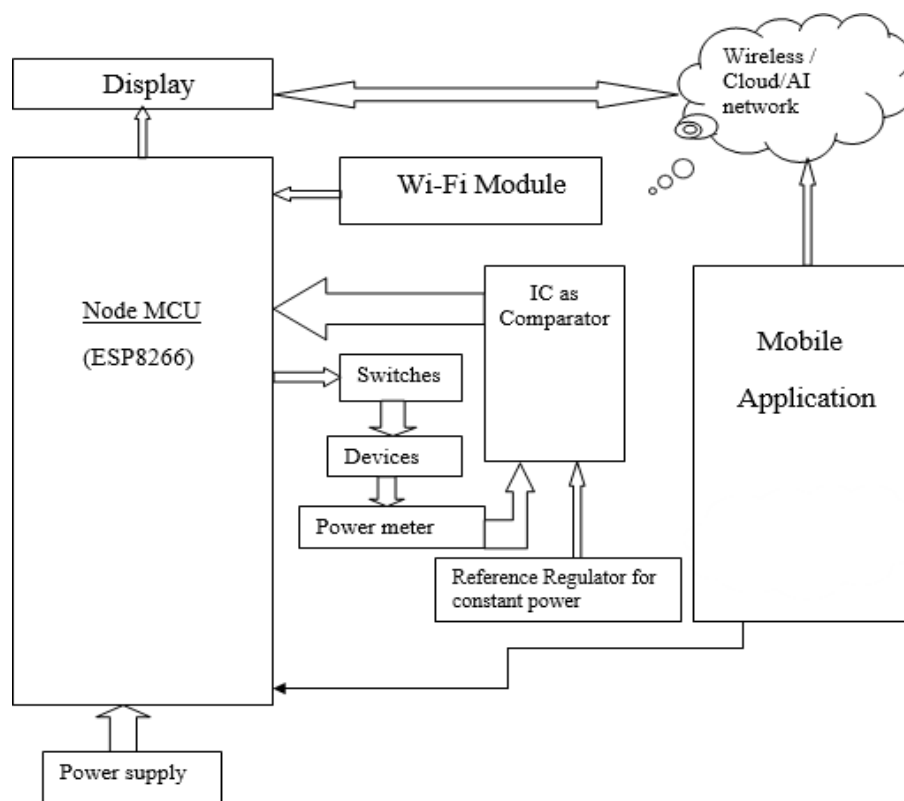


Figure 6: Block Diagram of Proposed System

Once the unique ID is generated, the next step is to include that key in the written encoding in Embedded C to establish communication between Node MCU and Blynk Server. This process is described below.

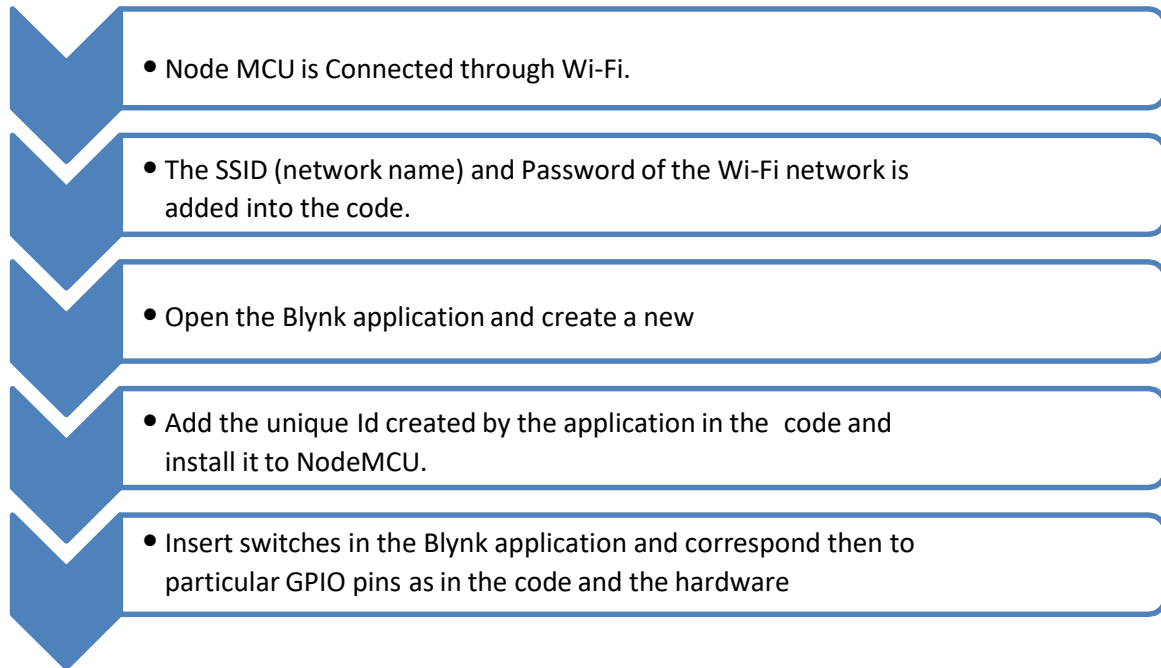


Figure 3: Setup to Control Node MCU from Blynk Application

The proposed system is shown above. The Node MCU Unit is the microcontroller or the main control unit of the system. It can be operated through mobile that interface with mobile application, wireless and Controller. The system can be operated with mobile. A signal is sent to the controller by using mobile. Controller performs its operation switcher are connected initially the switcher moves into ON state which enables all devices into on state the power meter measures the power of all the devices present across the architecture and network. IC is connected to power meter and reference regulator or constant power.

IC compares the signal of power meter and reference regulator if the power meter is high when compare to reference regulator then IC output is enabled send the signal to controller. The controller scans the brightness across the devices and it will send the signal to switches to perform trial and error operation that will reduces the power. The process is repeated so that power meter and reference regulator both are equal Hence the WLAN module (actually built into Node MCU), helps the microcontroller to establish a Wi-Fi communication with a device and accept commands from an application over a wireless network.

The node MCU further reception of the signal then switches the device on/off with the help of the relay. The node MCU, relay and the end devices are physically connected. There is a power supply for this supplies the microcontroller, the relay and the end devices. There is also a display unit showing the status of the application.

Circuit Diagram

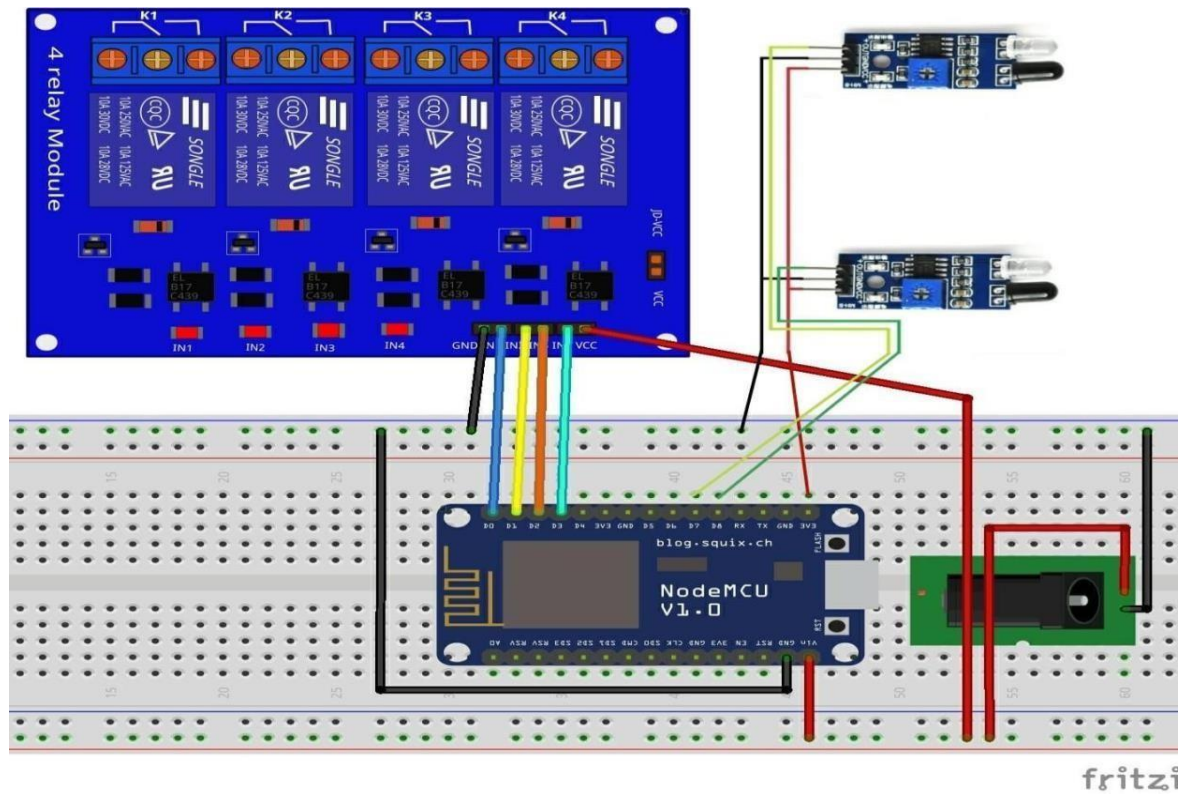


Figure 8: Circuit Diagram of Proposed System

RESULTS

Examining different home automation systems shows that there are different types of technologies used to implement this type of system. All proposed systems have been presented and compared in this paper, which shows some advantages and disadvantages of the systems. This review explained various home automation systems e.g. web-based, Bluetooth-based, Mobile Based, SMS Based, ZigBee Based, Arduino Microcontroller Based, Android App Based, IOT-based and cloud-based. Home due to its performance, simplicity, low cost and reliability automation system makes its position in the world market, this day is not so far, when every house becomes the smart home.

The Home automation Internet of Things has been using experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through internet. The designed system not only monitors the sensor data like temperature, gas, light, motion sensor but also actuates a process according to the requirement. For example, the switch gets dark. It also stores the sensor parameters in the cloud (Gmail) in a timely manner. This will help the user to analyze the condition of various parameters in the home anytime anywhere.

Home automation using the Internet of Things has been experimentally proven works satisfactorily by connecting simple devices to it and the devices have been successful remotely controlled via the Internet. Home automation is undeniably a resource to make a home environment automated. People can control their electrical devices through this home automation device and setting up control actions via mobile devices. In the future, this product has high marketing potential. In addition, it can be demonstrated from the computer mobile phones to control equipment in large places such as industries, hospitals, Institutions, etc.

CONCLUSION

The main outline for the project is to be able to communicate with various electrical devices wirelessly within the home. IOT or Internet of Things is an upcoming technology that will allow us to do this controlling hardware devices over the Internet. Here we suggest to use IOT for control household appliances and thus the automation of modern households via the Internet. This system uses two loads to demonstrate as house lighting. Our user-friendly interface allows the user easy control these home appliances over the Internet. For this system we use a NodeMCU. That NodeMCU is connected to a 4-channel relay module to receive user commands over the Internet. Relays are used to switch loads. After receiving user commands over the internet, the microcontroller processes these instructions to operate these loads accordingly. So this system enables efficient home automation over the Internet also in home and building automation systems the use of wireless technologies offers several possibilities benefits that cannot be achieved with a wired network.

- Reduced installation costs
- Easy to deploy, install and cover
- System scalability and easy expansion
- Aesthetic Benefits
- Integration of mobile devices

For all these reasons, wireless technology is not only an attractive choice in renovation and refurbishment, but also for new installations.

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