

IOT Based Home Automation System

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ABSTRACT -The project aims at achieving automation using the widely used mobile operating system Node MCU i.e. android Operating system. The electrical and home appliances can be controlled using the android mobile phones even if you are out of your house and you forgot to switch off the appliances. Many electrical and home appliances like light, fan etc. can be controlled using the android operating system. This can also be implemented at work place. Home automation is the residential extension of building automation. It is automation of home, housework or household activity. Home automation may include centralized control of lighting, HVAC (heating, ventilation and air conditioning) appliances, security locks of gates and doors and other systems, to provide improved convenience, comfort, energy efficiency and security. Home automation for the Elderly and disabled can provide increased quality of life for persons who might otherwise require caregivers or institutional care.

I. INTRODUCTION

"Home automation" refers to the automatic and electronic control of household features, activities and appliances. The utilities and features of our home can be easily controlled via internet. There are three main elements of home automation system: sensors, controllers and actuators.

Having day to day developing technology is a proud moment to the whole world. The foremost aim of the technology is to increase the efficiency and to decrease the effort. In this trending world, Internet of Things is being given extreme importance. In that, Automation, leads to have less effort and much efficiency. By using IoT, we are successful in controlling the appliances in various areas, in which one of them is to control the home automation by using Node MCU.

A load controlled by computer has many advantages compared with manual controlled loads. In order to save energy and make loads monitored easily, this research suggests smart home project

based on IoT technology. This smart home is an Internet of Things (IoT) project that controls loads with internet connection via Wireless Fidelity WIFI connection. A smart phone connected to internet with Blynk application as a control panel, and Node MCU.

Microcontroller kit in other side as a controller that receives control commands via WIFI signal.

II. OBJECTIVE

The main objectives of this research is to design and implement a home automation system using IoT that is capable of controlling and automating most of the house appliances through an easy manageable web interface. The proposed system has a great flexibility by using Wi-Fi technology to interconnect its distributed sensors to home automation server. This will decrease the deployment cost and will increase the ability of upgrading, and system reconfiguration. Also the objective is to build a smart home device which can be used to control the home appliances via internet. This establishes the internet connection to the system and all the home appliances can in turn be connected and controlled by internet.

III. LITERATURE SURVEY

Kumar Mandula discussed about the process of home automation using Bluetooth and Ethernet. When connectivity between Arduino and smart phone is established using Bluetooth, short range wireless communication is possible in an indoor environment. Ethernet module is used for connecting Arduino board from any part of the world.

Bharat Bohora designed system based on Blynk framework which controlled and monitored appliances via smartphone by using Wi-Fi as communication protocol and raspberry pi as private server. All the appliances and sensors are considered to the internet via NodeMCU.

Ming Wang in his paper discussed about his work on system that uses a smart central controller to set up a 433 MHz wireless sensor and

actuator network (WSAN). A series of control modules, such as switch modules, radio frequency control modules, have been developed in the WSAN to control directly all kinds of home appliances.

P.Siva Nagendra Reddy used android mobile to send commands to the Arduino board through WIFI module and Arduino processed them to

control all the home appliances. This system controlled the voltage levels of home appliances like fan, light etc. They got the status of their home appliances in their android mobile phone.

M L Sharma developed a system in which a home automation system was interfaced with Android mobile devices. The mobile device and system communicated with each other via Wi-Fi.

IV. BLOCK DIAGRAM

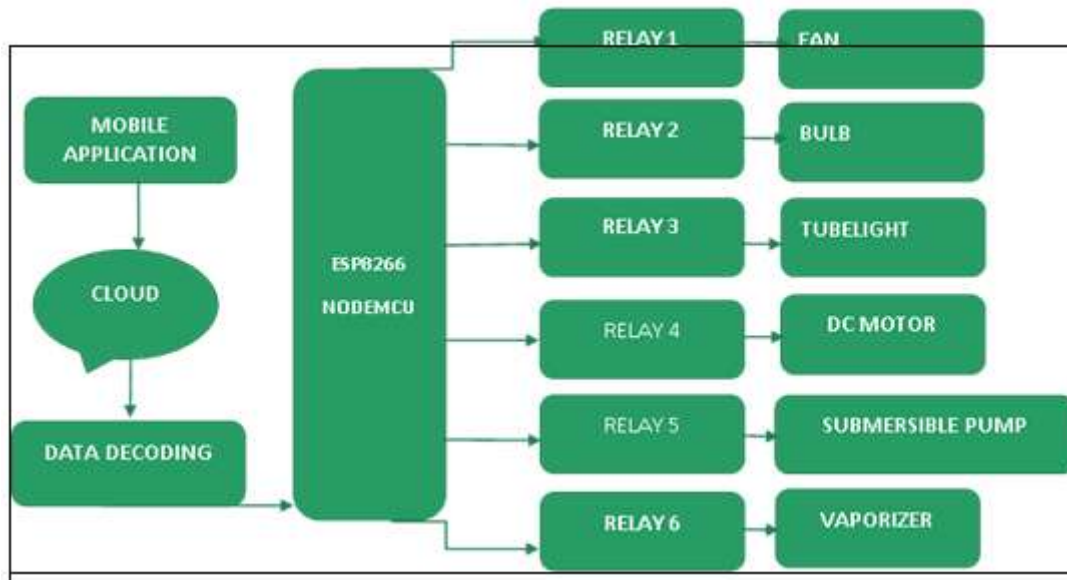


Fig. Block Diagram of IoT Based Home Automation System

WORKING OPERATION

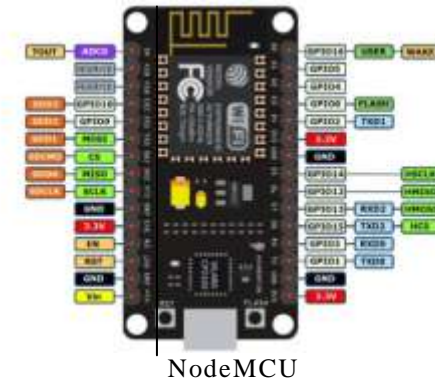
To achieve the home appliances control using smart phone, initially the mobile unit must be provided with sufficient internet connection and should be connected to the Wi-Fi Module ESP8266 which is inbuilt in NodeMCU should be connected to local network. By touching the specified location of widgets in the Blynk app or by giving voice command to the google assistant in mobile phone,

the Blynk server and IFTTT will interpret the message given and will send ON/OFF commands to ESP8266 on NodeMCU.

The NodeMCU will further give command to the relay driver IC ULN 2003 which drives the Relays. Then the relays connected to NodeMCU performs switching operations corresponding to input. So that the loads connected to relays will be switched ON/OFF.

HARDWARE REQUIREMENTS

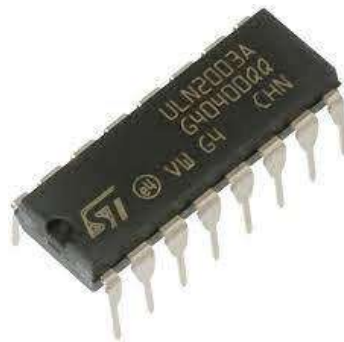
1. ESP8266 NODE MCU



Node MCU is an open source IOT platform, includes firmware which runs on the ESP8266 Wi-Fi Module from Espressif systems, and hardware which is based on the ESP-12 module. The term “Node MCU” by default refers to the firmware rather than the development kits. Node MCU firmware was developed so that AT

commands can be replaced with Lua scripting making the life of developers easier. The ESP8266 is a low-cost Wi-Fi chip with full TCP/IP stack and microcontroller capability produced by Shanghai-based Chinese manufacture, Espressif. Fig. shows the Node MCU (ESP8266) Development Board.

2. IC ULN 2003



IC ULN 2003

IC ULN 2003 is a 16 pin IC. Having 7 Darlington Pair's inside, where each can drive load up to 50v and 500 mA. For these 7 Darlington Pair's we have seven input and output pins. Adding to that we have a ground and common pin. The ground pin, as usual is grounded and the usage of common pin is optional. The power required for the transistors to work will be drawn from the input pin. IC ULN 2003 is most commonly used motor driver IC. In this project this is used to drive relay moduls.

DHT11 is a low-cost digital sensor for sensing temperature and humidity. This sensor can be easily interfaced with any micro-controller such as Arduino, Raspberry Pi etc. to measure humidity and temperature instantaneously. Sensor consists of a capacitive humidity sensing element and a thermistor for sensing temperature. The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form.

3. DHT 11

4. VOLTAGE SENSOR MODULE 1



ZMPT101B voltage sensor module is a voltage sensor made from the ZMPT101B voltage transformer. It has high accuracy, good consistency for voltage and power measurement and it can measure up to 250 V AC. It is simple to use and comes with a multi turn trim potentiometer for adjusting the ADC output. The analysis in this paper trends to find more accurate relationship between the input voltage and the ADC output by regression analysis.

BLYNK APPLICATION

Blynk App: - Blynk is a platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for our project by simply dragging and dropping widgets. It's really simple to set everything up and we will start tinkering in less than 5 minutes. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of our choice. Whether our Arduino or Raspberry Pi is linked to the internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get us online and ready for the Internet of Things



HARDWARE IMPLEMENTATION

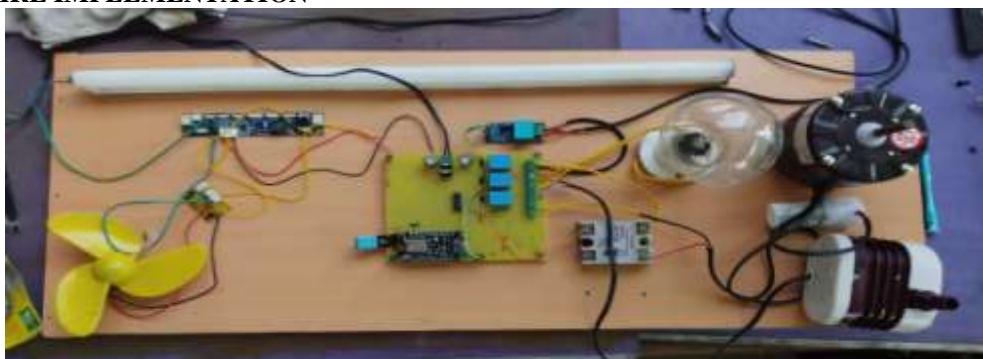


Fig. Hardware Implementation of IoT Based Home Automation System

V. FUTURE SCOPE

ADVANTAGES

- Increasing security of the system.
- Additional improvement to this project can be done by implementing the same project in the industries,
- Reducing more complexity of things and easily available to people.
- Cost effective greater flexibility.
- Reliable and accurate operation.
- Reduces human efforts.
- Reduces the time.
- Managing all home devices from one place.

APPLICATION

- Home automation for elderly and disabled people.
- Engine auto start control manufacturing machine control.
- Indoor positioning system.
- Switch car radios to traffic reports (RDS traffic alert).

VI. CONCLUSION

It is evident from this project work that control of home automation system can be cheaply made from low-cost locally available components and can be used to control multifarious home appliances ranging from the security lamps, the television to the air conditioning system and even the entire house lighting system. Home automation system that can be controlled remotely upon user authentication is proposed and implemented. The objective of this system is to provide a convenient way to control home appliances by using the Blynk app and save energy as well as time. With the help of this project we can control all the home appliances through IoT.

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