Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 6, Issue 03, March -2019

Home Automation using Internet of Things

Saurabh Dome[1], Dinesh Misale[2], Atharva Mudholkar[3], Pramod Biviskar[4], Prof. P.P Bastawade[5]

[1,2,3,4]*Students of Department of Computer Engineering AISSMS Polytechnic, Pune, Maharashtra*
[5]*Prof. of Department of Computer Engineering, AISSMS Polytechnic, Pune, Maharashtra*

Abstract — *This project presents a system and design implementation of new home automation system that uses IoT as an interface (using WiFi) as a network infrastructure connecting its appliances. The proposed system consists of two main components, the system consists of hardware devices, which can be controlled using the smartphone. With wireless networks, associating mobile devices such as PDAs and Smartphones with the automation system becomes possible everywhere and at any time, as a device's exact physical location is no longer considered for a connection (as long as the device is in reach of the network i.e Internet). Considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the house. Wi-Fi (Short for Wireless Fidelity) is a wireless technology that uses radio frequency to transmit data through the air. The controlling device for the automation in the project is a NodeMCU. The data sent from Android over Wi-Fi will be received by Wi-Fi module connected to NodeMUC.*

I. INTRODUCTION

We live in an exciting time where the everyday appliences or "things" are becoming smart! These "Things" have sensors and can communicate with other "Things. The Internet of Things, IoT, is upon us in a huge way and people are rapidly inventing new gadgets that enhance our lives.[1] The Internet of Things (IoT) has been in the spotlight for the past decade. It is regarded as one of the disruptive technologies of this century and so far, has caught the attention of society, industry and academy as a way of technologically enhancing day to day activities, the creation of new business models, products and services, and as a broad source of research topics and ideas.[1] The devices can be switched ON/OFF and sensors can be read using an Android application through Wi-Fi.[4] The hunger for automation brought many revolutions in the existing technologies. It has greater importance than any other technologies due to its user-friendly and daily in use nature. These can be used as a replacement of the existing switches in home which were old-school by new Iot systems which will allow you to control using your phone. [2] So no need to get up, do it while texting or watching movies. Considering the advantages of Wi-Fi an advanced automation system was developed to control the appliances in the house. Wi-Fi (Short for Wireless Fidelity) is a wireless technology that uses radio frequency to transmit data through the air. The controlling device for the automation in the project is a NodeMCU. The data sent from Android over Wi-Fi will be received by Wi-Fi module connected to NodeMUC.[4] It reads the data and decides the switching action of electrical devices connected to it through Relays.

II. PROBLEM DEFINITION

To design and develop a system to implement Internet of Things based home automation which will help to control the home appliances via Android phone remotely. The project will use ESP8266, a cheap Wi-Fi module and Arduino Uno 3, a board which will allow to flash the program to the ESP8266 and will give power supply.

III. EXISTING SYSTEM

- The existing systems which include bulky motherboards which produce large amount of heat were drawbacks of IoT. They were expensive, this phenomenon made IoT unpopular.
- Old systems were not supporting wireless interface which was biggest drawback of itself. In terms of connectivity they supported just RJ45 Ethernet port, there was no Wi-Fi module. Also in home or building automation systems, the use of wireless tech. gives out several advantages that cannot be achieved by using any wired network.
- Now days people pay above Rs. 7000-10000 for Google home and Amazon Alexa, however they provide additional functionality but if the person needs only automation then our project is worth to buy for Rs.1000. For all of these reasons, wireless technology is not only an perfect choice in refurbishment of appliances, but also for new installations.

Disadvantages of Existing system

- Heavily priced
- Not flexible, therefore not easy to modify
- Some of them use Bluetooth module instead of Wi-Fi

IV. PROPOSED SYSTEM

The all new proposed system is very efficient in terms of power, usability and complexity. It is also very easy to make that a 7 years' boy can make it up. In early 2012 a motherboard called *Raspberry Pi* was developed which was so small that it can fit in pocket and cheap like a half of cost of a smart phone. This changed future of internet of things. From that time, it became popular and people loved to implement it in real world. Old systems were not supporting wireless Interface which was biggest drawback of itself. In terms of connectivity they supported just RJ45 Ethernet port, there was no Wi-Fi relay module. In recent years, wireless systems like Wi-Fi have become more and more common in home networking. With wireless networks, associating mobile devices such as PDAs and Smartphones with the automation system becomes possible everywhere and at any time, as a device's exact physical location is no longer considered for a connection (as long as the device is in reach of the network i.e Internet).
The proposed home automation system using IoT can control the listed appliance:

- Turn the Lights on/off
- Turn the Fan on/off
- On/off any other different appliance

Advantages of the Existing system

- Really cheap to make
- Easy to make
- Flexible, therefore easy to modify
- Uses Wi-Fi module instead of Bluetooth module

V. BASIC IDEA

Internet of Things represents a concept for the ability of network devices to sense and collect data from the world around us (devices), and share the data across the Internet where it is processed and utilized for various purposes. The term industrial Internet interchangeably refers primarily to commercial applications of Internet of Things technology in the world of manufacturing. The Internet of Things is not limited to industrial applications, it can handle all kinds of daily in use household appliances that can be modified to function in an IoT system. Wi-Fi network adapters, motion sensors, cameras, microphones and other instrumentation can be embedded in this system to access them remotely.[3] So what we are going to do is use the NodeMCU and Blynk Interface which will allow us to connect the devices to the system.

VI. HARDWARE AND SOFTWARE REQUIREMENTS

Hardware Requirements:

Processor	:	Intel Core 2 Duo
Speed	:	1.0 GHz
RAM	:	512 MB
Hard Disk	:	500 MB
Key Board	:	Standard Keyboard
Mouse	:	Standard Mouse
Monitor	:	Standard Display

Software Requirements:

Operating System	:	Windows XP/7/8.1/10
Coding Language	:	Java
IoT Interface	:	Blynk Web Server

VII. SYSTEM DESIGN

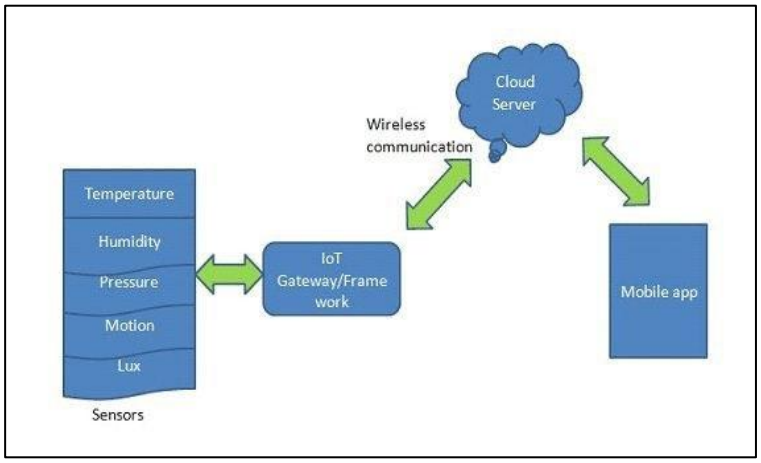

Figure 1: System Architecture

The system architecture of the home automation system is as shown in the Figure 1 The model consists of different sensors like example temperature, gas, motion and LDR. Initially the NodeMCU connects to the internet through Wi-Fi. When the connection is established it will start reading the parameters from the sensors or appliance's relay. The sensor data or the state of relay are sent to the smartphone at real-time and can stored in the cloud. The data can be analyzed anywhere anytime using smartphone that is, the user can also monitor the electric appliances through the internet via web server, so if the lights or any electrical appliances are left on in hurry, then they can be seen and turned off remotely through Android app. We used Blink as an interface between the NodeMCU and Android. The NodeMCU will upload the data and download the requests from the user through Blynk App.

VIII. IMPLEMENTATION

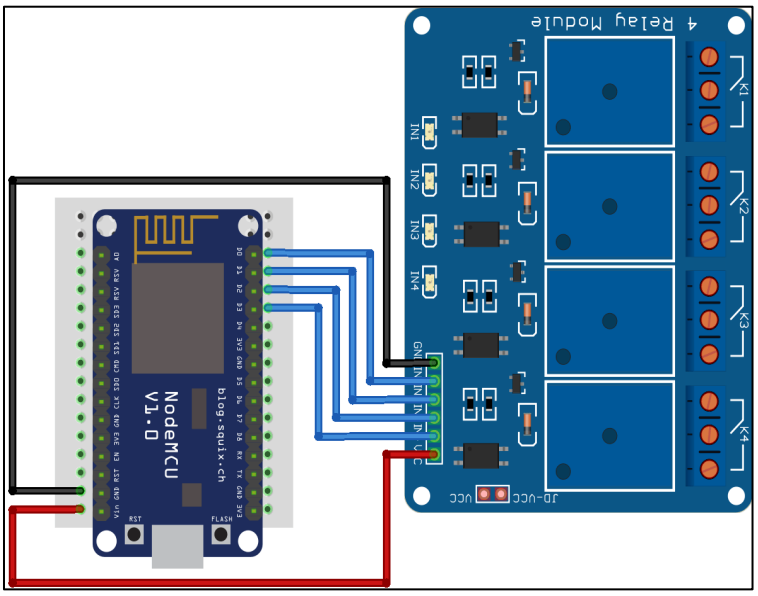

Figure 2: Connections and Arrangements

The figure 2 shows the connections of jump wire between NodeMCU and Relay Module. The following components are used to build the circuits:

A. ESP8266-01:

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability produced by manufacturer Espressif Systems in Shanghai, China. The chip first came in focus in August 2014 with the ESP-01 module, made by the third-party manufacturer called as Ai-Thinker. This small module allows microcontrollers to connect to the Wi-Fi network and perform simple TCP/IP connections using some Hayes-style commands. However, at first there was almost no English-language documentation on the chip and the commands it accepted. The really low price and the fact that there were very few external components on the module, which suggested that it could be very inexpensive in volume, attracted many hackers to explore the module, chip, and the software on it, as well as to translate that Chinese documentation. The ESP8285 is an ESP8266 with 1 MiB of built-in flash, which allows for single-chip devices capable of connecting to Wi-Fi. [4]

B. Arduino Uno-3:

The Arduino Uno is a microcontroller board which is based on the ATmega328 IC. It has 14 digital input and output pins (of which 6 are used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, one USB connection pin, a power jack, one ICSP header, and one reset button. It contains everything which is needed to support a microcontroller, that is simply connect it to a computer with one USB cable or power it with a battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip, instead of that it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.[4]

C. Relay Module:

A relay is an electrical device which is mainly used to control the high voltages using very low voltage as input. This consists of a coil wrapped around a pole and a two small metal flap which are used to close and open the circuit. One of the node is fixed and another can be moved. Whenever the electricity is passed through the coil, it creates a magnetic field and thus attracts the moving node towards the static node and the hence the circuit gets closed. So, just by applying a small voltage to power up the coil we can actually complete the circuit so the high voltage can travel. The static node of relay is not physically connected to the coil, so there is very less chance that Microcontroller powering the coil gets damaged if something thing goes wrong.[4]

IX. RESULT

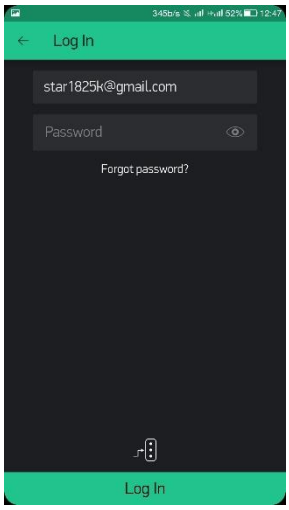

Figure 3: Login Screen

As seen in figure 1, login to Blynk Web Server's App. It will allow us an interface between Android and NodeMCU.

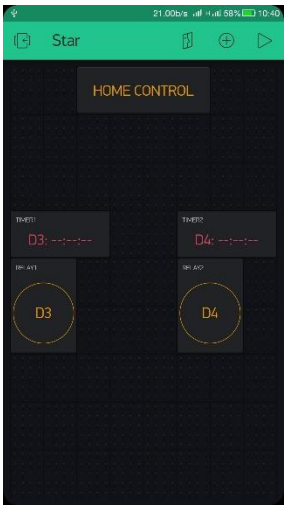

Figure 4: UI developed

After login here is the UI made figure 4. It includes 2 timers for two devices which can be extended as needed.

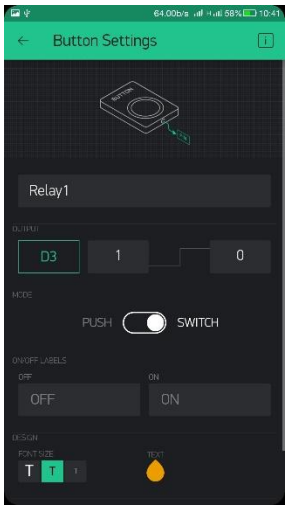

Figure 5: Button activity

In figure 5 we can see the configuration of buttons, i.e. It will send 0 signal to NodeMCU button is clicked, so device will be OFF.

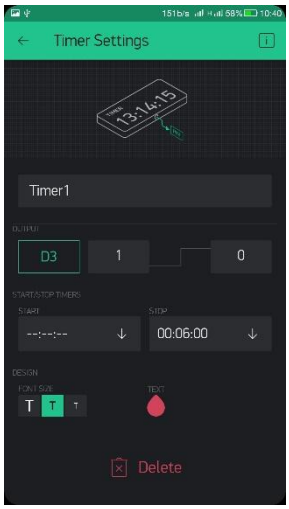

Figure 6: Timer activity

In figure 6 we can see the configuration of timer, i.e. It will send 0 signal to NodeMCU after the timer runs out.

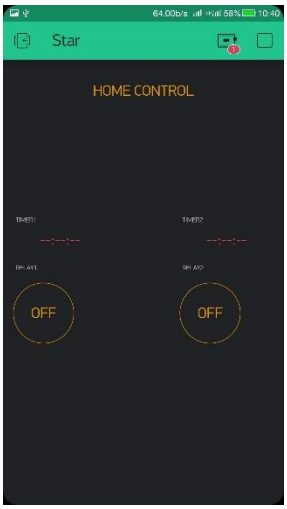

Figure 7: Main Screen

After clicking the play button we can now turn ON/OFF the devices, Use the timer.

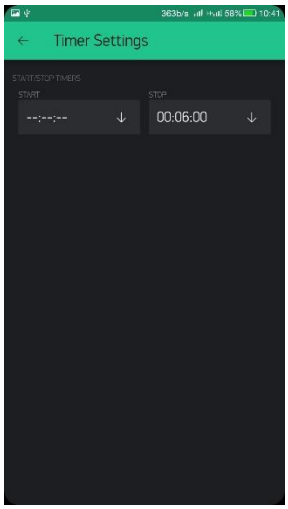

Figure 8: Using the timer

Here we can enter the start/end time in timer to turn ON/OFF the devices.

Thus, we created an efficient home automation system. Which can start and stop the appliances and it also includes timer function, so really helps in day to day activities.

X. CONCLUSION

The home automation using Internet of Things has been hence proven to work satisfactorily by connecting the simple appliances to it and those appliances were successfully controlled remotely through internet (using Android app). This home automation system is also capable of switching the devices using timer, that is whenever the timer runs off the appliances will be turned on and off respectively. It also stores the statistics of the appliances in the cloud in a timely manner. This will help the person/user to analyze the home appliances anytime, anywhere.

XI. FUTURE WORKS

This home automation system can be extended by including various other options which could include home security feature like capturing the photo of any person, who will move around the house and storing it onto the cloud and accessing it anytime by the owner from anywhere. This will reduce the data storage than using the CCTV camera (with HDD) which will record all the potage and stores it. The system can also be extended for energy monitoring, or weather stations and agricultural use. This kind of a system with respective changes can be used in the hospitals for people with disability or in industries where human invasion is impossible or is dangerous, and it also can be respectively made out for environmental monitoring system. Thus useful in day to day life.

XII. ACKNOWLEDGEMENT

This paper and project is completed under the guidance of Prof. Prajakta Bastawade we express our gratitude towards them for their continuous support on this research. We would also like to thank all the reviewers for who suggested to improve the paper.

XIII. REFERENCES

[1] Kusuma S M, “Home Automation Using Internet of Things”, Assistant Professor, Department of telecommunication, MSRIT, Bangalore, India.
[2] Niharika Shrotriya, Anjali Kulkarni, Priti Gadhave, “SMART HOME USING WI-FI”, International Journal of Science, Engineering and Technology Research (IJSETR).
[3] Anushri Aware, Sonali Vaidya, PriyankaAshture, Varsha Gaiwal, “Home Automation using Cloud Network”, PES’s Modern College of Engineering, Pune-04, International Journal of Engineering Research (IJSETR) and General Science Volume 3.
[4] Ilyas Baig, Chiktay Muzamil, Salahuddin Dalvi, “HOME AUTOMATION USING ARDUINO WIFI MODULE ESP8266”, Anjuman-I-Islam’s Kalsekar Technical Campus Panvel.

