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I0T HOME AUTOMATION WITH NODE MCU ESP8266AND BLYNK IOT INTERGATION

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Abstract - The Internet of Things (IOT) has changed the way we interact, communicate with and manage our homes. This paper presents a comprehensive study and implementation of IOT-based home automation using Node MCU ESP8266, cost-effective a microcontroller unit that provides Wi-Fi connectivity, and the Blynk IoT platform simplifies the process of controlling and monitoring our ESP8266 connected to our home appliances simplifies the process of controlling and monitoring our ESP8266 connected to our home appliances. This system enables remote control of household appliances through a mobile application, providing enhanced convenience, efficiency, and saves energy. The Node MCU ESP8266, equipped with Wi-Fi connectivity, serves as the central hub for this home automation system. It interfaces with a relay, making it capable of monitoring and controlling different home appliances. Blynk is a user-friendly and powerful IoT platform that allows users to create custom dashboards on their mobile devices. Through the Blynk mobile app, users can monitor and control the status of appliances in their homes from anywhere in the world, provided they have an internet connection.

Key Words: **Internet of things (IOT); Home Automation; Arduino IDE; Blynk IOT.**

1.INTRODUCTION

Home automation has seen remarkable advancements in technology with the integration of the Internet of Things (IOT), revolutionizing the world as we can control, monitor and observe our homes appliances which makes human being life easier [1]-[8]. Smart home automation gives us the freedom of controlling and getting the information about the uses of home appliances in home from a smart device such as mobile, phone, laptop and tube light etc. from any point on the earth [9]-[14]. Internet of Things (IOT) is a technology which is generally used for connection, controlling and managing your appliances and device with help of internet [15]-[20]. A system consists of sensors and home appliances or devise is connected to the internet through which we can communicate without any physical human interaction. A smart home automation system can be used for like runtime humidity reading, controlling or switching on and off of lights, air-conditioner, heater, fan, and many other devises can be easier to control. It also allows use to control the security and safety majors according to the user chose [21]-[24]. The Internet of Things (IOT) is a easy, conventional and effective way of connect, controlling and monitoring the electronic devices and used for controlling and adjusting the different parameter such as temperature of the room and humidity etc through internet [25]-[29]. In 2015, Mandula et.al., provided a system that can used to monitor and ability to control the data that can be sense through the sensor like light, temperature, movement of body, humidity etc depending on requirement, such as switching on lights when it getting dark. It is also used for storing data in Gmail timely [30]. In 2016, Pothanaicker et.al., presented basically about how we can control home appliances with help of software coding in a computer system. It saves energy and gives accessing to the home appliances through a website, which can control even if we are not in home in the presences of Wi-Fi [31]. In 2017, Singh et.al., design a system which is able to do different tasks as per the requirement at home. This allows to control through internet from anywhere. The basic use of this project to minimize the human effort and interference. The smart home automation system has different targets to be achieves such as networking without the presence wire or development of wireless technology communication with the help of cloud. The data from different senor should be stored in the cloud. The owner can control one or more than one home appliance devices through the internet as per the requirement. [32] In 2016, Kodali et.al., published a project which main aim in which he introduced a security system without the presence of wire or security alarm without any wire connection which can sends alert message to the owner through the Internet if any action took place outside given limit set by the owner. In adding this, the sensors can also be used for smart home automation system [33]. In 2017, Sharma et.al., Smart home automation system was developed to controlling and connect with android smart phone with the help of internet. We can download mobile application and can use it for connecting and also controlling with system. We can operate the fan, air conditioner, tube light and cooler from the mobile [34]. In 2017, Soliman et.al., Designed and demonstrated a home automation system based on microcontroller 'Arduino' board and Lab-view platform. In

this project two hardware components are used in the implementation of the following system: use laptop as a local server or controlling penal and the Lab-view as a path for contacting and controlling the Arduino is a microcontroller board. The device give respond to the command of the home owner [35]. In 2018, Satapathy et.al., Arduino MCU board is generally taken because of less costly and can be easily installed as a smart home automation system and provides security also. Wi-Fi is connected for controlling, taking data, connecting home appliances by owner through applications on smart phone [36]. In 2018, Hossain et.al., presented smart home automation technology that gives the knowledge about the devise which is connected through the movement sensor, server and switch connected among things [37]. In 2020, Abdulraheem et.al., Reports of Kansai University 2454 seeming to be present, without the help wire or said to be wireless machine-learning, communications, added systems and real time information. A government combination programs undertaken to achieve smart homes, cities, healthcare, and transportation areas with use of Internet of Thing applications development [38]-[41].

2.DESIGN

At first download and instal the Arduino IDE in our desktop and Blynk IOT in the mobile from the play store. Then download all the corresponding files of esp8266 and Blynk IOT in the Arduino IDE. After all, write the corresponding code to connect the Node MCU to the internet and can be control with the help of Blynk IOT application which is installed in the mobile. Take the Node MCU ESP8266 and connect its GPIO pin D2 with a one end of the diode and another end of the diode with the optocoupler and second with the ground Node MCU. Here the role of the diode is to restrict the flow of reverse current to the Node MCU. The optocoupler is used as a circuit divider which will prevent the Node MCU to get demanded. The other two pins of optocoupler with relay DC pins as shown in fig.1. At the same time, we have to design the dashboard in the Blynk IOT in the desktop along with the mobile also. After all we have to write the code in the Arduino IDE this code will be uploaded in the Node MCU so that it will connect the kit board with the Blynk IOT application wireless with the help of WI-FI.

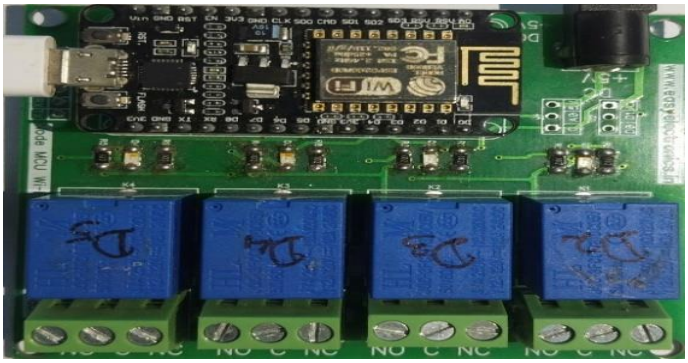

Fig-1 Design of circuit

3.SIMMULATION PARAMETER

TABLE:01

SLNO.	COMPONENTS:	QUANTITY:
01.	NODE MCU (ESP8266)	01
02.	DIODE	04
03.	OCTOCOUPLOR	04
04.	RELAY	04

4.SPEIFICATION OF COMPONENT

1. NODE MCU (ESP8266): The Node MCU ESP8266 is a popular openly available source development board that can be controlled through Wi-Fi. Its cost is very low and Wi-Fi controlling MCU with full microcontroller capability, making it suitable for a variety of Internet of Things (IOT) projects. The Node MCU board has GPIO (General Purpose Input/Output) pins that gives use the freedom to interact with external components such as sensors, LEDs, and other devices. The Node MCU can be using to store the program which is written using the Arduino IDE and that program can be used further. Arduino IDE which is a popular development environment for various microcontrollers.

2. DIODE: A diode is an electronic component. It's function is only allows current to flow in one direction on the other hand it blocks or restricts the current flow through opposite direction. It is made from semiconductor materials like silicon and germanium. Diodes have two terminals: an anode (positive) and a cathode (negative). Here the role of the diode is to restrict the flow of reverse current to the Node MCU. So that it will not get demanded.

3. OCTOCOUPLOR: An optocoupler, another name is an opto-isolator or photocoupler, is an electronic component. Its function is to transfers electrical signals between two isolated circuits. It consists of a light-emitting diode (LED) and photosensitive semiconductor device (like a phototransistor or a package).

4. RELAY: A relay is an electromechanical device used to control the flow of electricity in a circuit by using a low-power signal to switch a higher-power circuit on or off. It consists of an electromagnet (coil) that controls one or more switches.

5.SOFTWARE IMPLEMENTATION

The software implantation code is written is Arduino IDE to connect the hardware Node MCU ESP8266 with blynk IOT application. So, that we can connect and control our Node MCU from mobile with the help of internet.

5.1Code:

```
#define BLYNK_TEMPLATE_ID
#define BLYNK_TEMPLATE_NAME
#define BLYNK_AUTH_TOKEN
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
char ssid[] = "Rn_aswin";
char pass[] = "aswin101010";
BlynkTimer timer;
BLYNK_WRITE(V4)
{int value = param.asInt();
 Serial.println(value);
 if(value==1)
 {Serial.println("on");
  digitalWrite(D2,LOW);
 }if(value==0)
 { Serial.println("off");
  digitalWrite(D2,HIGH);}}
BLYNK_CONNECTED()
{Blynk.setProperty(V3, "offImageUrl", "https://static-
image.nyc3.cdn.digitaloceanspaces.com/general/fte/c
ongratulations.png");
Blynk.setProperty(V3,"onImageUrl","https://static
image.nyc3.cdn.digitaloceanspaces.com/general/fte/c
ongratulations_pressed.png");
Blynk.setProperty(V3,"url","https://docs.blynk.io/en/
getting-started/what-do-i-need-to-blynk/how-
quickstart-device-was-made");}
void setup()
{Serial.begin(115200);
 Blynk.begin(BLYNK_AUTH_TOKEN, ssid, pass);
 pinMode(D2,OUTPUT);}
void loop()
{ Blynk.run();
}
```

6.RESULT ANALYSIS

Case.1
When both the Node MCU(ESP8266) is connected to the internet and internet connection is available to the mobile. Then, when we switch is ON in the blynk IOT application the corresponding relay connected to the Node MCU will be respond according to the action.

When switch is ON shown in fig-2 and fig-3

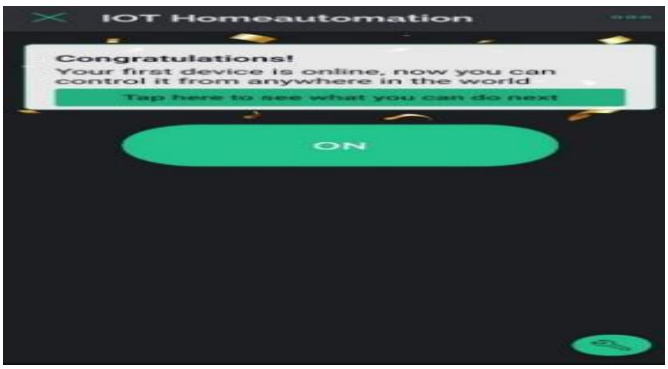

fig-2 mobile view

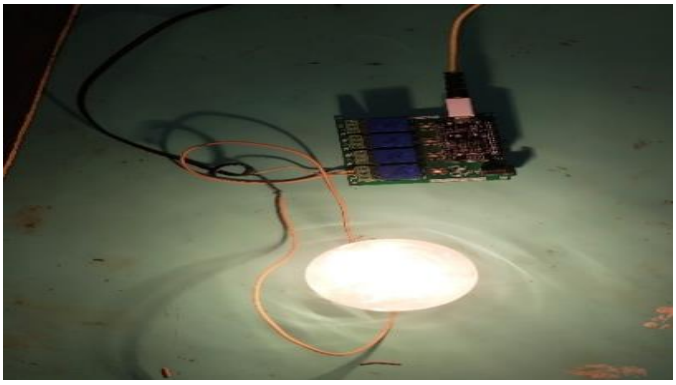

Fig-3 Circuit view

When switch is OFF the action is shown in fig-4and fig-5

Case.2
When both the Node MCU(ESP8266) is not connected to the internet through WI-FI and internet connection is available to the mobile. Then, when we switch is ON in the blynk IOT application the corresponding relay connected to the Node MCU will not respond according to the action as shown in fig- 4and fig-5.

Case.3

When the Node MCU(ESP8266) is connected to the internet through WI-FI and internet connection is not available to the mobile. Then, when we switch is ON in the blynk IOT application the corresponding relay connected to the Node MCU will be switch not respond according to the action as shown in fig-4 and fig-5

Case.4

When both the Node MCU(ESP8266) is not connected to the internet through WI-FI and internet connection is not available to the mobile also. Then, when we switch is ON in the blynk IOT application the corresponding relay connected to the Node MCU will be switch not respond according to the action as shown in fig.-4 and fig-5.

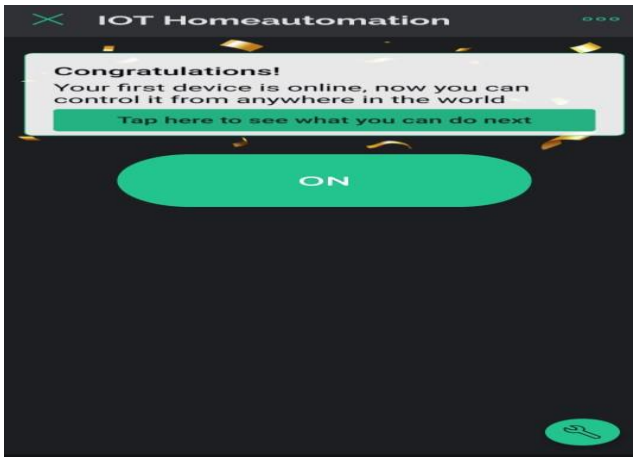

fig-4mobile view

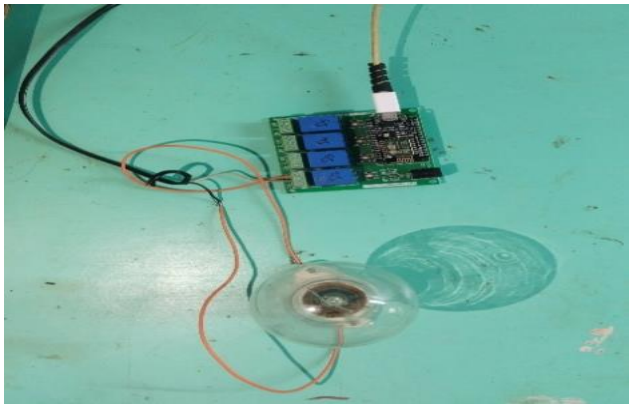

Fig-5 Circuit view

7.CONCLUSION

In the above project, when we switch ON/OFF the switches in blynk IOT application which is present in the mobile from a distance far away from the appliances and both node MCU and mobile is connected to Wi-Fi. In this condition only we can get a response from the circuit that is connected corresponding relay.

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