IOT BASED HOME AUTOMATION USING - NODEMCU

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ABSTRACT

The design and proto type implementation of new home automation system, that uses Wi-Fi technology as a network infrastructure connecting its parts. The proposed system consists of two main components first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Users and system administrator can locally (LAN) or remotely (internet) manages and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. Unlike most of available home needed automation system in the market the anticipated system is scalable that one server can manage lots of hardware interface modules as long as it exists on(Wi-Fi) network coverage's. Some System supports a wide range of home automation procedure like power management components, and the security components..etc. The proposed system is better from the scalability and elasticity point of view than the commercially available home computerization systems.

KEYWORDS: IoT, Home automated control ,Arduino home control remotely.

INTRODUCTION

Internet of Things is a impression where each device is assign together through that IP address anyone makes that device individual on internet. Basically it started as the "Internet of Computers." Research studies have forecast a volatile growth in the number of "things" or devices that will be connected together in the Internet. The resulting network is called the "Internet of Things" (IoT) [1]. The current developments in technology which has permit the use of Bluetooth and Wi-Fi have enabled to different devices to have capabilities of connecting with each other like one to one and also one to multi-devices. By Using a WIFI shield to act as a Micro web server for the Arduino which eliminates the need for wired connections between the Arduino board and computer which reduces cost level and also

enables it to work as a standalone device. The Wi-Fi shield needs connection to the internet from a wireless router or wireless hotspot and this would act as the gateway for the Arduino to communicate with the internet. With this in mind, an internet based home automation system for remote controls of home appliances are designed.

After successful Completion of this IOT based project, you would be able to control your home appliances such as TV, Fan, Bulb, Motor, Refrigerator, and door lock etc. with the help of your Smart-phone from anywhere in the world. Esp8266 a WIFI Module plays a vital role in this IOT Based Home Automation Project.

An Esp8266 Module will receive commands from your Smartphone, wirelessly through the internet. To encode those commands in a Smartphone and send it to ESP8266, for doing this work we need an application to active for the task. There is many Applications Available but we are going to choose the best one and easy access that is "Blynk" this applications. It is also available for both platforms such as IOS and Android. You can create Creative Projects with the Help of Blynk APP [2].

SYSTEM DESIGN

BLOCK DIAGRAM DESCRIPTION:

Real Time clock based home automation in an advance project to control the devices in timely and systematic manner. The devices can be controlled through wireless from other places. Technology of RTC with EEPROM can be record all the working parameters in the devices or appliances. Basically the project is a concept to bring automation in the industry or home.

All the home appliances will be controlled by mobile app. The appliances in the industry or home will be interfaced with centralized micro controller NODE MCU for the systematic working.
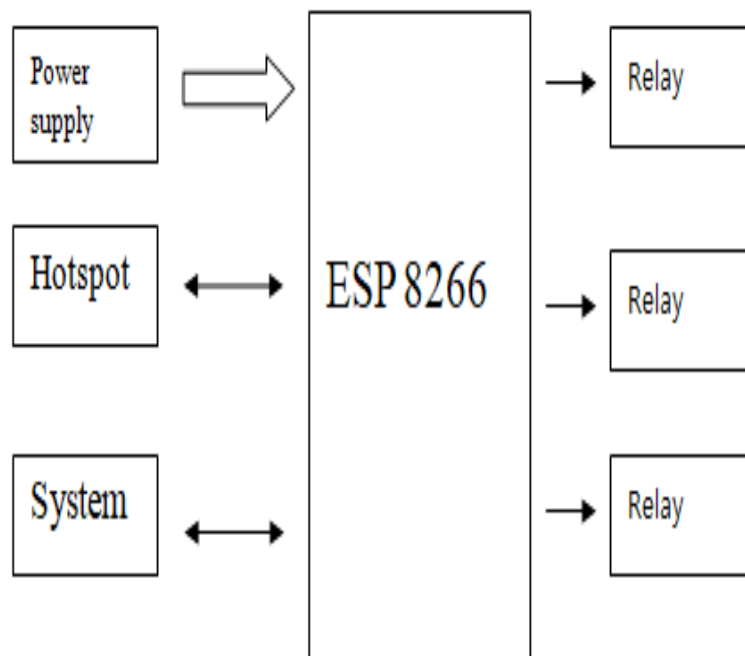
Fig.1 BLOCK DIAGRAM

The inbuilt RTC and EEPROM technology present the controller will be activated for the operation. The controller is interfaced with WIFI devices to received the control commands from Wi-Fi shield material (Wi-Fi hotspot). To demonstrate the possibility and effectiveness of this system, the devices such as light switches, power plug, temperature sensor, gas sensor and motion sensors, etc., have been integrated with the proposed home control systems. It employs an embedded micro – web server in NODE MCU microcontroller, with IP connectivity for accessing and controlling devices and appliances remotely

These devices can be controlled through web-applications or via Bluetooth Android based Smart phone using applications. The future system does not require a dedicated server PC with respect to similar systems and offers a protocol communication to monitor and control the home switching functionality. The operator will be done with Mobile app having Wi-Fi in that enough. If operator wants to switch the Light to turn on or off he needs to switch control button provided in app. Once the Wi-Fi will send the data to Wi-Fi present at microcontroller. As and when the requested was received the microcontroller activates through RTC and EEPROM and as per request received action will be done. In the same way all other appliances can be controlled [3].

POWER SUPPLY CIRCUIT:
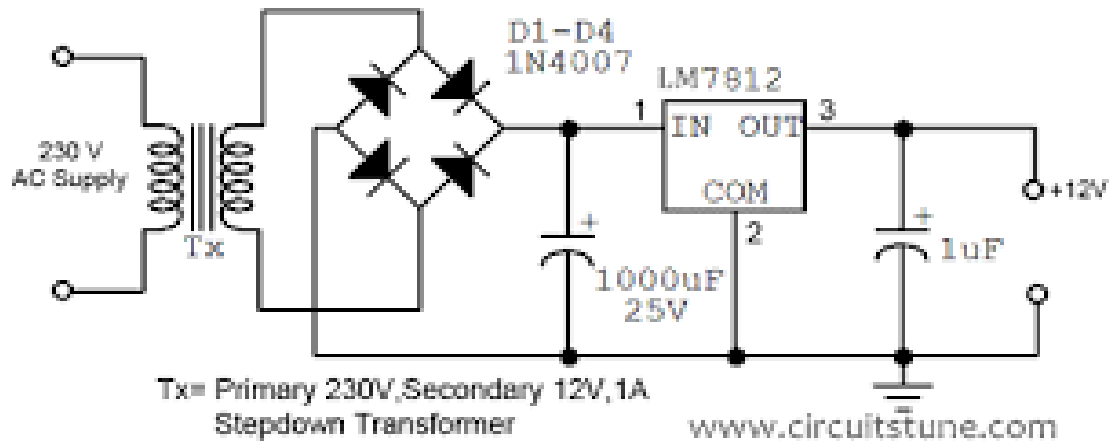
Fig.2 Full Wave bridge Rectifier

Available power is an Ac voltage arrives at 230V.since our electronic circuits require only very minimal voltage and current we use step down power transformer. Step down transformer is designed in such a way that the input is 230V and output of 12V.Anotherr thing is that electronic circuits operate in DC where as a available output of transformer is Ac of 12V.S So rectifier circuit is used to convert AC to DC. Rectifier circuit consists of four diodes formed in bridge fashion so as to convert incoming AC to DC [4].

RELAY:
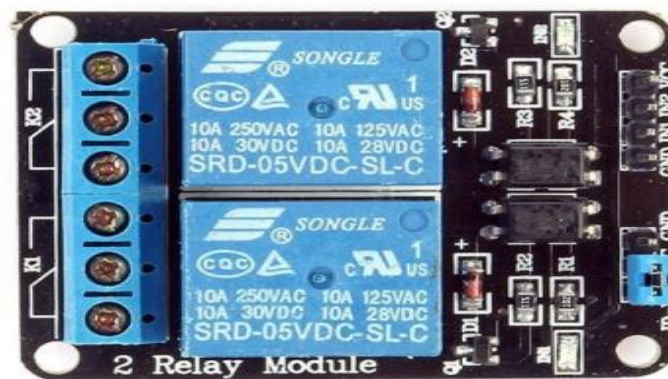
Fig.3 RELAY

The Relay is nothing but it is the electromagnetic switching. Relay allows one circuit to switch another circuit while they are separated. Relay is used to low voltage circuit to turn ON and turn OFF the device which required high voltage for its operations. For example, 5V supply connected to the relay is sufficient to drive the bulb operated on 230V AC mains. Relays are available in various configurations of operating voltages like 6V, 9V, 12V, 24V.

Normally the Relay is divided into two parts, one is input and other is output. Input side is nothing but a coil which is generate the magnetic field when small input voltage is given to it. Relay having three contactors: 1st Normally closed (NC), 2nd normally opened (NO) and 3rd common (COM). By using the proper combinations of the contactors electrical appliances may turn ON or OFF.
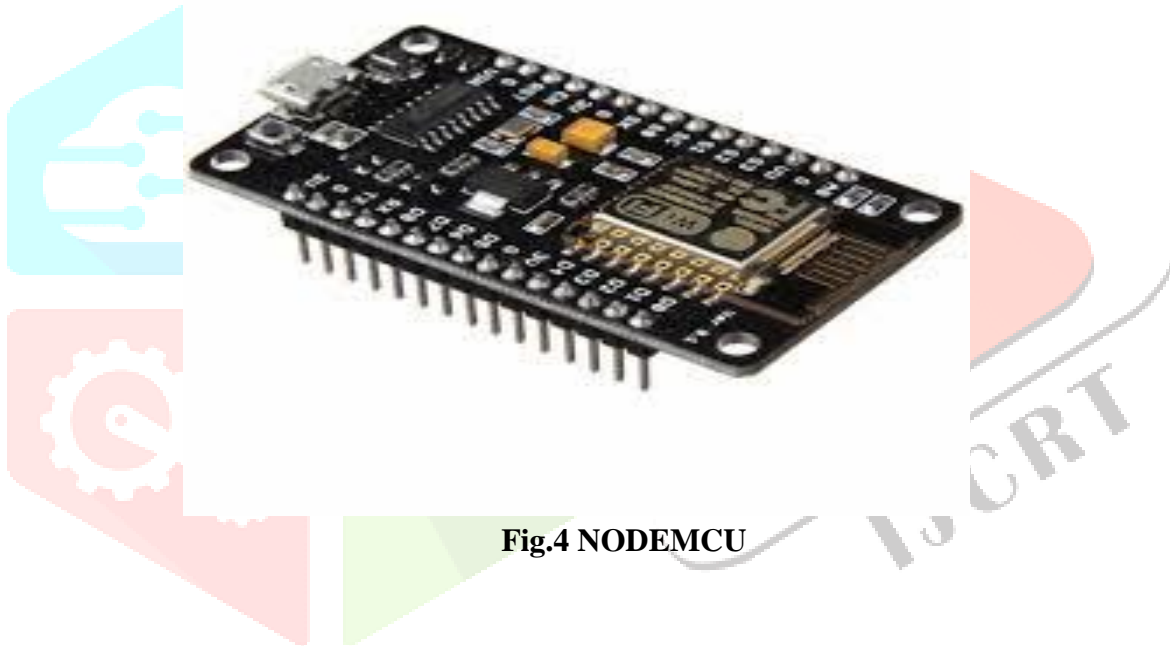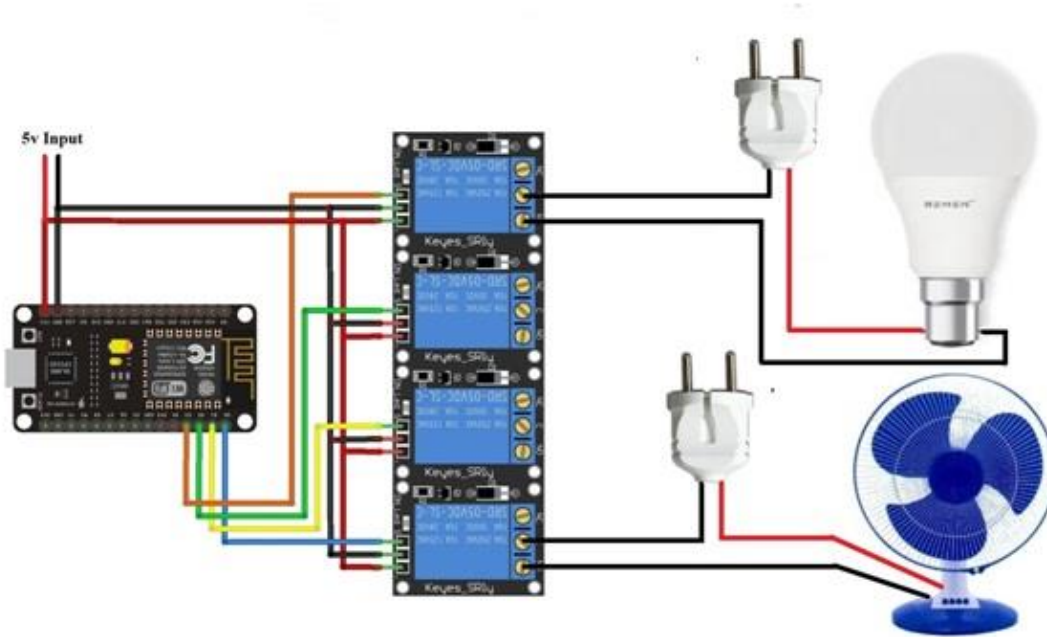
NODEMCU:

Fig.4 NODEMCU

The ESP8266 chip incorporates on a standard circuit board. The board has a built-in USB ports that is already fixed with wired up in the chip. The hardware reset button, Wi-Fi antenna, LED lights, and standard-sized GPIO (General Purpose Input Output) pins that can plug into a bread board. It has Processor called L106 32bit RISC microprocessor core based on the Ten silica Xtensa Diamond Standard 106Micro running at 80 MHz and has a memory of 32 Kbit instruction RAM ,32 Kbit instruction cache RAM, 80 Kbit user data RAM&16 Kbytes system data RAM. It have inbuilt Wi-Fi modules of (IEEE 802.11 b/g/n) Wi-Fi technology.

The ESP8266 is the name of a micro controller designed by Expressive Systems. The ESP8266 itself is one of the self-contained Wi-Fi networking solutions that also offering as a bridge from presented micro controller to Wi-Fi and is also capable of organization self-contained applications..[5]

PINOUT DIAGRAM:
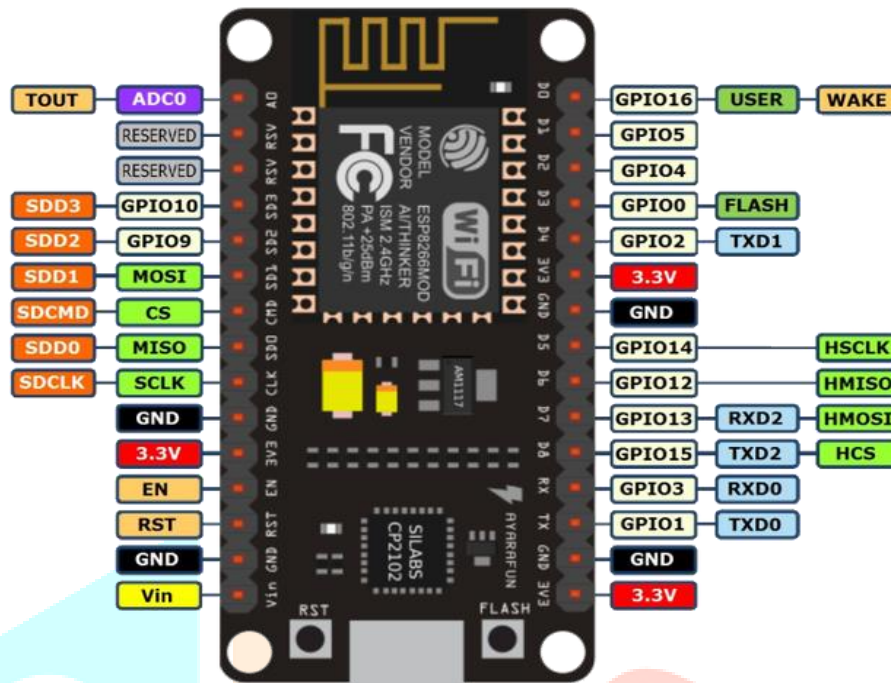
Fig.5 Pin diagram

SPECIFICATION:

1.   Voltage:3.3V

2.   Wi-Fi Direct (P2P), soft-AP

3.   Current consumption: 10uA~170mA.

4.   Flash memory attachable: 16MB max (512K normal).

5.   Integrated TCP/IP protocol stack.

6.   Processor: Ten silica L106 32-bit.

7.   Processor speed: 80~160MHz.

8.   RAM: 32K + 80K.

9.   GPIOs: 17 (multiplexed with other functions).

10. Analog to Digital: 1 input with 1024 step resolution.

11.   +19.5dBm output power in 802.11b mode

12.   802.11 support: b/g/n.

13. Maximum concurrent TCP connections: 5.

CIRCUIT DIAGRAM DESCRIPTION:

Fig.6 CIRCUIT DIAGRAM

All the home appliances will be controlled by mobile app. The appliances in the industry or home will be interfaced with centralized micro controller NODE MCU for the systematic Working. The inbuilt technology of RTC and EEPROM in attendance within the controller will be activated. The controller also interfaced in WI-FI to receive the controlling commands from Wi-Fi shield (Wi-Fi hotspot). The operator will be provided with Mobile app having Wi-Fi in that. If operator wants to switch the Light to turn on or off   he needs to switch control button provided in app.

SOFTWARE DESCRIPTION:

BLYNK:

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, and it can store data, visualize it and do many other cool things.

HOW BLYNK WORKS:

- ➢ Blynk was designed for the Internet of Things. It can control hardware remotely
- ➢ There are three major components in the platform:
- ➢ Blynk App - allows to you create amazing interfaces for your projects using various widgets we provide.
- ➢ Blynk Server - responsible for all the communications between the Smartphone and hardware. You can use our Blynk Cloud or run your locally. The open-sources, could easily switch thousands of devices at one time and can even be launched on a Raspberry Pi.
- ➢ Blynk Libraries - for all the popular hardware platforms - enable communication with the server and process all the incoming and out coming commands[6]
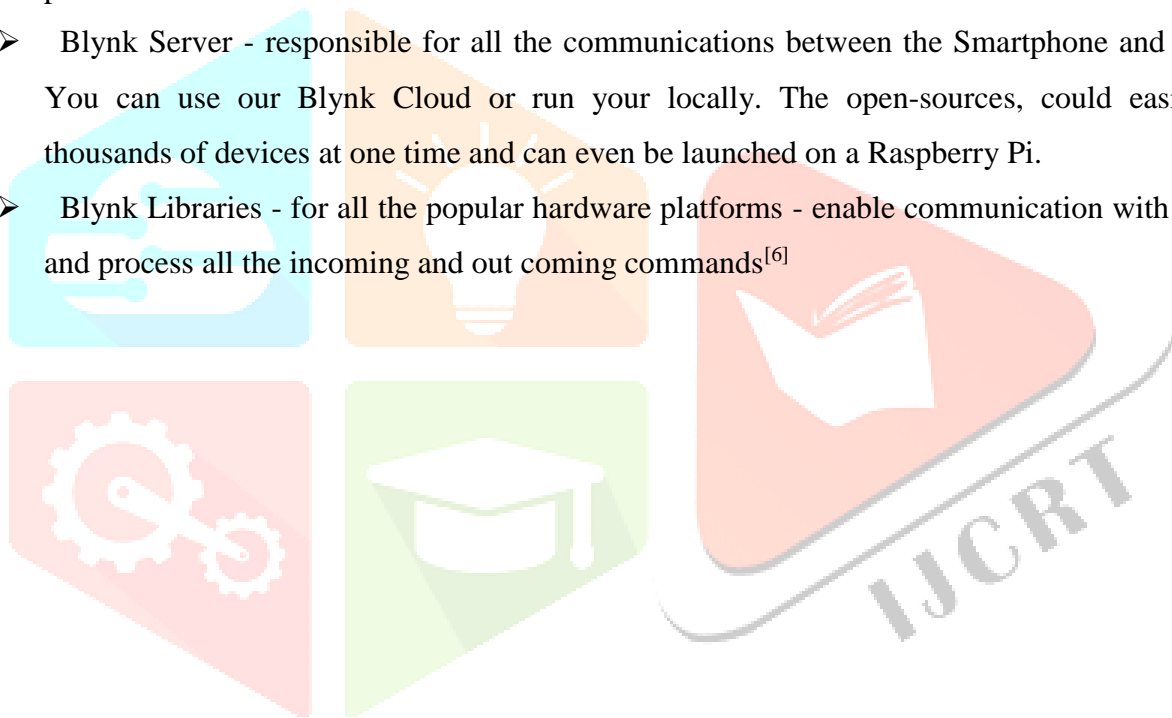
CREATE BLYNK ACCOUNT:

After you download the Blynk App, you'll need to create a New Blynk account.

Step: 1: This account is separate from the accounts used for the Blynk Forums, in case you already have one.
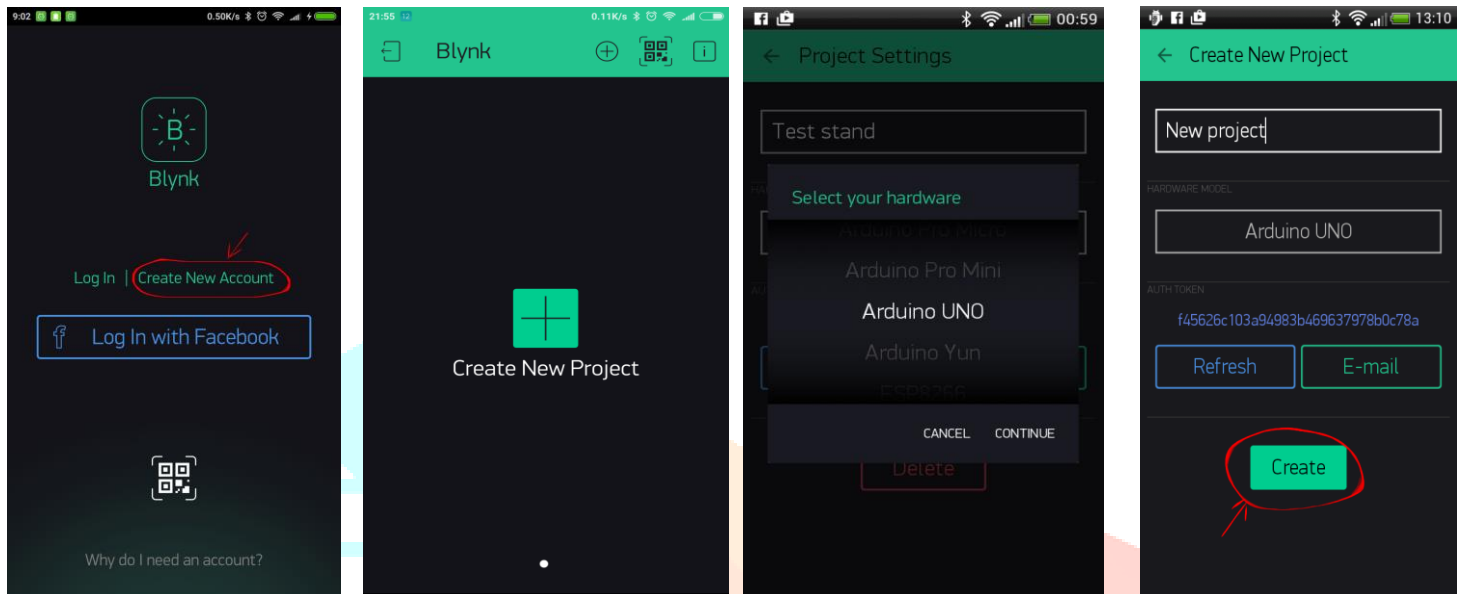
Step: 2 create a new project: After you've successfully logged into your account, start by creating a new project.

Step: 3 choose your hardware:

Step: 4 Auth Token: Auth Token is a unique identifier which is needed to connect your hardware to your Smartphone.

ARDUINO UNO:

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can send a set of instructions to the microcontroller on the board. To do so by you using the Arduino programming language (Wiring), and the Arduino Software (IDE), based on processing technology.

more than the years the Arduino has been the brain and thousands of projects, will be done on everyday objects to complex scientific instruments. A worldwide community of makers will be produced more number of Arduino for - students, artists, programmers, and professionals hobbyists,etc., -It is one of the

gathered open-source platform, their contributions have added up to an hard to believe amount of accessible knowledge that can be of great help to novices and experts alike [7,8].

SOURCE CODE:

```
#include <SoftwareSerial.h>

Software Serial SwSerial(10, 11); // RX, TX

#include <BlynkSimpleStream.h>

char auth[] = "d0e68eae86a3446995a256415bd6cfc4";

Widget Terminal terminal(V1);

BLYNK_WRITE (V1)

{

   if (String("Marco") == param.asStr()) {

   terminal.println ("You said: 'Marco'") ;

   terminal.println ("I said: 'Polo'") ;

 } else {

   Terminal. Print ("You said :");

   Terminal. Write (param.getBuffer (), param.getLength ());

   terminal.println ();

 }

   terminal. Flush();


}

void setup()

{

  SwSerial. Begin (9600);
```
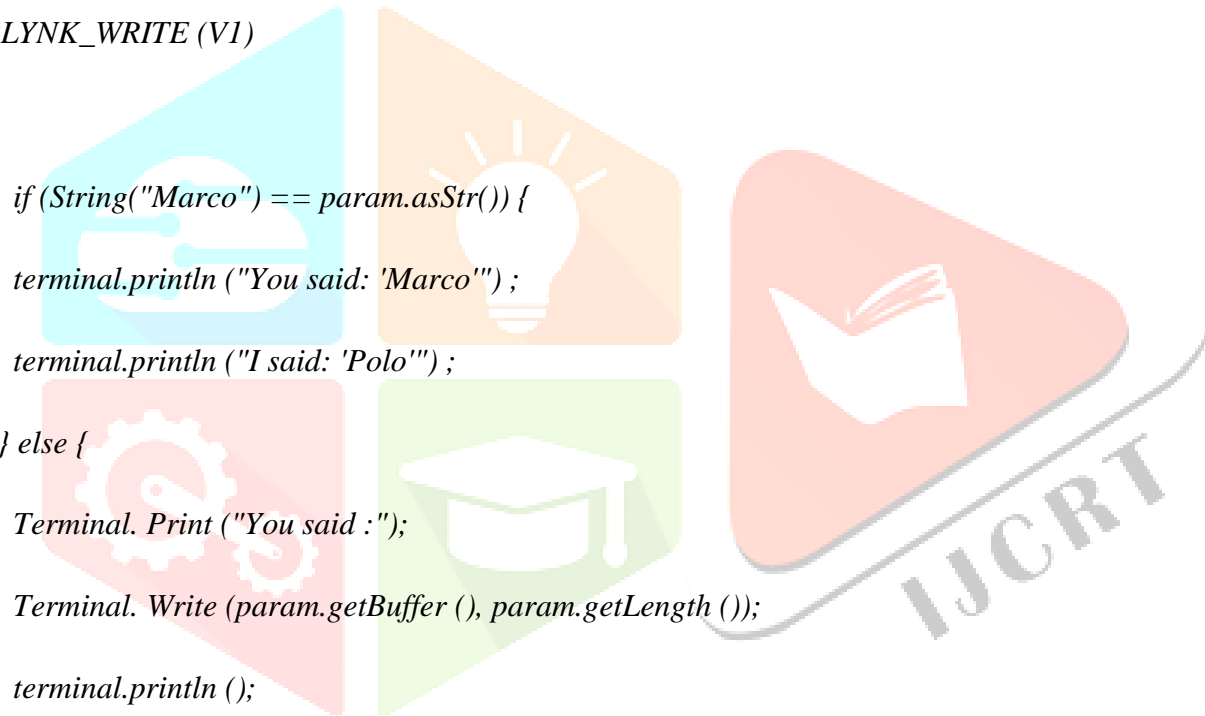
Serial. begin (9600);

Blynk. Begin (Serial, auth);

terminal.println (F ("Blynk v" BLYNK_VERSION ": Device started"));

terminal.println(F("-------------"));

terminal.println(F("Type 'Marco' and get a reply, or type"));

terminal.println(F("anything else and get it printed back."));

terminal. Flush();

}

void loop()

{

Blynk. Run();

}

CONCLUSION:

It is evident from this project work that an individual control 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. And better still, the components required are so small and few that they can be packaged into a small inconspicuous container. The designed home automation system was tested a number of times and certified to control different home appliances used in the lighting system, air conditioning system, home entertainment system and many more . Hence, this system is scalable and flexible.

Referance:

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