Chapter **1**	Introduction

1.1 Basic Introduction

The internet of things(IoT) is network of naïve devices communicating with each other over the internet to perform a unified task in a smarter way. The IoT architecture consists of wirelessly

embedded sensors, nodes, actuators and a micro-controller to perform and take intelligent decisions. Here, the object, devices, machines, animals, humans are provided a unique identification tag which enables it to be identified from a

remotely located area and transfer data without requiring HCI (Human-Computer Interaction).

IoT has become a way of life in recent years, as it has a great potential in helping human life and focus on the tasks that usually needs human intelligence. IoT has a very broad spectrum that covers every aspect of human interaction in daily life, from buying goods to health care, even monitoring of resources and remotely handling them. With IoT insight human resources can be much efficiently utilized while sparing the burden over natural resources.

Imagine a world where your refrigerator becomes your helper by creating a checklist of all the items required in the next few days based on your present consumption and preferences and forwards it to your handheld devices. Now imagine, your refrigerator is communicating with your storage cabinets of the kitchen and suggesting you the recipes based on the available ingredients. Now, your refrigerator is communicating with your microwave after you select a recipe based on the recommendations and your microwave starts preparing meal and serves you hot meal when you reach home after a tiring day. Doesn't this seem to be a part of magical world but NO its just a part of the IoT World which is not far from the real world.

Now let's come to another scenario which might seem hypothetical but is a trending application in IoT. Smart Health Care, a domain that affects all our lives. Imagine that we are injected with smart implants in our body that can analyse our blood for virus and bacteria contents and send this report to centralized system that automatically delivers you the medicine as per the analysis of blood content, sounds too good to be true but with the advancement in technology it could be the reality of near future, so now more value for your prestigious time rather than waiting in a long queue to get diagnosed. Health just got a new upgrade through IoT.

Importance

The household activities are automated by the development of special appliances such as water heaters to reduce the time taken to boil water for bathing and automatic washing machines to reduce manual labour of washing clothes. In developed countries, homes are wired for electrical power, doorbell, TV outlets, and telephones. The different application includes when a person enters the room, the light turns on. In advanced technology, the room can sense the presence of the person and who the person is.

Taking into account the day of the week, time of the day and other such factors it can also set apt lighting, temperature levels, television channels or music levels. In the case of a smoke detector when fire or smoke is detected, the lights in the entire house begin to blink to alert the resident to the probable fire. In case of a home theatre, the home automation system can avoid distraction and lock the audio and video components and can also make an announcement. The home automation system can also dial up the house owner on their mobile phone to alert them or call any alarm monitoring company.
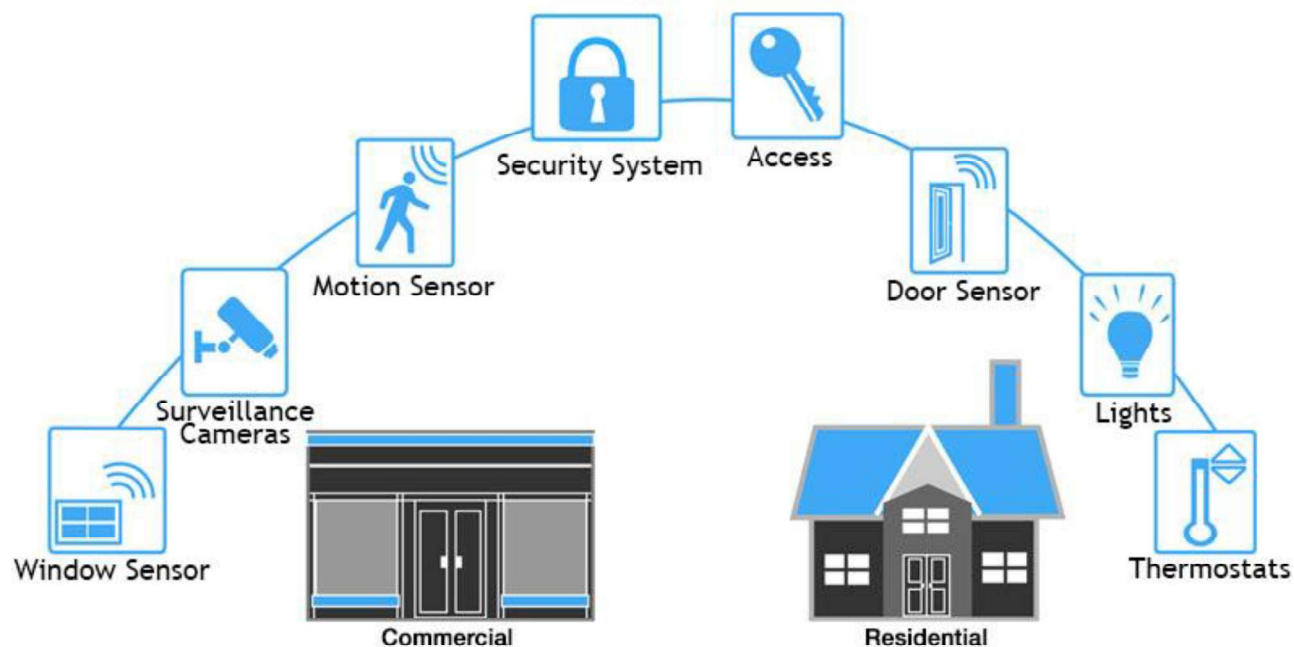
Fig. 1: A Represenatation Image Of Typical Home Automation System

It is essential that the different controllable appliances be interconnected and communicate with each other. The basic aim of Home automation is to control or monitor

signals from different appliances, or basic services. A smart phone or web browser can be used to control or monitor the home automation system.

The household activities such as food preservation and preparation is automated with the movement of pre packaged food or pre-made food. Automation of handling the food in the home is possible to only standardized products.

The use of electricity facilitated the automation in heating which trim down the manual toil to gas stoves and fuel heaters. The growth of thermostats enables automated control of heating and cooling at a later stage.

Other automated activity includes the air conditioner set to an energy saving setting when the house is vacant and get back to the normal setting when the resident is about to return home. The classy system preserve a list of products, records the usage through bar codes or an RFID tag and replaces the order automatically.

Features

Computers, wireless transmitters, cell phones, and touch screens controls different features of home automation such as:
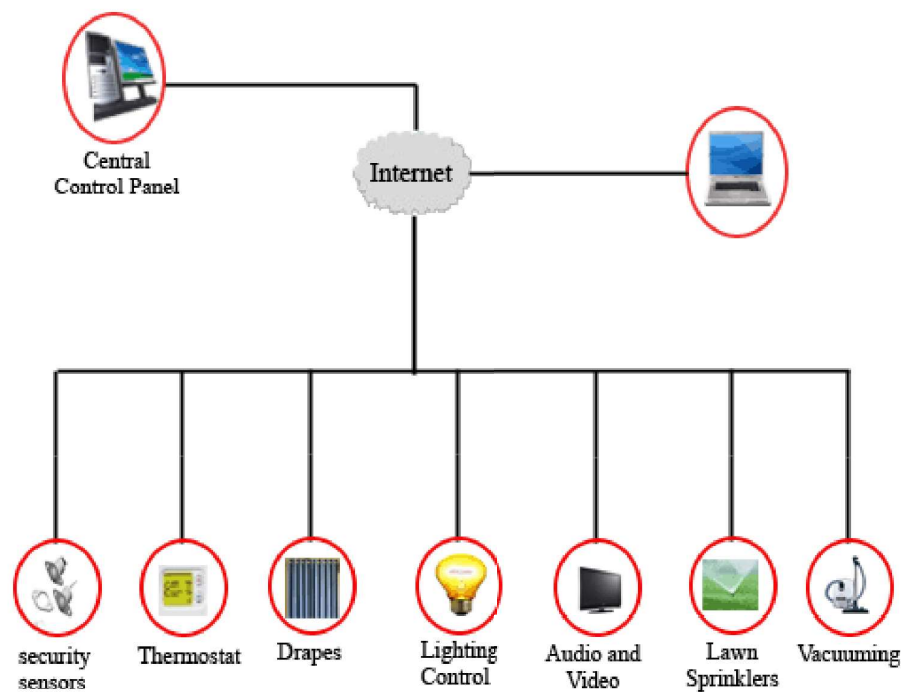
Fig. 2: An Overview Of Home Automartion Features

1. Security – With home automation, the lights of the car are turned on in order to help you to walk in the dark. In case the alarm goes off, the authorities can be alerted and a message can be sent to your cell phone by the system.

2. Thermostat – This is programmed to run the central heating and cooling system as per our own required settings. For example, air conditioner is set to an energy saving setting when the house is vacant and sets back to the normal setting when the resident is about to return home.

3. Drapes – With the help of the home automation system, the drapes of the room can be opened and closed during the night time.

4. Lighting – This can be set as per our own required settings for dim and bright light.

5. Audio/Video – The home automation system can turn on the stereo and play music or can also turn on the television to any channel.

6. Lawn sprinklers – The sprinkler system can be activated as per the schedule settings.

7. Vacuuming – Robotic vacuum cleaners automatically glides over the carpet to help you keep the house neat and tidy.

Classification

Since the market is flooded with home automation systems and device manufacturers, it is difficult to make a choice that suits your needs and also available at a reasonable rate. Below are the types of home automation system.

1. **Individual Control devices** - These devices were introduced in the market during the early years. Unlike the central control system, there is an independent control for each of the devices like AC, heater, etc. These devices are user friendly and very handy.

2. **Distributed Control Systems** – The important characteristic of this type of systems is emergency shut-down. These devices also include features such as hardware and software components launched by [SCADA](#) for better automatic control over the devices reducing the interaction with human. This helps you to alter the control parameters.

3. **Centrally Controlled Systems** – These systems are programmed via computers in order to handle all kinds of functions on appliances like heaters, AC's, doors, refrigerators, windows, cooking systems, etc. Despite you are at home or outside. Via telephone or internet, you can be connected to control system from office. In case things over the control parameters are forgotten, one can still be safe and timely on these controls with the help of computerized control.

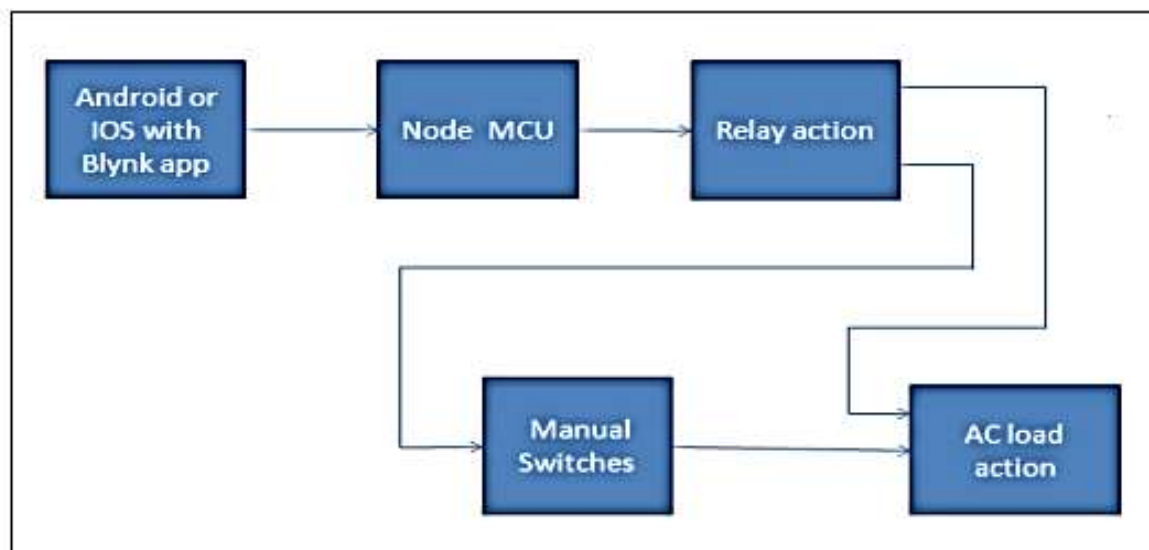## 1.2 Block Diagram

Figure 1.2 Block Diagram

1.3 Components Used

1.	Node mcu	1
2.	4 channel Relay module	1
3.	Box	1
4.	5v Source	1
5.	Connectors	As per required

Table 1.1: Components

1.4 Literature review

Smart home's based on IoT technology are becoming more and more popular. Main moto of IoT is to connect hardware world to internet. Then, Web of Things (IoT) emerged to easily connect sensors to the web, get the data and exchange data on the web that has been produced by the devices [5]. We have gone thoroughly through number of journals, research and conference papers and project reports to thoroughly understand the concept of IoT technology. Similarly, we have researched various IoT based projects that have been designed and developed in the past. Some of the proposed and existing smart homes platforms are as follows. The READY4SmartHomes [6] aims at reducing complexity of human face in his home due to lack of time. This project is intended to generate and provide different models which are been working using internet nothing but IoT etc. But it doesn't encompass vital IoT domains like home automize in less price etc. and neither does it mention need to integrate a reasoning engine to analyse IoT data.

Chapter	HISTORY

2.1 History

During the time when Greeks ruled, the ideas for automating tasks were into existence. Later during the Industrial Revolution, automation was developed. The steam powered machines launched by James Watt and improved by Richard Trevithick, Thomas Savery and Thomas Newcomen are a few examples of taking over the work from humans.

In the year 1725, the French investor Basile Bouchon designed an automated machine for drawloom. The instructions for the working of Bouchon loom were recorded in the form of holes on sheets of paper. With the help of these holes, the needles could guide the thread through the loom to make the cloth. The Bouchon method could be performed easily with the help of a pedal as compared to the manual process of weaving the cloth.

Chapter 3	**MATERIALS & METHODS**

3.1.   Node Mcu

IoT platform node MCU is open source . Language used in it is lua scripting language. It is based on the eLua project, and built on the ESP8266 SDK 0.9.5. It uses many open source projects, such as lua-cjson, and spiffs. It includes firmware which runs on the ESP8266 Wi-Fi SoC, and hardware which is based on the ESP-12 module. NodeMCU was created shortly after the ESP8266 came out. In December 30, 2013, Espressif systems began production of the ESP8266.The ESP8266 is a Wi-Fi SoC integrated with a Tensilica Xtensa LX106 core, widely used in IoT applications. NodeMCU started in 13 Oct 2014, when Hong committed the first file of NodeMCU - firmware to GitHub. Two months later, the project expanded to include an open-hardware platform when developer Huang R committed the gerber file of an ESP8266 board, named devkit 1.0. Later that month, Tuan PM ported MQTT client library from Contiki to theESP8266 SoC platform, and committed to Node MCU project, then Node MCU was able to support the MQTT IoT protocol, using Lua to access the MQTT IoT protocol, using Lua to access the MQTT broker. Another important update was made on 30 Jan 2015, when Devsaurus ported the u8glib to NodeMCU project, enabling NodeMCU to easily drive LCD, Screen, OLED, even VGA displays.

3.2.   Blynk

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 your project by simply dragging and dropping widgets. It's really simple to set everything up and you'll start tinkering in less than 5 mins. Blynk is not tied to some specific board or shield. Instead, it's supporting hardware of your choice. Whether your Arduino or Raspberry Pi is linked to the Internet over Wi-Fi, Ethernet or this new ESP8266 chip, Blynk will get you online and ready for the Internet Of Your Things.
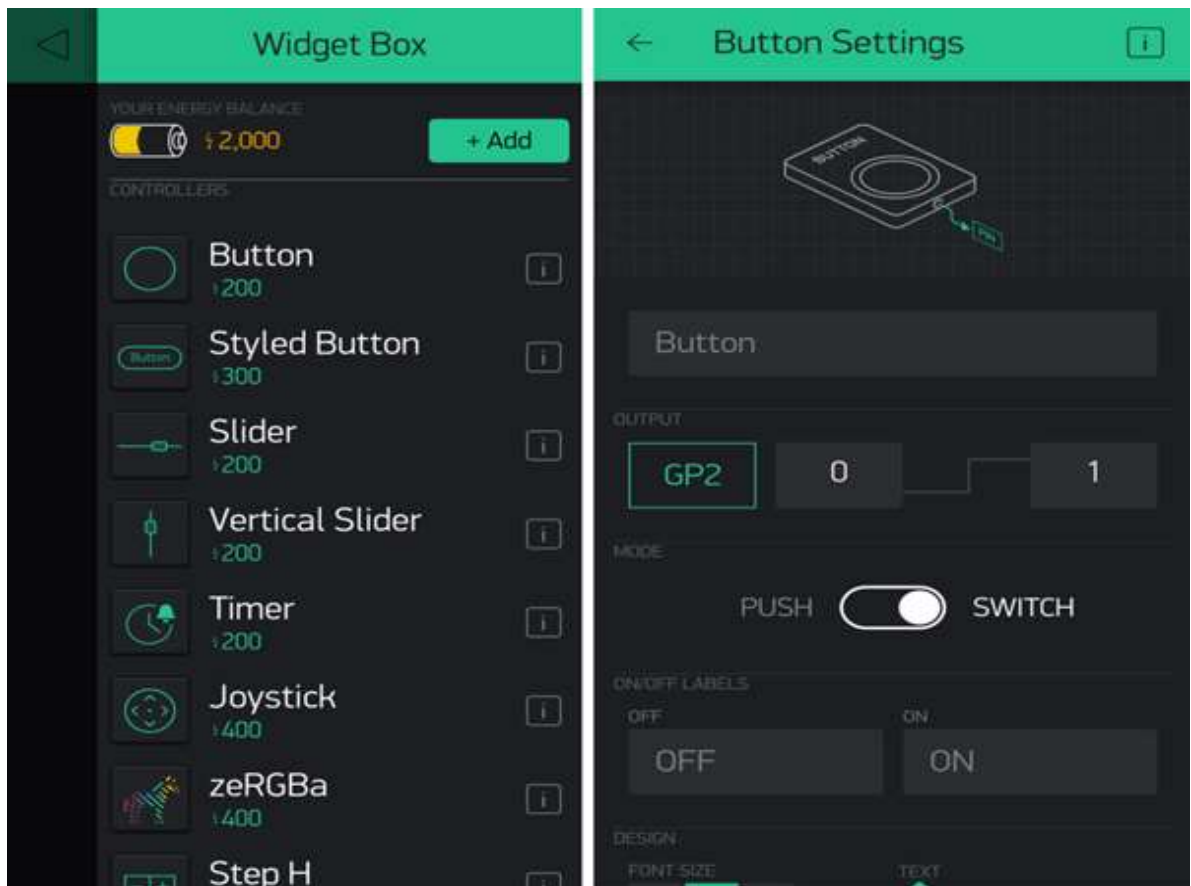
Fig 3: Blynk app overview.

Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.
There are three major components in the platform:
Blynk App: – It allows you to create amazing interfaces for your projects using various widgets which are provided.

Blynk Server: – It is responsible for all the communications between the smartphone and hardware. You can use the Blynk Cloud or run your private Blynk server locally. It's open-source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.
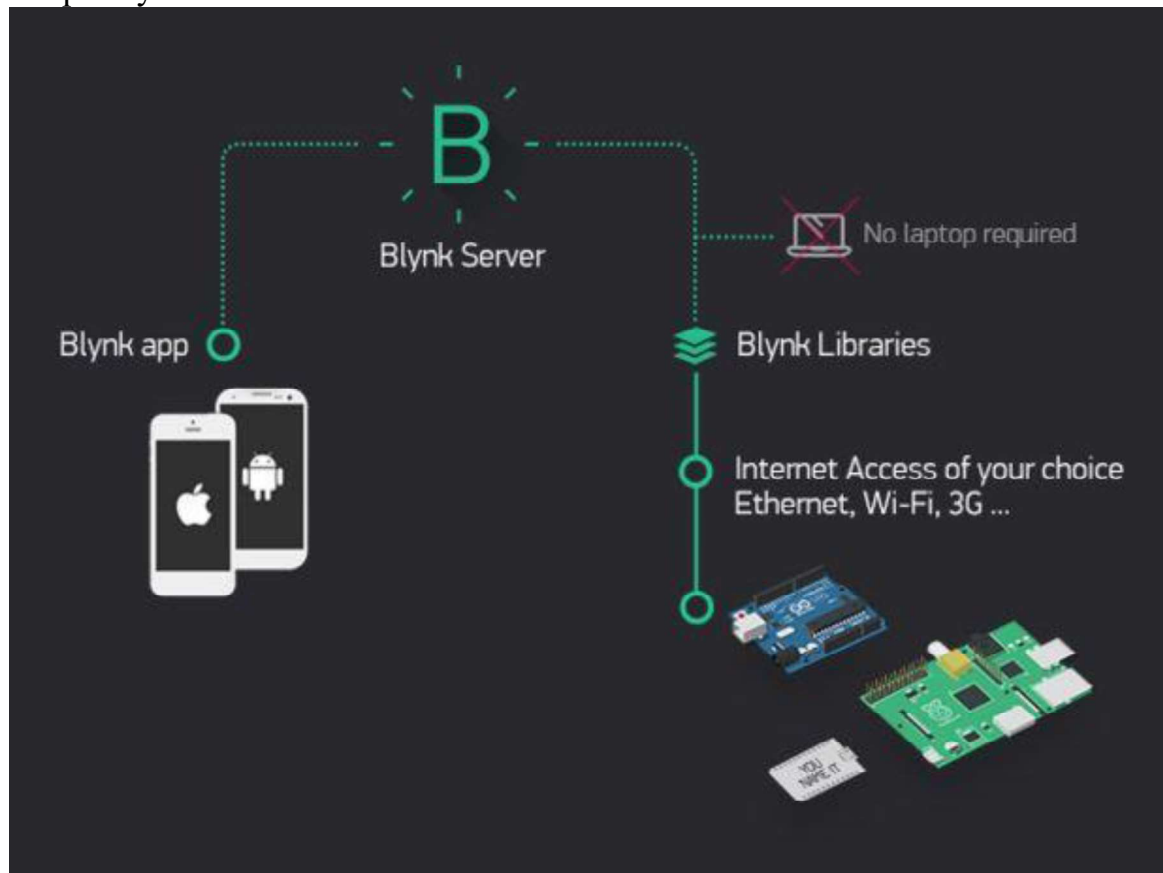
Blynk Libraries: – It enables communication, for all the popular hardware platforms, with the server and process all the incoming and outcoming commands.

Now imagine, every time you press a Button in the Blynk app, the message travels to the Blynk Cloud, where it magically finds its way to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

Fig 4: Blynk cloud architecture.

Characteristics of Blynk are:
Similar API & UI for all supported hardware & devices
Connection to the cloud can be done using Ethernet, Wi-Fi, Bluetooth, BLE and USB (Serial)
Set of easy-to-use Widgets
Direct pin manipulation with no code writing
Easy to integrate and add new functionality using virtual pins
History data monitoring via History Graph widget
Device-to-Device communication using Bridge Widget

Sending emails, tweets, push notifications, etc.

3.3Relay Module:

A relay is an electrically operated switch that can be turned on or off, letting the current go through or not, and can be controlled with low voltages, like the 5V provided by the Arduino pins.

Controlling a relay module with the Arduino is as simple as controlling any other output as we'll see later on. This relay module has two channels (those blue cubes). There are other models with one, four and eight channels. This module should be powered with 5V, which is appropriate to use with an Arduino. There are other relay modules that are powered using 3.3V, which is ideal for ESP32, ESP8266, and other microcontrollers.

Relay Pinout

The following figure shows the relay module pinout.
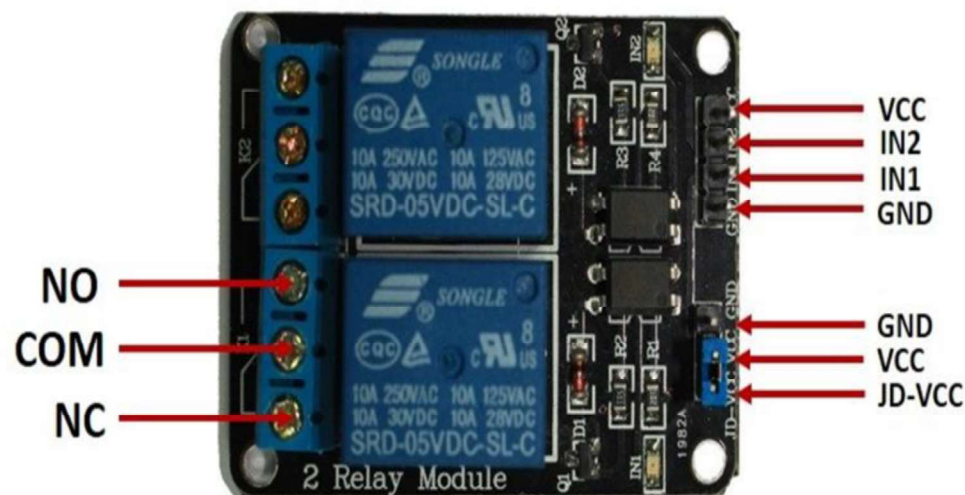
The six pins on the left side of the relay module connect high voltage, and the pins on the right side connect the component that requires low voltage—the Arduino pins

Mains voltage connections:

The high-voltage side has two connectors, each with three sockets: common (COM), normally closed (NC), and normally open (NO).
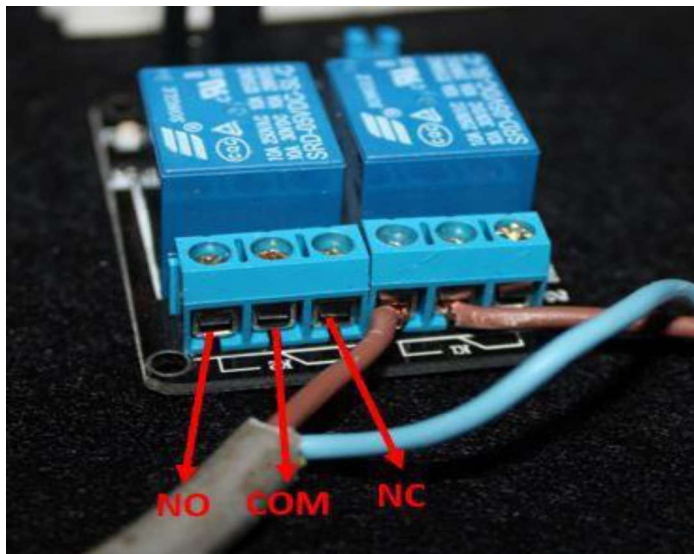
COM: common pin

NC (Normally Closed): the normally closed configuration is used when you want the relay to be closed by default, meaning the current is flowing unless you send a signal from the Arduino to the relay module to open the circuit and stop the current.

NO (Normally Open): the normally open configuration works the other way around: the relay is always open, so the circuit is broken unless you send a signal from the Arduino to close the circuit

3.5: Code Basics

So in this step I will explain on how little on what I have done in the code and you can find the code attached at the end of the instrucatbles.

In the Initial lines of code I have initialised all the pins required for the home automation project

Then an important function called **Blynk.begin(auth, "SSID Name", "*******")** is called. In its parameters you should give in the SSID name and password of your network .

Then there is a function called **Blynk.run()**. This is the most important function as this function keeps on listening for data and command from the blynk server which in turn receives the command from the Blynk app on your smartphone.

Another important function to find the RSSI strength is the **WiFi.RSSI()** . This function provides the signal strength

The expression dBm is used to define signal strength in wires and cables at RF and AF frequencies. The symbol is an abbreviation for "decibels relative to one milliwatt," where one milliwatt (1 mW) equals 1/1000 of a watt (0.001 W or 10 -3 W). This unit is commonly used in test laboratories

To find the Local Ip address to which the device is connected we use **WiFi.localIP()**;

A very important concept used here is the Virtual Pins. What are **Virtual Pins**?

Virtual Pins are designed to send any data from your microcontroller to the Blynk App and back.Anything you connect to your hardware will be able to talk to Blynk. With Virtual Pins you can send something from the App, process it on micro

controller and then send it back to the smartphone. You can trigger functions, read I2C devices, convert values, control servo and DC motors etc.

Virtual Pins can be used to interface with external libraries (Servo, LCD and others) and implement custom functionality.

You can send any data from Widgets in the app to your hardware.
All Controller Widgets can send data to Virtual Pins on your hardware.

For example, code below shows how to get values from the Button Widget in the App

BLYNK_WRITE(V1) //Button Widget is writing to pin V1

{ int pinData = param.asInt(); } //When you press a Button, Blynk App sends 1 On the second click - it sends 0

With this you can perform any action you want . For ex you keep a led on pin 13 and this should glow when you press Virtual Pin V1, Then the code you should implement is

```
 Change WiFi ssid, pass, and Blynk auth token to run :)

 *************************************************************/
#define BLYNK_PRINT Serial

#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>


// You should get Auth Token in the Blynk App.

// Go to the Project Settings (nut icon).
```

```
char auth[] = "YourAuthToken";

// Your WiFi credentials.

// Set password to "" for open networks.

char ssid[] = "YourNetworkName";

char pass[] = "YourPassword";

void setup()

{

// Debug console

Serial.begin(9600);

Blynk.begin(auth, ssid, pass);

Blynk.syncAll(); //This will sync the last state of your device

}

void loop()

{

Blynk.run();

}
```

Chapter 4	Project…steps

We have reached the final step of our process and now just follow the below steps

1. Plug in the board and upload the program

2. While uploading the program do not forgot to put correct SSID and Wifi name

3. Upload and wait for a while , till the sensor is stable and then open the com port , you will see the status , that Blynk is connected to the internet

4. Once it is confirmed, then unplug the device from the PC and power it up an 5V Dc source and enjoy controlling your home appliances

CONCLUSION

The paper has been experimentally proven to work successfully. We can control the AC loads using the Blynk app or manually using the normal switches. The designed system can be controlled from anywhere throughout the world. This will help the user by saving the power by switching off the home appliances in case of forgot to switch off. This will also help for physically disabled people who might otherwise require care givers.

In this paper we have introduced advance era for home management system and security to make human life more easy and luxuries. This paper deals with problem faced by peoples in day to day life, main Moto of this paper is to make things less complex and available in low prices.

Chapter 6

Future Scope

6 **The future work include**:- 1. To make it available in very less cost to ruler area peoples and schools.

7 2. Reducing more complexity of things and easily available to people.

8 3. Increasing security of the system.

References

Chapter 7	**REFERENCES**

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