



SOLAR BASED HOME AUTOMATION USING NODEMCU



DESIGN PROJECT 2

REPORT

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SAMAYAPURAM – 621 112

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**K.RAMAKRISHNAN COLLEGE OF TECHNOLOGY
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BONAFIDE CERTIFICATE

Certified that this project report titled “SOLAR BASED HOME AUTOMATION USING NODE MCU” is the bonafide work of **RAGHUNATH SP(811720104079), RAGUL R(81172010480), SUNIL D(811720104107), G.VELUKISHORE (811720104114)** who carried out the project under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation based on which a degree or award was conferred on an earlier occasion on this or any other candidate.

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We jointly declare that the project report on “**SOLAR BASED HOME AUTOMATION USING NODE MCU**” is the result of original work done by us and best of our knowledge, similar work has not been submitted to “**ANNA UNIVERSITY CHENNAI**” for the requirement of Degree of **BACHELOR OF ENGINEERING**. This project report is submitted on the partial fulfilment of the requirement of the award of Degree of **BACHELOR OF ENGINEERING**.

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ABSTRACT

With advancement of Automation technology, life is getting simpler and easier in all aspects. Home automation system achieved great popularity in the last decades and it increases the comfort and quality of life. With the rapid increase in the number of users of internet over the past decade has made Internet a part and parcel of life, and IoT is the latest and emerging internet technology. Internet of things is a growing network of everyday object-from industrial machine to consumer goods that can share information and complete tasks while you are busy with other activities. Wireless Home Automation system (HAS) using IoT is a system that uses computers or mobile devices to control basic home functions and features automatically through internet from anywhere around the world, an automated home is sometimes called a smart home. It is meant to save the electric power and human energy . Home Automation system(HAS) uses the Blynk Community that employs the integration of cloud networking, wireless communication, to provide the user with remote control of various lights, fans, and appliances within their home and storing the data in the cloud. The system will automatically change on the basis of sensors' data. This system is designed to be low cost and expandable allowing a variety of devices to be controlled .The sensing of different variables inside the house is conducted using the NodeMCU-ESP8266 and Blynk app.

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LIST OF ABBREVIATIONS

Symbol	Description
MCU	Micro Controller Unit
IOT	Internet of things
HAS	Home automation system
DC	Direct current
AC	Alternating current
ESP8266	Espressif Systems
USB	Universal serial bus
HVAC	Heating , ventilation and air conditioning

CHAPTER-1

INTRODUCTION

INTRODUCTION

The first home automation technology was developed in 1975 using a network technology called X10, which is a communication protocol that was used for home automation devices . With the increasing prevalence of burglary and personal threats to home occupants and property damage, it is crucial to have an effective system to keep track of security in the home and environment. The safety and security of lives and properties are of great concern and should be prioritized. Therefore, a home should be equipped with an intelligent system to monitor remotely, control, and report activities to the occupant.

To achieve security, safety, convenience, and control of a home, the need arises for an intelligent home automation system. A smart home is an application of the Internet of things (IoT) that enables occupants to monitor, control conveniently, and oversee their home activities from any location. The Internet of things is an interconnected system that allows electronic devices to communicate and exchange data through network connectivity. Smart home automation systems are therefore integral in ensuring a high quality of life by monitoring and controlling the home environment.

The primary aims of a smart home automation system are safety, control of appliances and the physical environment, and reduction in energy consumption. Appliances and devices are networked through the IoT home hardware technologies of sensors and actuators for communication and automation, offering localized or remote home control thereby making the home intelligent by offering services that involve little human input or interaction. The system is designed to be low-cost, flexible, and extensible. The mobile application gives the command to switch OFF or ON any of the electrical home appliances for efficient use of energy. The system is designed to be low-cost, flexible, and extensible.

1.1 Solar based Home Automation using NODEMCU

Solar-based home automation using NODEMCU and the Blynk app is an innovative application of IoT (Internet of Things) technology that allows homeowners to control and monitor various aspects of their homes using a solar power source. This system combines the power of renewable energy with smart home automation, providing energy-efficient and eco-friendly solutions. The project utilizes the NODEMCU microcontroller, which is an open-source development board based on the ESP8266 Wi-Fi chip. It integrates Wi-Fi capabilities, making it ideal for connecting devices to the internet and creating a network of smart devices. The Blynk app, on the other hand, provides a user-friendly interface to control and monitor the connected devices remotely.

Home automation can include controlling aspects of your home remotely through a computer or phone, programming electronic devices to respond automatically to certain conditions or centralizing the control of a variety of items by a single control center. Internet of Things(IoT) is nothing but connecting different real world objects to provide proper communication, synchronization, and inter-connecting between various devices. The system named Solar Power used to overcome the problem of load shedding and reducing the electricity bills i.e, grid power will be reduced and in turn results into efficient use of renewable energy

1.2 PROBLRM STATEMEENT

- Nowadays, People are looking at ways and means to improve their lifestyle using the latest technologies to control and operate home appliances.
- In order to compensate the Growing energy needs and increasing environmental concern, alternatives to the use of non-renewable and polluting fossil fuels have to be investigated.
- Living with disability and physically weak depend on others and even feel harder to take care of their daily task inside the home.
- To improve their lifestyle and make their life inside home more easier,HOME AUTOMATION gives a solution

1.3 SCOPE

The scope of this project encompasses the integration of solar power, home automation, and IoT technologies to create an efficient and sustainable smart home system. Here are some key aspects within the scope of this project:

- **Solar Power Integration:** The system incorporates solar panels to harness renewable energy and power the home automation devices. Solar energy is a clean and sustainable source, reducing the reliance on traditional electricity sources.
- **NODEMCU and Blynk Integration:** The NODEMCU microcontroller serves as the central hub for connecting and controlling various smart devices in the home. It communicates with the Blynk app, allowing users to remotely control and monitor the connected devices using their smartphones or tablets.
- **Home Automation:** The system enables automation of various home appliances and devices, such as lights, fans, air conditioning, security systems, and more. Users can schedule and automate the operation of these devices based on their preferences and needs.

- **Energy Monitoring:** The integration of IoT technology allows homeowners to monitor the energy consumption of different devices in real-time. This feature helps users understand their energy usage patterns, optimize energy consumption, and make informed decisions to reduce energy waste.
- **Remote Access and Control:** With the Blynk app, users can access and control their home automation system from anywhere in the world as long as they have an internet connection. This capability provides convenience, security, and flexibility to homeowners.

Overall, this project aims to combine solar power, home automation, and IoT technologies to create a sustainable, energy-efficient, and user-friendly system that enhances the comfort and convenience of homeowners while reducing their environmental impact.

CHAPTER-2

SYSTEM ANALYSIS

2.1 EXISTING SYSTEM

Home automation has come a long way in recent years, and there are various existing systems available in the market that provide automated control over different aspects of a home. Here are some common features and components found in existing home automation systems:

- **Central Control Hub:** Most home automation systems have a central control hub that serves as the brain of the system. This hub is usually a device or a software platform that allows users to connect and control various smart devices and appliances.
- **Wireless Communication Protocols:** Existing systems utilize wireless communication protocols such as Wi-Fi, Bluetooth, Zigbee, or Z-Wave to establish connections between the central control hub and the smart devices. These protocols enable seamless communication and control over the devices from a single interface.
- **Smart Devices and Appliances:** Home automation systems support a wide range of smart devices and appliances, including smart lights, thermostats, door locks, surveillance cameras, entertainment systems, and more. These devices are designed to be compatible with the automation system and can be controlled remotely.
- **Mobile Applications:** Many home automation systems offer dedicated mobile applications that allow users to control and monitor their smart devices from their smartphones or tablets. These apps provide an intuitive interface for managing automation settings, scheduling tasks, and receiving notifications.
- **Voice Control Integration:** Some home automation systems integrate with popular voice assistants like Amazon Alexa, Google Assistant, or Apple Siri. This feature enables users to control their smart devices using voice commands, adding an extra layer of convenience and hands-free operation.
- **Energy Management:** Certain home automation systems include energy management features, such as energy monitoring, power scheduling, and

energy usage reports. These features help homeowners track their energy consumption, optimize usage, and potentially reduce energy costs.

- **Security and Surveillance:** Many home automation systems offer security and surveillance features, allowing users to monitor their homes remotely and receive alerts in case of any suspicious activities. These systems may include motion sensors, door/window sensors, and security cameras.
- **Integration with Third-Party Services:** Some home automation systems support integration with third-party services like IFTTT (If This, Then That) or other smart home ecosystems. This integration allows users to create custom automation routines, integrate with other smart devices, and expand the functionality of their system.
- Existing home automation systems have made significant advancements in terms of functionality, ease of use, and interoperability. However, there is always room for improvement and customization based on individual requirements and preferences.

2.2 PROPOSED SYSTEM

- The home get its power from the solar panel.
- For consistent supply , Battery is used to store the energy for 24/7 accessibility.
- Solar charge controller is used to keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery.
- Solar output is boosted by DC-DC boost converter and converted into AC using inverter.
- Regulator is used to regulate a constant voltage across the relay module
- A 5V,4 channel relay acts as a switch that controls the home appliances.
- NodeMCU is a micro-controller unit which can connect object and let data transfer using wifi module. Blynk application is used to provide a order of control to operate home appliances by manually using android mobile

CHAPTER-3 SYSTEM DESIGN

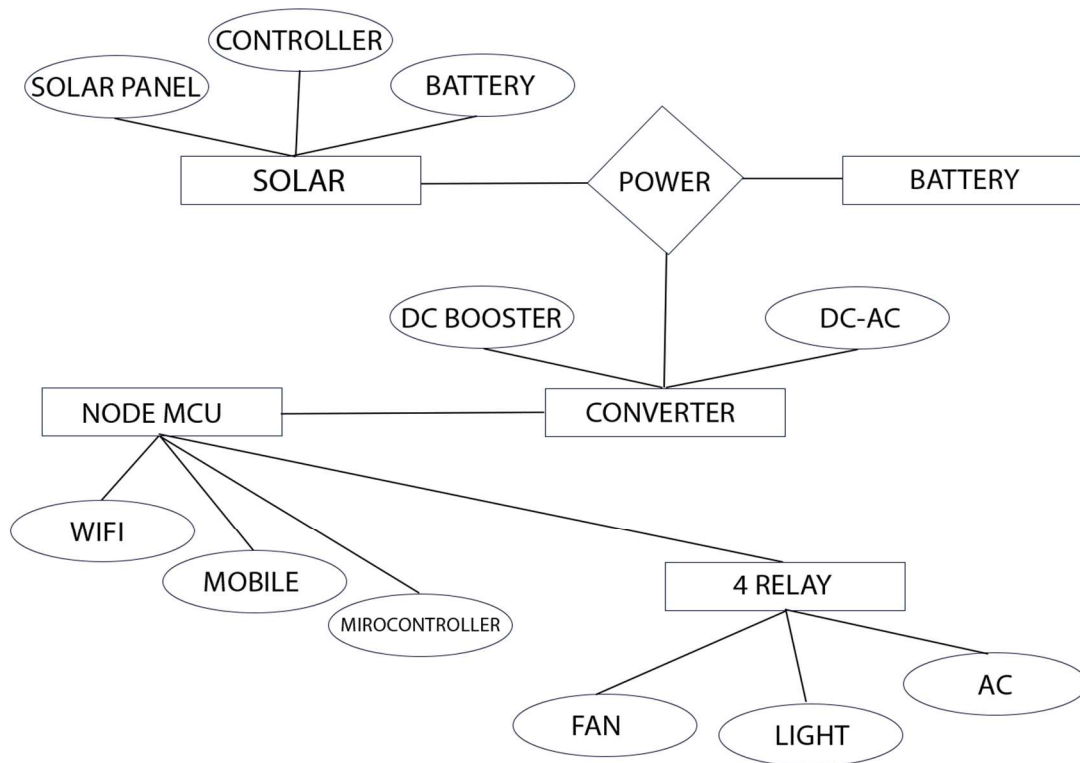
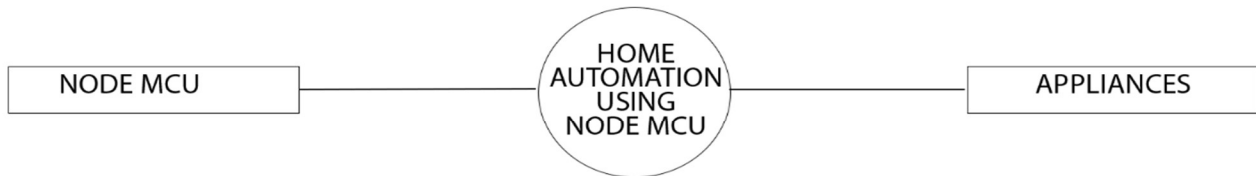


Fig3.1ER Diagram

0th LEVEL DIAGRAM



1st LEVEL DIAGRAM

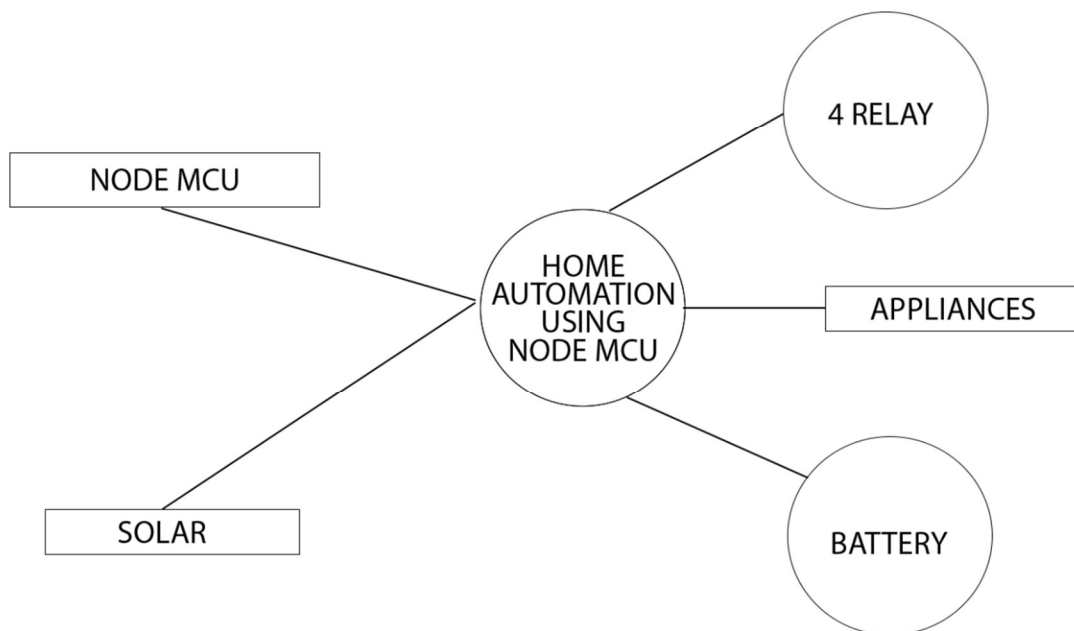


Fig 3.2 Data flow diagram

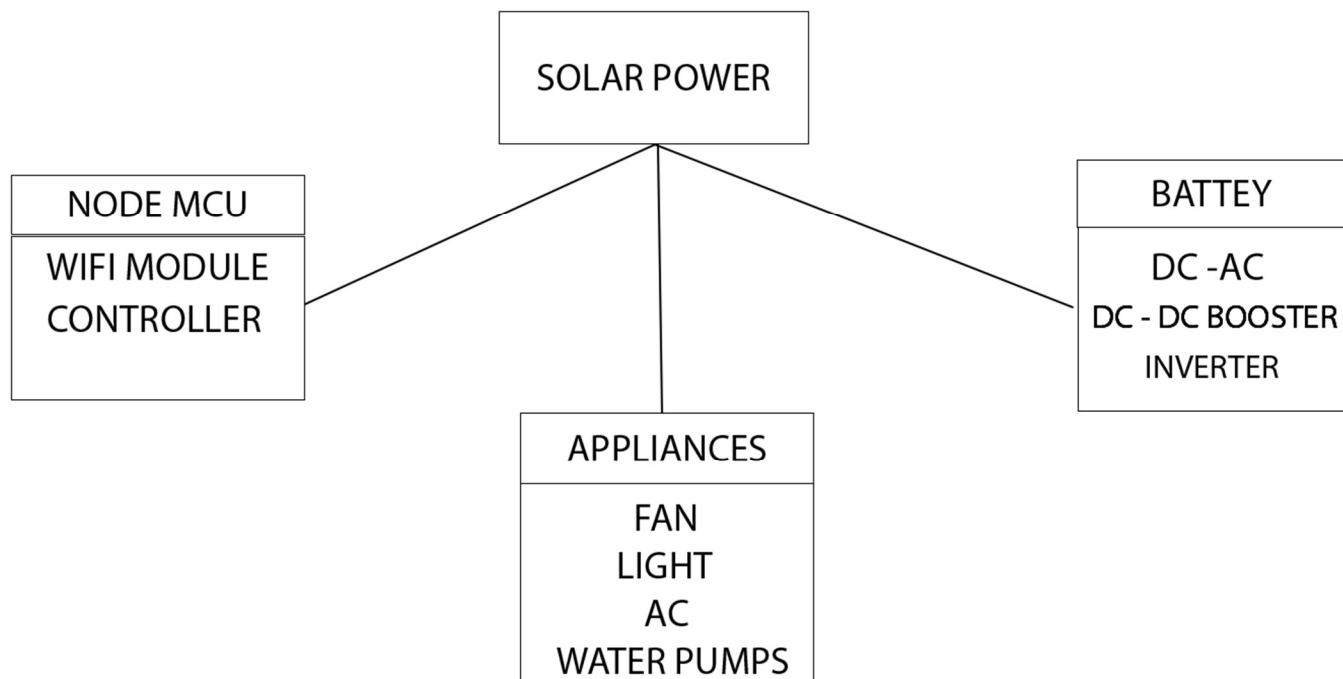


FIG 3.3 CLASS DIAGRAM

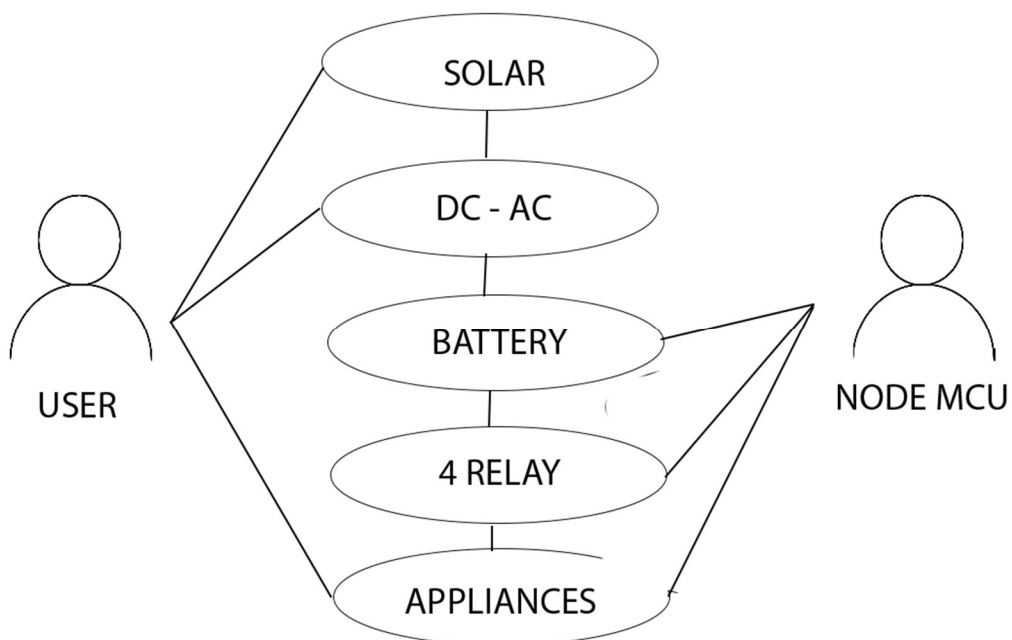


FIG 3.4 CLASS DIAGRAM

CHAPTER-4

LITERATURE REVIEW

The expeditiously growing internet has opened new horizons for development in various fields. The home automation industry has seen a brisk growth in the last few years. It has become a topic of interest of many people around the globe.

1) Vishwateja Mudiam Reddy & Naresh Vinay in their paper “Internet of Things Enabled Smart Switch”

They designed a system which integrates the cloud and web app. With the help of flip-flops, logic gates and a processor, the switches could be controlled. The proposed model was intended for reducing the cost of these systems which was the main barrier in the wide adaptation of this technology.

2) Khusvinder Gill & Shuang-Hua Yang[2] created a common home gateway for ZigBee and Wi-Fi.

This enabled remote control using a simple user interface. The system was cost effective and had good security inside the house.

3) Salma and Dr. Radcliffe

The aim of increasing the popularity and reach of home automation designed a system that used the Novel Network Protocol. It gave the option of controlling the commercial devices through a mobile or laptop. An additional network device was used for remote access instead of a microcontroller.

4) Carelin and I. Jacob Raglend

A flexible and simple system with an ability to integrate with very fewer efforts for off the shelf products was created.

5] The system used ZigBee for home controlling and GSM for remote access.

It did not provide any GUI and also it was prone to security threats as anyone could access the system.

6] Rozita Teymourzadeh, Salah Addin Ahmed

A GSM based system for home automation. Using the GSM protocol ,it became possible to access the system by using the Short Message System (SMS). The system also gave feedback to the user about the current state of any desired object.

7] H. Kanma

Proposes a home automation system using Bluetooth that can be accessed remotely through GPRS. The researchers use a cellphone equipped with Bluetooth connectivity as a host controller and a GSM modem that provides Internet connectivity. Home devices are fitted with Bluetooth communication adapters so that they can communicate with the host controller phone via Bluetooth. The paper discusses remotely controlling and updating home devices along with fault diagnostics and detection.

CHAPTER 5

PROPOSED SYSTEM

5.1 WORKING PRINCIPLE

- The home get its power from the solar panel.
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- Solar charge controller is used to keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery
- Solar output is boosted by DC-DC boost converter and converted into AC using inverter.
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- A 5V,4 channel relay acts as a switch that controls the home appliances.
- NodeMCU is a micro-controller unit which can connect object and let data transfer using wifi module.
- Blynk application is used to provide a order of control to operate home appliances by manually using android mobile.

CHAPTER 6

METHODOLOGY

This research is conducted based on the important steps that are done by orienting on the success indicators in connecting the NodeMCU ESP8266 module and other devices so that it can be used to solve multi-objective problems. To achieve these indicators, the stages of this research are as follows:

- 1) Analysis of the problem. Analyze the problems to be studied regarding smart home.
- 2) Analysis of needs. In this case all needs in researching both from journals, literature books, tools, and materials.
- 3) System design. Designing tools to be built using the NodeMCU ESP8266 module, and the sensors used.
- 4) System programming. Make a program using the Arduino IDE and the Blynk android application.
- 5) Testing tools. Testing tools with program codes created and internet connections.
- 6) Making reports and summarizing the results of the experiment. See system responsiveness to commands given to smart home.

CHAPTER 7

BLOCK DIAGRAM

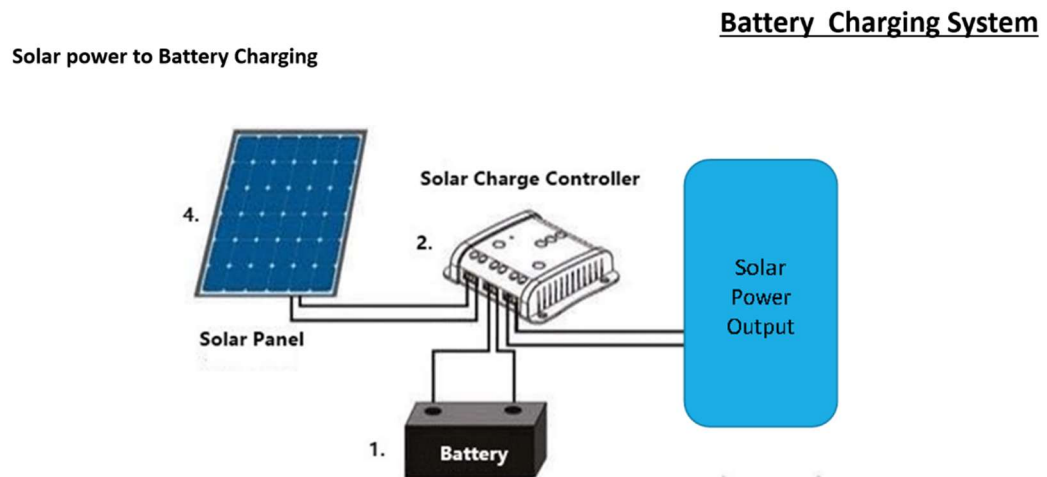


Fig 1 : Block diagram of battery charging system

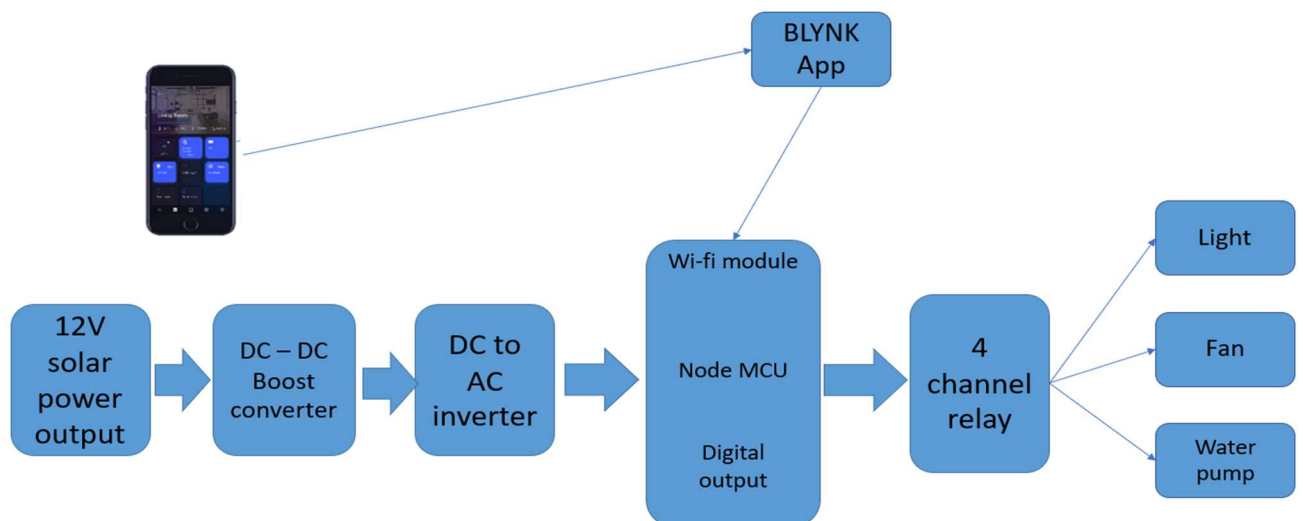


Fig 2 : Block diagram of proposed model

CHAPTER 8

CIRCUIT DIAGRAM

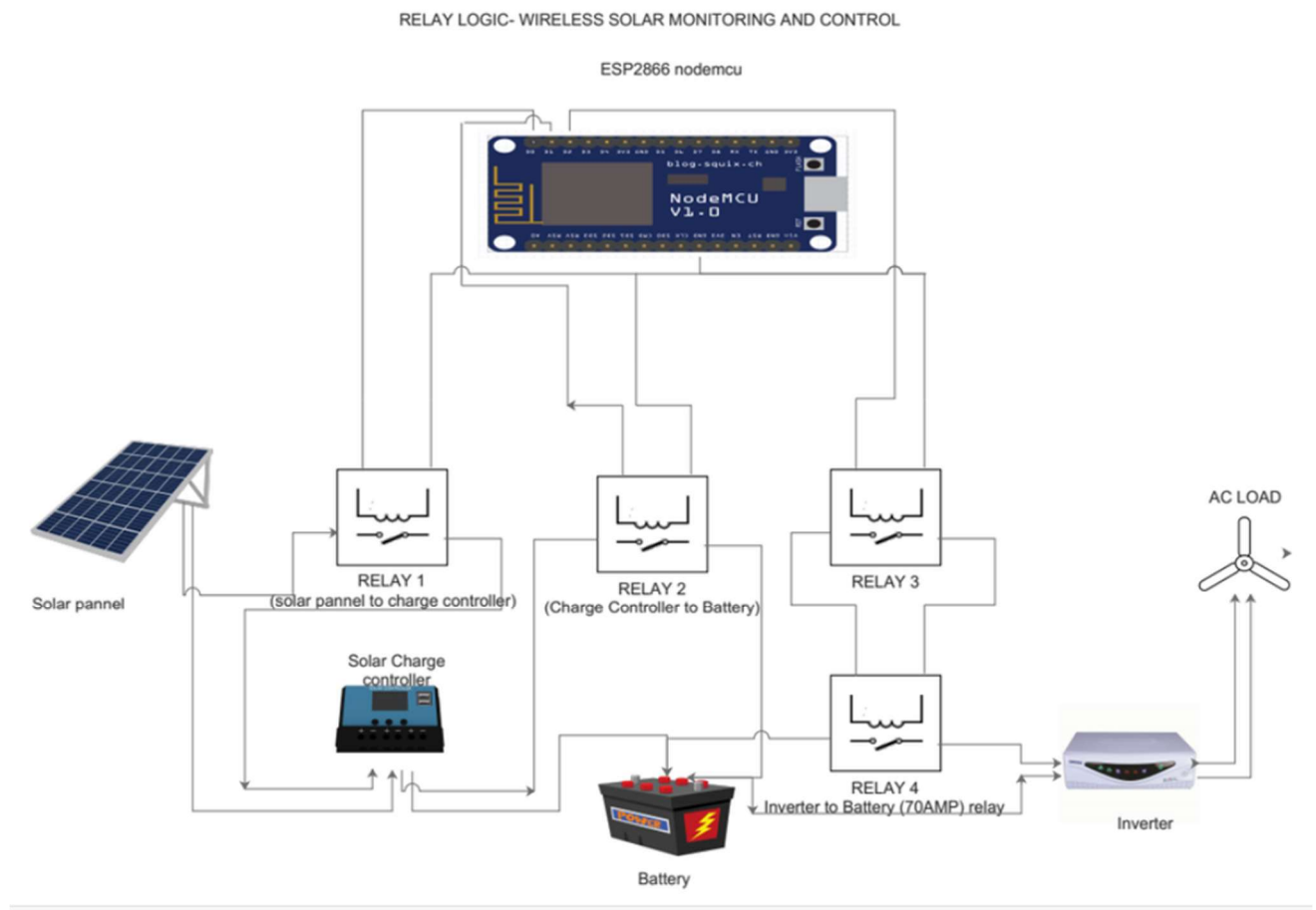


Fig 3 : Circuit diagram of the proposed model

CHAPTER 9

FLOW DIAGRAM

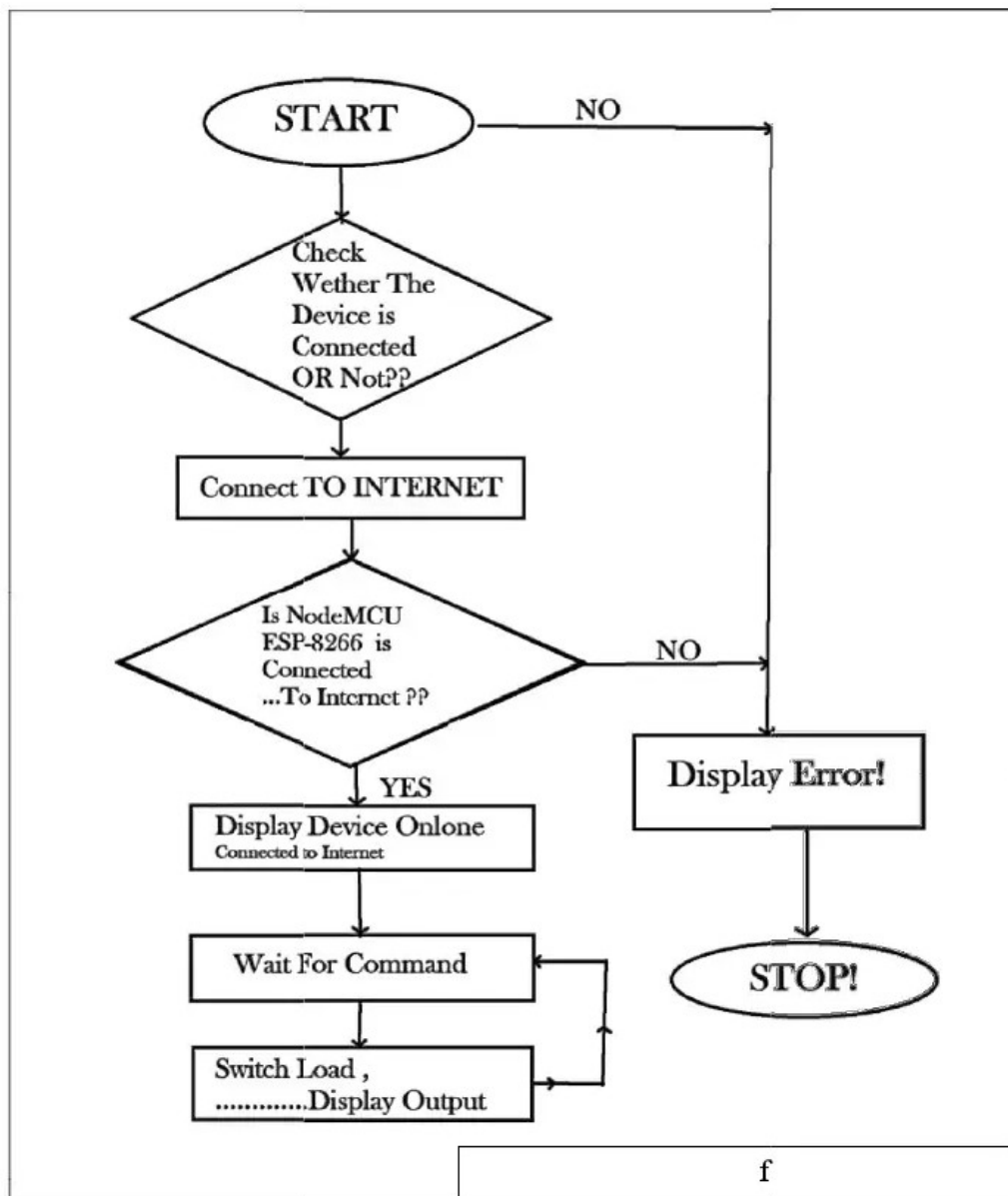


Fig 4 : Flow diagram of the proposed model

9.1 The Flow of The System

The system is based on NodeMCU board as an internet of things system. The NodeMCU is connected to the internet from the hotspot of the smart phone via WIFI connection as the NodeMCU has ESP8266 circuit to connect with the internet.

- 4 NodeMCU to be connected to the hotspot of the smart phone, needs to be identified to the name of hotspot, the password and token code letting the server of Blynk connects them together.
 - You may need the computer once to transfer code from Arduino IDE to the NodeMCU kit to prepare the software part of the project.
 - Figure 1 shows that the server of Blynk application will process the smartphone-NodeMCU connection.
-
- Blynk libraries are ZIP files can be downloaded from Github website to be imported to the Arduino IDE library.
 - Blynk server will check for internet connection, NodeMCU with android hotspot, the NodeMCU code includes the token code, the name of hotspot and it's password.
 - The information included to the code must be match with the hotspot information to allow ESP8266 connect with the WIFI to be as a channel to exchange commands between smart phone and NodeMCU.
 - Remaining processes are just commands sent from Blynk application to NodeMCU to control loads those are connected to the relay kit.

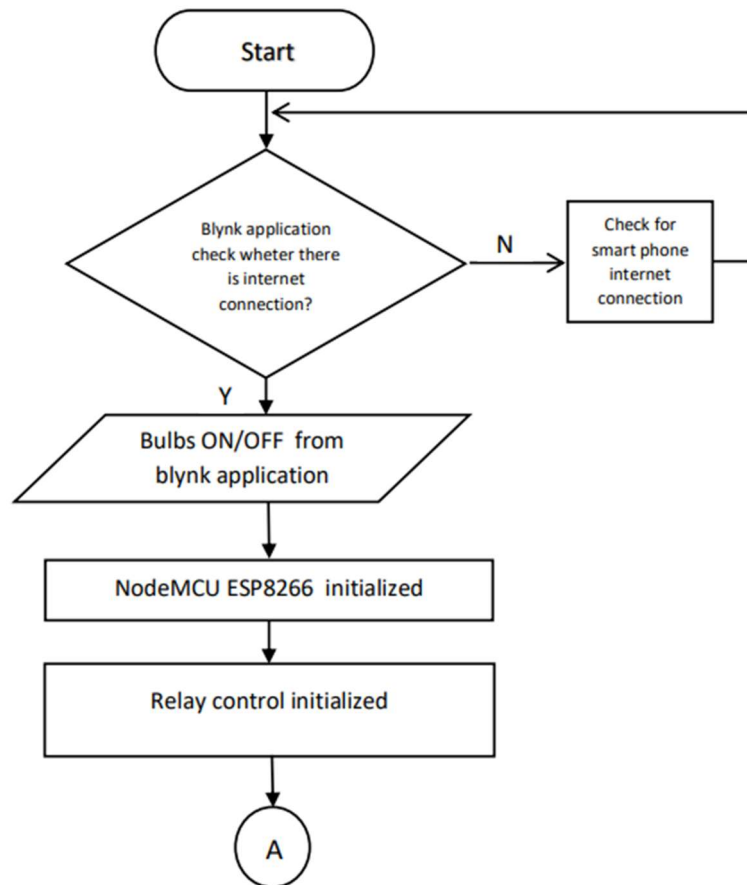


Fig 5 : Flow of system using Blynk app

CHAPTER 10

IMPLEMENTATION OF BLYNK APP

Step 1: Create Blynk Cloud FREE Account

Step 2: Create a New Template in Blynk Cloud

Step 3: Create a Data stream in Blynk Cloud

Step 4: Set Up Blynk Cloud Web Dashboard

Step 5: Install Blynk IoT App to Configure Mobile Dashboard

Step 6: Add Widgets in Blynk IoT App

Step 7: Program the NodeMCU for This Blynk Project

Step 8: Update the Wi-Fi Credentials Through OTA

Step 9: Connect the Home Appliances

Step 10: Finally!! the Blynk Smart Home System Is Ready

CHAPTER 11

COMPONENTS DESCRIPTION

11.1 NODEMCU

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. It can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

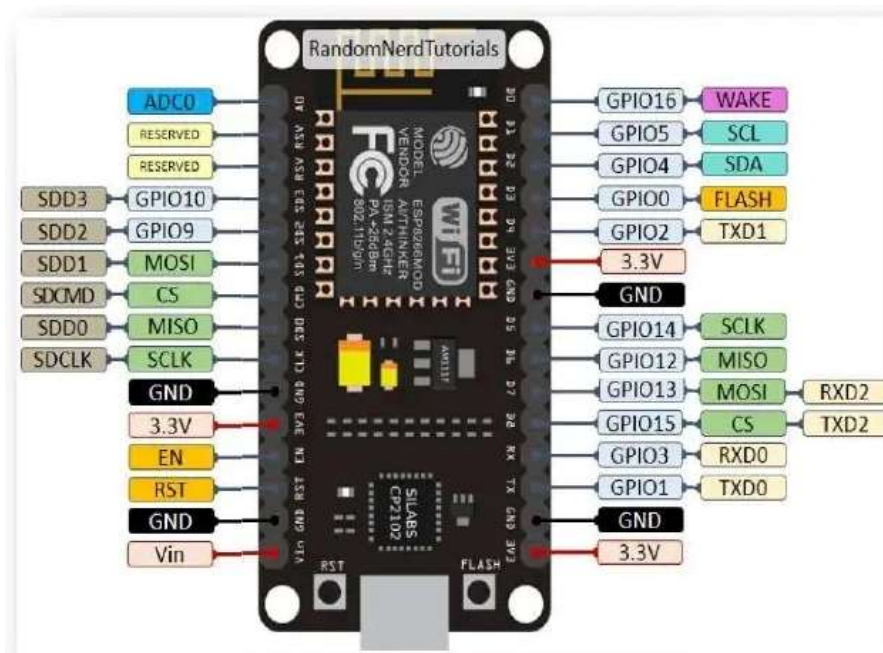


Fig 6 : Pin description of NodeMCU

SPECIFICATIONS

- Voltage:3.3V.
- Wi-Fi Direct (P2P), soft-AP.

- Current consumption: 10uA~170mA.
- Flash memory attachable: 16MB max (512K normal).
- Integrated TCP/IP protocol stack.
- Processor: Tensilica L106 32-bit.
- Processor speed: 80~160MHz. • RAM: 32K + 80K.
- GPIOs: 16 (multiplexed with other functions).
- Analog to Digital: 1 input with 1024 step resolution.
- +19.5dBm output power in 802.11b mode • 802.11 support: b/g/n.
- Maximum concurrent TCP connections: 5

11.2 RELAY DRIVER

A relay is a switch with an electric operation. A relay driver circuit is a circuit type that runs a relay, therefore, contributing to an appropriate circuit function. In turn, the relay switch opens or closes, as per the circuit requirement and functioning. The different relay types particularly benefit mains AC load switching or high-power transfer circuits a great deal. Not only that, but they are also cheap and practically easy to use, even for a first-timer.

WORKING PRINCIPLE:

A relay structure comprises a spring-loaded contact and coil that move undisturbed across a pivoted axis. The central pole ensures that as the relay coil receives voltage, it joins the N/C contact (Normally Closed). The connection happens because the relay coil has an electromagnetic pull that attracts the pole iron. Later, when you switch OFF the relay coil, the central pole disconnects from the Normally Open (N/O) terminal. It then joins the N/C switch contact terminal hence being in a default contact position. Generally, the switch OFF and switch ON operations in a relay drive alternately switches N/C to N/O. And it majorly depends on the state of the relay coil.

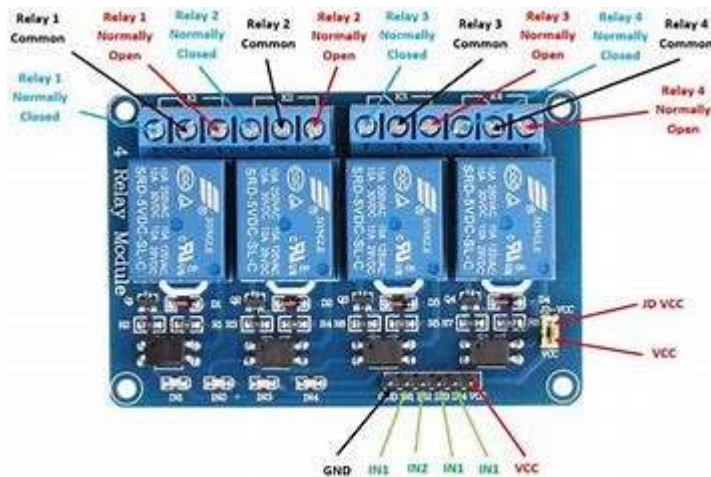


Fig 7 : Pin description of 4 channel relay

PIN DESCRIPTION

- 1) Input: 0-5 V
- 2) VCC: Positive supply voltage
- 3) GND: Ground
- 4) IN1--IN4: Relay control port
- 5) Output: supports various types of loads
- 6) Connect a load, DC 30V/10A, AC 250V/10A

FEATURES

1. Size: 75mm (Length) * 55mm (Width) * 19.3mm (Height)
2. Weight: 61g
3. PCB Color: Blue
4. There are four fixed screw holes at each corner of the board, easy for install and fix. The diameter of the hole is 3.1mm
5. High quality Single relay is used with single pole double throw, a common terminal, a normally open terminal, and a normally closed terminal
6. Optical coupling isolation, good anti-interference.

7. Closed at low level with indicator on, released at high level with indicator off
8. VCC is system power source, and JD_VCC is relay power source. Ship 5Vrelay by default. Plug jumper cap to use
9. The maximum output of the relay: DC 30V/10A, AC 250V/10A

11.3 BOOST CONVERTER

A boost converter is one of the simplest types of switch mode converter. As the name suggests, it takes an input voltage and boosts or increases it. All it consists of is an inductor, a semiconductor switch (these days it's a MOSFET, since you can get really nice ones these days), a diode, and a capacitor. Also needed is a source of a periodic square wave. This can be something as simple as a 555 timer or even a dedicated SMPS IC like the famous MC34063A IC.



11.4 SOLAR PANEL:

Solar panels collect clean renewable energy in the form of sunlight and convert that light into electricity which can then be used to provide power for electrical loads. Solar panels are comprised of several individual solar cells which are themselves composed of layers of silicon, phosphorous (which provides the negative charge), and boron (which provides the positive charge). Solar panels absorb the photons and in doing so initiate an electric current. The resulting energy generated from photons striking the surface of the solar panel allows electrons to be knocked out of their atomic orbits and released into the electric field generated by the solar cells which then pull these free electrons into a

directional current. This entire process is known as the Photovoltaic Effect. An average home has more than enough roof area for the necessary number of solar panels to produce enough solar electricity to supply all of its power needs excess electricity generated goes onto the main power grid, paying off in electricity use at night.



BENEFITES:

Using solar panels is a very practical way to produce electricity for many applications. The obvious would have to be off-grid living. Living off-grid means living in a location that is not serviced by the main electric utility grid. Remote homes and cabins benefit nicely from solar power systems. No longer is it necessary to pay huge fees for the installation of electric utility poles and cabling from the nearest main grid access point. A solar electric system is potentially less expensive and can provide power for upwards of three decades if properly maintained.

11.5 BATTERY:

A battery can be defined as an electrochemical device (consisting of one or more electrochemical cells) which can be charged with an electric current and discharged whenever required. Batteries are usually devices that are made up of multiple electrochemical cells that are connected to external inputs and outputs.

Batteries are widely employed in order to power small electric devices such as mobile phones, remotes, and flashlights. Historically, the ‘term’ battery has always been used in order to refer to the combination of two or more electrochemical cells.



11.6 SOLAR CHARGE CONTROLLER

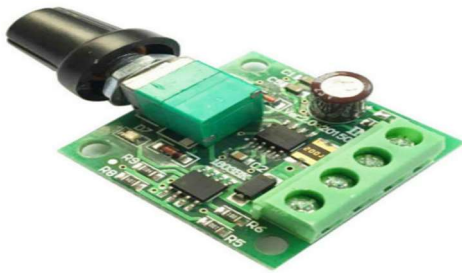
Solar Charge Controller is an electronic device that manages the power going into the battery bank from the solar array. It ensures that the deep cycle batteries are not overcharged during the day and that the power doesn't run back to the solar panels overnight and drain the batteries. Some charge controllers are available with additional capabilities, like lighting and load control, but managing the power is its primary job.

A solar charge controller is available in two different technologies, PWM and MPPT. An MPPT charge controller is more expensive and highly efficient than a PWM charge controller, and it is often worth it to pay the extra money.



11.7 REGULATOR

The output voltage or current will change or fluctuate when there is change in the input from ac mains or due to change in load current at the output of the regulated power supply or due to other factors like temperature changes. This problem can be eliminated by using a regulator. A regulator will maintain the output constant even when changes at the input or any other changes occur.



11.8 INVERTER

An inverter is used to produce an un-interrupted 220V AC or 110V AC (depending on the line voltage of the particular country) supply to the device connected as the load at the output socket. The inverter gives constant AC voltage at its output socket when the AC mains power supply is not available.



CHAPTER 12

PROGRAM

```
#define BLYNK_TEMPLATE_ID      "TMPL1QIAe72C"

#define BLYNK_DEVICE_NAME      "Quickstart Device"

#define BLYNK_AUTH_TOKEN
"kGLXlTvxpRiC_VFWQqUSgGXIEwGoeNGS"


#define BLYNK_PRINT Serial


#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>

char auth[] = BLYNK_AUTH_TOKEN;


char ssid[] = "CHK2";
char pass[] = "12101976";

#define RelayPin1 5 //D1
#define RelayPin2 4 //D2
#define RelayPin3 14 //D5
#define RelayPin4 12 //D6

#define RelayPin1 D1
#define RelayPin2 D2
#define RelayPin3 D3
#define RelayPin4 D4
```

```
BlynkTimer timer;
```

```
BLYNK_WRITE(V0)
```

```
{
```

```
int value = param.asInt();
```

```
if(value == 1)
```

```
{
```

```
digitalWrite(RelayPin1, LOW);
```

```
}
```

```
else
```

```
{
```

```
digitalWrite(RelayPin1, HIGH);
```

```
}
```

```
Blynk.virtualWrite(V5, value);
```

```
}
```

```
BLYNK_WRITE(V1)
```

```
{
```

```
int value = param.asInt();
```

```
if(value == 1)
```

```

    {
        digitalWrite(RelayPin2, LOW);
    }
else
    {
        digitalWrite(RelayPin2, HIGH);
    }
}
BLYNK_WRITE(V2)
{

    int value = param.asInt();

    if(value == 1)
    {
        digitalWrite(RelayPin3, LOW);
    }
else
    {
        digitalWrite(RelayPin3, HIGH);
    }
}
BLYNK_WRITE(V3)
{

```

```

int value = param.asInt();

if(value == 1)
{
    digitalWrite(RelayPin4, LOW);
}
else
{
    digitalWrite(RelayPin4, HIGH);
}
}

```

```

BLYNK_CONNECTED()
{
    Blynk.setProperty(V3, "offImageUrl", "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations.png");

    Blynk.setProperty(V3, "onImageUrl", "https://static-image.nyc3.cdn.digitaloceanspaces.com/general/fte/congratulations_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 myTimerEvent()

```

```

{

    Blynk.virtualWrite(V6, millis() / 1000);
}

void setup()
{

    Serial.begin(115200);
    delay(100);
    pinMode(RelayPin1, OUTPUT);
    pinMode(RelayPin2, OUTPUT);
    pinMode(RelayPin3, OUTPUT);
    pinMode(RelayPin4, OUTPUT);


    digitalWrite(RelayPin1, HIGH);
    digitalWrite(RelayPin2, HIGH);
    digitalWrite(RelayPin3, HIGH);
    digitalWrite(RelayPin4, HIGH);


    Blynk.begin(auth, ssid, pass);
    Blynk.begin(auth, ssid, pass, "blynk.cloud", 80);
    Blynk.begin(auth, ssid, pass, IPAddress(192,168,1,100), 8080);

```


Setup a function to be called every second

```
timer.setInterval(1000L, myTimerEvent);  
}
```

```
void loop()  
{  
  Blynk.run();  
  timer.run();  
}
```

CHAPTER 13

ADVANTAGES

Savings:

Smart thermostats and smart light bulbs save energy, cutting utility costs overtime. Some home automation technologies monitor water usage, too, helping to prevent exorbitant water bills. Certain devices even offer rebates.

Convenience:

Because home automation technology performs rote tasks automatically, endusers experience great convenience. Lots of smart gadgets are compatible with one another, and you can set different triggers between devices to automate regular home processes. For instance, you could set your smart locks to turn on your smart lighting when you unlock the front door.

Control:

Consumers also choose smart home devices to better control functions within the home. With home automation technology, you can know what's happening inside your home at all times.

Comfort:

Some people use smart technology to record shows or to play music throughout the home. Connected devices can also help create a comfortable atmosphere—they provide intelligent and adaptive lighting, sound, and temperature, which can all help create an inviting environment.

Peace of Mind:

Finally, many consumers invest in home automation technology for peace of mind. A new mom or dad can check on their little one thanks to smart cameras and other technologies. Or, if you can't remember whether you closed the garage after you left, you can verify remotely with an app.

CHAPTER 14

APPLICATIONS

Heating, ventilation and air conditioning (HVAC)

It is possible to have remote control of all home energy monitors over the internet incorporating a simple and friendly user interface.

Lighting control system

A "smart" network that incorporates communication between various lighting system inputs and outputs, using one or more central computing devices.

Occupancy-aware control system

It is possible to sense the occupancy of the home using smart meters[14] and environmental sensors like CO₂ sensors, which can be integrated into the building automation system to trigger automatic responses for energy efficiency and building comfort applications.

Appliance control and integration

With the smart grid and a smart meter, taking advantage, for instance, of high solar panel output in the middle of the day to run washing machines.

Home robots and security

A household security system integrated with a home automation system can provide additional services such as remote surveillance of security cameras over the Internet, or access control and central locking of all perimeter doors and windows.

- Leak detection.
- smoke and CO detectors.
- Home automation for the elderly and disabled.
- Smart Kitchen and Connected Cooking
- Using Voice control devices like Amazon Alexa or Google Home to kitchen appliances.

CHAPTER 15

DISADVANTAGES

Maintenance

In the event of some type of breakdown, its repair can be complex and expensive. In addition to this, it is possible that an important part of the system will be blocked and more functions will be canceled. Therefore, the cost of any type of breakdown can be very high.

Initial cost

The price of the home automation installation is still very high. The initial investment that must be made is very important since the entire home must be wired.

Data transmission speed

Depending on the number of systems that are connected, when transferring a large amount of data, the network can become congested and decrease the transmission speed, causing the functions to slow down

CHAPTER 16

HARDWARE RESULTS



Fig 8 : Hardware results of the proposed model

CONCLUSION

Home automation is a resource which can make home environment Automated .People can control their electrical devices via. Smartphone These home automation devices and set-up controlling action through mobile. In future these products may have high potential for marketing. The system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems.

In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies. he system as the name indicates, 'Home automation' makes the system more flexible and provides attractive user interface compared to other home automation systems. In this system we integrate mobile devices into home automation systems. A novel architecture for a home automation system is proposed using the relatively new communication technologies.

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