SMART HOME TECHNOLOGY USING WIFI

Submitted in Partial Fulfillment of the Requirements for the

BACHELOR OF ENGINEERING

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BONAFIDE CERTIFICATE

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ABSTRACT

The Smart Home Technology using Wifi by involving ESP8266

Introduction: This home automation project leverages Industrial Internet of Things (IIoT) principles to create an intelligent and interconnected ecosystem within a household. By integrating industrial-grade sensors, actuators, and communication protocols, the system achieves efficient management of various home functions, including energy consumption, security, and comfort. The project employs advanced data analytics and machine learning algorithms to optimize resource usage and adapt to user preferences over time. Through seamless integration with mobile and web interfaces, users can remotely monitor and control their home environment, enhancing convenience and peace of mind.

Objective: This innovative application of IIoT technologies not only revolutionizes home automation but also offers scalability and interoperability for future smart home developments. This home automation project utilizes Wi-Fi connectivity, facilitated by the Blink app, to implement Industrial Internet of Things (IIoT) principles within a residential setting. Through the integration of Wi-Fi-enabled sensors, actuators, and devices, the system offers seamless control and monitoring of various home functions such as lighting, security, and temperature regulation. Leveraging the Blink app's user-friendly interface, homeowners can remotely manage their smart devices, customize schedules, and receive real-time alerts.

Methodology:

1. Identify Needs: Determine what you want to automate in your home, whether it's lighting, temperature control, security, or entertainment systems.

2. Research and Plan: Explore different home automation technologies and solutions that meet the required needs. Create a detailed plan outlining the components, sensors, actuators, and software platforms it can be use.

3. Select Components: Choose the hardware components such as microcontrollers, sensors, relays, and actuators based on your requirements and budget.

4. Design Circuitry: Create circuit diagrams for connecting sensors, actuators, and controllers. Ensure compatibility and safety in your designs.

5. Develop Software: Write the software code for controlling and automating devices. This could involve programming microcontrollers, developing mobile apps, or using home

automation platforms.

6. Integration and Testing: Integrate all the components and test the system thoroughly ensure that it functions correctly and reliably. Debug any issues and make necessary adjustments.

7. User Interface: Create a user-friendly interface for controlling and monitoring your home automation system. This could be a mobile app, web interface, or voice commands.

8. Installation: Install the hardware components in your home according to plan. Ensure proper wiring, mounting, and positioning of sensors and actuators.

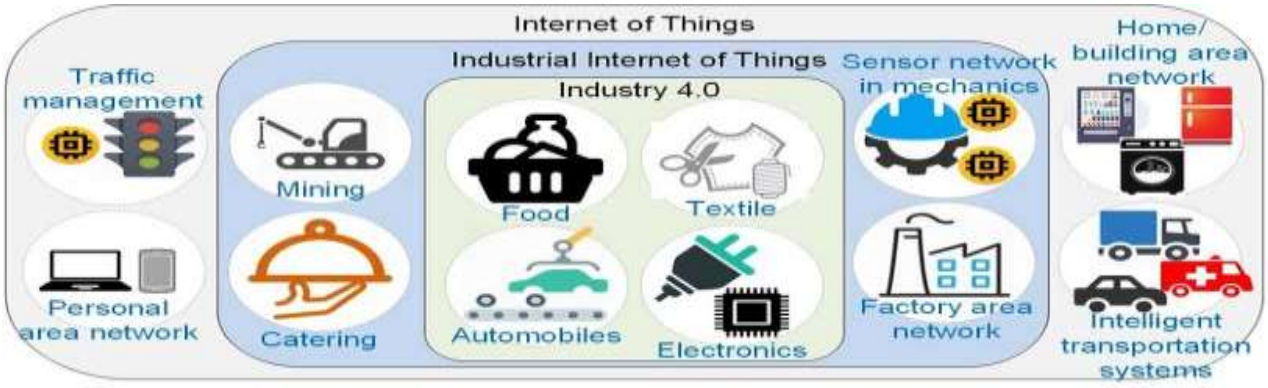
9. Training and Maintenance: Educate users (family members) on how to use the system effectively. Perform regular maintenance checks and updates to keep the system running smoothly.

10. Expand and Customize: Consider expanding your home automation system by adding new devices or functionalities. Customize the system further to optimize performance and convenience.

INTRODUCTION

Industrial Internet of Things (IIoT):

Industrial Internet of Things (IIoT) revolutionizes traditional industrial processes by seamlessly integrating advanced sensors, automation technologies, and data analytics within industrial environments. This interconnected network of devices enables real-time monitoring, predictive maintenance, and optimization of manufacturing operations, enhancing efficiency, productivity, and profitability. By harnessing the power of IIoT, industries can achieve greater operational visibility, proactive decision-making, and cost savings through predictive analytics and condition-based maintenance. However, as industries embrace IIoT, they also face challenges such as cybersecurity risks, data privacy concerns, and the need for skilled personnel to manage and interpret the vast amounts of data generated.



As IIoT continues to evolve, its transformative impact on manufacturing, energy, transportation, and other sectors promises to reshape the industrial landscape, driving innovation and competitiveness in the global economy.

HOW IOT WORKS IN HOME AUTOMATION

1. Device Connectivity: IoT devices in home automation typically connect to the internet via Wi-Fi, Bluetooth, Zigbee, Z-Wave, or other wireless protocols. This connectivity allows them to communicate with each other and with centralized hubs or controllers.

2. Sensors and Actuators: IoT devices are equipped with sensors to gather data from the environment or detect changes, such as temperature sensors, motion sensors, light sensors, etc. Actuators are mechanisms that enable devices to perform actions, such as turning on/off lights, adjusting thermostat settings, locking doors, etc.

3. Data Transmission and Processing: Data collected by sensors is transmitted over the internet to centralized hubs, cloud servers, or directly to other devices for processing. This data may include information about the state of devices, environmental conditions, user preferences, etc.

4. Cloud Computing and Analytics: Cloud platforms play a crucial role in home automation by providing storage, processing power, and analytics capabilities. Data collected from IoT devices is stored in the cloud, where it can be analyzed to extract valuable insights or used to optimize device functionality.

5. Mobile Apps and User Interfaces: Users interact with their smart home devices through mobile apps, web interfaces, voice assistants, or dedicated control panels. These interfaces allow users to monitor and control their devices remotely, set schedules, create automation rules, and receive notifications/alerts.

6. Automation and Integration: One of the key features of home automation is the ability to

automate tasks and integrate different devices and systems. This can be achieved through rules-based automation, where certain actions are triggered based on predefined.

7. Security and Privacy: With the proliferation of IoT devices in homes, security and privacy concerns are paramount. Manufacturers implement security measures such as encryption, authentication, and regular software updates to protect against unauthorized access and data breaches. Users are also encouraged to follow best practices such as using strong passwords, keeping firmware up to date, and being cautious about sharing personal information.

STEP BY STEP PROCEDURE:

This project helps to provide high-quality support to patients & make things easier for processing Home Automation ,we can use the components listed below.

Components Required:

- 2- Relay board
- ESP8266
- Glass Bulb
- Power Supply board
- Transformer
- Connecting Wires

2-RELAY BOARD

In a 2-relay board, each relay functions as an electrically controlled switch. These relays are pivotal components that physically open or close the circuits connected to them when activated. They operate based on input signals received from a microcontroller or similar controlling device. The diodes included in the relay board play a crucial role in protecting the circuit from voltage spikes that may occur when the relays are deactivated. By allowing current to flow in only one direction, the diodes ensure the integrity and durability of the entire system by preventing damage caused by reverse voltage.

Furthermore, resistors and transistors are often integrated into the relay board's design to regulate current flow and amplify control signals. Resistors help manage the flow of electricity through the circuit, ensuring that the relays and other components operate within safe limits. Transistors serve to amplify the control signals received from the microcontroller, ensuring that they have sufficient power to effectively activate the relays. Together, these additional components contribute to the overall efficiency and reliability of the relay board, ensuring smooth operation and longevity.

When a control signal is sent to the relay board, it triggers the corresponding relay to either connect or disconnect the electrical circuit it controls. This functionality is essential for various applications, including home automation. For instance, one relay might be used to control the lights in a room, while the other manages the operation of a fan or other appliances. The seamless coordination of these components enables the relay board to fulfill its role in automating and controlling electrical devices, providing convenience and efficiency to users.

ESP8266

The ESP8266 is a highly versatile and widely used microcontroller module, particularly popular for its built-in Wi-Fi capabilities. At its core, the ESP8266 features a powerful microcontroller unit with integrated Wi-Fi connectivity, making it ideal for Internet of Things (IoT) projects and applications requiring wireless communication. The module typically includes GPIO (General Purpose Input/Output) pins, analog input pins, UART (Universal Asynchronous Receiver-Transmitter) interfaces, and SPI (Serial Peripheral Interface) communication, allowing it to interface with a wide range of sensors, actuators, and other peripheral devices.

In operation, the ESP8266 can function both as a standalone microcontroller and as a Wi-Fi module, enabling it to connect to local networks or serve as an access point for other devices. Its ability to run custom firmware and execute code makes it incredibly versatile, allowing developers to create a variety of IoT applications such as home automation, weather stations, and smart appliances. Additionally, the ESP8266 can communicate with cloud services and web servers, facilitating remote monitoring and control of connected devices over the internet.

The ESP8266's low cost, small form factor, and extensive community support have contributed to its widespread adoption in the maker and IoT communities. Its ease of use, combined with its robust features and capabilities, make it an attractive option for both beginners and experienced developers alike. Whether used as a standalone microcontroller or as part of a larger networked system, the ESP8266 offers a flexible and cost-effective solution for a wide range of IoT applications, driving innovation in the field of connected devices.

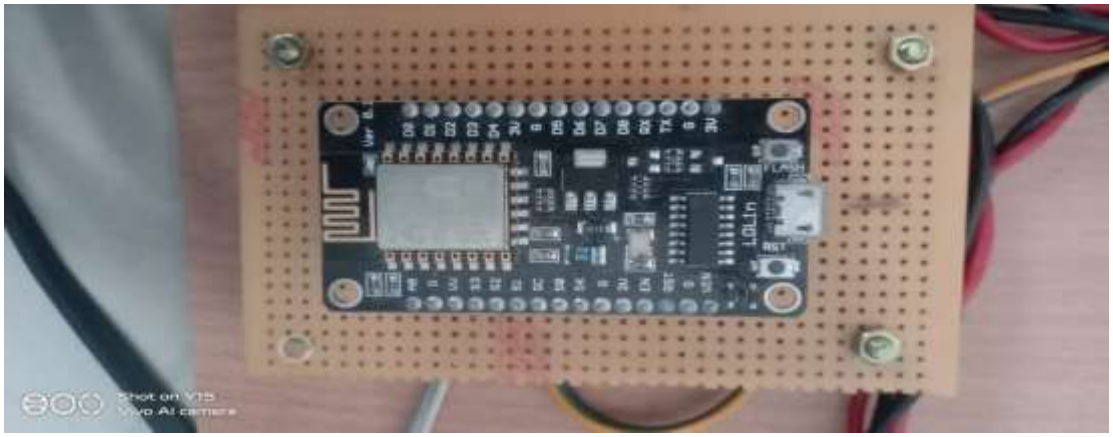
GLASS BULB

The glass bulb of a light bulb serves multiple crucial functions in ensuring its proper operation and safety. Firstly, it provides protection to the filament and other internal components from external damage, such as physical impact or environmental factors. The glass bulb acts as a barrier, preventing dust, moisture, and other contaminants from reaching the delicate filament, which could otherwise affect its performance or cause premature failure.

Moreover, the glass bulb plays a vital role in shaping the distribution of light emitted by the bulb. Its shape and surface characteristics influence factors such as light diffusion, directionality, and intensity. By controlling these properties, manufacturers can design light bulbs that produce a desired lighting effect, whether it's omnidirectional illumination for general lighting or focused light for task-specific applications.

POWER SUPPLY BOARDS

Power supply boards contain various components that work together to convert input voltage into a usable form for electronic devices. One essential component is the transformer, which steps down or steps up the input voltage, depending on the application. Transformers operate on the principle of electromagnetic induction, where alternating current in the primary coil induces a voltage in the secondary coil.



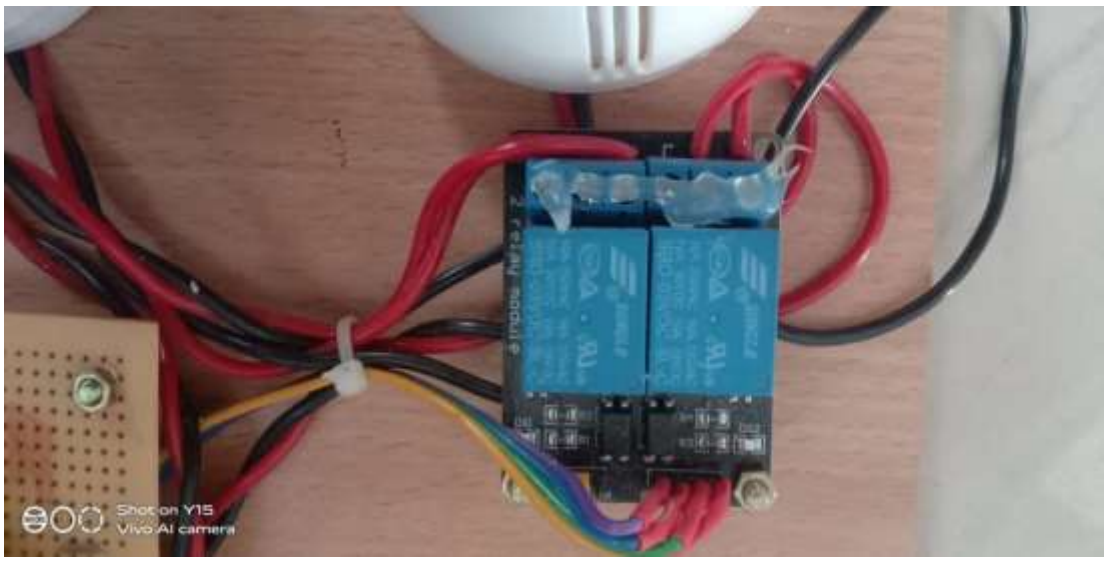
This transformed voltage is then rectified by diodes, converting it from AC to DC. Capacitors are used to smooth out the rectified DC voltage, reducing ripple and ensuring a more stable output.

Another critical component is the voltage regulator, which maintains a constant output voltage regardless of variations in input voltage or load. Voltage regulators can be linear or switching types, each with its advantages and disadvantages. Linear regulators dissipate excess voltage

as heat, making them less efficient but simpler and cheaper. Switching regulators, on the other hand, achieve higher efficiency by rapidly switching the input voltage on and off and then filtering the output to achieve the desired voltage level. Additionally, safety components such as fuses and transient voltage suppressors (TVS diodes) are often included to protect against overvoltage, overcurrent, and voltage spikes, ensuring the safety and reliability of the power supply board and the connected devices.Jumping wires, also known as Dupont wires, are essential components for building prototypes and experimenting with electronics in IoT projects. They provide a simple and flexible way to connect various electronic components on a breadboard or other prototyping platforms.

TRANSFORMER

Transformers are fundamental electrical devices that operate on the principle of electromagnetic induction to transfer electrical energy between two or more circuits through magnetic coupling. They consist of two coils of wire, known as the primary and secondary windings, wound around a common magnetic core, usually made of iron or ferrite. When an alternating current (AC) flows through the primary winding, it creates a changing magnetic field around the core.

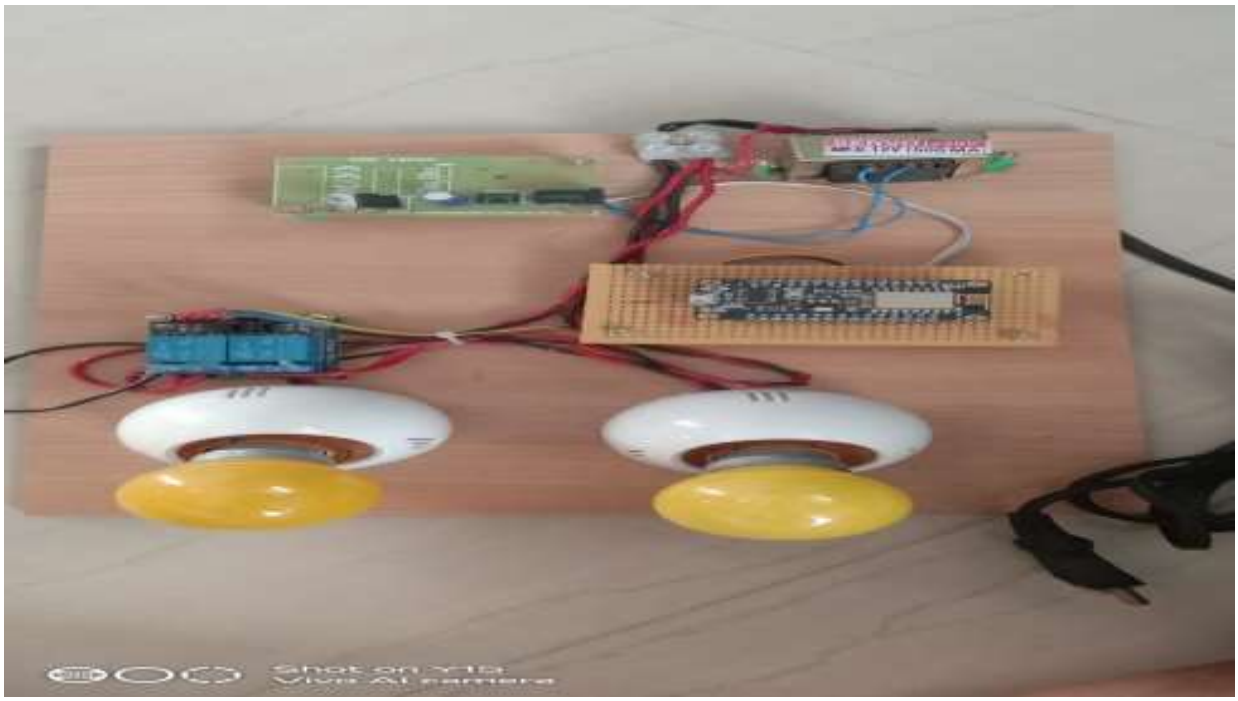


The operation of transformers is governed by Faraday's law of electromagnetic induction, which states that a changing magnetic field induces an electromotive force (EMF) or voltage in a nearby conductor. The amount of voltage induced in the secondary winding depends on the ratio of the number of turns in the primary and secondary windings, known as the turns ratio. By varying the number of turns in each winding, transformers can step up or step down the input voltage to achieve the desired output voltage level. This ability to efficiently change voltage levels without the need for moving parts makes transformers indispensable in electrical power distribution, voltage regulation, and signal coupling application

CONNECTING WIRES

Connecting wires, also known simply as wires, are essential components in electrical and electronic circuits, serving to establish conductive pathways between various components and devices. These wires are typically made of highly conductive materials such as copper or aluminum due to their excellent electrical conductivity and affordability. The conductive

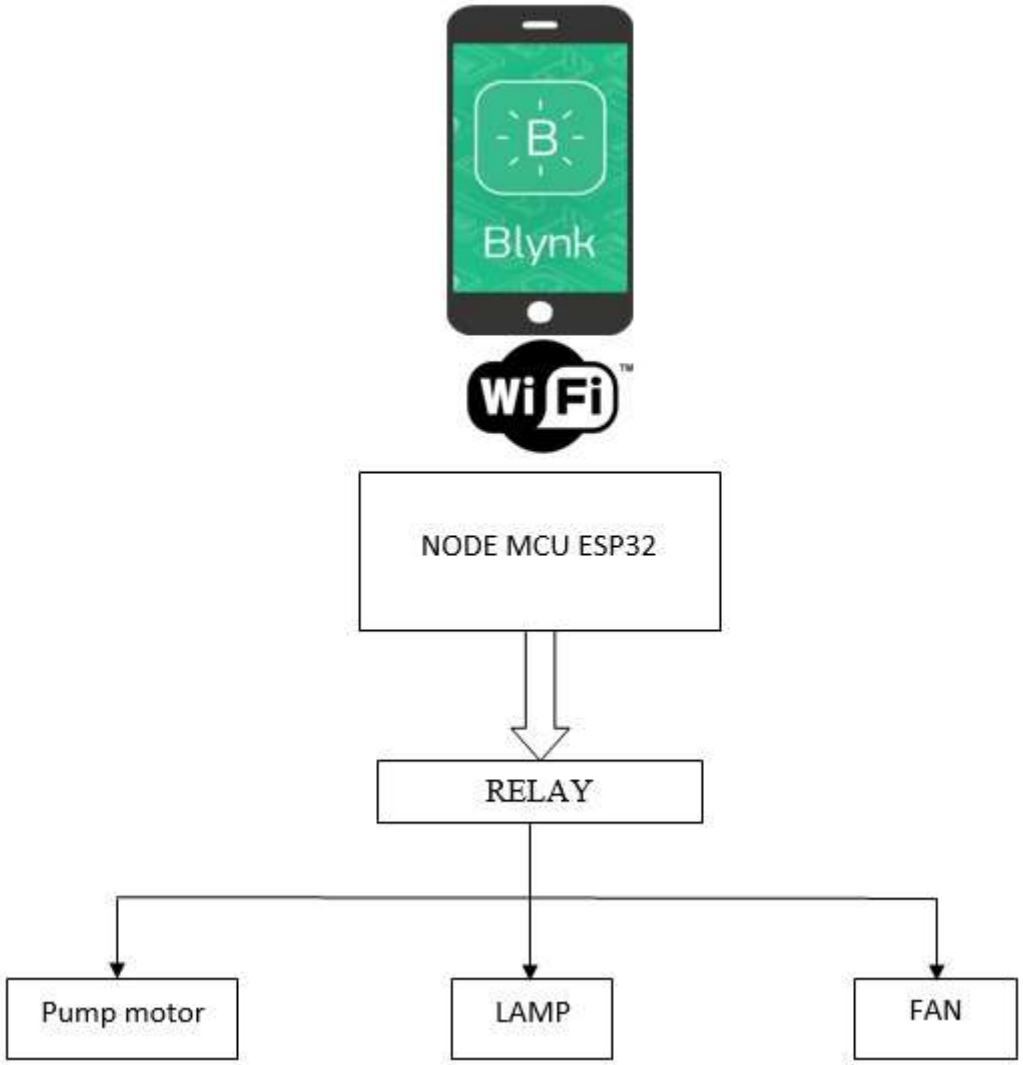
material is typically encased in an insulating material such as PVC (polyvinyl chloride) or rubber to prevent electrical short circuits and ensure safety.



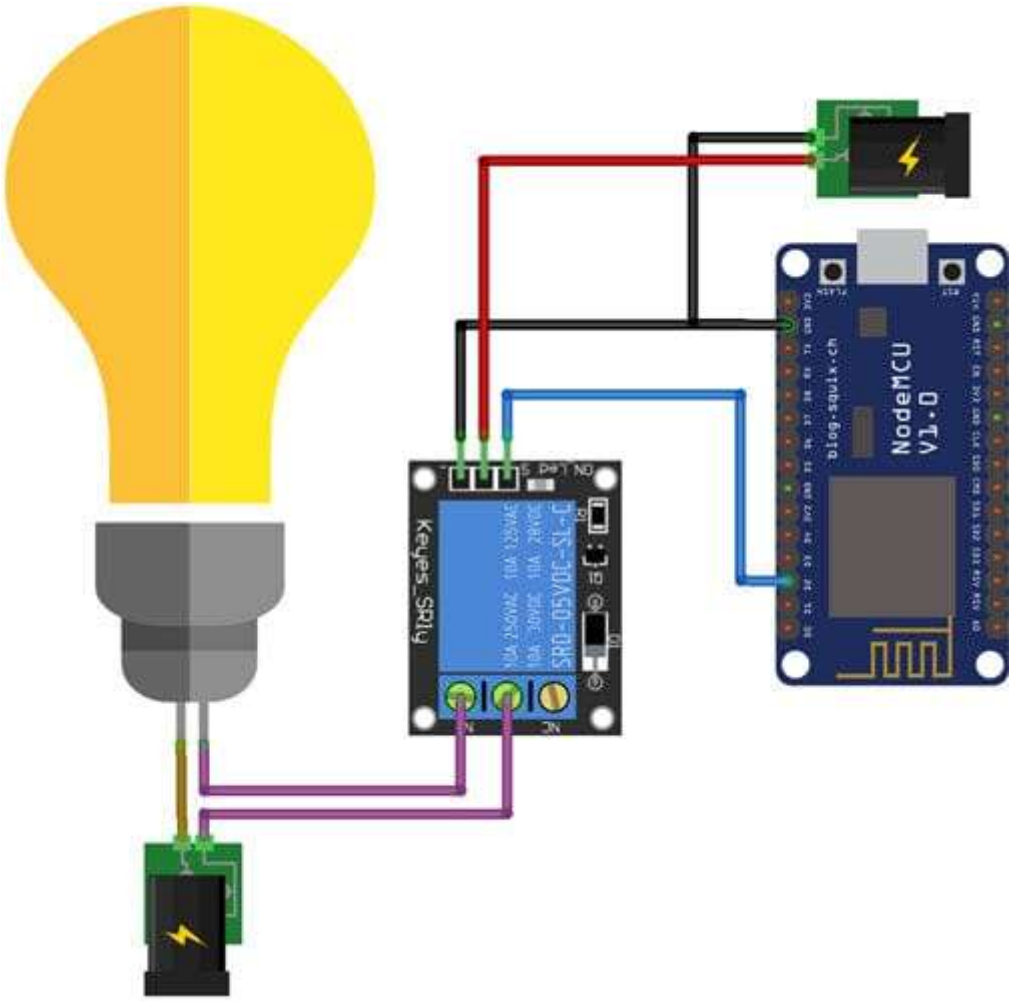
In operation, connecting wires facilitate the flow of electric current from one point to another within a circuit. When voltage is applied across the circuit, electrons flow through the conductive material of the wire, creating an electric current. The wire's conductivity allows for minimal resistance to this flow, ensuring efficient transmission of electrical energy. The insulation surrounding the conductive material prevents the current from leaking or causing unintended connections with nearby conductors, ensuring the integrity and safety of the circuit.

Connecting wires come in various sizes, gauges, and colors, with each serving specific purposes based on the requirements of the application. Thicker wires with lower gauge numbers are capable of carrying higher currents without overheating, making them suitable for power transmission. In contrast, thinner wires with higher gauge numbers are used for low-current signal transmission or connecting components on circuit boards. The color coding of wires helps distinguish between different circuits and connections, aiding in troubleshooting and maintenance. Overall, connecting wires are indispensable components in electrical and electronic systems, providing the necessary pathways for the transmission of electrical signals and power.

FLOW CHART


Blynk
Wi Fi
NODE MCU ESP32
RELAY
Pump motor
LAMP
FAN

CIRCUIT DIAGRAM



APPLICATION

- Smart Thermostats: These devices enable users to remotely control the temperature of their homes, optimize energy usage, and create personalized heating and cooling schedules.
- Smart Lighting Systems: IoT-enabled light bulbs and fixtures allow users to adjust brightness, color, and ambiance remotely via smartphone apps or voice commands.
- Security and Surveillance: IoT cameras, doorbell cameras, and motion sensors provide real-time monitoring of homes, allowing users to receive alerts and access footage remotely to enhance security.
- Smart Locks: These devices enable keyless entry and remote locking/unlocking of doors, providing convenience and security by allowing homeowners to grant access to visitors remotely

- Home Appliances: Many modern appliances, such as refrigerators, ovens, and washing machines, are now equipped with IoT capabilities, allowing users to monitor and control them remotely for increased convenience and efficiency.
- Voice Assistants: Devices like Amazon Echo and Google Home serve as central hubs for controlling IoT devices using voice commands, offering hands-free convenience and integration with other smart home systems.
- Environmental Monitoring: IoT sensors can monitor air quality, humidity levels, and other environmental factors to help users maintain a healthy and comfortable indoor environment.

PROGRAM

```
#include <LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);

#include <SoftwareSerial.h>
SoftwareSerial mySerial(4,3);


int X;
int Y;
float TIME = 0;
float FREQUENCY = 0;
float WATER = 0;
float TOTAL = 0;
float LS = 0;
const int input = 2;

#define sol1 7
#define sol2 6

#define float_sw1 A1
#define float_sw2 A2

#define sensorPin A0
int turbidity,count=0;
int sensorValue;


void send_data()
{
   mySerial.print("Turbidity:");
   mySerial.print(turbidity);
   mySerial.print('\n');
   //delay(300);

   mySerial.print("Liters:");
```

```
   mySerial.print(TOTAL);
   mySerial.print('\n');
   //delay(300);
   Serial.print("Turbidity:");
   Serial.println(turbidity);
   Serial.print("Liters:");
   Serial.println(TOTAL);

}


void setup()
{
Serial.begin(9600);
mySerial.begin(9600);
lcd.begin(16, 2);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("IOT Based Water");
lcd.setCursor(0,1);
lcd.print("Dist - System  ");
delay(2000);
pinMode(input,INPUT);
pinMode(sol1,OUTPUT);
pinMode(sol2,OUTPUT);

pinMode(float_sw1,INPUT_PULLUP);
pinMode(float_sw2,INPUT_PULLUP);

digitalWrite(sol1,HIGH);
digitalWrite(sol2,HIGH);
}


void loop()
{
  sensorValue = analogRead(sensorPin);
  turbidity = map(sensorValue, 0, 750, 100, 0);

  lcd.setCursor(11,0);
  lcd.print("T:");
  lcd.print(turbidity);
  delay(500);
if(!digitalRead(float_sw1))
{
  digitalWrite(sol1,LOW);
  delay(200);
}
if(digitalRead(float_sw1))
{
```

```
  digitalWrite(sol1,HIGH);
  delay(200);
}

if(!digitalRead(float_sw2))
{
  digitalWrite(sol2,LOW);
  delay(200);
}
if(digitalRead(float_sw2))
{
  digitalWrite(sol2,HIGH);
  delay(200);
}

X = pulseIn(input, HIGH);
Y = pulseIn(input, LOW);
TIME = X + Y;
FREQUENCY = 1000000/TIME;
WATER = FREQUENCY/7.5;
LS = WATER/60;
if(FREQUENCY >= 0)
{
if(isinf(FREQUENCY))
{
lcd.clear();
lcd.setCursor(0,0);
lcd. print("VOL. :0.00");
lcd. setCursor(0,1);
lcd.print("TOTAL:");
lcd.print( TOTAL);
lcd.print(" L");
}
else
{
TOTAL = TOTAL + LS;
//Serial.println(FREQUENCY);
lcd.clear();
lcd.setCursor(0,0);
lcd.print("VOL.: ");
lcd.print(WATER);
lcd.print(" L/M");
lcd.setCursor(0,1);
lcd.print("TOTAL:");
lcd.print( TOTAL);
lcd.print(" L");
}
}
delay(500);
count=count+1;
```

```
if(count>=10)
{
  count=0;
  send_data();
}

  }
```

OUTPUT

CONCLUSION

The home automation using Internet of Things has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through Internet.

Enhanced Convenience and Efficiency

In conclusion, the implementation of home automation systems offers immense potential to enhance convenience, comfort, and energy efficiency within households.

Consideration for Success

However, successful adoption requires careful consideration of factors such as security, interoperability, and user experience to ensure seamless operation and maximize the benefits of this transformative technology.

Personalized Customization and Scalability

Furthermore, the evolution of home automation technology presents opportunities for personalized customization and scalability.