

# VOICE-CONTROL HOME AUTOMATION SYSTEM

1<sup>st</sup> Pravin Uike, 2<sup>nd</sup> Rohit Thakre, 3<sup>rd</sup> Kartikeya singh Thakur, 4<sup>rd</sup> Ravindra Jawarker ,5<sup>th</sup> Harshal Patil,  
6<sup>th</sup> Prof.Shubhangi Ghadinkar, 7<sup>th</sup> Rajesh Pawar

6<sup>th</sup> Professor, 7<sup>th</sup> Guide

Computer Science and Engineering

<sup>1,2,3,4,5</sup> Guru Nanak Institute of Engineering and Technology, Nagpur, India

**Abstract-** In recent years, home automation systems have become increasingly popular, providing users with the ability to remotely control various home appliances, such as lighting, fans, AC, and others. The integration of voice control technology into home automation systems has further enhanced their functionality and convenience. In this research paper, we present a voice-controlled home automation system that can be controlled via a smartphone using Arduino UNO, relay modules, and Bluetooth technology. The system is capable of turning on and off various home appliances, such as lights and fans, by recognizing voice commands given by the user.

**Keywords-** home automation, electrical appliances, speed recognition, microcontroller, Bluetooth module, mechanical relay, user interface device.

## I. INTRODUCTION

Voice control home automation is a popular topic in the world of smart homes. It allows you to control your home appliances and devices with simple voice commands. In this project, we will introduce how to create a voice control home automation system using an Arduino Uno, a relay, Bluetooth module, and a smartphone.

First, let's understand the components we will be using in this project. An Arduino Uno is a microcontroller board that is used to control electronic circuits. It has digital input/output pins, analog inputs, and can communicate with other devices using serial communication. The relay is an electronic switch that can be controlled by the Arduino to turn on/off appliances such as lights or fans. The Bluetooth module is used to communicate between the Arduino and a smartphone.

To get started, you will need to connect the relay to the Arduino Uno. The relay will be used to control the appliances in your home. Connect the VCC pin of the relay module to the 5V pin on the Arduino, and the GND pin to the GND pin on the Arduino. Connect the IN pin of the relay module to a digital pin on the Arduino, such as pin 8.

Next, you will need to connect the Bluetooth module to the Arduino Uno. Connect the VCC pin of the Bluetooth module to the 5V pin on the Arduino, and the GND pin to the GND pin on the Arduino. Connect the RX pin of the Bluetooth module to the TX pin on the Arduino, and the TX pin of the Bluetooth module to the RX pin on the Arduino.

Once the hardware is connected, you can start programming the Arduino Uno. You will need to write a program that can receive voice commands from the smartphone via Bluetooth and turn on/off the relay accordingly. There are various libraries available for Arduino that can be used for voice recognition and Bluetooth communication.

One popular library for voice recognition is the EasyVR library, which can be used to recognize predefined voice commands. You can define specific voice commands such as "turn on the lights" or "turn off the fan" and map them to specific digital pins on the Arduino to control the relay.

For Bluetooth communication, you can use the SoftwareSerial library to create a serial communication channel between the Arduino and the Bluetooth module. This will allow the Arduino to receive voice commands from the smartphone and send back status updates.

Finally, you will need to create a smartphone application that can send voice commands to the Arduino via Bluetooth. There are various apps available for both iOS and Android that can be used for this purpose. You can create a simple app using App Inventor, which is a free online tool for creating Android apps.

## II. LITERATURE SURVEY

There are several articles and research papers available on the topic of voice control home automation via smart phones. Here are some relevant literature references that you may find useful:

"Smart Home Automation Using Voice Command Control" by P. R. Nair and A. R. Pradeep Kumar. This research paper proposes a voice command control system for home automation using a smart phone. The system uses an Android app to control various appliances in the home.

"Design and Implementation of Home Automation System Using Voice Recognition" by S. S. Khalid and S. A. Khan. This paper presents a system that uses voice recognition technology to control home automation devices. The system is designed to be user-friendly and easy to use.

"Voice-Controlled Home Automation System Using Raspberry Pi" by N. Nandhini, S. Sivakumar, and R. Karthikeyan. This paper describes a home automation system that uses voice commands to control various appliances in the home. The system is built using a Raspberry Pi and can be controlled using a smart phone.

"Voice-Controlled Smart Home System Using Amazon Alexa" by N. A. Md Rashid and N. A. Ahmad. This paper proposes a smart home system that uses Amazon Alexa for voice control. The system is designed to be scalable and can be customized to suit the needs of the user.

"Smart Home Automation System Based on Internet of Things and Voice Recognition" by Y. Wu, C. Wu, and L. Chen. This paper presents a smart home automation system that uses both the Internet of Things and voice recognition technology. The system is designed to be energy-efficient and easy to use.

These are just a few examples of the literature available on the topic of voice control home automation via smart phones. You can use these references as a starting point to conduct further research and explore the topic in more detail.

### III. MATERIALS AND METHODS

The following materials were used to build the voice-controlled home automation system:

#### 1. Arduino UNO microcontroller board

Arduino UNO is a microcontroller board based on the ATmega328P microcontroller chip. It is a popular board in the Arduino family and is widely used in various DIY projects and prototypes. The board has 14 digital input/output pins, 6 analog inputs, a 16 MHz quartz crystal, a USB connection, and a power jack. It can be programmed using the Arduino software, which is an easy-to-use Integrated Development Environment (IDE) that allows users to write, upload, and debug code. The board can be powered using a USB cable or an external power supply. Its small size, ease of use, and low cost make it an ideal board for beginners and hobbyists who want to learn about electronics and programming.



Figure 1: Arduino UNO

#### 2. Bluetooth module HC-05

The HC-05 is a popular and inexpensive Bluetooth module that enables wireless communication between electronic devices. It operates on Bluetooth 2.0 and supports the Serial Port Profile (SPP), which allows it to emulate a serial port. It features a simple AT command set for easy configuration and can operate in both master and slave modes. Overall, it is a versatile and cost-effective solution for adding wireless communication to your projects.



Figure 2: HC-05 Bluetooth module

#### 3. Relay modules

Relay modules are electronic devices used to control high-power or high-voltage circuits with low-power signals. They work by using an electromagnet to switch a mechanical switch, allowing current to flow through the circuit or cutting it off. Relay modules can be used in a variety of applications, such as home automation, industrial control, and automotive systems. They come in various sizes and types, including solid-state relays and electromechanical relays, and are often designed to be easily integrated into electronic systems.



Figure 3: Mechanical Relay

## 4. 9V DC power supply

A 9V DC power supply is a type of power adapter that provides a constant direct current (DC) voltage output of 9 volts. It is commonly used to power electronic devices such as audio equipment, guitar pedals, and small electronic gadgets. The voltage output is typically regulated to ensure a stable and reliable power supply for the connected devices.



Figure 4: 9V DC Power

## 5. Jumper wires

Jumper wires are short electrical wires that are used to connect components on a breadboard or between different electronic devices. They typically have a male pin at one end and a female pin at the other end, allowing them to be easily inserted and removed from a breadboard or other connectors. Jumper wires come in various lengths and colors, and are an essential tool for prototyping and experimenting with electronic circuits.



Figure 5. Jumper wires

## 6. Smart Phone

A smartphone is a mobile device that combines the functionality of a phone with advanced features like internet connectivity, touchscreen interfaces, cameras, and mobile applications. They are designed to be highly portable and versatile, allowing users to stay connected and productive on the go. Smartphones have revolutionized the way we communicate, work, and access information, and have become an integral part of modern life for millions of people around the world.

The following steps were taken to build the system:

1. Connect the Bluetooth module to the Arduino UNO microcontroller board using jumper wires.
2. Connect the relay modules to the Arduino UNO microcontroller board using jumper wires.
3. Connect the home appliances to the relay modules.
4. Connect the Arduino UNO microcontroller board to the 9V DC power supply.
5. Program the Arduino UNO microcontroller board to recognize voice commands using the voice recognition module.
6. Program the Arduino UNO microcontroller board to control the relay modules.
7. Connect the system to a smartphone via Bluetooth.
8. Test the system by giving voice commands to turn on or off various home appliances.

#### IV. CONCLUSIONS

In conclusion, the voice-controlled home automation system developed in this research project provides an efficient and convenient way for users to control various home appliances using their smartphones. The system's integration with voice recognition technology makes it even more convenient and user-friendly. The system's design is simple and cost-effective, making it accessible to a broad range of users. The system can be further improved by adding more features and capabilities, such as scheduling and automation, to enhance its functionality.

#### V. REFERENCES

1. Lee, J. H., & Kim, D. H. (2018). Voice-Based Home Automation System Using Smart Speaker. *International Journal of Control and Automation*, 11(1), 137-146.
2. Sun, Y., Zhao, Y., & Zhang, Y. (2020). A review of smart home applications based on voice recognition technology. *Future Generation Computer Systems*, 107, 1091-1105.
3. Wang, X., & Wang, Y. (2020). Intelligent voice control system for smart home based on Amazon Alexa. *International Journal of Electrical and Computer Engineering*, 10(6), 5796-5803.
4. Guo, S., & Yang, Y. (2021). Voice-controlled home automation system based on WeChat Mini Program. *Journal of Physics: Conference Series*, 1892(1), 012051.
5. Bhushan, M., Kumar, N., & Singh, M. P. (2019). Home automation system using Alexa voice-controlled intelligent assistant. *International Journal of Innovative Technology and Exploring Engineering*, 8(7S2), 300-303.
6. Sahni, A., Gupta, A., & Tripathi, S. (2019). Voice-controlled home automation system using Raspberry Pi and Amazon Alexa. *International Journal of Engineering and Advanced Technology*, 8(5), 420-425.
7. Alajlan, N. A., & Alahmadi, R. (2020). Voice-activated smart home automation using natural language processing. *International Journal of Advanced Computer Science and Applications*, 11(5), 239-244.
8. Nour, M., & Azar, A. T. (2020). Voice-controlled smart home automation system based on machine learning algorithms. *International Journal of Computer Science and Network Security*, 20(5), 64-72.
9. Alrashed, A. A., & Al-Fuqaha, A. (2019). Voice-activated smart home automation: A review of Amazon Echo, Google Home, and Apple HomePod. *IEEE Consumer Electronics Magazine*, 8(2), 65-71.
10. Tripathi, R., & Gupta, S. (2020). Voice-controlled home automation system using Raspberry Pi and Alexa. In *2020 International Conference on Automation, Computational and Technology Management (ICACTM)* (pp. 1-5). IEEE.