

# Voice Operated Home Appliances Control System

Suma M.R

Lecturer in Electronics Engg, Govt. Polytechnic College, Kalamassery- Kerala.

**Abstract:** Today's technology exists primarily to make people's lives easier, particularly at home. People have long desired to live in a world where everything is automated and controlled by speech. Furthermore, the disabled require specific household appliance maneuverings in their everyday routine. On the Android platform, a way for using voice control for household appliances was presented. Voice control for household appliances can be accomplished with an Arduino Uno, an HC-06 Bluetooth Module, and an Android application. This system was designed to control electrical appliances in the home using a simple interface. Voice recognition systems are becoming increasingly common in home automation in today's culture as technology advances. A voice recognition system for home automation can give a low-cost and easy-to-implement solution. A speech recognition system is a physical device that can control itself by recognising the speaker's voice. The fundamental goal of this system design is to make it simple for normal, disabled and elderly people to control and operate household appliances. It also catered to individuals looking for luxury and advanced home automation. This project proposes a Geotech voice recognition module for recording and importing instructions or commands required to operate the basic functions of physical devices. The physical gadgets may be controlled using the speaker's voice thanks to the Arduino Uno. This project is also being implemented as a wireless control system. We shall cover Voice Operated Home Appliances Control System in this paper.

**Keywords:** Voice, Home, Appliances, Control, System, Voice Recognition, Home Automation, Technologies, Physical Device, Speaker, Record, Commands, Electrical Devices, Lamps, Fans, Television.

## I. INTRODUCTION

A control system is a device or combination of devices that manages, orders, directs or regulates the behavior of another device or system in order to produce the desired result. [1] Home automation is related to the control system in that the home automation controls the house appliances by using the control system in either switch or remotely control. In today's current and advanced technology, home automation is extensively used since using automation in home appliances will provide greater convenience to the general population. Most home appliances today use a remotely controlled system, but

there is a disadvantage to this method. In that the elderly are unable to manage the home appliances due to illiteracy and poor vision. Furthermore, the remotely controlled system for home appliances is inconvenient for physically impaired individuals to operate because it is difficult for those persons to pick up the remote control while it is dropped on the floor. In addition, there is a controlling system that uses switches to control residential appliances. However, this switch controlling mechanism is inconvenient for disabled individuals because the switch is generally placed in a high location to prevent youngsters from touching the switch. As a result, disabled people were unable to achieve such high positions. [2]

As a result, implementing a voice-based controlling system for home appliances is far more beneficial to the disabled and elderly than a remotely managed system. This is due to the voice recognition technique's ability to decrease problems in remotely managing systems and switch controlling systems.

The demography of the world population reveals a pattern in which the old population is quickly expanding as people's average life expectancy rises. Governments and nations all over the world are concerned about caring for and supporting this expanding population. Home automation is one of the major rising businesses, that has the potential to improve people's lives. Some of these home automation systems are aimed at individuals looking for luxurious and sophisticated home automation platforms, while others are aimed at those with specific requirements, such as the elderly and the disabled. [3] The reported Voice Controlled Smart Home System (VCSHS) aims to give persons with special needs with a system that can respond to voice commands and regulate the on/off status of electrical items in the home, such as lighting, fans, televisions, and so on. The system should be economically priced, simple to set up, and simple to operate. The series of questions explored in this article will be how to make people's lives more convenient, comfortable, and safe, as well as how to save more energy. [4]

## Design of an Intelligent Voice Controlled Home Automation System:

Smart phones have become a need for everyone on the earth as modern technology has advanced. On Android systems, applications that are valuable to us in many ways

are being developed. Natural language processing is another emerging technology that allows us to command and control objects with our voices. By combining all of these elements, we provide a microcontroller-based voice-controlled home automation system employing smart phones in our paper. With such a system, consumers will be able to operate any gadget in their home with their voice. All the user requires is an Android smart phone, which is in practically everyone's pocket these days, and a control circuit. The control circuit is made up of an Arduino Uno microcontroller, which processes user commands and handles device switching. Bluetooth, a widely utilised wireless technology for data transfer, is used to connect the microcontroller and the smart phone. [5]

### **Applications and Advantages of voice controlled home appliances system:**

This voice-controlled home appliances system can be used to manage household equipment such as electric lights, electric heaters, and water pumps, among others, using a mobile phone.

This voice-controlled household appliance technology can also be utilised in industrial applications to control industrial lights and motors.

This voice-controlled home appliances system can also be utilised to control the load in retail malls, educational institutes, street lighting, and government or private workplaces via cell phone.

This voice-controlled home appliances system is less expensive and more dependable than other home automation systems and it allows consumers to control their house load via mobile phone.

The client can quickly reduce his home bill and save time by using this approach. [6]

## **II. REVIEW OF LITERATURE**

Jagadeeswari M. developed a home automation system in 2014 to operate household appliances using voice commands and commands sent via mobile phone. The primary goal of this home automation system is to create a wireless communication link between home appliances and a distant user. This system includes two techniques for controlling home appliances: using speech to text SMS (Short Message Service) and using a mobile phone as a remote control. This technology will aid the elderly, the disabled, and those who are unable to type SMS (Short Message Service). The system is managed by an Android OS (Operating System) based mobile phone that issues a vocal command, and then uses a mobile application to transform the voice to text using the Android Intent API 2.01. After conversion, the produced commands are appended to SMS (Short Message Service) messages

and sent via the GSM (Global System for Mobile Communication) network. The SMS (Short Message Service) command will be received by the PIC 16D877A Microcontroller through Bluetooth channel on the receiving end. [7]

Muhammad Izhar Ramli used the Web to create a module for an electrical equipment control system. They also set the server to restart automatically if the server is currently down. [8]

N. Sriskanthan proposed the Bluetooth-based home automation paradigm via PC. However, it was incompatible with mobile technologies. [9] E. Yavuz has designed a phone and PIC remote controlled device to control the devices. The pin check algorithm was demonstrated with a cable network but not with wireless connectivity. [14] Pradeep G showed a home automation system using Bluetooth that saves a lot of power and time by using a way to save the preloaded list and not having to set up a connection every time. [10]

## **III. OBJECTIVES**

- This is useful in communication equipment to prevent the speaker's signals or noise.
- Use a voice command or other sound to turn on and off a device such as a computer, appliance or lamp.
- In telephone conversations.
- Create a voice-controlled system for home appliances.
- Create a simple user interface for an Android application.

## **IV. RESEARCH METHODOLOGY**

This study's overall design was exploratory. The first target described in the previous section was able to be realised based on the results gained in this project. This technology can easily operate home appliances for those with physical disabilities. This is because home appliances may be operated wirelessly using voice commands and this system can be customised to accommodate people with upper limb disabilities.

Furthermore, this project is capable of achieving the second and third stated objectives. This system may accomplish the basic function of a physical device, reducing inconvenience for elderly people who may be illiterate or have poor eyesight, as well as providing users with a luxurious and pleasant lifestyle. Because the instructions for this system can be recorded in several languages based on the user's settings, this voice controlling system can lessen the inconvenience for elderly people who may be illiterate or have poor eyesight. Furthermore, it is capable of providing the public with a luxurious and pleasant living. [11]

V. RESULT AND DISCUSSION

Description of the Voice Operated Home Appliance Control System project:



Figure 1: Voice Operated Home Appliance Control System Project

Device control with voice is one of the main areas of future research. Imagine a world where users can do each and every task by just talking. We have already seen a few automobile industries have implemented this in cars. Voice Controlled Home Appliances have many applications including device controlling inside the home as well as in industry.

So basically, we are going to Control home appliances using voice-based commands. Talking about voice-operated device controlling, we can say that roughly there are two types of controlling operations. In the first one, the user has to speak in a microphone connected to the electronic circuit.

In another case, the user can talk into an Android phone or other device, which then delivers commands to the project using a wireless connection approach. We used a second method of operation in this project, which was voice control using an Android mobile application.

One of the key goals of this technique is to lower the amount of work required by humans. Users are not need to get up from their seats to operate the device.

This is a sophisticated Voice-Controlled Home Appliance Control System that requires an Android smartphone or tablet.

The Android app makes use of voice recognition technologies. We can use our voices to control devices. This project is extremely beneficial to physically impaired people, senior citizens, and elderly people in nursing homes, as well as people who are injured and unable to walk or move.

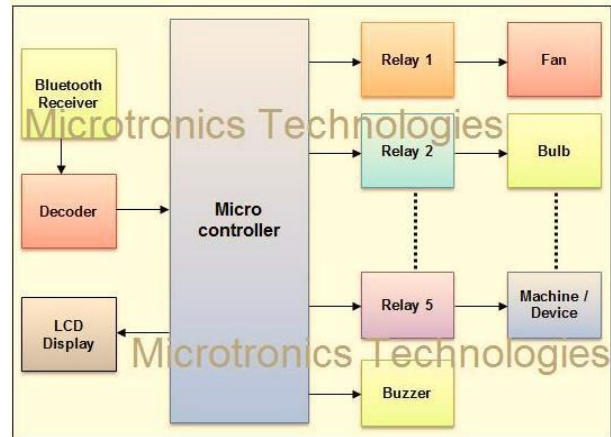


Figure 2: Block Diagram You will get the following documents with this project:

1. Project report in pdf and Word (.doc or.docx) formats
2. Schematic
3. PCB layout
4. Assembly language microcontroller programme
5. Microcontroller code in Hex format
6. Datasheets for all components and integrated circuits utilised in the project
7. Power point presentation | PowerPoint file
8. Installation file for Android applications (.apk) [12]

The suggested system transforms voice commands to text and sends them to the home mobile phone using standard GSM SMS architecture; in the given system, we test a light, fan, and a main switch or power supply, as illustrated in figure 3. [13]

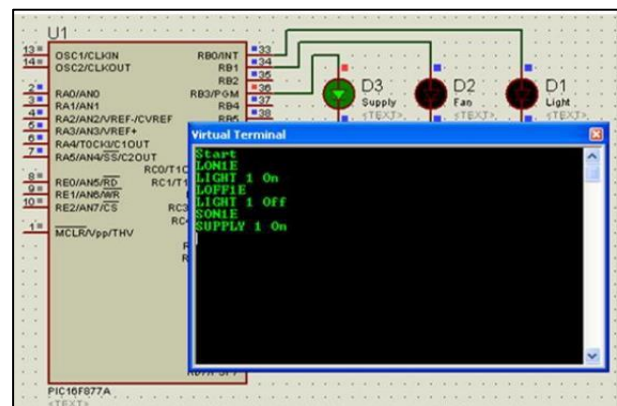


Figure 3: Voice Command tests for supply and light



**Table 1: Voice commands and SMS commands with Acknowledgement [14]**

Voice Command to Text Command Attributes			
Voice Commands	SMS Commands	SMS commands Acknowledgement	
		Success	Failure
Main Switch On	'SONIE'	'SUPPLY 1 on'	'SUPPLY 1 on 0'
Main Switch OFF	'SOFFIE'	'SUPPLY 1 off'	'SUPPLY 1 off 0'
Light On	'LONIE'	'LIGHT 1 on'	'LIGHT 1 on 0'
Light Off	'LOFFIE'	'LIGHT 1 off'	'LIGHT 1 off 0'
Fan On	'FONIE'	'FAN 1 on'	'FAN 1 on 0'
Fan Off	'FOFFIE'	'FAN 1 off'	'FAN 1 off 0'

When the user speaks Light on an Android OS-based mobile device, the given programme translates the given text to "LONIE" format and appends the given text to SMS payload, as shown in table 1. When an SMS message is received by the user and read by the microcontroller via the Bluetooth module, following the completion of the reception, the concerned operation is carried out, and the microcontroller saves the device's status and transmits feedback on the success or failure of the concerned operation. Similarly, a user can turn off the light by saying Light off, and the Android OS-based Mobile application will convert the voice into the text "LOFFIE" and append it to the SMS payload, and the process will continue. [15] The advancement of new technologies in the realm of electronics has resulted in significant changes in the day-to-day lives of all humans. They have ventured into industries such as manufacturing, medical, telecommunications, and home automation. The majority of the system controls the appliances via a web server and mobile connectivity.

A typical wireless device automation system allows one to control appliances from a wireless centralised control unit. Most commercially available automation systems require these appliances to be properly designed to be compatible with one another and with the control unit.

The project shows how to use a system to control lights, fans, air conditioners, television sets, security cameras, electronic doors, computer systems, audio/visual equipment, industrial machines, industrial equipment, and other appliances that are plugged into a wall outlet wirelessly. [16]

**Table 2: Comparison Table of Existing Automation Techniques [17]**

Technology	Processor	Tools	Applications	Advantages
Smart card	PIC16f84A	Electromechanical relay interface, card reader	Secured door system	Low cost and low complexity
RFID	PC	Passive RFID	Digital door lock system	Secure access
RFID	PC	24 bit tag and 8 bit user ID tag	Secure access of home	Information in tag is protected
RFID	Atmel 89S52	Low cost antenna system, RFID reader	Authentication system	Reduced cost enhanced reliability
ZigBee	ARM, x51	Beekit, code warriorIDE	Light switching, temperature control	Easy network creation and modification
RFID, ZigBee	PC	ZigBee	Smart digital door lock system	Easy installation
Wi-Fi, ZigBee	Wi-Fi processor or ZigBee processor	Wi-Fi and ZigBee network	Light switch, radiator valve	Increase connectivity of devices, remote access
GSM, Bluetooth	8051 family	GSM module, Bluetooth module, RS 232 interface	Controlling light, fan and other interface	Bluetooth eliminates usage charges
Voice commands	AT89S51	HM 2007	Electrical devices	Cheap, easy to install and easy to run

**Voice Controlled Home Automation Can Make Your Smart Home Better:**

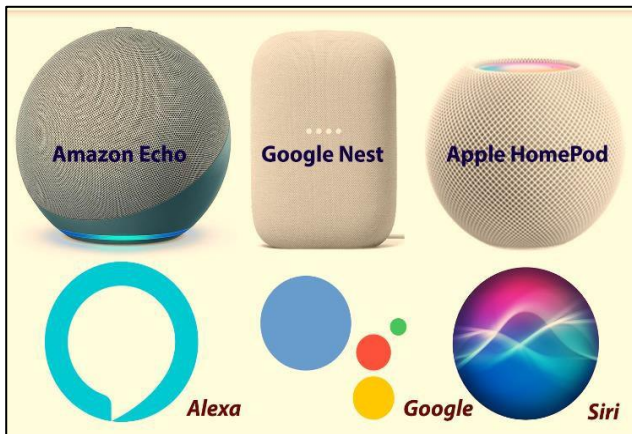
With Voice Controlled Home Automation, you have the ability to centralise all smart devices in your home. While focused on your official task, you will be able to command your coffee machine to start producing cappuccino and switch off the television. There's no need to look for the TV remote or set aside your laptop before drinking that cappuccino.

Even if you're in the basement, you may instruct your Smart Speaker to close the garage door if you believe you left it open. You have the ability to control what happens on the other end of the home with your voice alone.

It is no secret that voice control is in high demand, given its popularity. Manufacturers have been fast to design solutions that allow information-gathering smart speakers to double as conduits for relaying voice instructions to thermostats, light switches, whole-home music systems, security systems, and other devices. [18]

**Smart Speakers:**

Smart Speakers with voice assistants are setting the standard for voice control in Smart Homes. Prior to voice control, connected smart home gadgets could only be controlled via automation or a phone app.



**Figure 4: Voice Controlled Home Automation Can Make Your Smart Home**

In many circumstances, depending on the device you wished to control, you would have to use numerous apps. If you wanted to turn on the lights, you have to use the lighting app. To change the temperature in your home, you must launch the thermostat app.

The Smart Speakers allow you to operate your Smart Home with your voice. Voice Assistant is built into almost every smart home device or product. You will utilise the voice control features of the Smart speaker on a daily basis once you have set up your smart home. Voice assistant technologies such as Amazon Alexa and Google Assistant have paved the way for the rise in voice control. Voice Assistant can help make your home smarter and more automated by simplifying your daily activities, from lights and plugs to thermostats and cameras.

#### **Plugs:**

Allows you to convert practically any wired device in your home with an on/off switch into an automated one that can be controlled with a simple tap on your phone or voice command.

#### **Lighting:**

When linked with Voice Assistant, smart lights allow you to control your connected lights via your phone or by voice. You can automate your entire smart home lighting setup by using timers and routines.

#### **Cameras:**

Smart cameras allow you to monitor activity both inside and outside your house. You may view footage on compatible devices after connecting your cameras to voice Assistant. You can keep track of what's going on no matter where you are.

#### **Televisions:**

You can use your voice to access streaming apps, change the channel, control the volume, and more on smart TVs. When you're through, simply say, "Hey, turn off the TV."

#### **Thermostats:**

Heating and cooling expenses can quickly pile up. Smart thermostats can help you save energy by regulating the temperature of your house while you're away. [19]

## **VI. CONCLUSION**

The communication link between the appliances and the remote user is critical in automation. In this study, we presented a system that operates electric appliances via speech when the user is in a remote area, as well as through a home mobile device.

The voice operated device control system is an integrated system that provides elderly and disabled persons, as well as industry personnel, with an easy-to-use device automation system that can be fully operated using spoken commands. The system is modular, which means it is designed to be simple to install, configure, run, and maintain. This paper offers a voice-operated system built with a microcontroller, ZigBee wireless communication technology, and a speech recognition approach. The automation is based on voice command recognition utilising HM2007 and low-power RF ZigBee wireless connection modules that are quite inexpensive. This system uses voice commands to manage all lights and electrical appliances in a home or workplace utilising the HM2007 chip, which is extensively used in such gadgets.

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