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VOICE CONTROLLED ELEVATOR

[1]Varsha N, [2]Neha Nagraj Airani, [3]Ramya T, [4]Mrs.Vishalini Divakar
[1,2,3] Student, [4]Asst. Prof
[1,2,3,4] Department of Electronics And Communication Engineering
Kammavari Sangham Institute of Technology, Bengaluru, India

***Abstract*--This paper presents the design and construction of a voice operated elevator control system. As we normally see an elevator which might not deal with many safety issues, this system acts as a human-machine communication system. Speech recognition is the process of recognizing the spoken words to take the necessary actions accordingly. This system is extremely beneficial to those who are paralyzed, limited of stature, or severely impaired. If two or more voice signals are received at the same time then the microcontroller will operator on the priority basis. Manual override buttons are also physically connected to the microcontroller. These buttons provide alternate option for voice who finds to use traditional elevator inconvenient. With this system, residence and Commercial facilities are provided with minimize elevator costs. Educate the users on use of voice as well as manual elevator. Thus, this elevator provides experience for people with disabilities and short stature people.**

Keywords: Voice control, voice input, microphone, automated elevator, disabled friendly

I. INTRODUCTION

Elevator system is common but voice-based elevator system is one of the rarest approaches to serve the humanity. Voice based elevator control system acts as a communication system between humans and machines. Speech recognition is the process of recognizing spoken words. We will take necessary measures accordingly. Users can also control electrical equipment such as fans and doors using their voice. Voice recognition system is extreme beneficial for people with paralysis or limited height or people with severe disabilities. Elevators are very common in most places. Elevator usage is increasing in many areas uses such as square measure for carrying around vertical transportation of products and people in high-rise buildings, etc. Offices, search center and alternative skyscrapers and as technology advances, the need for it increases the number of devices is increasing every day. So, this project Emphasis is placed on the design and modernization of existing elevators infrastructure that remembers voice commands. Automatic speech recognition is a method of converting speech. A computer is used to convert audio signals into words. These words are in turn used by microcontroller to provide acceptable results instructions to all connected devices. With support for people with disabilities will also be enhanced. Ensuring contactless transportation of people and goods in elevators by accepting input via voice commands, i.e. It is also beneficial in times of COVID-19.

II. LITERATURE SURVEY

This paper 1 focuses on voice recognition project. The speech recognition model is elevator control, and from this model, you can control the elevator by receiving feedback. When we are thinking about the first concept to appear: voice control what I'm thinking of is voice recognition. Machines must be able to recognize and interpret human's speech as input to a speech recognition model. Voice recognition is done by machines I can understand the words, but I can't understand the context of the words. Anyone can speak using the speech recognition module.[1]
The arduino microcontroller works checking all input ports ensures proper connectivity. The same applies to the power connections for the outputs of the pins. This can be used to connect with external devices. Arduino you can run the program using the software. Programs and software work with C and C programs. C++ programming language. These programs can be used to upload to the Arduino microcontroller. What I noticed here is that this is a very efficient method of deployment. Speed control is implemented using PWM. Pulse width modulation is a type of modulation in the digital domain you can modify the signal using pulse width modulation effectively change the operating cycle and elevator speed engine. The method used in this article is reliable and Variable speed is easy to implement which was noticed in this paper.[2]

The Sphinx4, a Java-based speech recognition library, is employed for accurate speech recognition. The recognition platform includes high-level interfaces like Live Speech Recognizer, Stream Speech Recognizer, Speech Aligner, and Speech Result. In the Live Speech Recognizer, the microphone serves as the speech source, utilizing start and end recording features for identification. On the other hand, Stream Speech Recognizer utilizes an Input Stream as the speech source, capable of receiving data from a file or network socket. Speech aligner aligns text and audio voice, while Speech Result offers links to various aspects of the recognition result, such as the recognized utterance, a list of terms with time stamps, and the recognition lattice. [3]The architecture in corporates Sinusoidal Pulse Width Modulation (SPWM)technology and utilizes a photoelectric encoder to acquire speed data. It compares the provided speed curve with closed-loop power, continuously adjusting the elevator's speed in real-time. The typical trajectory of the elevator involves three stages: initiation, consistent running, and deceleration. The repeated starting and stopping actions of the elevator pose a potential challenge to the motor's speed control. Ensuring a fast, secure, and comfortable elevator requires precise control of its speed, with an integrator predominantly regulating the speed of an older elevator, and timing governing the starting and deceleration processes.[4]

Voice recognition systems have been available in the market for a considerable duration, yet their full potential remains unrealized. This paper explores the optimal and reliable utilization of these systems.
Voice-controlled systems, particularly beneficial for individuals with disabilities, employ a speaker-dependent projection-based recognition algorithm to achieve commendable accuracy in recognizing voice commands. Enhancements can be achieved by expanding the reference pool and selecting acoustically diverse voice commands, transforming the recognition algorithm into a "multi-speaker independent "one.
The universal model of a voice-controlled elevator presented in this paper allows the realization of real working lift scenarios using contemporary technology.
Demonstrated in this paper is a voice recognition program and its integration with the controller, providing an ample array of commands essential for effective lift control.[5]

The voice-controlled elevator is very useful. This project tries to shed light on the voice recognition system, which can be used to modify the conventional elevator and make it more efficient and usable for physically challenged people. This implementation brings together all the features that can be needed to make sure that the services provided by it make the system independent. It will make it easier for users to use the elevator service and will be of great benefit to physically-impaired people, reducing their reliance on others to use the elevator. It resolves the issue of pressing the switches all the time for moving up or down, which becomes quite difficult in crowded hours.[6]

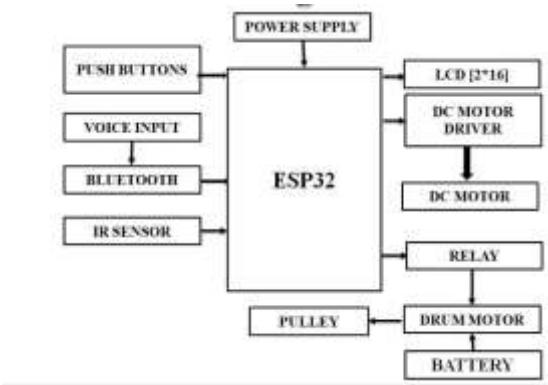
III. METHODOLOGY

In this system we are making use of ESP32 which governs all the actions taking place such as taking voice input from the Bluetooth module and processing the output through the LCD, DC motor driver and pulley which results in the movement of elevator. The power supply is given through the 12V adapter to the ESP 32 and 12V battery is used for the drum motor.

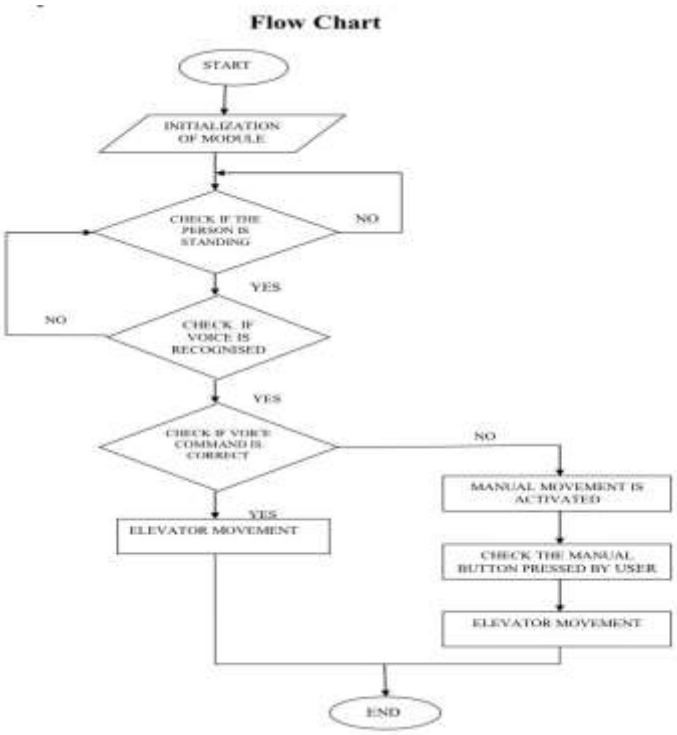
The user will give the input in the form of voice through the Bluetooth module which is processed by the ESP32 which in turn opens the door of the elevator then, the user is transported to their desired floor. In case of multiple inputs the one that is heard first will be taken as priority by the ESP32.

The drum motor in this system with the help of the pulley is used for the up and down motion of the cabin. The DC motors in the system are used for the double door mechanism. IR sensors in this system are used to indicate the floor, the cabin has reached. The LCD is used as output devices in this system, where the LCD displays the movement of the elevator.

3.1. BLOCK DIAGRAM



3.2 FLOW CHART



IV. COMPONENTS USED

Hardware components used:

a. ESP32

figure 4.1: ESP 32

The ESP32, a versatile microcontroller developed by Espressif Systems, embodies the cutting edge of embedded systems technology. With its dual-core processor, built-in Wi-Fi and Bluetooth connectivity, and an array of peripheral interfaces, the ESP32 empowers developers to create a wide range of innovative projects. From IoT devices and wearables to automation systems and beyond, its flexibility and power make it a cornerstone of modern embedded development. With the ESP32, the possibilities are as expansive as the imagination.

b. DC motor

Figure 4.2: DC motor

DC motors, short for Direct Current motors, are fundamental components in countless applications, ranging from robotics and industrial machinery to automotive systems and consumer electronics. They operate by converting electrical energy into mechanical motion, utilizing the interaction between magnetic fields generated by a stationary component (stator) and a rotating component (rotor) to produce torque and rotation. Their simplicity, reliability, and controllability make them indispensable in various fields, where precise speed and torque control are essential.

c. DC motor driver

Figure 4.3 : DC motor driver

A DC motor driver is a crucial electronic component that controls the speed and direction of a DC motor. It serves as an interface between the microcontroller or other control circuits and the motor itself. DC motor drivers typically include features such as PWM (Pulse Width Modulation) control for speed regulation, H-bridge configurations for controlling direction, and current sensing capabilities for

monitoring motor performance and protecting against overloads. These drivers come in various forms, from simple integrated circuits to more complex modules with advanced features.

d. IR sensors

Figure 4.4: IR Sensor

IR sensors work based on the principle of detecting infrared radiation emitted or reflected by objects. They typically consist of an IR emitter (LED) and an IR detector (photodiode or phototransistor). The emitter emits infrared light, and the detector senses the reflected or emitted infrared radiation.

e. LCD display

Figure 4.5: LCD Display

Liquid Crystal Displays (LCDs) are ubiquitous in today's digital landscape, serving as the primary interface between humans and electronic devices. These displays utilize the unique properties of liquid crystals to create visual output. Sandwiched between two polarizing filters, a layer of liquid crystal molecules responds to electric currents, aligning to control the passage of light. By selectively manipulating these molecules, LCDs can produce images and text with remarkable clarity and precision.

f. Adapter

Figure 4.6: Adapter

Adapters, also known as power adapters or AC adapters, are essential accessories that convert electrical power from one form to another to meet the requirements of electronic devices. They typically consist of a plug for connecting to a power source, a transformer or converter to change voltage levels, and a connector to interface with the device. Adapters come in various types, including AC adapters, which convert alternating current (AC) from a wall outlet to the appropriate voltage and current for electronic

devices, and DC adapters, which convert direct current (DC) from a power source such as a battery or solar panel to the required voltage and current.

g. Push Buttons

Figure 4.7: Push buttons

Push buttons are simple yet versatile electrical switches commonly used in various electronic devices and control systems. They consist of a button mechanism housed in a casing, typically made of plastic or metal. When the button is pressed, it makes or breaks an electrical connection, allowing current to flow or interrupting the circuit. Push buttons come in different configurations, including momentary and latching types. Momentary push buttons return to their original position after being released, making them suitable for applications such as user interfaces and control panels where temporary activation is required.

h. Battery

Figure 4.8: Battery

A 12V battery is a common type of rechargeable battery widely used in automotive, marine, and off-grid applications. These batteries typically consist of lead-acid cells connected in series to produce a nominal voltage of 12 volts. They are designed to provide a steady and reliable source of power for starting engines, powering accessories, and supplying electricity to various devices and systems

i. Pulley

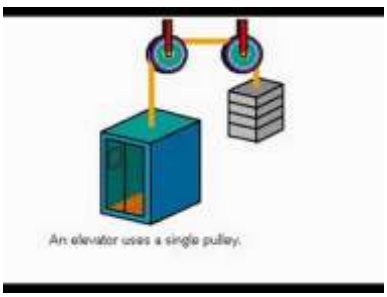


Figure 4.9: Pulley

Pulleys are simple yet essential mechanical components used in various systems to transmit motion and force. Consisting of a grooved wheel mounted on an axle, pulleys are often used in conjunction with belts, ropes, or chains to transfer power between rotating shafts.

j. Drum motor

Figure 4.10: Drum motor

A drum motor is a compact and integrated solution for conveyor belt systems, combining the motor and gearbox within the drum. Unlike traditional conveyor systems where motors and gears are external components, a drum motor houses them inside a cylindrical shell, often made of stainless steel. This design offers several advantages, including space savings, improved hygiene (due to the enclosed design), reduced maintenance requirements, and quieter operation. Drum motors are widely used in industries such as food processing, packaging, logistics, and material handling, where conveyor systems play a crucial role in production and transportation processes.

k. Bluetooth Module

Figure 4.11: Bluetooth Module

Bluetooth modules are compact electronic devices that enable wireless communication between electronic devices over short distances. They utilize Bluetooth technology, a wireless protocol standardized for transmitting data over short distances using radio waves. These modules typically consist of a Bluetooth chip, antenna, and necessary circuitry for communication. They are widely used in various applications, including wireless audio streaming, IoT (Internet of Things) devices, home automation systems, and industrial automation. Bluetooth modules come in different form factors, such as standalone modules, integrated into microcontroller development boards, or embedded directly into products.

Software components used:

a. Arduino IDE

Figure 4.12: Arduino IDE

The Arduino Integrated Development Environment (IDE) is a user-friendly software platform designed for programming and developing projects with Arduino-compatible microcontroller boards. It provides a comprehensive set of tools, including a code editor, compiler, and uploader, making it easy for both beginners and advanced users to write, compile, and upload code to their Arduino boards. The Arduino IDE supports the Arduino programming language, which is based on Wiring, a simplified version of C and C++.

b. Voice BOT

Figure 4.13: Voice Bot app

A voice bot app is a software application that utilizes speech recognition and natural language processing (NLP) technologies to interact with users through spoken language. These apps enable users to perform various tasks, access information, and control devices using voice commands instead of traditional user interfaces like keyboards or touchscreens.

V. RESULT

An android application named voice bot is used as a mic to give voice input to the elevator, as the input is received by the elevator, the elevator moves to the desired floor, This process is displayed in the LCD. In case of failure of the voice the push buttons can also be used.

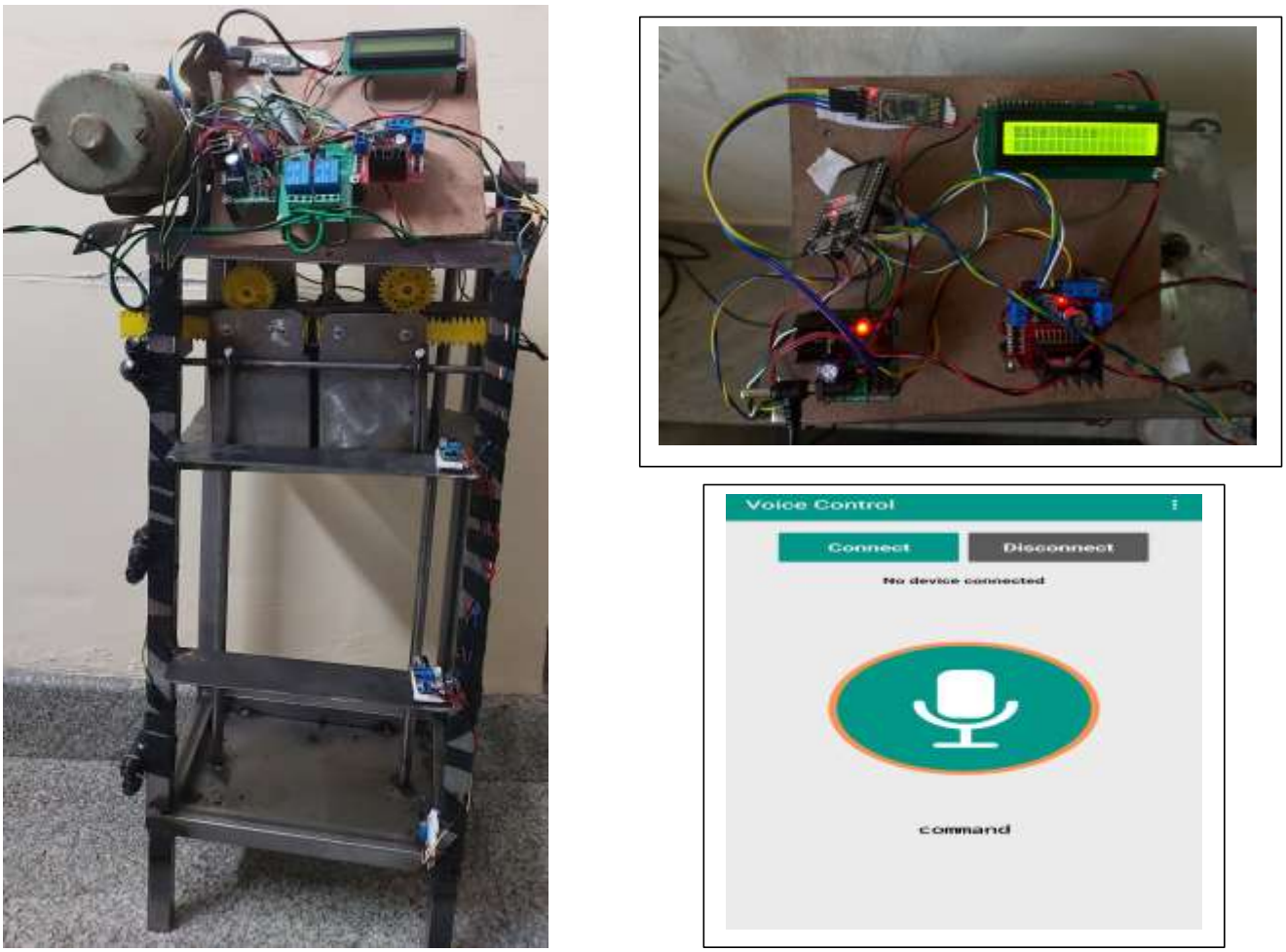


Figure 5.1: Voice controlled elevator model

VI. FUTURE SCOPE

The future scope of voice-controlled elevators holds considerable potential, driven by advancements in voice recognition technology and the increasing integration of smart systems into our daily lives. Here are some potential directions:

1. Improved Accessibility: Voice-controlled elevators can significantly enhance accessibility for individuals with disabilities, allowing them to operate elevators independently without the need to press buttons or interact physically with the controls.

2. Enhanced User Experience: Voice commands can offer a more intuitive and seamless user experience, particularly in busy or crowded environments where pressing buttons might be inconvenient or difficult.

3. Integration with Smart Buildings: Voice-controlled elevators can be integrated into broader smart building systems, allowing for more efficient management of energy usage, maintenance scheduling, and security protocols.

4. Personalization and Customization: Future voice-controlled elevator systems could incorporate personalized settings, such as recognizing and responding to specific users' preferences for floor destinations, language preferences, or even customized greetings.

5. Safety Features: Voice-controlled elevators could incorporate safety features such as emergency voice commands for summoning help in case of emergencies or detecting distress in a user's voice and responding accordingly.

VII. CONCLUSION

The voice-controlled elevator is very useful. This project tries to shed light on the voice recognition system, which can be used to modify the conventional elevator and make it more efficient and usable for physically challenged people. This implementation brings together all the features that can be needed to make sure that the services provided by it make the system independent. It will make it easier for users to use the elevator service and will be of great benefit to physically-impaired people, reducing their reliance on others to use the elevator. It resolves the issue of pressing the switches all the time for moving up or down, which becomes quite difficult in crowded hours.

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