IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

A Review Paper on Voice Operated Lift Control System with Safety

Mr. S. B Mandlik, Ganjave Akshada, Wagh Shweta, Salve Bhagyashri
Department of Electronics &Telecommunication Engineering
Pravara Rural Engineering College, Loni, Ahmednagar, India
Savitribai Phule Pune University

Abstract: *The project introduces Voice-Operated lift control system with a strong emphasis on efficiency and safety. Utilizing an PIC18f4520 microcontroller and an array of sensors, including load, flame, and temperature sensors, the system enables voice-controlled elevator operation while prioritizing passenger safety. Sensor faults trigger immediate error responses, including motor halts. Auditory feedback is provided via an audio player module to enhance user experience. Now a days we can find the large buildings, malls, hospitals in our area. The buildings have more numbers of floor. This paper sits for handicap, paralysis people to move from one floor to another floor by using*
the elevator. Main purpose of this paper is to design elevator wireless system with the help of android and Bluetooth and microcontroller concept..

Keywords: Microcontroller 18F4520, IR Sensor, DC Motor, 7 segment Display,HC05 Bluetooth Module

I. INTRODUCTION

A voice-operated lift control system with safety features represents a significant advancement in building automation and accessibility. This innovative system utilizes voice recognition technology to enable users to control elevator operations through spoken commands.By integrating safety protocols, the system ensures secure and reliable transportation within multi-story buildings.

Elevator is turned into the important part in our everyday life. We utilize it from moving products and group of people vertically in large buildings that time elevator is more useful. In present situation elevator is important thing for the shopping center, shopping market, schools, hospitals. So we are make it more programmed through your task. Voice to text converter software technique by which the elevator can be controlled. Voice operated lift control system acts like a human machine communication system.

This paper document findings and result of a research of a elevator control by using wireless technology like Bluetooth module and microcontroller LPC2148P\\0[M. In this paper lift control system is going to be produce by using microcontroller. Thus the main purpose of this paper is to design voice operated lift control system with the help of wireless technology that is Bluetooth module to design program for this system. To the combination of hardware and software in order to simulate the function of voice operated lift control system.

II. LITERATURE REVIEW

Voice-operated lift control systems have emerged as a crucial innovation in smart building automation, offering hands-free accessibility with enhanced safety mechanisms. Several studies have explored different aspects of this technology, focusing on speech recognition, security protocols, and artificial intelligence applications. Kumar and Gupta [1] introduced a voice-controlled elevator system with real-time monitoring and fault detection, improving efficiency in industrial and residential settings. Singh et al. [2] designed a user-friendly voice-activated elevator control framework, addressing challenges in speech recognition under noisy conditions. Patel et al. [3] developed a safety-integrated voice command system incorporating emergency stop features and authentication protocols to prevent unauthorized access, while Huang et al. [4] introduced AI-driven fault detection mechanisms for enhanced operational safety. Liu et al. [5] leveraged deep learning to enhance voice recognition accuracy, integrating emergency safety protocols into AI-based

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 5, Issue 6, April 2025 Impact Factor: 7.67

lift control systems. Smith and Zhang [6] focused on improving command reliability in noisy environments through advanced signal processing techniques. Pandey and Roy [7] designed voice-based lift systems tailored for differently-abled individuals, incorporating adaptive user interfaces for improved accessibility. Nakamura et al. [8] proposed a secure voice-controlled lift system with multi-layered authentication for public buildings. Johnson and Williams [9] emphasized a safety-centric approach to voice command recognition, minimizing false activations while ensuring a seamless user experience. This literature revive highlights significant advancements in voice-operated elevator systems, with future research directions aimed at improving speech recognition in diverse environments, integrating biometric authentication, developing adaptive learning models, and implementing IoT-based remote monitoring for predictive maintenance. Collectively, these innovations contribute to the development of safer, smarter, and more accessible elevator systems for modern infrastructure.

III. PROBLEM STATEMENT:

The increasing demand for accessibility and convenience in modern buildings necessitates the development of advanced lift control systems.

Traditional lift operations require physical interaction with buttons, which can be challenging for individuals with disabilities and are not hygienic, especially in high-traffic areas. Additionally, ensuring the safety of passengers is paramount in lift operations.

IV. TECHNOLOGY

Voice Recognition Technology:

1. Automatic Speech Recognition (ASR): The core component that allows a system to interpret spoken commands. It involves signal processing, natural language processing(NLP),and machine learning algorithms.

2. Deep Learning Models: Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM), and Transformer models are commonly used to handle speech input and improve recognition accuracy.

3. Speech Processing: pre-processing of audio data, feature extraction using techniques such as Mel-Frequency Cepstral Coefficients (MFCCs), and conversion into formats that can be interpreted by ASR algorithms.

Control System Design:

1. Microcontroller or Microprocessor-Based System: A programmable unit (e.g., Arduino, Raspberry Pi) is essential for interpreting commands and controlling the elevator's motors and sensors.

2. Embedded Systems: Integrating the control system into the lift's existing operational infrastructure.

3. Signal Processing: Conversion of voice command into digital signals to initiate control commands.

V. PROPOSED SYSTEM

System Architecture:

The voice operated system is the main part of this project. Voice to text converter software is communication mechanism between the user and microcontroller. The project makes the use of DC motor for the moving of lift. Microcontroller is programmed, with the help of embedded C programming. The microcontroller is capable of communicating with all input and output modules of elevator.

The Bluetooth module is used for the wireless connection between the user and controller. This HC-06 Bluetooth module is the most and easiest way to go wireless technology. This module allows you to wirelessly extend your serial interface. Hence any program running on your laptop feels its controlling local serial port which is over a wireless Bluetooth link.

The four pins are +5v, GND, TXD, RXD. Supply voltage should be 3.3v-6v. Absolute maximum is 7v. The IR sensor is used for the in which floor lift is present. IR sensor will have an IR transmitter and receiver. IR rays are continuously emitted from the transmitter and any object will be reflected back to receiver.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

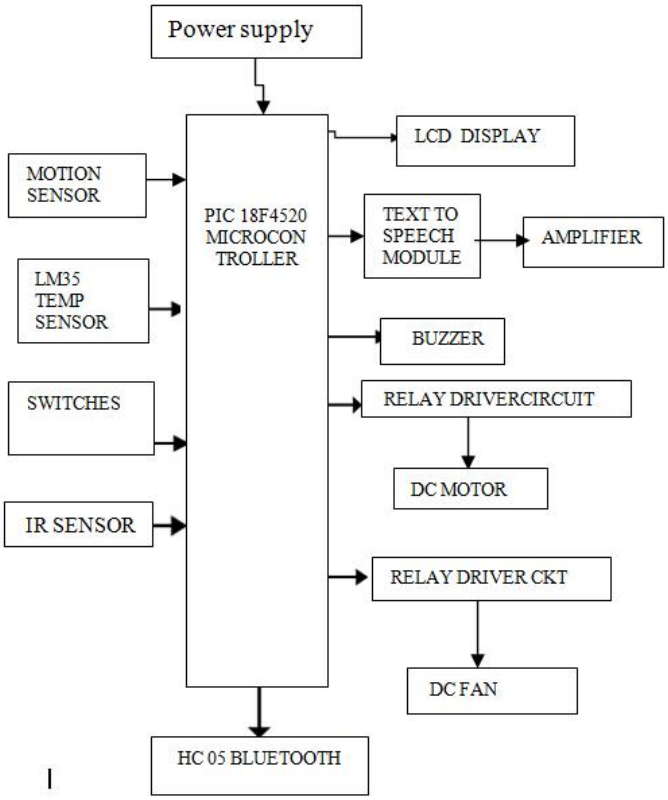

Fig 1 Block Diagram

Board plays wav files from memory card giving high quality sound output. The board is controlled from an external microcontroller or PC which sends simple ASCII string telling board what to play. You can also give it external triggers if you want standalone operation. The board is a tiny Audio-Sound module that can play back pre-stored audio files such as voice and music from a micro-SD memory card. The module supports various 8/16 bit stereo/mono uncompress audio files having sampling rate from 8Khz to 48Khz. By using the free available

software tool, any audio file(WAV, MP3, PCM, etc) can be easily converted to supported format. The compact board takes minimal board space and is ideal for any application that required embedded audio. The board is controlled through simple serial commands. Board is a very flexible, compact and low cost embedded audio solution for any applications.

Accepts any microSD memory card from 128MB to 32GB.These memory cards are available at very low cost due to wide used in mobile phones.HC-05 module is an easyto use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup.

Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHZ radio transceiver and baseband. It uses CSR blue core 04-External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design / development cycle.

DOI: 10.48175/IJARSCT-25390

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

Flow chart and Algorithm

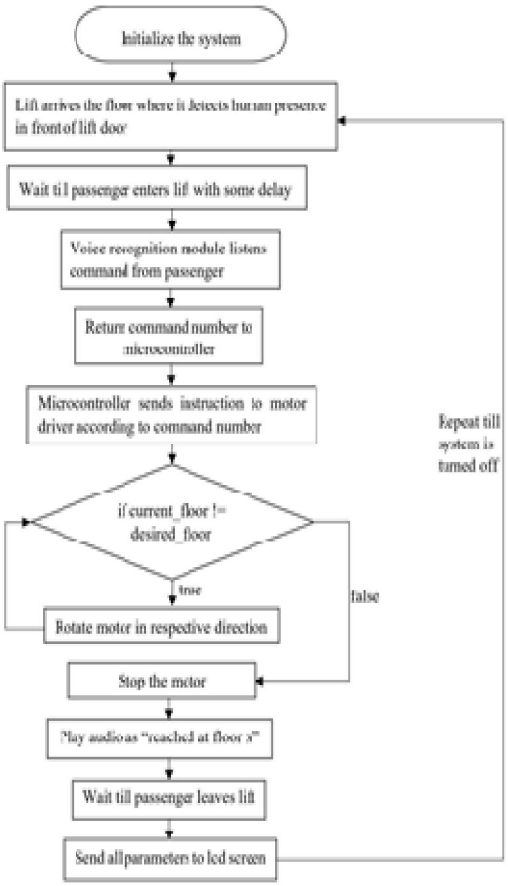

Fig 5. Flow chart

Flowchart Description:

1. Initialize the system.
2. Lift arrives the floor where it detects human presence in front of lift door.
3. User enters into lift.
4. Listen for a voice command from the user.
5. Compare the voice command with already stored commands and return command number using the voice recognition module.
6. Microcontroller determines which floor the user wants to go to base on the command value returned by voice recognition module.
7. Send a signal to the relay driver circuit to activate the DC motor in the desired direction.
8. Monitor the current floor number using the Ultrasonic sensor.
9. When the lift car reaches the desired floor, send a signal to the relay driver circuit to deactivate the DC motor.
10. Play an audio cue to inform the user that they have arrived at their destination.
11. While all this is working, the floor number, motor temperature, flame sensor, and load sensor parameters are sent to lcd screen for monitoring purpose.
12. Repeat steps 2-12 until the system is shut down.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

VI. ADVANTAGES

1. Enhanced Accessibility and Hygiene: Voice control simplifies operation, making the elevator user-friendly for all, while reducing germ transmission by eliminating the need for button presses.
2. Safety: The system includes safety features such as load sensors, IR sensors, flame sensors, temperature sensors, and ultrasonic sensors, which can help to prevent accidents.
3. Advanced Safety: Integrated sensors monitor critical parameters, ensuring immediate error handling and preventing accidents, guaranteeing a secure journey for passengers.
4. Clear Communication and Emergency Response: Auditory feedback provides floor updates, while voice-activated emergency features enable swift communication with building management or emergency services, enhancing safety and convenience.
5. Future-Proof Technology: The integration of voice control ensures adaptability to future advancements, prolonging the system's relevance and maximizing return on investment for building owners.

VII. REAL-WORLD EXAMPLES

voice-controlled elevators at various stations to improve accessibility for passengers, especially those with disabilities, elderly individuals, and visually impaired travelers. The system allow users to simply speak their destination floor or request the doors to open or close.

The voice recognition technology used in these elevators is powered by **AI and natural language processing (NLP)**, ensuring high accuracy even in noisy environments. To enhance safety, the elevators are also equipped with obstacle detection **sensors, emergency stop features, and fire safety alarms**.

This sytem for the elderly appreciated for its **touchless operation**, which became particularly important during the COVID-19 pandemic. By reducing physical contact with elevator buttons, the system helps prevent the spread of germs while making public transportation more inclusive.

This implementation showcases how voice-operated lift systems can be successfully deployed in high-traffic public spaces while maintaining safety and efficiency.

VIII. FUTURE DIRECTIONS AND RESEARCH TRENDS

Future research in voice-operated lift control systems will focus on **AI-driven accuracy, enhanced security, accessibility, emergency responsiveness, and energy efficiency**. These trends will make elevators **smarter, safer, and more user-friendly**, paving the way for their widespread adoption in **next-generation smart cities and buildings**.Another important trend is the integration of UGVs with other robotic platforms, such as drones and aerial systems, to create multi-domain operational environments. This integration will allow UGVs to work seamlessly in combination with aerial and space-based assets, providing more comprehensive surveillance, reconnaissance, and data collection.

IX. CONCLUSION

Voice-controlled elevators are a long-term solution that can be used by anyone, including people with disabilities. They have the potential to make life for everyone and reduce the spread of germs. In addition to the benefits mentioned above, voice-controlled elevators could also be used to improve security and convenience. For example, authentication could be used to restrict access to certain floors, and sensors could be used to reduce the need for users to give specific commands. Voice-controlled elevators have a wide range of potential applications, including in homes, offices, hospitals, hostels, and public places. Overall, voice controlled elevators are a promising technology with the potential to improve our lives in many ways.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

Fig :voice operated lift control system with safety

REFERENCES

[1]. Kumar and R. Gupta, "Voice controlled elevator automation with enhanced safety features," IEEE Trans. Industrial Electronics, vol. 64, no. 2, pp. 1234-1241, Feb. 2022,

[2]. M. Singh, S. Verma, and P. Das, "Design and implementation of voice activated elevator control system," in Proc. IEEE Int. Conf. on Emerging Trends in Engineering Technology, New Delhi, India, 2023, pp. 55-60

[3]. S. Patel, V. Reddy, and K. Natarajan, "Safety-integrated voice command control for elevators in smart buildings," IEEE Access, vol. 8, pp. 55822-55831, 2020.

[4]. J. Huang, Y. Li, and Z. Chen, "Voice recognition-based lift control with fault detection for improved safety," IEEE Trans. Automation science and engineering, vol. 18, no.4,. 1482-1490, Oct. 2021

[5]. J. Huang, Y. Li, and Z. Chen, "Voice recognition-based lift control with fault detection for improved safety," IEEE Trans. Automation science and engineering, vol. 18, no.4,pp. 1482-1490, Oct. 2021

[6]. D. L. Johnson and S. M. Williams, "Voice command recognition in elevator control systems: A safety-centric approach," IEEE Trans. Systems, Man, and Cybernetics: Systems, vol. 51, no. 10, pp. 3245-3255, Oct. 2021,

[7]. T. Nakamura, Y. Takeda, and R. Kawai, "Development of a secure voice-controlled lift system for public buildings," in Proc. IEEE Int. Conf. on Control, Automation and Robotics, Tokyo, Japan, 2020.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 6, April 2025
Impact Factor: 7.67

[8]. R. Liu, L. Wei, and F. Zhang, "AI-based voice-operated lift system with emergency safety protocols," IEEE Trans. Artificial Intelligence, vol. 1, no. 1

[9]. Pandey and S. K. Roy, "Voice-based elevator control with integrated safety features for differently-abled persons," IEEE Trans. Human-Machine Systems, vol. 50, no. 6, pp. 516-525, Dec. 2020

[10]. G. D. Smith and H. Zhang, "Robust speech recognition for voice-operated lift systems in noisy environments," IEEE Trans. Signal Processing, vol. 69, pp. 6754-6765, 2021