International Journal of Computational and Electronics Aspects in Engineering
Volume 1, Issue 4, Dec 2020, pp 95 - 100
DOI: 10.26706/ijceae.1.4.20200702

Voice Control Elevator for Prevention of Physical Touch

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***Abstract*— Nowadays, usage of the elevator is very common everywhere in out day to day life. The main aim of elevator is to transport the things like person or goods in fraction of seconds. As it has number of advantages so we prefer to use elevator. But as you know, corona virus is spreading all over the world; it is important and mandatory to take precaution by individual and we are sure our propose system help you out in this. The existing elevators can be used by pressing floor number as per needs. These elevators cannot be used by paralyzed, blind and physically challenged persons. In this paper we proposed voice control to elevator to prevent a physical touch as we all as all types of user can be used it easily. We used Arduino Uno ATmega328P microcontroller, Bluetooth module HC-05 and Motor driver unit with Android application. The speech recognition system provides the communication mechanism between the user and the Arduino based elevator control mechanism. We used of a DC motor for moving the elevator based on the voice/speech commands given by the user from mobile application. Its process the data and the result are generated in form of according to the user choices; that is elevator is moves upside or downside.**

***Keywords*—**Elevator Automation, Voice Recognition, Wireless Technology, Arduino and Bluetooth

I. INTRODUCTION

At the moment, smartphones with strengthened processors, greater storage capacity, a richer entertainment function and more communication methods are becoming more powerful. For proposer utilization of this device, we proposed voice control elevator system. The vertical development was essential for the urbanization of the world's cities since the end of the 1800s when lifting and escalating systems were introduced. They are indeed our urban workers and play a vital role in our transit, in an exclusive Future-IoT interview. In our day-to-day route, we use elevators and escalators to move between the workplace and shopping floors and, in some cases, a transport system to save time on foot. The usage of elevator has been increased in different applications, for example in carrying goods and carrying people in buildings like offices, shopping malls.

The design of elevators and escalators likewise has evolved over the years. But due to current covid-19 situation the elevator controlling has got risky as there is possibility spread and get infected by corona virus. As all the elevators are been controlled by pressing the button there is risk of getting infected.

This project builds smart elevators which are controlled by using Smartphone application. Using the Bluetooth IoT technology. This makes the system more reliable and safer from covid-19 and easily used by paralysis and physically challenged persons.

The microcontroller is capable of communicating with all input and output modules. The voice recognition system which is the input module to the microcontroller takes the voice instructions given by the user as input and the controller judges whether the instruction is to elevators

Technical Article
First Online on – 30 Dec 2020

Cite this article – Archana L. Rane, Nikhil Patil, "Voice Control Elevator for Prevention of Physical Touch", *International Journal of Computational and Electronic Aspects in Engineering*, RAME Publishers, vol. 1, issue 4, pp. 95-100, 2020.
https://doi.org/10.26706/ijceae.1.4.20200702

upwards or to the downwards, and according to the users voice the switching mechanism controls the elevators.

Literature review carried out in context to the present work is presented as follows.

K. Srilatha et.al. are proposed two components; voice modules and microcontrollers by using Arduino Uno board and microcontroller. Voice module provides a communication mechanism between user and microcontroller. The microprocessor is capable to communicate all input and output devices at the same time [1].

C. Patel and A. Maathur are worked on voice robotization, which could assist handicap with peopling without the help of the other individual. The usage of microcontrollers is to control various gadgets and coordinate every module, in particular voice module, engine module and LCD. LCD is to display this status of the lift. The output resulted has a highest accuracy than expected. This is done using speech recognition [2].

May Thu Win et.al. proposed that they have designed and implemented a prototype elevator and its control systems using Arduino microcontroller-based circuit. The elevator is operated by using DC motors and gears along with timing belt. Forward and reverse direction of motion of the DC motor is obtained by using a MOSFET H-Bridge [3].

Aboli Gatane et.al. are proposed to model of a voice-controlled elevator is widespread what's more, it empowers to acknowledge administrations of genuine working elevator by utilizing something like date means [4].

Kim, Yongtae et. al. developed a robotic arm that can lift the weight up to 10kgs. The designed robotic arm is called Exosuit which can be controlled by voice commands. The maximum weight to lift is observed based on its performance measures. The muscular effort is represented in percentages for lifting the load to maximum weight [5].

F. Salah and M. Saod proposed a programmed lift framework. This framework is utilized to follow the visually impaired individuals' status by utilizing voice compliance. This framework comprises of two sections. An initial segment is a remote unit with visually impaired and a subsequent part is a lift unit. The remote unit is answerable for dealing with the voice arranges and sends the data to the lift unit to control the lift development [6].

Devyani Randive et. al. developed a voice activation system. This system contains a Bluetooth module, LCD display, RF transmitter, Adriano UNO, Motor driver unit. The input voice command is given from the Bluetooth module and based on the command the movement of the motor is done [7].

M. Kumar and Shimi S. L. designed a system specially for the people suffering from paralysis and also for the elderly people. A wooden adjustable bed fitted with motorized jack is modeled rather than building a mechanical base with linear actuators which is proven to be very economic. The adjustable bed offers three elevation positions sleep position, rest position and sitting position and according to one's comfort he or she may choose position by voice commands. The use of voice commands eliminates the need to remote controllers and other electronic device and makes it easy to interact with the system to perform automation and control electrical devices. Buzzer allows disabled person to notify the guardians whenever the person need help [8].

The organization of this paper is as follows. Section II describes the methodologies. Experimental results are discussed in Section III. Finally, discussion, conclusion and future works are given in Section IV.

II. METHODOLOGIES

The proposed system makes an easy way to use the elevator using Smartphone. The aim of the implementation is to demonstrate the use of smart elevators using Smartphone. This system makes use of a DC motor for moving the elevator based on the voice/speech commands given by the user on their Smartphone. With the help of embedded C programming, the microcontroller is programmed. The microcontroller can communicate with all lift modules input and output.

The voice recognition system, which is the microcontroller's input module, takes the user's voice instructions on the smartphone as input and assesses whether the command is to rise up or downwards. The similar voice-based commands also used to turn on/off the fan inside the elevator. Also, LCD display is available for visual information of operations being performed for the person in the elevator. The propose process is compatible with Smartphone with mobile application so anybody can easily used. It works pretty much like a smart speaker. The user has the Smartphone standing in the elevator. In the elevator, the Bluetooth module has implemented, which is connected to Arduino Uno as shown in figure 1: The functional block diagram of the proposed system.

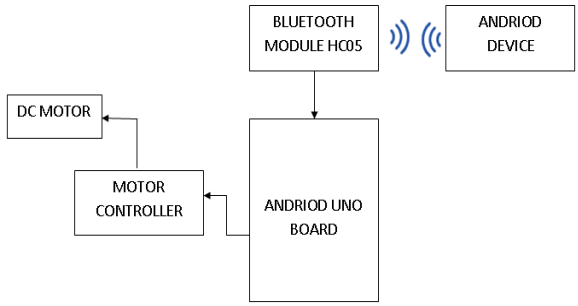

Figure **1:** Block Diagram of Voice control elevator

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board has sets of digital and analogue input/output (I/O) pins which can be connected with various boards (shields) and other circuits. The board contains 14 digital pins, 6 analogue pins and can be programmed with the Arduin IDE using a USB cable type B. The USB cable or an external 9-volt battery allows the system to supply voltages of between 7 and 20 volts. The reference software is distributed under a Share-Alike 2.5 licence for Creative Commons and is now on the Arduino website. The Uno board is the first of a series of arduino boards based on USB, and Arduino IDE Version 1.0 was the reference version of Arduino which has now become more up-to-date. The ATmega328 on the board has a boot loader that allows you to upload a new code without an external programmer. As Uno communicates with the original STK500 protocol, the Uno does not use the FTDI USB-to-serial driver chip, which is different from all previous boards. Instead, it uses a USB-to-serial converter, the Atmega16U2 (Atmega8U2 through to version R2).Once Arduino Uno has read the data and processes it with the help of voice mode of Google assistant, the output is passed to the stepper motor. Stepper motors are designed to work on the principle of electromagnetism. The full rotation of a stepper motor is divided into number of expansive steps. There is a shaft made up of soft iron which is enclosed by the electromagnetic stators. So by giving the supply to stator the rotor will move the one by one step angle. The advantage of stepper motor is it can be controlled accurately without any feedback mechanism, as long as the motor works in an ideal environment/cycle. This defined standard helps us in defining the floors in the model. The overall working flow of system is given in figure 2.

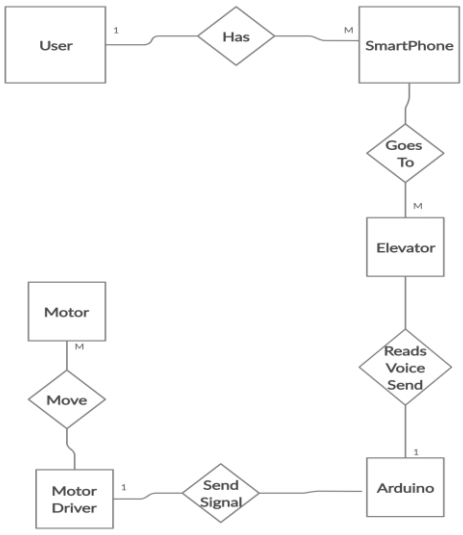

Figure 2: Flow of system

Step 1: Firstly, the user opens the application with the help of Smartphone.

Step 2: It's connected to the Bluetooth module which is already implemented in the elevator.

Step 3: Once the user gets connected, the user has to put the floor number through the voice command (which floor he/she want to go).

Step 4: The voice command is received by the Bluetooth module and it forwarded to the Arduino.

Step 5: The Arduino read the floor number which is received by Bluetooth module. Here electronic code is written in C programming to select appropriate floor number which passes to the stepper motor to move upward or downward side. In coding we implemented the logic of adding or subtraction floor number. First it has to capture the position that it's goes upside or download side accordingly its act.

Step 6: Finally Arduino send the signal to the motor driver (L298N) with floor number and the motor driver sends the signals to motor to rotate motors.

III. Experimental Result

For the purpose of experimentation, we have checked the device working status by connecting with mobile application with voice control elevator system. We test the system by applying testing concept and got result as shown in Figure 3 to 8.

Figure 3: Check Bluetooth device is enable or not

Figure 4: System ready to communicate/Talk

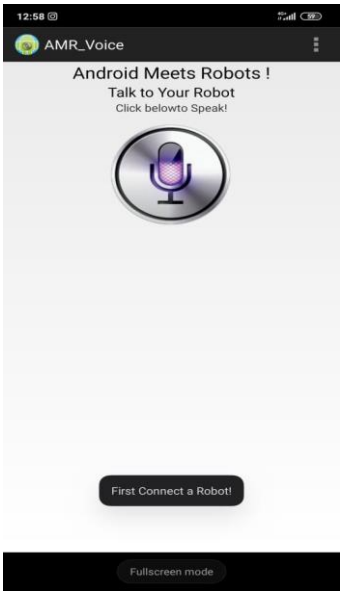

Figure 5: Connect to Bluetooth device

Figure 6: Available device scan

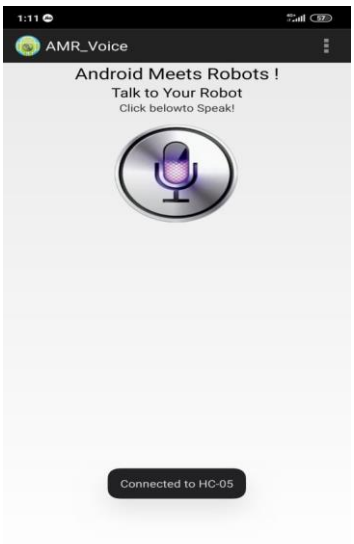

Figure 7: System connected to Bluetooth

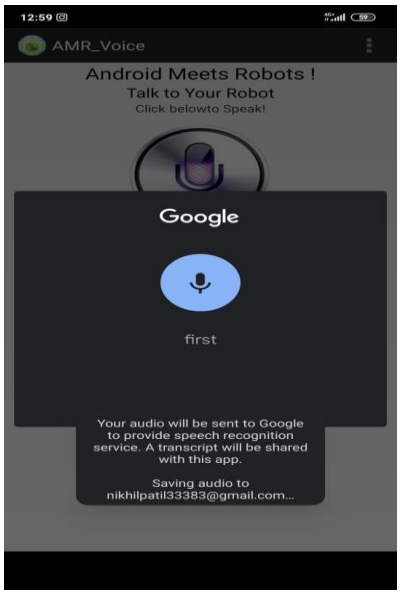

Figure 8: Voice command given to the system (First Floor)

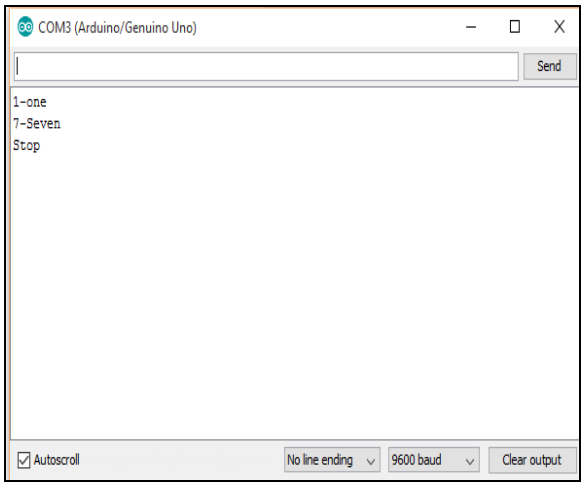

Figure 9: Arduino Monitor helps to read commands in back end

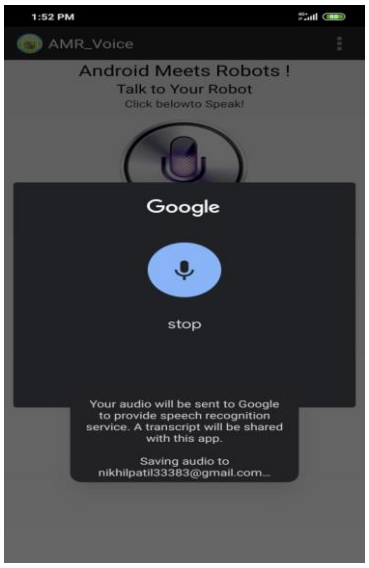

Figure 8: In emergency stop command provide as help

Today the world moves faster and tries to achieve everything in fraction of second. Everyone work around the machines and software. Everyone wants sophisticated, reliable and efficient systems to work with fewer efforts and wants relief from tedious jobs. By using the method described in above section, the project is completed with the allocated resources. No additional resources were required and also will not be required in future. 'Voice controlled Elevator' is to introduce IoT solution for elevators of building which help users to operate elevators without touching the buttons which is the biggest need now a days. At the end we can say that with the help of this system users can use elevators with ease.

IV. Conclusion

Elevator is very common to us now days. The voice-controlled elevator is of a great use as it works effortlessly. This system helps to avoid a physical touch to the device and prevent to spread a virus like corona with the help of giving voice command to the system and accordingly system is worked. This is a Long-term solution which operates independently. The actionable recommendations and solutions make sure that any user can use the elevator. Even the user has any kind of disability. Blind and visually impaired people encounter serious problems in leading an independent life due to their reduced perception of the environment. With the help of our system, the blind people, physically challenged people, low heighted person etc can use the elevator easily and prevent any awkward situation in front of the normal people. The prototype of the elevator is a useful to take input from user and act accordingly.

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