

VOICE OPERATED INTELLIGENT LIFT

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Abstract - This project presents the design and construction of voice operated lift/elevator control system. This system acts as human-machine communication system. Speech recognition is the process of recognizing the spoken words to take the necessary actions accordingly. User can also control the electrical devices like fan, door etc with the help of voice recognition system. The main purpose of designing this project is to operate the Elevator by using voice commands. This device is very helpful for paralysis, short height people and physically challenged persons.

Key Words: Mel Freequency Cepstrum Coefficient (MFCC), Dynamic Time Warping (DTW).

1. INTRODUCTION

The main aim of this project is to design and construct a voice operated lift/elevator control system. This system acts as human-machine communication system. Speech recognition is the process of recognizing the spoken words to take the necessary actions accordingly.

This device is very helpful for paralysis, short height people and physically challenged persons. The speech recognition system provides the communication mechanism between the user and the microcontroller based lift control mechanism. This project makes use of a DC motor for moving the lift/elevator based on the voice/speech commands given by the user and MAT lab code is used for recognition of the voice commands. Microcontroller is programmed, with the help of embedded C instructions.

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 lift upwards or to the downwards, and according to the users voice the switching mechanism controls the lift. For fault detection and power failure buzzer is used.

2. WORKING

Input voice of the user is received by the system using the inbuilt MIC in the pc. This sound input is given to the mat lab code in pc. After receiving the input voice MFCC of the voice is found. This MFCC is compared with the previously created database in mat lab.

Using DTW algorithm similarity between the two MFCCs are calculated. Thus we can decide the floor insisted by the voice command of the user.

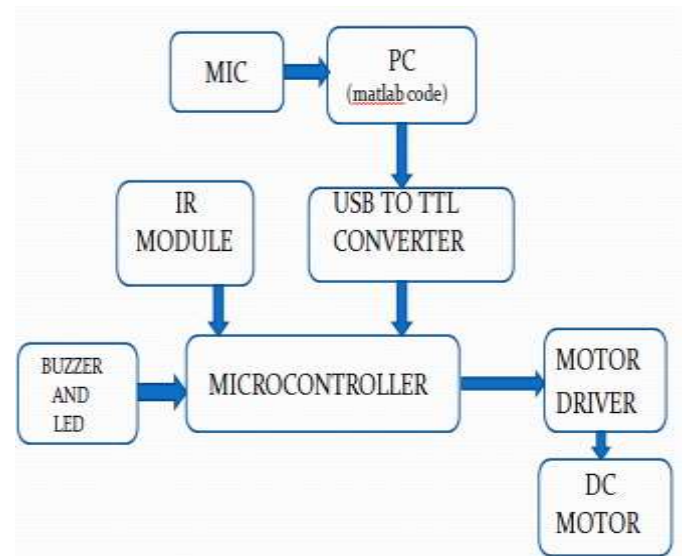


Fig -1: Block diagram

By means of USB to TTL converter, we are giving the data from PC to PIC microcontroller.

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 lift upwards or to the downwards. According to the users voice the switching mechanism controls the DC motor through L293D(motor driver).

The clockwise and anticlockwise rotation depend upon the input floor number. IR sensor is used for detecting the floor and stopping the motor rotation. Fault indication is done by buzzer.

2.1 Mat Lab Coding

- Database creation
- Training the data to create MFCC
- Voice recognition

DATA BASE CREATION AND TRAINING

Database creation



Training of Data



Fig-2: Block diagram of database creation and training

Data indeed, any data that can be turned into a linear sequence can be analyzed with DTW. A well known application has been automatic speech recognition, to cope with different speaking speeds. Other applications include speaker recognition and online signature recognition. Also it is seen that it can be used in partial shape matching application.

In database creation section sound input of different floors in user voice are stored in database. During training of data MFCC of the sound is calculated from the database and stored.

VOICE RECOGNITION

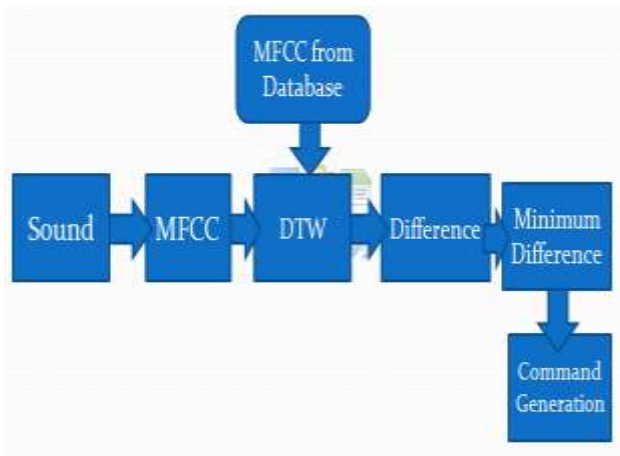


Fig-3: Block diagram of voice recognition

In this section of MAT lab , voice command of user is given for comparison. Then MFCCs of the voice command is found. Using DTW minimum difference database value is evaluated. Thus the destination floor number is identified. This floor number is given serially to the PIC microcontroller for lift operation.

3. EXPERIMENTAL SETUP

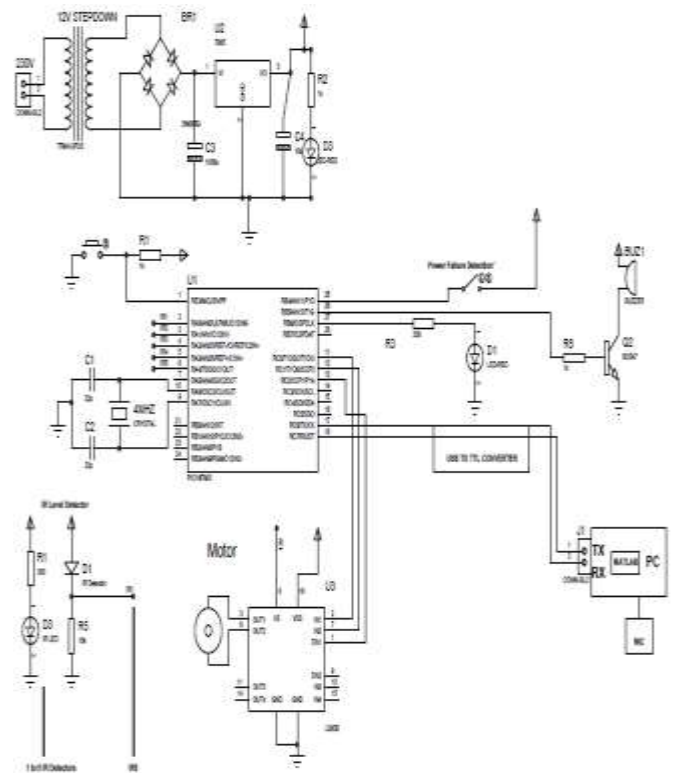


Fig-3: Circuit diagram

The Fig-3 shows the circuit diagram for voice operated intelligent lift. The voice recognition is done using matlab coding, which is done in PC. PIC 16F883 is the main controller used here.

Here the rectifier is used as a component of power supply. The 230V AC is step down to 12V AC using transformer and is rectified to 12V DC by the rectifier. LM7805 is used as the voltage regulator, which regulates the voltage to 5V. And capacitors are used to remove the ripples. An LED is used at the output of the supply to indicate the power.

The MAT lab coding for the voice recognition is done in PC, where the database is created using our team members voice and it is trained, at the time of training the MFCC coefficients are calculated. Finally the voice recognition is done by comparing the MFCC coefficients using DTW technique. Since the output of the MAT lab code is the corresponding floor number, which is given to the PIC controller using USB to TTL converter.

A DC motor is interfaced with the controller using driver L293D. The motor will rotate in clock wise and anti clockwise direction as per the controller program, corresponding to the floor number.

In our circuit five IR modules are used to indicate five floors, the lift is considered as the obstruction. In each IR module there is a transmitter and receiver, the transmitter is an IR LED and receiver is a photo detector. When the lift reached

corresponding floor, it is considered as an obstruction and the voltage vary according to the intensity of light, since the corresponding port pin will be high, the motor stops rotation.

When the supply is ON, the microcontroller, check the data from the PC which is the corresponding floor number as per the input voice command through the inbuilt MIC of the PC. The matlab output is given to the controller using USB to TTL converter. Based on that value the motor will rotate in clockwise or anti clockwise direction. It stops rotation when corresponding floor is reached by checking the port where the IR module is connected.

There is a section for power failure detection , in case of any power failure the buzzer will produce an alert.

4. CONCLUSIONS

1. Voice recognition system have been out on the market for some time they have not yet fully developed to their full potential. In this paper we used it potentially and reliably.
2. A voice recognition program and its connection with the controller can supply a sufficient amount of commands necessary for the lift control.
3. The model of a lift is a useful tool for training students in specialization of automation, voice signal recognition and control technologies as well as for specialists qualification improvement in similar specialization.
4. Voice controlled systems are especially useful for disabled people. Speaker dependent projection based recognition algorithm ensures a sufficiently good recognition accuracy of voice commands. It can be improved by increasing the amount of references and by selecting acoustically different voice commands. References can be collected from many speakers and averaged. The presented recognition algorithm in such way can be transformed into the "multi-speaker independent" one.

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