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Voice Operated Intelligent Elevator

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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.**

Keywords :: Microcontroller, voice command, speech recognition module.

1.Introduction

A lift is a characteristic electromechanical device controlled in electronic digital way containing controlled electric drives, differently realized positioning systems, quite a complex logic control system and having high requirements for reliability and safety. In order to have a model, which is as realistic as it's possible, it has an industrial design except the lift cage and its shaft model. It has no relay contact and up-to-date control elements are chosen for the model: cage drive is with the asynchronous motor and frequency converter, control logic is realized through easily programmed controller, sensors of the cage position are non-contact, control commands are given in a voice mode (reserve version is sensor programmed control panel). Commanding/controlling of the computer and applications, using speech for handling the environment (smart house) are very promising fields, especially for disabled people. For those who have difficulties in entering data with other input tools like keyboard, mouse, etc., speech recognition is an effective alternative to alter or to combine input methods. People with motor disabilities can control various devices via speech input. One of smart house elements could be the control of a lift by voice commands.

2.Characteristics of Voice Operated Elevator

Elevator has to be moved vertically by recognizing our voice commands by using speech Recognition module. By giving different commands lift can be moved from one floor to another automatically. If voice command is received successfully by Elevator an acknowledgement will be coming in the form of beep sound from buzzer. In this way activation of buzzer depend on the voice command received by Elevator. Important factors in speech recognition:

1.Speaker – each voice is unique; hence creating techniques that can accurately and reliably recognize anyone's voice and any dialect of a given language is a major challenge.

2. .Coarticulation – the spectral characteristics of a spoken word (or sounds within the word) vary depending on what word(or sounds)surround it.

3.Speaking rate and style – people speak at different rates and with different pronunciations of the same sounds, thereby making it difficult to get stable patterns for sounds or words that can be used with all speakers and speaking rates and styles.

4.Environmental conditions – speech can be difficult to recognize in home environments (background speech from radios or TV), when spoken in a car (road noise distortions), or in noisy backgrounds (airports, train stations). Each of the above factors contributes some degree of variability to the speech signal. These sources of

variability must be carefully considered when developing applications based on speech recognition technology.

3.Speech Recognition

Speech recognition (SR) is the translation of spoken words into text. It is also known as "automatic speech recognition", "ASR", "computer speech recognition", "speech to text", or just "STT".Some SR systems use "speaker independent speech recognition" , while others use "training" where an individual speaker reads sections of text into the SR system. These systems analyze the person's specific voice and use it to fine tune the recognition of that person's speech, resulting in more accurate transcription. Systems that do not use training are called "speaker independent" systems. Systems that use training are called "speaker dependent" systems.Speech recognition applications include voice user interfaces such as voice dialling (e.g. "Call home"),call routing domestic appliance control, search (e.g. find a podcast where particular words were spoken), simple data entry (e.g., entering a credit card number), preparation of structured documents (e.g. radiology report), speech-to-text processing (e.g., wordprocessors or emails),and aircraft (Direct Voice Input).

Speech recognition algorithm

Model of a lift can be controlled by a small number of voice commands (floor number, stop and go), but the high recognition accuracy of voice commands is necessary. Speaker independent recognition would be more convenient, because it would not be necessary to train the recognition program for a new user. But speaker independent recognition is more complicated than speaker dependent one and ensures less recognition accuracy. Therefore speaker dependent projection based recognition is used in our project.

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 voice recognition chip 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. The similar voice based commands also used to turn on/off the fan inside the lift. Also, LCD display is available for visual information of operations being performed.In voice recognition systems the words are programmed and stored on the microprocessor of the voice recognition.While the circuit powered on it constantly listens for external commands.Whwn a command is recognized,it sends an appropriate signal to its output port to activate attached interface cards and /or devices.

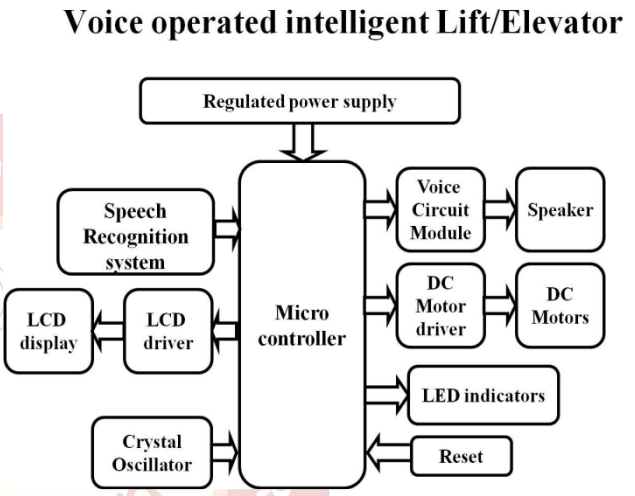

Fig.1. Model of voice operated Elevator

4.DC motor control

Direct current (DC) motors have been used in variable speed drives for a long time. The versatile characteristics of dc motors can provide high starting torques which is required for traction drives.The main work of DC motor is regenretion when lowering in the traction Elevator.In a DC four qudrant drive,turning the motor into a generator and pumping the region energy back inti the line for continuous breaking is very simple.Control over a wide speed range, both below and above the rated speed can be very easily achieved. The methods of DC Motor speed control are simpler and less expensive than those of alternating current motors.The most conventional DC Motor Speed Control technology is PulseWidth Modulation which has considerable advantages such as high accuracy with speed control fast response speed wide margin on speed control and low expenditure.

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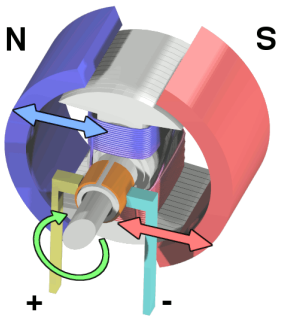

Fig 2. DC motor Control

Pulse width modulation (PWM) is a method for binary signals generation, which has 2 signal periods (high and low). The width (W) of each pulse varies between 0 and the period (T). The main principle is control of power by varying the duty cycle. Here the conduction time to the load is controlled. Let for a time t1, the input voltage appears across the load i.e. ON state and for t2 time the voltage across the load is zero. The average voltage at output is given by Va = Vmax. Where,TON =Time period for Pulse ON,TOFF =Time period for Pulse OFF.Pulse width modulation is implemented using a microcontroller, dependent on an input value for generating variable pulse widths, for driving motor at variable speed.

5.Tools requirements

Software requirements:
1. PIC-C compiler for Embedded C programming.
2. PIC kit 2 programmer for dumping code into Micro controller.
3. Express Voice Circuit design.
4. Proteus for hardware simulation.

Hardware requirements:
1. Regulated Power Supply.
2. Microcontroller.
3. Speech recognition module.
4. DC motors.
5. Motor driver system.
6. LCD display.
7. LED indicators.
8. Voice circuit.
9. Fan for within lift use.

6. Analysis

This study of speech recognition was conceived of as a comparative case study of two people, an interlanguage speaker and a native speaker, interacting in a certain way with a computer. The speech corpus was collected as spontaneous speech, although some of the tasks administered required samples of elicited speech and the sessions were recorded.

Quick Training Modules	words dictated	words misrecognized	recognition accuracy
correction commands	46	6	86.9%
common commands	124	14	94.7%
dictation words	94	12	87.2%
other common command words	35	0	100%
additional words	43	8	81.3%
total number of words	342	40	88.3%
total % of recognition accuracy			**88.3%**

Table I. Accuracy Analysis

To get the feel of the aims of the program, i.e. the more the program was used, the better it was supposed to adapt to the user. The only intervention was represented by technical assistants who limited their interventions to setting up the equipment and giving basic training instructions.

Fig.3 Analysis Graph

The subjects therefore experienced very similar situations as having to deal with difficulties entirely on their own. During the administration of the first three tasks, the two subjects were unaware of each other's progress. In order to ensure correct operational measures, the validity of the study was constructed using videorecording, audiorecording and recorded interviews.

7.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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