Wireless Voice operated lift control system with Safety Care

Submitted by

KADLAG TANUJA DATTATRAY	**B190103830**
SHINDE PRAJAKTA SHANKAR	**B190103868**
SONAWANE PRATIKSHA SHIVAJI	**B190103871**
WAMAN AKANKSHA KASHINATH	**B190103882**

In partial fulfilment of

Bachelor of Engineering

(Electronics)

Savitribai Phule Pune University, Pune (M.S.)

Department of Electronics Engineering

Amrutvahini College of Engineering, Sangamner.

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Guided By

Mr. Bansode B.N.

Department of Electronics Engineering

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(2022-2023**)**

CERTIFICATE

This is to certify that, the project **"Wireless Voice operated lift control system with Safety Care"** submitted by **Kadlag Tanuja Dattatray, Shinde Prajakta Shankar, Sonawane Pratiksha Shivaji, Waman Akanksha Kashinath** is a bonafide work completed under my supervision and guidance in partial fulfilment for award of Bachelor of Engineering (Electronics) degree of Savitribai Phule Pune University, Pune.

Place: Sangamner

Date:

Mr. Bansode B. N.
Guide
Dept. of Electronics Engineering

Dr. V. S. Ubale
Project Coordinator
Dept. of Electronics Engineering

Dr. S. S. Gundal
Head
Dept. of Electronics Engineering

Dr. M. A. Venkatesh
Principal
Amrutvahini College of Engineering, Sangamner

Savitribai Phule Pune University

CERTIFICATE

This is to certify that

KADLAG TANUJA DATTATRAY	**B190103830**
SHINDE PRAJAKTA SHANKAR	**B190103868**
SONAWANE PRATIKSHA SHIVAJI	**B190103871**
WAMAN AKANKSHA KASHINATH	**B190103882**

Students of B.E. Electronics was examined in Project entitled

"Wireless Voice operated lift control system with Safety Care"

On

_____ / _____ / 2023

At

Department of Electronics Engineering

Amrutvahini College of Engineering,

Sangamner.

INTERNAL EXAMINER **EXTERNAL EXAMINER**

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. Speech Recognition could be a system that functions to convert auditory communication into the computer file. The system input is human speech. The main purpose of coming up with this method is to control the Elevator by mistreatment voice commands by the user. It aims at serving to unfit, short height folks and physically challenged persons. This projected system is incredibly abundant convenient throughout COVID-19 pandemic.

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CHAPTER 1

1. INTODUCTION

1.1 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. Elevator is become the main part of our day-to-day life. Elevator is become a transport device that is very common to us now a days. We use it every day to move goods or peoples vertically in a high building such as shopping center, working office, hotel and many more things. Elevator is a very useful device that moves people in the shortest time to desired floor. Lift is the vital part of everyone's life living in large buildings, and moreover it is the necessary thing in large buildings or any big construction having number of floors to move from one floor to another. Now a day it is becoming prestigious thing for the malls, shopping Markets, colleges, hospitals, hotels. Which are having two or three floors or more than that. So we are trying to make it more automatic through our project.

Speech recognition model is the method by which the elevator can be controlled .and by Speech recognition model we will get input to controlling the elevator. Whenever we are dealing with voice control, the first term come in our mind is Speech Recognition i.e. system should know or understand human voice as input to the speech recognition model. Speech recognition is a technology in which the system will understand the words but not its meaning of the words given by the speech of any person to speech recognition module. Speech is a best and ideal method to controlling the elevator. In this project we are also going to give indication to the security in emergency situation. In emergency situation means in case of lift failure .it may be the fault because of power failure or may more reasons of power failure .in emergency condition it will indicate to the security person and that time buzzer will ringing on. [1] 2. Literature survey Vrajesh Prajapati and Mehta at. el.: Voice recognized elevator, we have given the information which describes the voice operated elevator which is also easy in language and important for user. This voice operated elevator mainly useful for handicapped person (blind). Elevator operated on voice so maintenance cost for keypad which is use previously also reduce. A voice recognition program and its connection with the controller can supply sufficient number of commands necessary for the elevator control on which the elevator will operated.

The old elevators were having many drawbacks like there was key press problem and time required to press one key was also more. Voice operated elevator is saving time Elevators are taken into account Associate in nursing inescapable a part of our society. But Elevators primarily based on it needs humans’ physical interaction for its movement. So considering completely different aspects of automatic. technology we have a tendency to came up with a concept of planning the elevator that may be automatic which can perform all the task mistreatment voice commands of users as input rather than physical input with simply giving a voice command the user can reach the destined floor. Manual work which might give an ease to the user to achieve their destined floor throughout peak hours and can conjointly provide a ease to physically-challenge individuals. Elevators are controller devices that use switch mechanism for operation. Either the person wishes to travel in down or upward direction, uses the computer keyboard or perhaps for Associate in emergency stop or to open & shut the elevator door. In today’s life we will notice a colossal kind of housing complexes packed in procurable location with multi storage building capability. This project higher fits for blind, unfit and physically challenged people. Trying toward current scenario of COVID-19. Manually operated elevate encompasses a high rate of spreading the virus. The essential explanation for planning this method is to perform elevator operation via voice directions. Speech recognition systems are the crucial a part of the project. The speech recognition of the elevator system permits the communication mechanism between the users and also the PIC microcontroller primarily based mechanism.

1.2 Need of Project

Looking towards the current situation of COVID-19, manually operated lift has high rate of spreading the virus as contact of each other while manually operating it. Also for the handicapped person manually operating the lift will not be possible. So to overcome this major drawback, Voice controlled elevator can be a very good option.

At present, the lift is operated by buttons which is difficult to operate for blind people and people with disability. When the blind and disabled people are alone, they find it difficult to operate the lift so, this is a problem for these categories of people while using the lift.

One more drawback of the current lift is when any emergency problem arises in the lift when people inside the lift then sometimes provide help cannot possible in time. So many times, the panic situation can occur.

1.3 Objective of Project

1. Operation of lift through voice commands.
2. It is operated on the voice of any person.
3. To highlight key provisions on the use of voice-operated lift for handicap person.If in case of any emergency happening then wireless alert send to control room.

1.4 Theme of Project

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.

1.4.1 Sensor

It is equipment which is used to recognize the actual physical object. If gives output usually in digital form so that in can be easily processed by the machine. The sensor is usually chosen from the sensors which already exist.

1.4.2 Pre-processing

It helps in the production of an efficient set of data by doing noise filtering, smoothing and normalization. It usually processes larger amount of data and reduces the various variations present in it. It helps in safe keeping of an image from various errors

1.4.3 Feature Extraction

It is basically used to collect the required information from the data input used by the sensor so that the classification can be done easily. It is usually done with the help of software which can be modified according to the sensor.

1.4.4 Classification

It is a technique which is used to do the classification of the object based upon its properties. It uses the various features which have been classified by the feature extraction and assign it to various classes according to its attributes. There are various categories of classification like nearest mean classification, classification using feed forward artificial neural network etc. which are being used according to the requirement

1.4.5 Matching

Matching algorithms are applied to compare the feature representations of the input images and determine their similarity or degree of match. The choice of matching algorithm depends on the application and the specific requirements. Some commonly used algorithms include nearest neighbor search, RANSAC (RANdom SAmple Consensus), and graph matching algorithms.

1.4.6 Verification

Image processing verification processes involve techniques used to verify the authenticity, integrity, or quality of an image. These processes are applied to ensure that the image has not been altered, tampered with, or corrupted.

1.5 Organization of Project

Chapter 1:- The first chapter of this report contains introduction Also chapter 1 gives brief idea about why this project is necessary, what is the objective of project and theme of the project.

Chapter 2:- Chapter 2 gives the comparison of two similar system and literature review study.

Chapter 3:- Chapter 3 gives brief about System development and it contains block diagram, working of block diagram and circuit diagram showing connections.

Chapter 4:- This chapter contains overall analysis and result of project.

Chapter 5:- This chapter contains conclusions, future scope and applications. At the end the references and acknowledgement.

CHAPTER 2

2 LITERATURE SURVEY

2.1 Comparison of System

Vrajesh Prajapati and Mehta at. el.: Voice recognized elevator, we have given the information which describes the voice operated elevator which is also easy in language and important for user. This voice operated elevator mainly useful for handicapped person (blind).Elevator operated on voice so maintenance cost for keypad which is use previously also reduces. A voice recognition program and its connection with the controller can supply sufficient number of commands necessary for the elevator control on which the elevator will operated. The old elevators where having many drawbacks like there were key press problem and time required to press one key was also more. Voice operated elevator is saving time. [2]

A Survey Paper on Design & Control of an Elevator for Smart City Application it is concluded that the design and control of three floor elevator for smart city application. The main requirement of the multi storage buildings are elevators. Elevators ease the work human being and keep them in the comfortable zone. One can make the better use of PLC in the designing of the elevator control system. This control is based on the input that is received from the operatoras well as from the sensors. Elevator control system is needed to control all the functions of the elevator. It is the one which guides the elevator car, Elevator car is one which actually carries the passengers between the different floors; it also controls the opening and closing of doors at different floor, and the safety switches are also controlled by the elevator control system. The ladder logic programming is used to simulate the proposed system. Because of use of PLC, elevator systems are getting better, faster, stronger and better-quality elevators are produced. Hence more importance is given to the design of an elevator control system.

In paper design and implementation of Embedded based elevator control System it is concluded that the elevator control system is one of the important aspects in electronics control module in automotive application. In this investigation elevator control system is designed with different control strategies. First the elevator control system is implemented for multi-storage building. This implementation is based on FPGA based Fuzzy logic controller for intelligent control of elevator group system. This proposed approach is based on algorithm which is developed to reduce the amount of computation required by focusing only on relevant rules and ignoring those which are irrelevantto the condition for better performance of the group of elevator system. Here only two inputs are considered i.e. elevator car distance and number of stops. Based on these data, fuzzy controller can calculate the Performance Index (PI) of each elevator car, the car which has maximum PI gives the answer to the hall calls. This would facilitate reducing the Average Waiting Time (AWT) of the passenger. In the second level, the dispatching algorithm isimplemented for multi-storage building. Here six types of dispatching algorithms are considered. Based on the traffic situation and condition, one algorithm out of six is operated, that facilitates reducing the Average Waiting Time of the passenger and also reduces the power consumption of the elevator system. The hardware part of the work comprises a simple D. C. Motor, which can control the up and down movement of the elevator car. This D. C.

Motor is controlled through the MC9S12DP256B microcontroller. Here four floor elevator systems have been considered and every floor has two switches, one switch is used for up movement and another switch is used for down movement. Based on the switch pressed, the elevator car can move either in upward or downward direction. Here two sensors are used in every floor. One sensor is used for detecting the elevator car when elevator car reached to its destination floor. This sensor detects the car and stops the D.C. Motor. At the same time, another sensor is used for opening and closing the door. Finally, a novel fuzzy based PID controller algorithm is implemented using MC9S12dp256B microcontroller. This algorithm is mainly used for maintaining the constant speed of D.C. Motor with different load conditions.

In paper Voice Operated Elevator with Emergency Indicator it is concluded that elevator is the main part in day to day life .it become transport devices that we are using every day .elevator is useful to move goods and persons. In this project, we are using the microcontroller AT89S52. on this microcontroller the elevator controller is constructed to simulate as elevator in the real elevator. This project dissertation documents the results of a research on a microcontroller-based elevator control system. It provides useful data to those who want to carry out a elevator Control system research. This System is operated on the Voice of any person which will help the handicap person to Travel form one place to another without any help of other. Microcontroller is become main part of each application now a days. Application in each and every automation control like Hand-held communication devices Remote controllers, automatic and automobiles, security system, telephone printing machines, indicating ,measuring instruments and products of day to day life. The project described here being also a microcontroller based, used for security purpose and in emergency condition. The use of microcontroller in this project is to store the data which is using in the programming for purpose of moving the elevator, process data that will be according to the user wishes.

In paper elevator control system project, it is concluded that as part of the requirements in a juniorlevel measurements & instrumentation course (for an Electrical and Computer Engineering Technology program), students are required to design and implement an elevator control system project. The elevator simulator is pre-built and equipped with a car that travels through three floors, a car hoist system that uses a 12-volt DC motor, floor sensors to detect the position of the car, and an elevator call pushbutton on each floor. Terminal strips are provided for I/O connections. Students are required to use a National Instruments data acquisition system with analog I/O and digital I/O capability. The objective of the project is for students to design the software (using LabVIEW) and hardware interfacing electronics for the simulated elevator control system such that it mimics the operation of a typical elevator. This paper provides a detailed listing of the engineering requirements for the system and the functional test procedure for verifying proper operation of the system. Examples of student work are provided, along with a project assessment. This project is also linked to several ABET criteria and can be used for assessment of the same. Recommendations are provided to help ensure student success on the project. This project has been found to effectively integrate both hardware and software design, while utilizing information covered from many prerequisite courses. Due to the slow response characteristics of this system, this PC-based control project lends itself well to this application.

2.2 Survey of Components

2.2.1 PIC18F4520

The PIC18F4520 is a microcontroller from the PIC18 family manufactured by Microchip Technology. It is a 8-bit microcontroller based on the Enhanced Flash Core with a wide range of integrated peripherals and features. Here are some key specifications of the PIC18F4520:

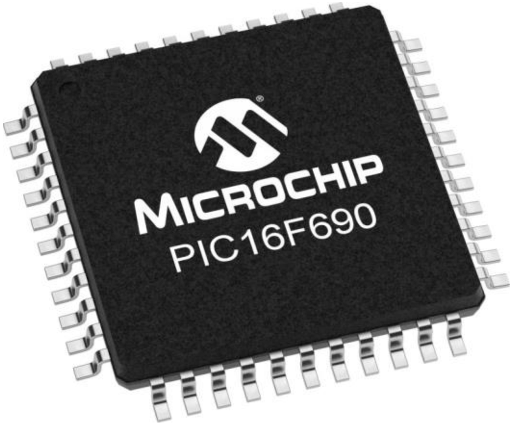
Architecture: 8-bit
CPU Speed: Up to 40 MHz
Flash Memory: 32 KB
RAM: 2 KB
Data EEPROM: 256 bytes
I/O Pins: 36
Timers: 4 x 8-bit, 1 x 16-bit
UART/USART: 1 module
SPI: 1 module
I2C: 1 module
ADC: 10-bit, 8 channels
PWM: 2 modules
Operating Voltage: 2.0V to 5.5V
Packages: 40-pin PDIP, 44-pin TQFP, 44-pin QFN, and 44-pin PLCC

The PIC18F4520 microcontroller is widely used in various applications, including industrial control, automation, consumer electronics, and embedded systems. It offers a good balance between performance, features, and cost, making it a popular choice for many projects.

It is important to note that the information provided here is a general overview, and for more detailed and up-to-date specifications and features, it is recommended to refer to the official documentation and datasheet provided by Microchip Technology for the PIC18F4520 microcontroller.

2.2.2 PIC16F690

The PIC16F690 is an 8-bit microcontroller from the PIC16 family manufactured by Microchip Technology. It is a low-cost, high-performance microcontroller with integrated peripherals and features. Here are some key specifications of the PIC16F690:



Architecture: 8-bit
CPU Speed: Up to 20 MHz
Flash Memory: 7.3 KB
RAM: 256 bytes
EEPROM: 256 bytes
I/O Pins: 20
Timers: 3 x 8-bit, 1 x 16-bit
UART/USART: 1 module
SPI: 1 module
I2C: 1 module
ADC: 10-bit, 12 channels
PWM: 2 modules
Operating Voltage: 2.0V to 5.5V
Packages: 20-pin PDIP, 20-pin SOIC, 20-pin SSOP

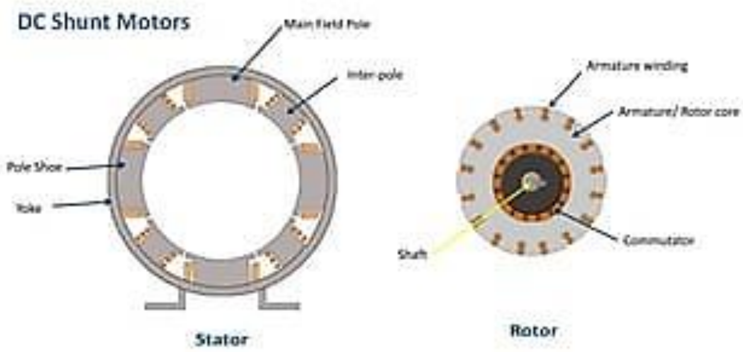
The PIC16F690 microcontroller is widely used in various applications, including automotive, lighting control, small appliances, and industrial control. It offers a cost-effective solution for projects that require low power consumption and moderate processing capabilities.

It is important to note that the information provided here is a general overview, and for more detailed and up-to-date specifications and features, it is recommended to refer to the official documentation and datasheet provided by Microchip Technology for the PIC16F690 microcontroller.

2.2.3 DC Motor

DC Shunt motor

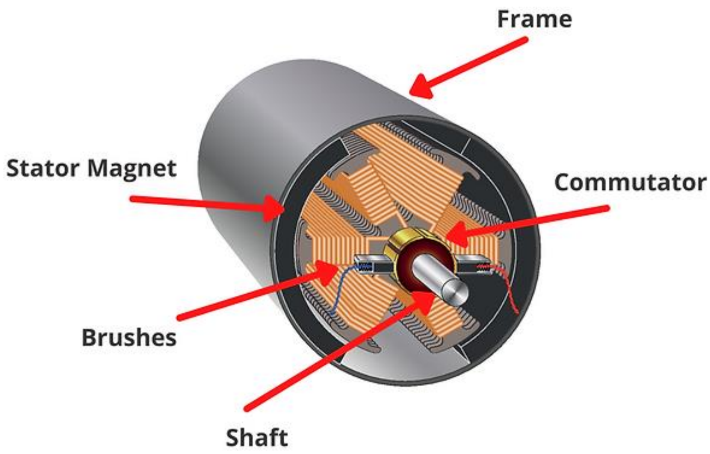
A DC shunt motor (also known as a shunt wound DC motor) is a type of self-excited DC motor where the field windings are shunted to or are connected in parallel to the armature winding of the motor. Since they are connected in parallel, the armature and field windings are exposed to the same supply voltage. Though there are separate branches for the flow of armature current and field current – as shown in the figure of below.



Permanent Magnet DC Motor

The permanent magnet dc motor can be defined as a motor which includes a permanent magnet pole is called Permanent Magnet DC Motor. In this motor, the magnet can be used to make the flux working within the air gap in its place of the field winding. The rotor structure is similar to the straight DC Motor. PMDC Motor's rotor includes armature core, commutator, & armature winding. Normally, in a conventional DC motor, there are two kinds of winding such as armature as well as Filed.

The main function of field winding is to produce the functioning magnetic flux within the air gap as well as wound on the stator of the motor while armature winding can be wound on the rotor. Inactive carbon brushes are pushed on the commutator like in conventional DC motor. The operating voltage of the PMDC motor is 6 volts, 12 volts otherwise 24 volts DC supply attained from the voltage sources.



Photograph 2.10: PMDC Motor

Compound Motor

A compound wound DC motor (also known as a DC compound motor) is a type of self-excited motor, and is made up of both series the field coils S_1 S_2 and shunt field coils F_1 F_2 connected to the armature winding as shown in the figure below.
Both the field coils provide for the required amount of magnetic flux, that links with the armature coil and brings about the torque necessary to facilitate rotation at the desired speed. As we can understand, a compound wound DC motor is basically formed by the amalgamation of a shunt wound DC motor and series wound DC motor to achieve the better off properties of both these types. Like a shunt wound DC motor is bestowed with an extremely efficient speed regulation characteristic, whereas the DC series motor has high starting torque.

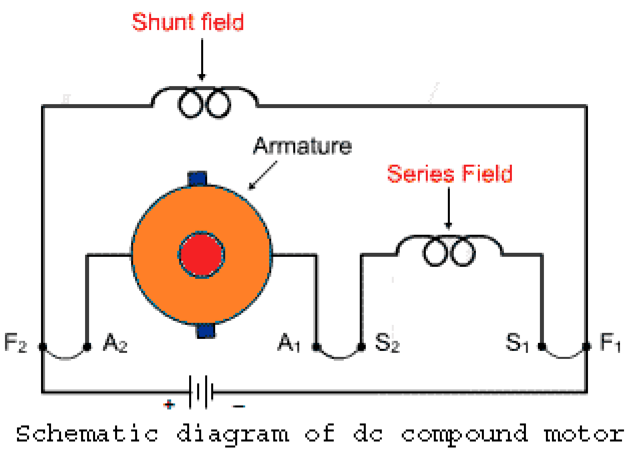


Figure 2.11: Compound Motor

2.2.4 Battery -

12V 2Ah Rechargeable Lead Acid Battery is normally use for robots in competition. Wired or Wireless Robots runs for a long time with high speed with this type of battery. Seal Lead Acid (SLA) Rechargeable battery is the most common general purpose battery.

Low cost, robust and less maintenance required are the advantages of SLA. But it is considered heavy weight for certain robotic application. To charge SLA batteries, you can use any general DC power supply as long as it provides the correct voltage to your battery.

Photograph 2.14: Battery

Features:

Rechargeable

Recyclable

No Memory Effect

Able to use for most of the 12V controllers, motors or any other appliances

Specification:

Voltage: 12V

Capacity: 2Ah

Size: 98mm x 43mm x 52 mm

Weight: 0.450kg

Package Includes:

1 x 12V 1.2Ah Rechargeable Lead Acid Battery

2.2.5. Relay

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signa

Photograph 2.15: Relay

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and most have double throw (changeover) switch contacts as shown in the diagram

Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical. The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil. The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification. Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available. For further information about switch contacts and the terms used to describe them please see the page on switches. Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay.

The supplier's catalogue should show you the relay's connections. The coil will be obvious and it may be connected either way round. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection_diode across the relay coil. The figure shows a relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts.

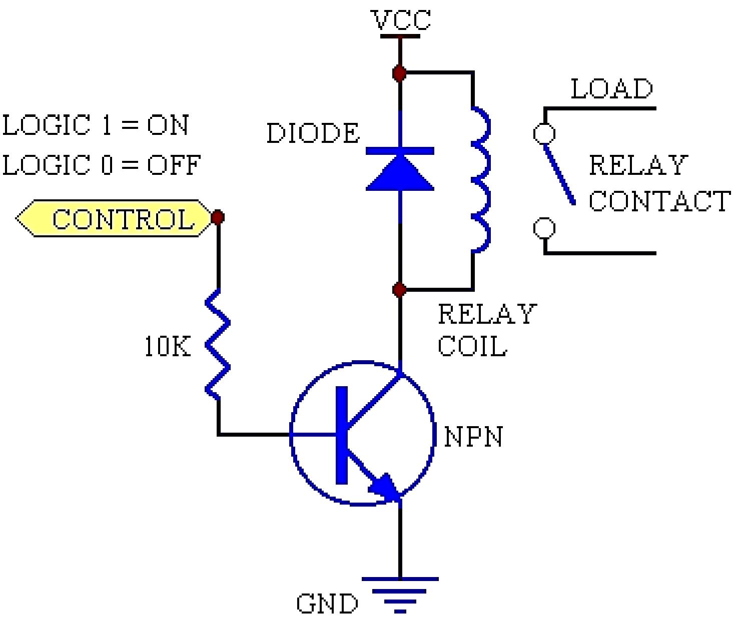


Figure 2.16: Circuit Diagram

There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.

The relay's switch connections are usually labelled COM, NC and NO:

- COM = Common, always connect to this; it is the moving part of the switch.
- NC = Normally Closed, COM is connected to this when the relay coil is off.
- NO = Normally Open, COM is connected to this when the relay coil is on.

Applications of relays

Relays are used for:

- Control a high-voltage circuit with a low-voltage signal, as in some types of modems or audio amplifiers.
- Control a high-current circuit with a low-current signal, as in the starter solenoid of an automobile.
- Detect and isolate faults on transmission and distribution lines by opening and closing circuit breakers.
- Time delay functions. Relays can be modified to delay opening or delay closing a set of contacts. A very short (a fraction of a second) delay would use a copper disk between the armature and moving blade assembly. Current flowing in the disk maintains magnetic field for a short time, lengthening release time. For a slightly longer (up to a minute) delay, a dashpot is used. A dashpot is a piston filled with fluid that is allowed to escape slowly. The time period can be varied by increasing or decreasing the flow rate. For longer time periods, a mechanical clockwork timer is installed

2.2.6. Power Supply

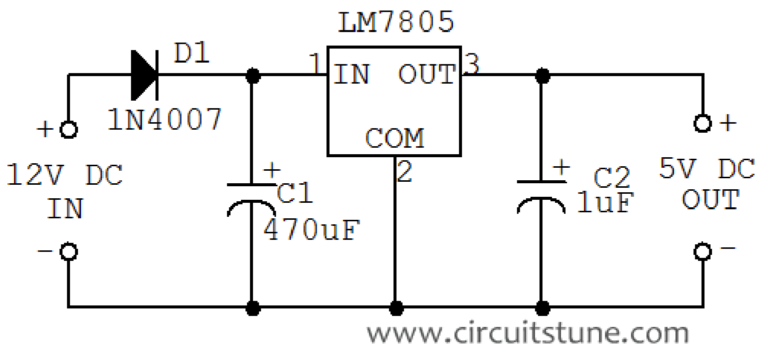


Figure 2.17: Power Supply

The 7805 Voltage Regulator IC. A regulated power supply is very much essential for several electronic devices due to the semiconductor material employed in them have a fixed rate of current as well as voltage. The device may get damaged if there is any deviation from the fixed rate. One of the important sources of DC Supply are Batteries. But using batteries in sensitive electronic circuits is not a good idea as batteries eventually drain out and lose their potential over time. Also, the voltage provided by batteries are typically 1.2V, 3.7V, 9V and 12V. This is good for circuits whose voltage requirements are in that range. But, most of the TTL IC's work on 5V logic and hence we need a mechanism to provide a consistent 5V Supply. Here comes the 7805 Voltage Regulator IC to the rescue. It is an IC in the 78XX family of linear voltage regulators that produce a regulated 5V as output. 7805 is a three terminal linear voltage regulator IC with a fixed output voltage of 5V which is useful in a wide range of applications. Currently, the 7805 Voltage Regulator IC is manufactured by Texas Instruments, ON Semiconductor, STMicroelectronics, Diodes incorporated, Infineon Technologies, etc.

Some of the important features of the 7805 IC are as follows:

- It can deliver up to 1.5 A of current (with heat sink).
- Has both internal current limiting and thermal shutdown features.
- Requires very minimum external components to fully function.

The above circuit shows all the components required for a 7805 IC to work properly. The 0.22µF Capacitor near the input is required only if the distance between the regulator IC and the power supply filter is high. Also, the 0.1µF Capacitor near the output is optional and if used, it helps in the transient response. In this circuit, VIN is the input voltage to the 7805 IC and the source can be from either a battery of an unregulated DC. VOUT is the output of the 7805 IC, which is a Regulated 5V.

Design of Power supply:

All electronic circuits use DC power supply of adequate voltage for their operation.

To obtain this DC voltage from 230V AC mains, we need to use a 'rectifier'. The rectified DC voltage is 'pulsating' in nature. We know that a combination of rectifier & filter can produce a dc voltage which is almost pure i.e. ripple free. However, the problem with such a power supply is that its output voltage will not remain constant in the event of fluctuations in ac input voltage or changes in load current. This type of power supply is called as unregulated power supply. The power supply, which provides a constant output voltage irrespective of everything is called, regulated power supply. So we have to design a regulated power supply using series voltage regulator IC 7805.

Following figure shows general block diagram of regulated power supply.

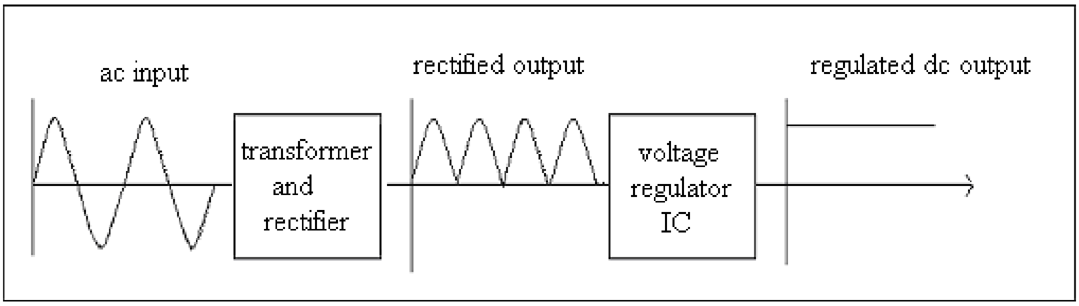


Figure 2.18: General Block Diagram Of Power Supply

BRIDGE RECTIFIER

Bridge rectifier circuit consists of four diodes arranged in the form of a bridge as shown in figure.

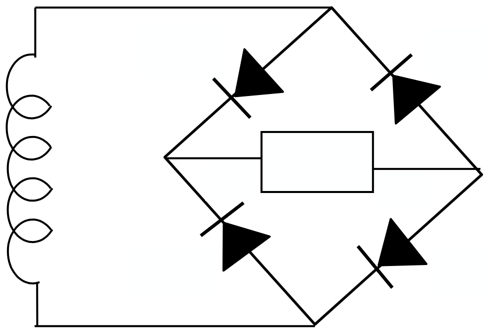


Figure 2.19: Bridge Rectifier

OPERATION

During the positive half cycle of the input supply, the upper end A of the transformer secondary becomes positive with respect to its lower point B. This makes Point1 of bridge Positive with respect to point 2. The diode D1 & D2 become forward biased & D3 & D4 become reverse biased. As a result a current starts flowing from point1, through D1 the load & D2 to the negative end.During negative half cycle, the point2 becomes positive with respect to point1. Diodes D1 & D2 now become reverse biased. Thus a current flow from point 2 to point1.

Transformer

Transformer is a major class of coils having two or more windings usually wrapped around a common core made from laminated iron sheets. It has two cols named primary and secondary. If the current flowing through primary is fluctuating, then a current will be inducted into the secondary winding. A steady current will not be transferred from one coil to other coil.

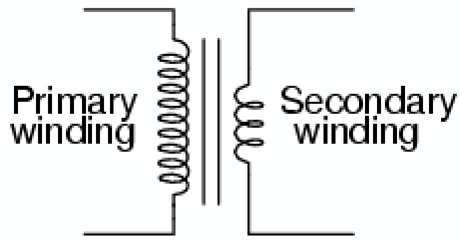


Figure 2.20: Basic Transformer

Design of C1:

The maximum current that can be drawn from this IC is 1A. But our circuit requires maximum current of Imax, which is summation of all the current required to drive individual IC's Im = 100 Ma. For safety purpose, we consider the maximum current limit exactly double of the circuit requirement

Imax = 2Im.

Therefore, Imax = 200 mA.

We know that,

$$Q = CV \quad \ldots\ldots\ldots\ldots\ldots\ldots \text{(1)}$$

Where,

Q = charge on capacitor.

C = capacitance.

V = voltage applied to capacitor.

Also,

$Q = I\ t.$ ……………………………….. (2)

Where,

$I = I_{max}.$

t = period of output voltage of rectifier.

Equating equations (1) & (2), we get

$CV = I_{max}\ t.$ ……………………………….. (3)

Now, at input of transformer, applied voltage frequency is 50 Hz.

As we have used step down transformer of 9-0-9 V, we get output voltage having same frequency of 50 Hz but amplitude step down to 9V (rms). After rectification, frequency doubles & amplitude becomes Vpeak, as shown in figure.

V_{in} (rms) = 230 v.

V_{sec} (rms) = 9v.

Therefore, $V_{peak} = V_p = V_{sec} / 0.707.$

$V_p = 12$ v.

And, $t = 1 / 2f.$

$= 1 / 100.$

$= 0.01$ sec.

From equation (3),

$CV = I\ t.$

Therefore,

$C = I_{max}\ t\ /\ V.$

= 200 * 0.01 / 12

= 166.66 uF.

Select, C1= 470 uF.

Design of C2:

We know that, due to internal circuitry of IC 7805 and load connected at the output of power supply; various types of noises are generated at its output, such as thermal noise, flicker noise, shot noise, white noise etc. Hence in order to bypass all these noises, we have to connect a capacitor C2. It can take value between 0.1uF to 100uF.Here we have connected C2 = 100 uF.

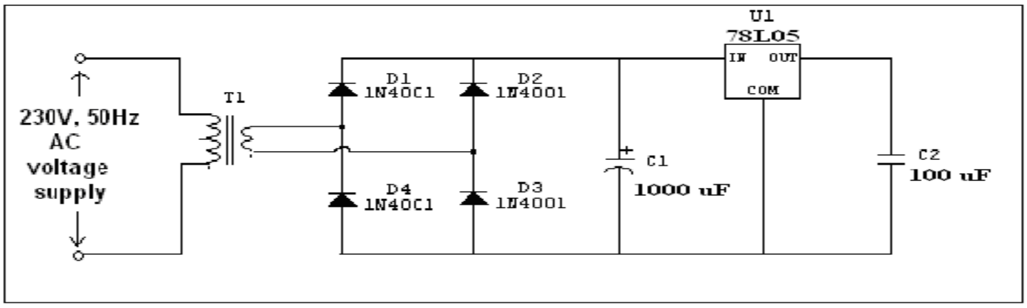
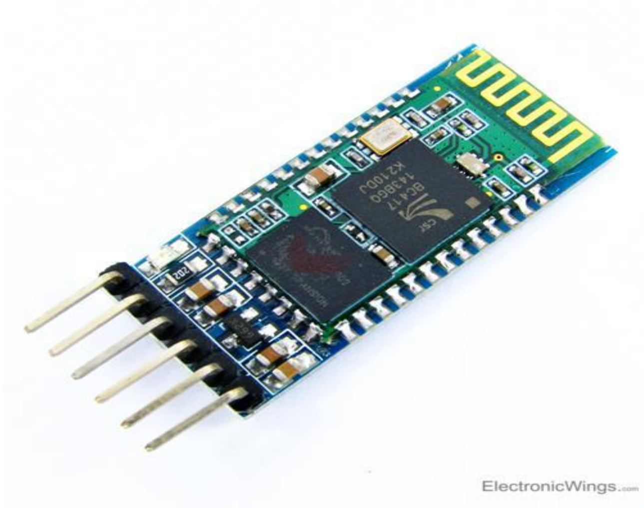


Figure 2.21: Design for 5v Power Supply

2.2.7. Bluetooth Module (HC 05)



Bluetooth wireless technology is becoming a popular standard in the communication. it is one of the fastest growing fields in the wireless technologies. It is convenient, easy to use and has the bandwidth to meet most of today's demands for mobile and personal communications. Bluetooth technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). The most popular host controller interface today is either a UART or a USB. Here, I will only focus on the UART interface, it can be easily show how a Bluetooth module can be integrated on to a host system through a UART connection and provide the designer an optimal solution for Bluetooth enabled systems.

2.2.8. Push Button

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism to control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal.[1] The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state.
Terms for the "pushing" of a button include pressing, depressing, mashing, slapping, hitting, and punching.

Photograph 2.23: Push Button

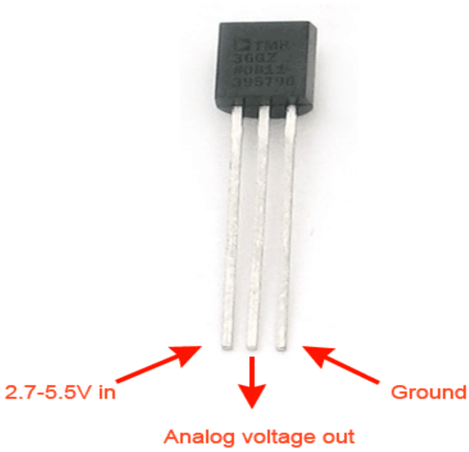
The "push-button" has been utilized in calculators, push-button telephones, kitchen appliances, and various other mechanical and electronic devices, home and commercial.

In industrial and commercial applications, push buttons can be connected together by a mechanical linkage so that the act of pushing one button causes the other button to be released. In this way, a stop button can "force" a start button to be released. This method of linkage is used in simple manual operations in which the machine or process has no electrical circuits for control.

Red pushbuttons can also have large heads (called mushroom heads) for easy operation and to facilitate the stopping of a machine. These pushbuttons are called emergency stop buttons and for increased safety are mandated by the electrical code in many jurisdictions. This large mushroom shape can also be found in buttons for use with operators who need to wear gloves for their work and could not actuate a regular flush-mounted push button.

As an aid for operators and users in industrial or commercial applications, a pilot light is commonly added to draw the attention of the user and to provide feedback if the button is pushed. Typically this light is included into the center of the pushbutton and a lens replaces the pushbutton hard center disk. The source of the energy to illuminate the light is not directly tied to the contacts on the back of the pushbutton but to the action the pushbutton controls. In this way a start button when pushed will cause the process or machine operation to be started and a secondary contact designed into the operation or process will close to turn on the pilot light and signify the action of pushing the button caused the resultant process or action to start.

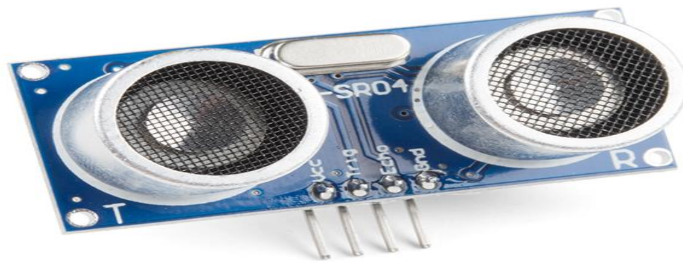
2.2.9.Temp Sensor LM35:



The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade

scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35D is rated to operate over a 0° to +100°C temperature range

2.2.10. Ultrasonic Sensor:



Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

1. Using IO trigger for at least 10us high level signal,

2. The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

3. IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning. Test distance = (high level time×velocity of sound (340M/S) / 2, 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

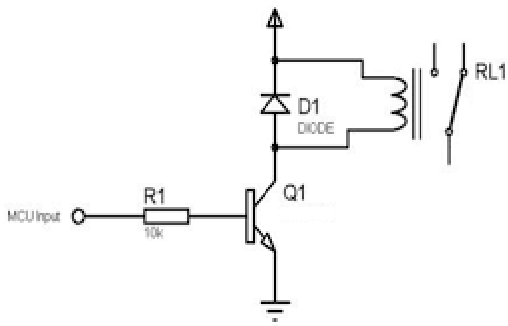
system and accordingly system is worked. This is a Long-term solution which operates independently. The actionable recommendations and solutions make sure that any user can use the elevator. Even theuser has any kind of disability. Blind and visually impaired people encounter serious problems in leading 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.

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.

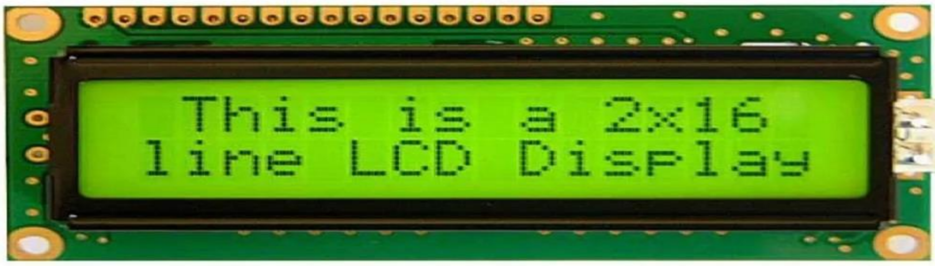
3. The model of a lift is a useful tool for training students in specialization of automation, voice signal recognition and control technologies as well as for specialists' qualification improvement in similar specialization.

2.2.11.Relay Driver Circuit:



- Motor requird 12v power supply to start.
- Relay driver circuit give 12v supply from low voltage 5v.

2.2.12.Liquid crystal display:



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments),animations and so onA 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

The purpose of using 16x2 LCD in our project is to display all the parameters of electricity meter and is connected to the port 0 of ARM microcontroller.

Features

- 16x2 matrix
- Low power operation support: 2.7 to 5.5V.
- Duty cycle: 1/16
- Connector for standard 0.1-pitch pin headers.

2.2.13.Zigbee Module:

It can be used to transmit and receive data at multiple baud rates from any standard CMOS/TTL source. CC2500 Wireless Trans-receiver module is a direct line in replacement for your serial communication it requires no extra hardware and no extra coding to turn your wired communication into wireless oneIt works in Half Duplex mode i.e. it provides communication in both directions, but only one direction at same time (not simultaneously). This switching from receiver to transmitter mode is done automatically.

Features of CC2500 Wireless Module:

Supports Multiple Baud rates (4800/9600/19200/38400).Works on ISM band (2.4 GHz) which is reserved

internationally so no need to apply for license.

- Supports multiple frequencies within the same band rate thus avoiding data collision.
- No complex wireless connection software or intimate knowledge of RF is required to connect your serial devices.
- Designed to be as easy to use as cables.
- No external Antenna.

CHAPTER 3

3. SYSTEM DEVELOPMENT

3.1 Block Diagram of the System

In this rapid world of technology where voice begins its era of domination to replace the touch screens from smart phones to huge computer systems, bringing voice in day to day affairs becomes significant. Elevators being one such system used in daily life serves this purpose of making future generations hands free which also becomes a boon for the disabled.

The basic working principle of elevator is based on the elevator algorithm, where an elevator can decide to stop based on two conditions. The first one being the direction and second one based on the current floor and destination floor. The elevator is generally made up of rotors, cables, pulleys based on traction, climbing or hydraulic model. To serve laboratory purposes it can also be designed by connecting the elevator system to a desktop or microprocessor to accept input voice.

In this project, a voice controlled elevator system is proposed where the input commands to stimulate the movement of the elevator system are kept convenient for the users. The commands include voice input for the floor operations, directions, elevator car's door operation and a special option to place a call of speaker's choice in case of any unexpected event that requires immediate action.

3.2 Developed Block Diagram Schematic

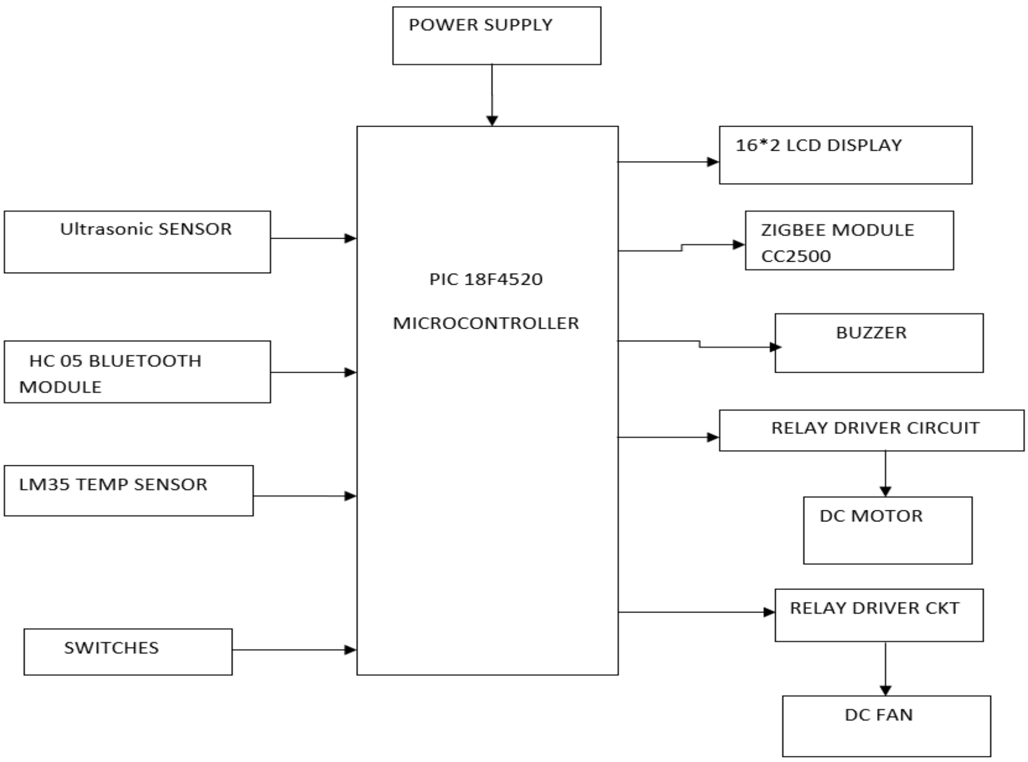


Figure 3.1: Block Diagram Of lift control system

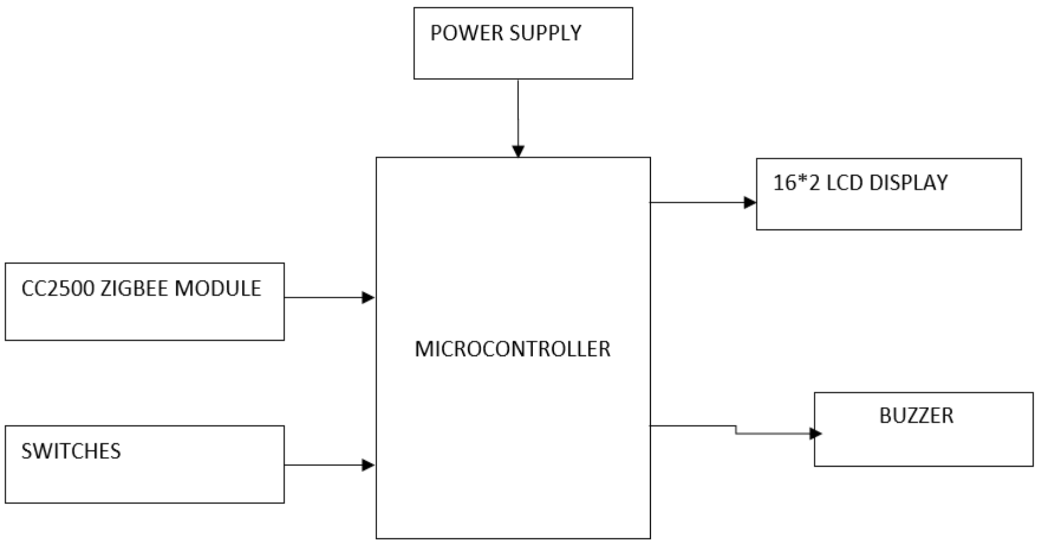


Figure 3.2: Block Diagram of Security Control system

3.3 .Functional partitioning

Voice operated system is the main part of this project. Voice to text convertor 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.

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.

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.

3.4 Testing And Troubleshooting

3.4.1 Before Soldering in Components

- Check that component agree with the part list (value and power of resistors, value and voltage eating of capacitor, etc.) if in any doubt double check the polarized components (diodes, capacitor, rectifiers etc)
- If there is a significant time elapse between circuits, take trouble to read the article; the information is often given in a very condensed from. Try to get most important point

out of the description of the operation of the circuit, Even if you don't understand exactly what is supposed to happen.

- If there is any doubt that some component may not may be equivalent, check that they are compatible. Only use good quality IC socket.
- Check the continuity of the tracks on the PCB (and through plated holes with the double sided boards) with a resistance meter or continuity tester.
- Make sure that all drilling, filling and other 'heavy' work is done mounting any component. If possible keep any heat sinks well isolated from other components.
- Make wiring diagram if the layout involves lots of wires spread out any all direction.
- Do not reuse wire unless it is of good quality. Cut off the ends and strip it a new.

3.4.2 After mounting the component

- Inspect all the soldered joints by are using a magnifying glass the check them with a continuity tester. Make sure there are no dry joints and no tracks are short circuited by poor soldering.
- Ensure that the positions of all the component agree with mounting diagram.
- Check that any links needed are present and that they are in the right positions to give the desired configuration.
- Check all the ICs in their sockets (see that there are no pins bent under any ICs no near ICs are interchanged etc.)
- Check all the polarized components (diodes, capacitor etc.) are fitted correctly.
- Check the wiring (watch for off cuts of components leads) at the same time ensure that there are not short-circuits between potentiometer, switches, etc. And there immediate surrounding (other components or the case).Do the same with mounting hardware such as spacers, nuts and bolts etc.
- Ensure that the supply transformer is located as closely as possible to the circuits (this could have significant improvement in the case of critical signal level).
- Check that the connections to the earth are there and that they are of good contact.
- Make sure the circuit is working correctly before spending any time putting it into a case.

3.5 Embedded C

Embedded C is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. Embedded C uses most of the syntax and semantics of standard C, e.g., main() function, variable definition, datatype declaration, conditional statements (if, switch, case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

Features:-

1) It is small and simpler to learn, understand, program and debug.
2) Compared to assembly language, C code written is more reliable and scalable, more portable between different platforms.
3) C compilers are available for almost all embedded devices in use today, and there is a large pool of experienced C programmers.
4) C has advantage of processor-independence and is not specific to any particular microprocessor/microcontroller or any system.
5) As C combines functionality of assembly language and features of high level languages.
6) It is fairly efficient.
7) It supports access to I/O and provides ease of management of large embedded projects.

3.6. Designing Circuit Boards

To design a circuit board, simply drag and drop components onto your document and connect them together using the intelligent wiring tool. Then select the menu option 'Convert to PCB' and leave PCB Wizard 3 to do the rest for you.

If you want to simulate your design before turning it into a circuit board, PCB Wizard 3 offers tight integration with Control Studio 2 and Livewire.

3.6.1 Proteus

Proteus was initially created as a multiplatform (DOS,Windows, Unix) system utility, to manipulate text and binary files and to create CGI scripts. The language was later focused on Windows, by adding hundreds of specialized functions for: network and serial communication, database interrogation, system service creation, console applications, keyboard emulation, ISAPI scripting (for IIS). Most of these additional functions are only available in the Windows flavour of the interpreter, even though a Linux version is still available.

Proteus was designed to be practical (easy to use, efficient, complete), readable and consistent.

Its strongest points are:

- powerful string manipulation;
- comprehensibility of Proteus scripts;
- availability of advanced data structures: arrays, queues (single or double), stacks, bit maps, sets, AVL trees.

The language can be extended by adding user functions written in Proteus or DLLs created in C/C++.

3.7. PCB Layout

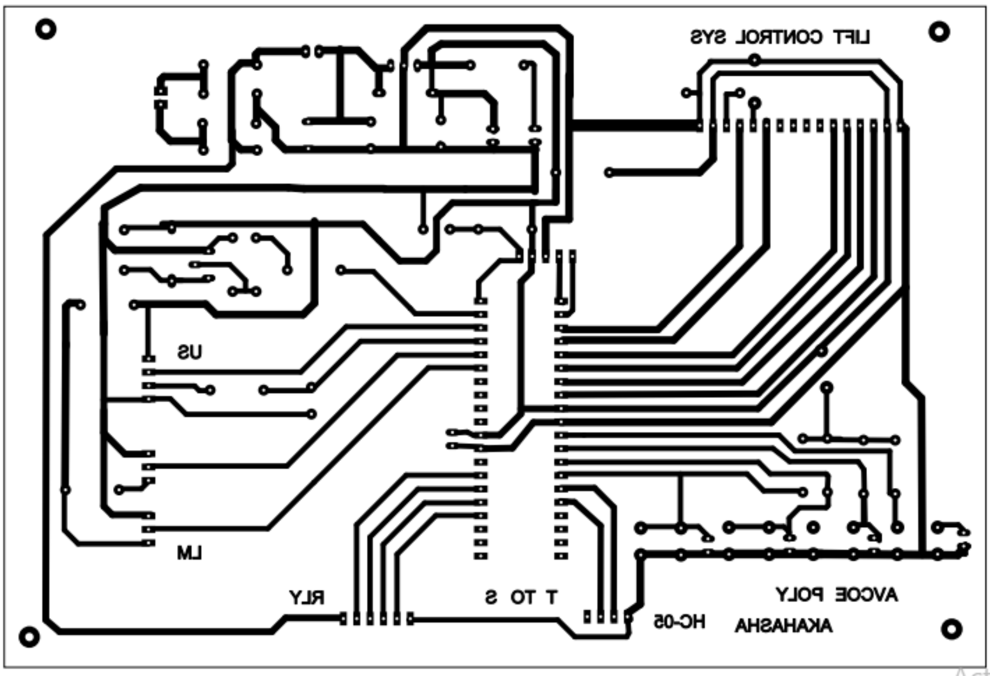


Figure 3.2:PCB layout

3.8 Circuit Diagrams

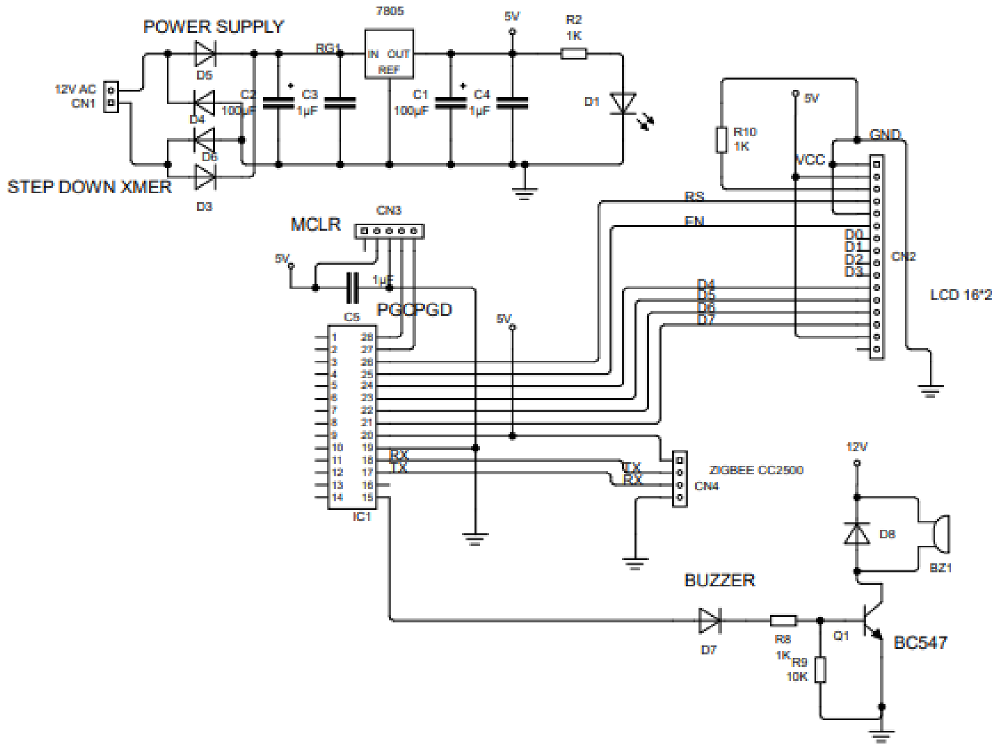


Figure 3.3: Circuit Diagram

3.9. Steps to Test hardware

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 use. 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 PIC Controller as shown in figure 1: The functional block diagram of the proposed system.

3.10.Flowchart

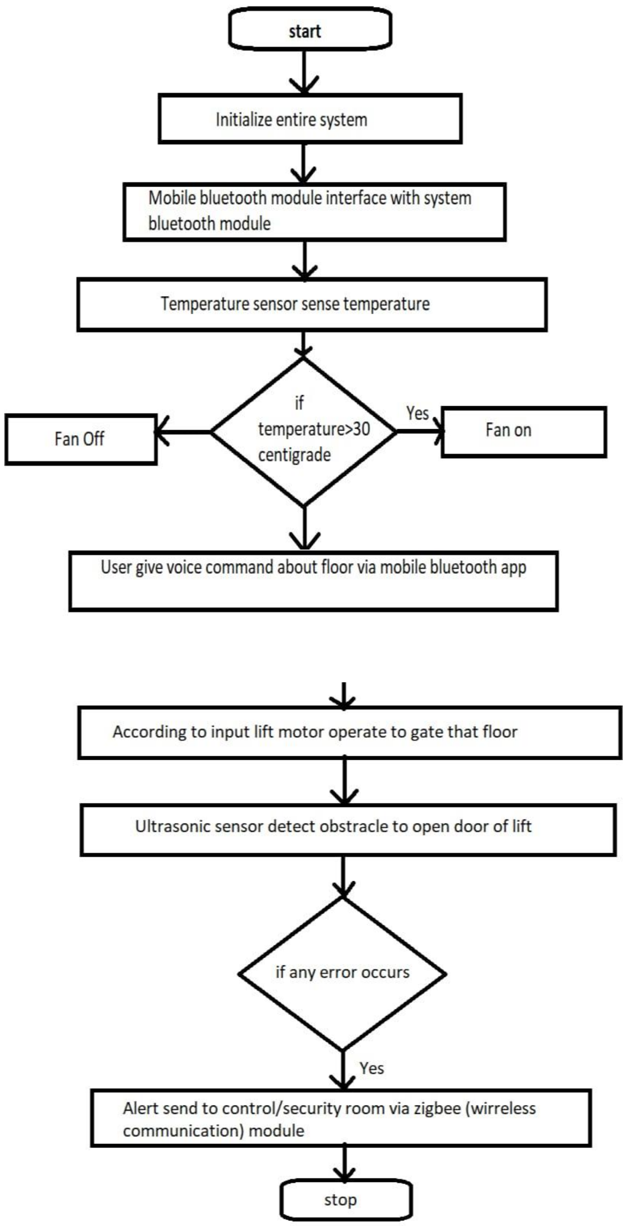


Figure 3.4: Flowchart of the system

CHAPTER 4

PERFORMANCE ANALYSIS

4.1 Result Analysis

4.1.1 Practical Analysis

Practical analysis of a wireless voice-operated lift control system with safety care involves evaluating the system's functionality, usability, reliability, and safety considerations. Here are some key aspects to consider:

Voice Recognition Accuracy: Assess the accuracy of the voice recognition system in understanding and interpreting voice commands reliably. Evaluate its ability to recognize different voices, accents, and variations in speech patterns. Conduct extensive testing with various individuals to ensure reliable and accurate voice command recognition.

Response Time: Measure the system's response time from the moment a voice command is given to the lift's action. Analyze whether the response time meets acceptable standards for efficient lift operation and user satisfaction.

Safety Features: Evaluate the safety features integrated into the system to ensure safe lift operation. This may include emergency stop functionality, obstacle detection sensors, and door control mechanisms. Conduct thorough testing to verify that these safety features operate reliably and respond appropriately in emergency situations.

User Interface: Assess the user interface for ease of use and intuitive operation. The voice-operated control system should provide clear instructions and feedback to the user, ensuring a seamless and user-friendly experience.

Robustness and Reliability: Test the system's robustness and reliability by subjecting it to various real-world scenarios, such as background noise, different voice volumes, and environmental factors. Ensure that the system performs consistently and reliably in different operating conditions.

Integration with Existing Lift Systems: Consider the integration process of the voice-operated control system with existing lift systems. Evaluate the compatibility, ease of installation, and potential modifications required to integrate the system seamlessly with the existing lift infrastructure.

Power Efficiency: Analyze the power consumption of the wireless voice-operated control system and ensure it operates efficiently to conserve energy. Assess the system's standby mode and power-saving features to minimize power consumption when not in active use.

Security and Privacy: Consider security measures to protect the wireless communication between the voice-operated control system and the lift. Implement encryption and authentication mechanisms to prevent unauthorized access and protect user privacy.

Maintenance and Support: Evaluate the ease of maintenance and availability of support for the system. Consider the availability of software updates, troubleshooting resources, and customer support to address any issues that may arise during operation.

Regulatory Compliance: Ensure that the wireless voice-operated lift control system complies with relevant safety standards, building codes, and regulations governing lift operation and accessibility.

4.1.2 Theoretical Analysis

The theoretical analysis of a wireless voice-operated lift control system with safety care involves examining the underlying principles, algorithms, and theoretical considerations that govern its operation. Here are some key aspects to consider in the theoretical analysis:

Voice Recognition Algorithms: Study the voice recognition algorithms used in the system. Analyze the principles behind speech processing, including speech recognition, noise cancellation, and signal processing techniques. Evaluate the performance and accuracy of the voice recognition algorithms in different noise conditions and variations in speech patterns.

Communication Protocols: Examine the wireless communication protocols utilized in the system to establish communication between the control unit and the lift. Consider the theoretical aspects of data transmission, error detection, and correction techniques to ensure reliable and secure wireless communication.

Control System Theory: Apply control system theory to understand the theoretical framework behind the lift control mechanism. Study feedback control loops, system stability, and control algorithms employed in the system. Analyze the theoretical aspects of optimizing lift operation, minimizing response time, and ensuring smooth and efficient ride quality.

Safety Considerations: Evaluate the theoretical safety measures incorporated into the system. This may include theoretical analysis of emergency stop mechanisms, obstacle detection algorithms, and door control systems. Assess the theoretical reliability and effectiveness of these safety features in preventing accidents and ensuring passenger safety.

Human-Machine Interaction: Study the theoretical aspects of human-machine interaction in the voice-operated control system. Analyze the theoretical foundations of user interface design, voice command recognition, and feedback mechanisms. Consider theories of usability, cognitive load, and user experience to optimize the system's interaction with users.

Energy Efficiency: Conduct theoretical analysis of energy-efficient operation in the system. Study power management techniques, theoretical algorithms for optimizing power consumption, and theoretical models for estimating power requirements. Evaluate how theoretical approaches can maximize energy efficiency and prolong battery life in wireless components.

System Performance Optimization: Use theoretical analysis to optimize system performance. Consider theoretical models for load balancing, elevator scheduling, and traffic management to minimize waiting time and maximize elevator efficiency. Apply theoretical optimization algorithms to enhance system performance and user satisfaction.

Fault Detection and Diagnostics: Study theoretical methods for fault detection, diagnostics, and predictive maintenance in the lift control system. Analyze theoretical models for identifying anomalies, analyzing sensor data, and predicting potential failures. Develop theoretical algorithms for proactive maintenance and troubleshooting.

Privacy and Security: Consider theoretical aspects of privacy and security in the wireless voice-operated control system. Analyze encryption algorithms, authentication mechanisms, and theoretical methods for protecting user privacy and preventing unauthorized access to the system.

Compliance with Standards: Ensure that the theoretical design and operation of the wireless voice-operated lift control system align with relevant industry standards, regulations, and safety guidelines.

4.2 Comparison between Practical and Analytical Analysis

Aspect	Practical Analysis	Analytical Analysis
Methodology	Real-world testing and experimentation	Mathematical modeling and simulations
Data Collection	Empirical observations and measurements	Theoretical assumptions and calculations
Focus	System performance, reliability, and user experience	Theoretical understanding and predictions
Validation of Assumptions	Validates assumptions through real-world tests	Validates assumptions through mathematical models
Identifying Practical Challenges	Identifies practical challenges and limitations	Identifies theoretical limitations and constraints
Optimization and Improvement	Allows fine-tuning and improvement based on observations	Provides insights for optimizing system performance
Accuracy	Reflects actual system behavior and performance	Predicts system behavior under ideal conditions
Real-world Factors	Accounts for environmental, user, and component variations	May not fully account for real-world complexities
Time and Cost	Potentially time-consuming and costly	More time-efficient and cost-effective

Table 4.1: Difference of analytical and practical analysis

4.3 Justification for Difference

4.3.1 Inaccuracy of measurement

Inaccuracies in measurement can occur in a wireless voice-operated lift control system with safety care due to various factors. Here are some potential sources of measurement inaccuracy:

Voice Recognition Errors: Despite advancements in voice recognition technology, there can still be inaccuracies in interpreting voice commands. Background noise, variations in speech patterns, accents, or environmental conditions can lead to misinterpretation or incorrect recognition of voice commands, resulting in inaccurate control signals for the lift.

Sensor Calibration: Inaccurate calibration of sensors used in the system, such as proximity sensors or obstacle detection sensors, can introduce measurement errors. If the sensors are not calibrated properly or if there are inconsistencies in their readings, it can affect the accuracy of detecting obstacles, determining lift positions, or assessing environmental conditions.

Wireless Communication Interference: Wireless communication used for transmitting voice commands and control signals can be subject to interference. Signal interference or disturbances from other wireless devices or electromagnetic sources can result in data corruption or loss, leading to inaccurate transmission and reception of control signals.

Position and Motion Tracking: Accurate tracking of the lift's position and motion is crucial for safe and efficient operation. However, inaccuracies in position sensors, such as encoders or Hall effect sensors, or errors in motion detection algorithms can result in position tracking errors, leading to inaccurate control actions or misalignment between the lift's actual position and the desired position.

Environmental Factors: Environmental conditions, such as temperature variations, humidity, or vibration, can impact the performance and accuracy of the system components. In extreme cases, these factors can introduce measurement inaccuracies, affecting the overall system operation.

System Degradation and Aging: Over time, components of the wireless voice-operated lift control system may degrade or experience wear and tear, which can lead to reduced accuracy in measurements. Aging components, such as sensors or microcontrollers, may exhibit drift, reduced sensitivity, or other performance issues, impacting the overall measurement accuracy.

Calibration and Maintenance: Inadequate or infrequent calibration and maintenance routines can contribute to measurement inaccuracies. Regular calibration and maintenance procedures are essential to ensure that the system remains accurate and reliable over time.

4.3.2 Tolerances of components

The tolerances of components in a wireless voice-operated lift control system with safety care refer to the allowable variations or deviations from the specified values or dimensions of the components. Here are some key components and their associated tolerances to consider:

Voice Recognition Module: The voice recognition module should have a specified tolerance for voice command recognition accuracy. This tolerance indicates the acceptable range of variations in speech patterns, accents, and background noise that the system can reliably recognize and interpret as valid commands.

Sensors: Various sensors used in the system, such as proximity sensors, motion sensors, and obstacle detection sensors, have specific tolerances related to their sensing range, sensitivity, and accuracy. These tolerances define the acceptable deviation from the actual values to ensure reliable and precise sensing.

Control Circuitry: The control circuitry, including microcontrollers or programmable logic controllers (PLCs), may have tolerances related to their operating voltage, clock frequency, and timing accuracy. These tolerances ensure that the control circuitry operates within specified limits for accurate and reliable control signal generation.

4.3.3 Resolution of Sensors

The resolution of sensors in a wireless voice-operated lift control system with safety care refers to the smallest detectable change or increment that the sensor can measure accurately. Here are some key sensors used in such a system and their associated resolutions:

Voice Recognition Module: The resolution of a voice recognition module typically refers to the accuracy in distinguishing and recognizing different voice commands. It depends on the algorithms and techniques used for speech processing and can vary based on the system's design and implementation.

Proximity Sensors: Proximity sensors are used to detect the presence or absence of objects in the lift's vicinity. The resolution of a proximity sensor is determined by the smallest distance change it can detect reliably. For example, an infrared or ultrasonic proximity sensor may have a resolution of a few millimeters.

Motion Sensors: Motion sensors, such as accelerometers or gyroscopes, are used to detect the lift's movement and orientation. The resolution of a motion sensor is typically specified in terms of the smallest detectable change in acceleration or angular velocity. It can vary based on the sensor's specifications and can range from a few microg's to a fraction of a degree per second.

Obstacle Detection Sensors: Obstacle detection sensors are employed to identify obstacles in the lift's path and prevent collisions. The resolution of an obstacle detection sensor is determined by the smallest object size or distance it can detect reliably. This resolution can vary based on the sensor technology used, such as infrared, ultrasonic, or laser-based sensors.

Position Sensors: Position sensors, such as encoders or Hall effect sensors, are used to determine the lift's position accurately. The resolution of a position sensor refers to the smallest detectable change in position. It depends on the sensor's resolution specification and can range from fractions of a millimeter to micrometers, depending on the sensor type and application.

CHAPTER 5

5. CONCLUSION

5.1 Conclusions

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.

5.2 Future Scope of the Project

Authentication: In future use, we can give authentication to provide security. In this only authenticated voice can access secured device (like locker).

Sensor: By using sensor we reduce the effort of declaring each and every device a particular name. Example: If a person gives a command light ON sensor will be sense person location and only that light will get ON.

Smart Door: The smart doorbell can be made by implementing voice and video calls with the person standing light outside the door and the owner remotely .There by increasing the safety quotient of the system.

5.3 Applications

- Similar system used in Tea and coffee vending machine.
- In hospital
- Hostel
- Public places

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APPENDIX

Source Code

lift control Tx

```
#include <18f4520.h>

#DEVICE ADC=10


#fuses
INTRC_IO,PROTECT,BROWNOUT,NOMCLR,NOCPD,NOWDT,NOPUT,FCME
N


#use delay(clock=8000000)//,restart_wdt)

#use rs232(baud=9600, xmit=PIN_C6, rcv=PIN_C7)



#define BUZZ_ON     OUTPUT_HIGH(PIN_A0);

#define BUZZ_OFF     OUTPUT_LOW(PIN_A0);


#define RLY2_HI      OUTPUT_HIGH(PIN_C0);

#define RLY2_LO      OUTPUT_LOW(PIN_C0);


#define RLY1_HI      OUTPUT_HIGH(PIN_A6);

#define RLY1_LO      OUTPUT_LOW(PIN_A6);


#define RLY3_HI      OUTPUT_HIGH(PIN_D0);

#define RLY3_LO      OUTPUT_LOW(PIN_D0);


#define RLY4_HI      OUTPUT_HIGH(PIN_D1);
```

```
#define RLY4_LO     OUTPUT_LOW(PIN_D1);

#define RLY5_HI     OUTPUT_HIGH(PIN_C1);
#define RLY5_LO     OUTPUT_LOW(PIN_C1);

#define RLY6_HI     OUTPUT_HIGH(PIN_C2);
#define RLY6_LO     OUTPUT_LOW(PIN_C2);

#define RLY8_HI     OUTPUT_HIGH(PIN_D1);
#define RLY8_LO     OUTPUT_LOW(PIN_D1);

#define RLY10_HI   OUTPUT_HIGH(PIN_D3);
#define RLY10_LO   OUTPUT_LOW(PIN_D3);

#define RLY9_HI      OUTPUT_HIGH(PIN_D2);
#define RLY9_LO      OUTPUT_LOW(PIN_D2);

#define sel_HI     OUTPUT_HIGH(PIN_B7);
#define sel_LO     OUTPUT_LOW(PIN_B7);

#define TRIG_HI    OUTPUT_HIGH(PIN_A1);
#define TRIG_LO    OUTPUT_LOW(PIN_A1);

#define RS_HI   OUTPUT_HIGH(PIN_B5);
#define RS_LO   OUTPUT_LOW(PIN_B5);

#define EN_HI   OUTPUT_HIGH(PIN_B4);
```

```
#define EN_LO   OUTPUT_LOW(PIN_B4);


#define D4_HI   OUTPUT_HIGH(PIN_B3);
#define D4_LO   OUTPUT_LOW(PIN_B3);
#define D5_HI   OUTPUT_HIGH(PIN_B2);
#define D5_LO   OUTPUT_LOW(PIN_B2);
#define D6_HI   OUTPUT_HIGH(PIN_B1);
#define D6_LO   OUTPUT_LOW(PIN_B1);
#define D7_HI   OUTPUT_HIGH(PIN_B0);
#define D7_LO   OUTPUT_LOW(PIN_B0);


int8 ucRxTimOut = 0;
int8 ucRxIndex = 0;
volatile int16 ucLDRadc1 = 0;
volatile int16 ucLDRadc2 = 0;
int16 ui4SecCNT = 0;
int8 ucStat = 61;//1;//10;
int8 ucKeyPressed = 0;
int8 uccurrnt_otp = 0;
int8 ucValidRespFlg = 0;
int8 ucval1 =0;
int8 ucCommStat = 0;
int8 ucPosition = 0;
int8 ucPosition1 = 0;
int16 uiRornDely = 0;
int16 uiRornDely1 = 0;
volatile int16 ucLDRadc = 0;
```

```
volatile int16 ucLDRadc3 = 0;
volatile int16 ucLDRadc4 = 0;
volatile int8 ucTxForVar = 0;

float uibat_vltg = 0;
int16 uiTemp = 0;
int8 ucfiref = 0;
int8  ucactionflg = 0;
int16 uiright_ir = 0;
float uisolar_adc = 0;
float uisolar_vltg = 0;
int8 ucDecimal_Array[18] = {0,0,0,0,0,0,0,0,0,0,0,0};
int8 ucASCII_Array[18] = {0,0,0,0,0,0,0,0,0,0,0,0};
int16 uiDely1 = 0;
int16 uidispen_time =0;
int16 ucPositionPrev1 = 0;
int16 ucPositionPrev = 0;
int16 ucDiff = 0;
int16 uiDely = 0;
//BYTE CONST TABLE [17]=       "  ENTER ID      ";
BYTE CONST ucArray1[17]     = {"                "};
BYTE CONST ucArray2[17]     = {"VOICE OPERATED  "};//2
BYTE CONST ucArray3[17]     = {"LIFT CONTROL STM"};//3
BYTE CONST ucArray4[17]     = {" FAN            "};//4
BYTE CONST ucArray5[17]     = {"FLOOR:          "};//5

void Get_Key(void)
```

```
{
  int8 keypress1cnt = 0;
  int8 keypress2cnt = 0;
  int8 keypress4cnt = 0;
  int8 keypress3cnt = 0;
  ucKeyPressed = 0;
delay_ms(100);
  if(INPUT(PIN_D4) == 0)
  {
      delay_ms(2);
    if(keypress1cnt < 100)
    {
      keypress1cnt++;
    }
    else
    {
      //ucUpKCntr = 0;
    }
    if((keypress1cnt == 1))//||(ucUpKCntr == 80))
    {
      ucKeyPressed = 4;


    }
  }
  else
  {
```

```
    keypress4cnt = 0;
  }


    if(INPUT(PIN_D5) == 0)
  {
      delay_ms(2);
    if(keypress2cnt < 100)
    {
      keypress2cnt++;
    }
    else
    {
      //ucUpKCntr = 0;
    }
    if((keypress2cnt == 1))//||(ucUpKCntr == 80))
    {
      ucKeyPressed = 3;


    }
  }
  else
  {
    keypress4cnt = 0;
  }


if(INPUT(PIN_D6) == 0)
  {
```

```
    delay_ms(2);
  if(keypress4cnt < 100)
  {
    keypress4cnt++;
  }
  else
  {
    //ucUpKCntr = 0;
  }
  if((keypress4cnt == 1))//||(ucUpKCntr == 80))
  {
    ucKeyPressed = 2;


  }
}
else
{
  keypress4cnt = 0;
}
if(INPUT(PIN_D7) == 0)
{
  delay_ms(2);
  if(keypress3cnt < 100)
  {
    keypress3cnt++;
  }
```

```
      else
      {
        //ucUpKCntr = 0;
      }
      if((keypress3cnt == 1))//||(keypress3cnt == 80))
      {

        ucKeyPressed = 1;




      }
    }
    else
    {
      keypress3cnt = 0;
    }


}
void Send_Sms_Action(void)
{



    if(ucPosition == 1)
    {
    //   printf("SECOND FLOOR");
```

```
putc('2');
   delay_ms(1);
putc('3');

   }
   else if(ucPosition == 2)
   {
   //   printf("FIRST FLOOR");
putc('2');
   delay_ms(1);
putc('2');

   }
   else if(ucPosition == 3)
   {
   //   printf("GROUND FLOOR");
putc('2');
   delay_ms(1);
putc('1');

   }


}


void main(void)
```

```
{

  SETUP_ADC(ADC_OFF);                  //disable ADC i/p
  SETUP_ADC_PORTS(NO_ANALOGS);         //disable analog i/p
    setup_comparator(NC_NC_NC_NC);
    SETUP_CCP1(CCP_OFF);

  SET_TRIS_A(0x8C);//0100 0111
  SET_TRIS_B(0x18);//0001 0110
  SET_TRIS_C(0x80);//1000 1110
  SET_TRIS_D(0xFC);//0000 0011
  SET_TRIS_E(0x04);//0000 0000

  SETUP_TIMER_1(T1_INTERNAL|T1_DIV_BY_8);   //enables timer1
  SET_TIMER1(40536); // timer of 200ms   (64286);//10msec
  enable_interrupts(INT_RDA);
  ENABLE_INTERRUPTS(INT_TIMER1);

   ucPositionPrev = ucPosition = 1;
   ucPositionPrev1 = ucPosition1 = 1;

  BUZZ_ON;
  delay_ms(350);
```

```
BUZZ_OFF;
RLY1_LO;
RLY2_LO;



delay_ms(1150);
sel_LO;

ui10SecCNT = 100;
putc('<');//RF Rx Self ID
delay_ms(1);
putc('1');//ID
delay_ms(1);
putc('5');//Channel ID
delay_ms(1);
putc('>');//



ui2SecCNT = 300;
ucStat = 0;//change it as per requirement 0
Send_Sms_Flag = 0;

LCD_WRITE_Const_ARRAY(1,0,4,16);//Blank
LCD_WRITE_Const_ARRAY(2,0,5,16);//Put
LCD_Init_Command(0xC5);//
delay_ms(10);
```

```
  LCD_Data('S');
  LCD_Data('E');
  LCD_Data('C');
   LCD_Data('O');
   LCD_Data('N');

while(1)
{
  enable_interrupts(INT_RDA);
  if(uiLcd10Sec == 1)
  {
    uiLcd10Sec = 70;
    INIT_LCD();
    delay_ms(10);
    LCD_WRITE_Const_ARRAY(1,0,4,16);//Blank
      LCD_WRITE_Const_ARRAY(2,0,5,16);//Put
  }
      TRIG_HI;
      delay_us(10);
      TRIG_LO;
      delay_ms(7);
   //  POWRON_F = 1;
      ADC_CALL(2);//Lamp Current
      delay_ms(5);
      uiright_ir = current_adc_val;
```

```
ADC_CALL(3);//
  ucLDRadc2 = (85-(current_adc_val/2));

   Show_Float_No_ONLine_At_Offset_IntDig_FltDig(2,13,uiright_ir,3,0);

if(uiright_ir < 40)
{
 //ucobstaclf =
  BUZZ_ON;
  delay_ms(350);
  BUZZ_OFF;
  ui1SecCNT = 10;
}
if(ui1SecCNT == 1)
{
  ui1SecCNT = 0;
RLY1_HI;
RLY2_LO;
delay_ms(400);
 RLY1_LO;
 RLY2_LO;
delay_ms(500);
RLY1_HI;
RLY2_LO;
delay_ms(400);
 RLY1_LO;
 RLY2_LO;
```

```
      delay_ms(1350);
      delay_ms(1350);
      delay_ms(1350);

    RLY1_LO;
    RLY2_HI;
    delay_ms(400);
     RLY1_LO;
     RLY2_LO;
    delay_ms(500);
    RLY1_LO;
    RLY2_HI;
    delay_ms(400);
     RLY1_LO;
     RLY2_LO;
    }

      Get_Key();
      if(ucKeyPressed == 1)
      {

    BUZZ_ON;
    delay_ms(350);
    BUZZ_OFF;
putc('2');
    delay_ms(1);
putc('4');
```

```
delay_ms(350);
delay_ms(350);

  }
  if(ucKeyPressed == 2)
  {
    if(ucPosition < 3)
    {

    ucPosition++;
    }
    else
    {
    ucPosition = 1;
    }
  }
if(ucKeyPressed == 3)
{
  RLY5_LO;
  RLY6_HI;
}
else if(ucKeyPressed == 4)
{
  RLY6_LO;
  RLY5_HI;
}
```

```
else
{
    RLY6_LO;
    RLY5_LO;
}


if(ucPosition == 1)
{
            LCD_Init_Command(0xC6);//
  delay_ms(10);

  LCD_Data('S');
  LCD_Data('E');
  LCD_Data('C');
   LCD_Data('O');
   LCD_Data('N');
LCD_Data('D');
}
else if(ucPosition == 2)
{

  LCD_Init_Command(0xC6);//
  delay_ms(10);

  LCD_Data('F');
  LCD_Data('I');
```

```
  LCD_Data('R');
   LCD_Data('S');
   LCD_Data('T');
}
else if(ucPosition == 3)
{

      LCD_Init_Command(0xC6);//
  delay_ms(10);

  LCD_Data('G');
  LCD_Data('R');
  LCD_Data('O');
   LCD_Data('U');
   LCD_Data('N');
LCD_Data('D');
}

if(ucfanf == 1)
{
    LCD_Init_Command(0x88);//
  delay_ms(10);

  LCD_Data('O');
  LCD_Data('N');
}
else
```

```
{
    LCD_Init_Command(0x88);//
  delay_ms(10);

  LCD_Data('O');
  LCD_Data('F');
  LCD_Data('F');
}

  if(ucRxTimOut == 1)
    {
      ucRxTimOut = 0;

    if((ucRx_Array[1] == 'd')&&(ucRx_Array[2] == 'o')&&(ucRx_Array[6] ==
'o')&&(ucRx_Array[7] == 'p'))
     {

      ucactionflg = 1;
      BUZZ_ON;
      delay_ms(350);
      BUZZ_OFF;



     }
    else if((ucRx_Array[1] == 'd')&&(ucRx_Array[2] == 'o')&&(ucRx_Array[6] ==
'c')&&(ucRx_Array[7] == 'l'))
     {
```

```
  ucactionflg = 2;
      BUZZ_ON;
      delay_ms(350);
      BUZZ_OFF;



    }
    else if((ucRx_Array[1] == 'f')&&(ucRx_Array[2] == 'a')&&(ucRx_Array[5] ==
'o')&&(ucRx_Array[6] == 'n'))
    {

      BUZZ_ON;
      delay_ms(350);
      BUZZ_OFF;
ucactionflg = 3;
  ucfanf = 1;
    LCD_Init_Command(0x88);//
  delay_ms(10);

  LCD_Data('O');
  LCD_Data('N');

    }
    else if((ucRx_Array[1] == 'f')&&(ucRx_Array[2] == 'a')&&(ucRx_Array[5] ==
'o')&&(ucRx_Array[6] == 'f'))
    {

      BUZZ_ON;
```

```
        delay_ms(350);

        BUZZ_OFF;

ucactionflg = 4;

  ucfanf = 0;

    LCD_Init_Command(0x88);//

  delay_ms(10);


  LCD_Data('O');

  LCD_Data('F');

  LCD_Data('F');


     }

    else if((ucRx_Array[1] == 'g')&&(ucRx_Array[2] == 'r')&&(ucRx_Array[6] ==
'd')&&(ucRx_Array[8] == 'f')&&(ucRx_Array[9] == 'l'))

     {


        BUZZ_ON;

        delay_ms(350);

        BUZZ_OFF;

    ucPosition = 3;

          LCD_Init_Command(0xC6);//

  delay_ms(10);


  LCD_Data('G');

  LCD_Data('R');

  LCD_Data('O');

   LCD_Data('U');
```

```
LCD_Data('N');
LCD_Data('D');
LCD_Data(' ');

}
else if((ucRx_Array[1] == 'f')&&(ucRx_Array[2] == 'i')&&(ucRx_Array[3] == 'r')&&(ucRx_Array[4] == 's')&&(ucRx_Array[5] == 't'))
{

BUZZ_ON;
delay_ms(350);
BUZZ_OFF;
ucPosition = 2;
LCD_Init_Command(0xC6);//
delay_ms(10);

LCD_Data('F');
LCD_Data('I');
LCD_Data('R');
LCD_Data('S');
LCD_Data('T');
LCD_Data(' ');
}
else if(((ucRx_Array[1] == 's')&&(ucRx_Array[2] == 'e')&&(ucRx_Array[6] == 'd')&&(ucRx_Array[8] == 'f')&&(ucRx_Array[9] == 'l'))||((ucRx_Array[1] == '2')&&(ucRx_Array[5] == 'f')&&(ucRx_Array[6] == 'l')&&(ucRx_Array[9] == 'r')))
{
```

```
}

    BUZZ_ON;

    delay_ms(350);

    BUZZ_OFF;

  ucPosition = 1;

        LCD_Init_Command(0xC6);//

delay_ms(10);


LCD_Data('S');

LCD_Data('E');

LCD_Data('C');

 LCD_Data('O');

 LCD_Data('N');

 LCD_Data('D');


   }


  for(ucRxIndex = 0;ucRxIndex < 20;ucRxIndex++)

    {

       ucRx_Array[ucRxIndex] = 0;

    }

    ucRxIndex = 0;

  }
```

```
if(ucPositionPrev != ucPosition)
   {
    delay_ms(250);


    if(ucPositionPrev > ucPosition)
    { //ROTATE ANTICLOCKWISE
      ucDiff = (ucPositionPrev - ucPosition);


      switch(ucPositionPrev)
      {
      case 1:
          switch(ucPosition)
          {
            case 2:
                uiRornDely = (100*ucDiff);
            break;
            case 3:
                uiRornDely = (100*ucDiff);
            break;

          }
      break;
      case 2:
          switch(ucPosition)
          {
```

```
            case 1:
                uiRornDely = (100*ucDiff);
            break;
            case 3:
                uiRornDely = (100*ucDiff);
            break;

        }
    break;
    case 3:
        switch(ucPosition)
        {
            case 1:
                uiRornDely = (100*ucDiff);
            break;
            case 2:
                uiRornDely = (100*ucDiff);
            break;

        }
    break;



    }

    RLY5_HI;
//  RLY_1 = 1;
```

```
  for(uiDely = 0;uiDely < (uiRornDely*80);uiDely++)
  {
    for(uiDely1 = 0;uiDely1 < 60;uiDely1++) ;//1000
  }
    RLY5_LO;


}
else
{  //ROTATE CLOCKWISE
   ucDiff = (ucPosition - ucPositionPrev);
    //uiRornDely = (15000*(unsigned int)ucDiff);
   switch(ucPositionPrev)
  {
  case 1:
      switch(ucPosition)
      {
      case 2:
          uiRornDely = (100*ucDiff);
      break;
      case 3:
          uiRornDely = (100*ucDiff);
      break;


      }
  break;
  case 2:
      switch(ucPosition)
```

```
    {
    case 1:
        uiRornDely = (100*ucDiff);
    break;
    case 3:
        uiRornDely = (100*ucDiff);
    break;

    }
break;
case 3:
    switch(ucPosition)
    {
    case 1:
        uiRornDely = (100*ucDiff);
    break;
    case 2:
        uiRornDely = (100*ucDiff);
    break;

    }
break;



}
RLY6_HI;
//  RLY_2 = 1;
```

```
            for(uiDely = 0;uiDely < (uiRornDely*70);uiDely++)
            {
               for(uiDely1 = 0;uiDely1 < 60;uiDely1++);//
            }
               RLY6_LO;
        //   RLY_2 = 0;
        }

   delay_ms(500);
//   delay_ms(1350);
   RLY1_HI;
   RLY2_LO;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   delay_ms(500);
   RLY1_HI;
   RLY2_LO;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   delay_ms(1350);
   delay_ms(1350);
   delay_ms(1350);
//   delay_ms(1350);
   RLY1_LO;
   RLY2_HI;
```

```
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   delay_ms(500);
   RLY1_LO;
   RLY2_HI;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
Send_Sms_Flag = 1;
Send_Sms_Action();
         ucPositionPrev = ucPosition ;


        }


if(ucactionflg == 1)
{
   RLY1_HI;
   RLY2_LO;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   delay_ms(500);
   RLY1_HI;
   RLY2_LO;
   delay_ms(300);
    RLY1_LO;
```

```
    RLY2_LO;
    ucactionflg = 0;
}
if(ucactionflg == 2)
{
   RLY1_LO;
   RLY2_HI;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   delay_ms(500);
   RLY1_LO;
   RLY2_HI;
   delay_ms(300);
    RLY1_LO;
    RLY2_LO;
   ucactionflg = 0;
}
if(ucactionflg == 3)
{
   LCD_Init_Command(0x8C);//
   delay_ms(10);

   LCD_Data('O');
   LCD_Data('N');
   LCD_Data(' ');
   ucactionflg = 0;
```

```
}
if(ucactionflg == 4)
{
  LCD_Init_Command(0x8C);//
  delay_ms(10);

  LCD_Data('O');
  LCD_Data('F');
  LCD_Data('F');
  ucactionflg = 0;
}

}

}
```

lift Rx unit

```
#include <16f690.h>
#DEVICE ADC=10

#fuses
INTRC_IO,PROTECT,NOBROWNOUT,NOMCLR,NOCPD,NOWDT,NOPUT,FC
MEN

#use delay(clock=8000000)//,restart_wdt)

#byte adresh = 0x1e
#byte adresl = 0x9e

#define RLY1_ON     OUTPUT_HIGH(PIN_C3);
#define RLY1_OFF   OUTPUT_LOW(PIN_C3);

#define RLY2_ON     OUTPUT_HIGH(PIN_C5);
#define RLY2_OFF   OUTPUT_LOW(PIN_C5);

#define buzz_ON     OUTPUT_HIGH(PIN_A5);
#define buzz_OFF   OUTPUT_LOW(PIN_A5);

#define TRIG_HI     OUTPUT_HIGH(PIN_C5);
#define TRIG_LO    OUTPUT_LOW(PIN_C5);

#define RS_HI   OUTPUT_HIGH(PIN_A2);
#define RS_LO   OUTPUT_LOW(PIN_A2);
```

```
#define EN_HI   OUTPUT_HIGH(PIN_C0);
#define EN_LO   OUTPUT_LOW(PIN_C0);




#define D4_HI   OUTPUT_HIGH(PIN_C1);
#define D4_LO   OUTPUT_LOW(PIN_C1);
#define D5_HI   OUTPUT_HIGH(PIN_C2);
#define D5_LO   OUTPUT_LOW(PIN_C2);
#define D6_HI   OUTPUT_HIGH(PIN_B4);
#define D6_LO   OUTPUT_LOW(PIN_B4);
#define D7_HI   OUTPUT_HIGH(PIN_B6);
#define D7_LO   OUTPUT_LOW(PIN_B6);

BYTE CONST ucArray1[17]     = {"                "};
BYTE CONST ucArray2[17]       = {"VOICE OPERATED  "};//2
BYTE CONST ucArray3[17]       = {"LIFT CONTROL STM"};//3
BYTE CONST ucArray4[17]    = {"GROUND FLOOR    "};//4
BYTE CONST ucArray5[17]     = {"FIRST FLOOR    "};//5
BYTE CONST ucArray6[17]     = {"SECOND FLOOR     "};//6
BYTE CONST ucArray7[17]     = {"LIFT AT        "};//7

int8 ucArrPtr = 0;
int8 uc_keypressf = 0;
int16 uiprev_zaxis = 0;
int8 ucscreendisplay = 0;
```

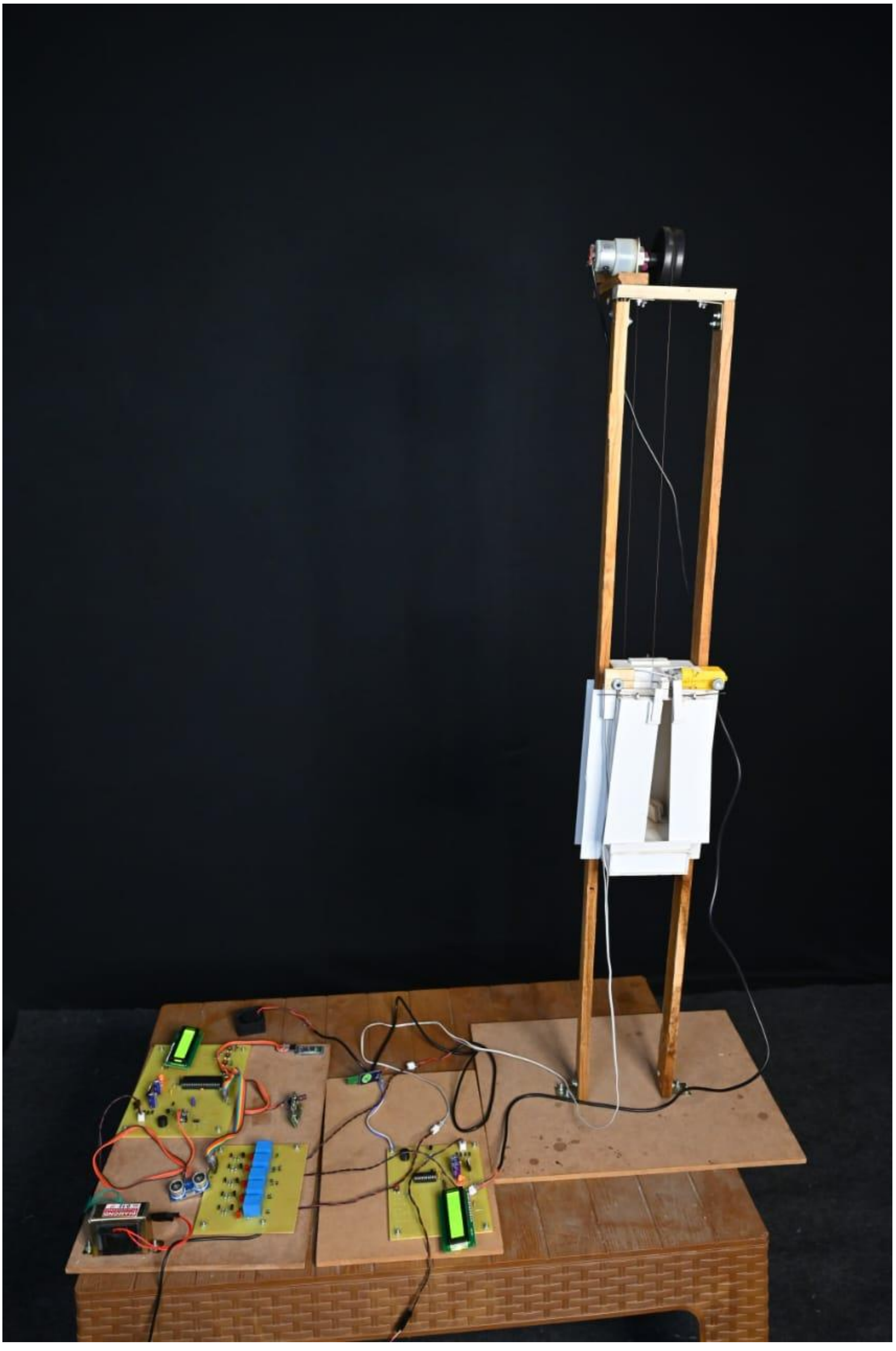
```
int8 ucright_flag = 0;
int8 ucbackword_f = 0;
int8 ucforword_flag = 0;
int8 ucsendf = 0;
int16 uiprev_xaxis = 0;
int16 uiprev_yaxis = 0;

int8 ucvalue = 0;
int8 ucsendflag = 0;


void main(void)
{

  SETUP_ADC(ADC_OFF);                  //disable ADC i/p
  SETUP_ADC_PORTS(NO_ANALOGS);         //disable analog i/p
    setup_comparator(NC_NC_NC_NC);
    SETUP_CCP1(CCP_OFF);
  SET_TRIS_A(0x00);//0010 0100
  SET_TRIS_B(0x20);//0010 0000
  SET_TRIS_C(0x40);//0100 1001

  delay_ms(450);

  SETUP_TIMER_1(T1_INTERNAL|T1_DIV_BY_8);   //enables timer1
  SET_TIMER1(40536); // timer of 200ms   (64286);//10msec
  enable_interrupts(INT_RDA);
```

```
ENABLE_INTERRUPTS(INT_TIMER1);

ENABLE_INTERRUPTS(GLOBAL);
 INIT_LCD();

delay_ms(450);
LCD_WRITE_Const_ARRAY(1,0,2,16);//Blank
LCD_WRITE_Const_ARRAY(2,0,3,16);//Blank
ui1SecCNT = 15;
ucautof = 0;
while(1)
{

   enable_interrupts(INT_RDA);
   if(ucRxTimOut == 1)
   {

      ucRxTimOut = 5;
      RXiNDEX = 0;
      if((ucRxARR[0] == '1'))//&&(ucRxARR[1] == 'K'))
      {
         buzz_ON;
         delay_ms(500);
          buzz_OFF;
            LCD_WRITE_Const_ARRAY(1,0,7,16);//Blank
LCD_WRITE_Const_ARRAY(2,0,4,16);//Blank
```

```
        }
        if((ucRxARR[0] == '2'))//&&(ucRxARR[1] == 'K'))
        {
          buzz_ON;
          delay_ms(500);
           buzz_OFF;
        LCD_WRITE_Const_ARRAY(1,0,7,16);//Blank
   LCD_WRITE_Const_ARRAY(2,0,5,16);//Blank;

        }
        if((ucRxARR[0] == '3'))//&&(ucRxARR[1] == 'K'))
        {
          buzz_ON;
          delay_ms(500);
           buzz_OFF;

        LCD_WRITE_Const_ARRAY(1,0,7,16);//Blank
   LCD_WRITE_Const_ARRAY(2,0,6,16);//Blank

        }
        if((ucRxARR[0] == '4'))//&&(ucRxARR[1] == 'K'))
        {
          buzz_ON;
          delay_ms(500);
           buzz_OFF;
delay_ms(500);
```

```
        LCD_WRITE_Const_ARRAY(1,0,8,16);//Blank
   LCD_WRITE_Const_ARRAY(2,0,1,16);//Blank
   buzz_ON;
           delay_ms(500);
            buzz_OFF;
delay_ms(500);
   buzz_ON;
           delay_ms(500);
            buzz_OFF;
               }
        if((ucRxARR[0] == '5'))//&&(ucRxARR[1] == 'K'))
        {
           buzz_ON;
           delay_ms(500);
            buzz_OFF;
            putc('5');
              }
             for(RXiNDEX = 0;RXiNDEX < 45;RXiNDEX++)
        {
           ucRxARR[RXiNDEX] = 0;
        }
        RXiNDEX = 0;
ucRxTimOut =0;
      }
      }


}
```

PROJECT PHOTOGRAPH



PIC18F2420/2520/4420/4520 Data Sheet

28/40/44-Pin
Enhanced Flash Microcontrollers
with 10-Bit A/D and nanoWatt Technology

MICROCHIP

PIC18F2420/2520/4420/4520

28/40/44-Pin Enhanced Flash Microcontrollers with 10-Bit A/D and nanoWatt Technology

Power Managed Modes:

- Run: CPU on, peripherals on
- Idle: CPU off, peripherals on
- Sleep: CPU off, peripherals off
- Idle mode currents down to 5.8 µA typical
- Sleep mode current down to 0.1 µA typical
- Timer1 Oscillator: 1.8 µA, 32 kHz, 2V
- Watchdog Timer: 2.1 µA
- Two-Speed Oscillator Start-up

Peripheral Highlights:

- High-current sink/source 25 mA/25 mA
- Three programmable external interrupts
- Four input change interrupts
- Up to 2 Capture/Compare/PWM (CCP) modules, one with Auto-Shutdown (28-pin devices)
- Enhanced Capture/Compare/PWM (ECCP) module (40/44-pin devices only):
  - One, two or four PWM outputs
  - Selectable polarity
  - Programmable dead time
  - Auto-Shutdown and Auto-Restart
- Master Synchronous Serial Port (MSSP) module supporting 3-wire SPI™ (all 4 modes) and I^{2}C™ Master and Slave Modes
- Enhanced Addressable USART module:
  - Supports RS-485, RS-232 and LIN 1.2
  - RS-232 operation using internal oscillator block (no external crystal required)
  - Auto-Wake-up on Start bit
  - Auto-Baud Detect
- 10-bit, up to 13-channel Analog-to-Digital Converter module (A/D):
  - Auto-acquisition capability
  - Conversion available during Sleep
- Dual analog comparators with input multiplexing)

Flexible Oscillator Structure:

- Four Crystal modes, up to 40 MHz
- 4X Phase Lock Loop (available for crystal and internal oscillators)
- Two External RC modes, up to 4 MHz
- Two External Clock modes, up to 40 MHz
- Internal oscillator block:
  - 8 user selectable frequencies, from 31 kHz to 8 MHz
  - Provides a complete range of clock speeds from 31 kHz to 32 MHz when used with PLL
  - User tunable to compensate for frequency drift
- Secondary oscillator using Timer1 @ 32 kHz
- Fail-Safe Clock Monitor:
  - Allows for safe shutdown if peripheral clock stops

Special Microcontroller Features:

- C compiler optimized architecture:
  - Optional extended instruction set designed to optimize re-entrant code
- 100,000 erase/write cycle Enhanced Flash program memory typical
- 1,000,000 erase/write cycle Data EEPROM memory typical
- Flash/Data EEPROM Retention: 100 years typical
- Self-programmable under software control
- Priority levels for interrupts
- 8 x 8 Single-Cycle Hardware Multiplier
- Extended Watchdog Timer (WDT):
  - Programmable period from 4 ms to 131s
- Single-supply 5V In-Circuit Serial Programming™ (ICSP™) via two pins
- In-Circuit Debug (ICD) via two pins
- Wide operating voltage range: 2.0V to 5.5V
- Programmable 16-level High/Low-Voltage Detection (HLVD) module:
  - Supports interrupt on High/Low-Voltage Detection
- Programmable Brown-out Reset (BOR
  - With software enable option

 Preliminary

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1.0 DEVICE OVERVIEW

This document contains device specific information for the following devices:

- PIC18F2420
- PIC18F2520
- PIC18F4420
- PIC18F4520
- PIC18LF2420
- PIC18LF2520
- PIC18LF4420
- PIC18LF4520

This family offers the advantages of all PIC18 microcontrollers – namely, high computational performance at an economical price – with the addition of high-endurance, Enhanced Flash program memory. On top of these features, the PIC18F2420/2520/4420/4520 family introduces design enhancements that make these microcontrollers a logical choice for many high-performance, power sensitive applications.

1.1 New Core Features

1.1.1 nanoWatt TECHNOLOGY

All of the devices in the PIC18F2420/2520/4420/4520 family incorporate a range of features that can significantly reduce power consumption during operation. Key items include:

- **Alternate Run Modes:** By clocking the controller from the Timer1 source or the internal oscillator block, power consumption during code execution can be reduced by as much as 90%.
- **Multiple Idle Modes:** The controller can also run with its CPU core disabled but the peripherals still active. In these states, power consumption can be reduced even further, to as little as 4% of normal operation requirements.
- **On-the-fly Mode Switching:** The power managed modes are invoked by user code during operation, allowing the user to incorporate power-saving ideas into their application's software design.
- **Low Consumption in Key Modules:** The power requirements for both Timer1 and the Watchdog Timer are minimized. See **Section 26.0 "Electrical Characteristics"** for values.

1.1.2 MULTIPLE OSCILLATOR OPTIONS AND FEATURES

All of the devices in the PIC18F2420/2520/4420/4520 family offer ten different oscillator options, allowing users a wide range of choices in developing application hardware. These include:

- Four Crystal modes, using crystals or ceramic resonators
- Two External Clock modes, offering the option of using two pins (oscillator input and a divide-by-4 clock output) or one pin (oscillator input, with the second pin reassigned as general I/O)
- Two External RC Oscillator modes with the same pin options as the External Clock modes
- An internal oscillator block which provides an 8 MHz clock and an INTRC source (approximately 31 kHz), as well as a range of 6 user selectable clock frequencies, between 125 kHz to 4 MHz, for a total of 8 clock frequencies. This option frees the two oscillator pins for use as additional general purpose I/O.
- A Phase Lock Loop (PLL) frequency multiplier, available to both the high-speed crystal and internal oscillator modes, which allows clock speeds of up to 40 MHz. Used with the internal oscillator, the PLL gives users a complete selection of clock speeds, from 31 kHz to 32 MHz – all without using an external crystal or clock circuit.

Besides its availability as a clock source, the internal oscillator block provides a stable reference source that gives the family additional features for robust operation:

- **Fail-Safe Clock Monitor:** This option constantly monitors the main clock source against a reference signal provided by the internal oscillator. If a clock failure occurs, the controller is switched to the internal oscillator block, allowing for continued low-speed operation or a safe application shutdown.
- **Two-Speed Start-up:** This option allows the internal oscillator to serve as the clock source from Power-on Reset, or wake-up from Sleep mode, until the primary clock source is available.

1.2 Other Special Features

- **Memory Endurance:** The Enhanced Flash cells for both program memory and data EEPROM are rated to last for many thousands of erase/write cycles – up to 100,000 for program memory and 1,000,000 for EEPROM. Data retention without refresh is conservatively estimated to be greater than 40 years.
- **Self-programmability:** These devices can write to their own program memory spaces under internal software control. By using a bootloader routine located in the protected Boot Block at the top of program memory, it becomes possible to create an application that can update itself in the field.
- **Extended Instruction Set:** The PIC18F2420/2520/4420/4520 family introduces an optional extension to the PIC18 instruction set, which adds 8 new instructions and an Indexed Addressing mode. This extension, enabled as a device configuration option, has been specifically designed to optimize re-entrant application code originally developed in high-level languages, such as C.
- **Enhanced CCP module:** In PWM mode, this module provides 1, 2 or 4 modulated outputs for controlling half-bridge and full-bridge drivers. Other features include Auto-Shutdown, for disabling PWM outputs on interrupt or other select conditions and Auto-Restart, to reactivate outputs once the condition has cleared.
- **Enhanced Addressable USART:** This serial communication module is capable of standard RS-232 operation and provides support for the LIN bus protocol. Other enhancements include automatic baud rate detection and a 16-bit Baud Rate Generator for improved resolution. When the microcontroller is using the internal oscillator block, the USART provides stable operation for applications that talk to the outside world without using an external crystal (or its accompanying power requirement).
- **10-bit A/D Converter:** This module incorporates programmable acquisition time, allowing for a channel to be selected and a conversion to be initiated without waiting for a sampling period and thus, reduce code overhead.
- **Extended Watchdog Timer (WDT):** This enhanced version incorporates a 16-bit prescaler, allowing an extended time-out range that is stable across operating voltage and temperature. See **Section 26.0 "Electrical Characteristics"** for time-out periods.

1.3 Details on Individual Family Members

Devices in the PIC18F2420/2520/4420/4520 family are available in 28-pin and 40/44-pin packages. Block diagrams for the two groups are shown in Figure 1-1 and Figure 1-2.

The devices are differentiated from each other in five ways:

1. Flash program memory (16 Kbytes for PIC18F2420/4420 devices and 32 Kbytes for PIC18F2520/4520).
2. A/D channels (10 for 28-pin devices, 13 for 40/44-pin devices).
3. I/O ports (3 bidirectional ports on 28-pin devices, 5 bidirectional ports on 40/44-pin devices).
4. CCP and Enhanced CCP implementation (28-pin devices have 2 standard CCP modules, 40/44-pin devices have one standard CCP module and one ECCP module).
5. Parallel Slave Port (present only on 40/44-pin devices).

All other features for devices in this family are identical. These are summarized in Table 1-1.

The pinouts for all devices are listed in Table 1-2 and Table 1-3.

Like all Microchip PIC18 devices, members of the PIC18F2420/2520/4420/4520 family are available as both standard and low-voltage devices. Standard devices with Enhanced Flash memory, designated with an "F" in the part number (such as PIC18**F**2420), accommodate an operating V_{DD} range of 4.2V to 5.5V. Low-voltage parts, designated by "LF" (such as PIC18**LF**2420), function over an extended V_{DD} range of 2.0V to 5.5V.

PIC16F631/677/685/687/689/690 Data Sheet

20-Pin Flash-Based, 8-Bit

CMOS Microcontrollers with

nanoWatt Technology

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PIC16F631/677/685/687/689/690

20-Pin Flash-Based, 8-Bit CMOS Microcontrollers with nanoWatt Technology

High-Performance RISC CPU:

- Only 35 instructions to learn:
  - All single-cycle instructions except branches
- Operating speed:
  - DC – 20 MHz oscillator/clock input
  - DC – 200 ns instruction cycle
- Interrupt capability
- 8-level deep hardware stack
- Direct, Indirect and Relative Addressing modes

Special Microcontroller Features:

- Precision Internal Oscillator:
  - Factory calibrated to ± 1%
  - Software selectable frequency range of 8 MHz to 32 kHz
  - Software tunable
  - Two-Speed Start-up mode
  - Crystal fail detect for critical applications
  - Clock mode switching during operation for power savings
- Power-Saving Sleep mode
- Wide operating voltage range (2.0V-5.5V)
- Industrial and Extended Temperature range
- Power-on Reset (POR)
- Power-up Timer (PWRTE) and Oscillator Start-up Timer (OST)
- Brown-out Reset (BOR) with software control option
- Enhanced low-current Watchdog Timer (WDT) with on-chip oscillator (software selectable nominal 268 seconds with full prescaler) with software enable
- Multiplexed Master Clear/Input pin
- Programmable code protection
- High Endurance Flash/EEPROM cell:
  - 100,000 write Flash endurance
  - 1,000,000 write EEPROM endurance
  - Flash/Data EEPROM retention: > 40 years
- Enhanced USART module:
  - Supports RS-485, RS-232 and LIN 2.0
  - Auto-Baud Detect
  - Auto-wake-up on Start bit

Low-Power Features:

- **Standby Current:**
  - 50 nA @ 2.0V, typical
- Operating Current:
  - 11 μA @ 32 kHz, 2.0V, typical
  - 220 μA @ 4 MHz, 2.0V, typical
- Watchdog Timer Current:
  - <1 μA @ 2.0V, typical

Peripheral Features:

- 17 I/O pins and 1 input only pin:
  - High current source/sink for direct LED drive
  - Interrupt-on-Change pin
  - Individually programmable weak pull-ups
  - Ultra Low-Power Wake-up (ULPWU)
- Analog Comparator module with:
  - Two analog comparators
  - Programmable on-chip voltage reference (CV_{REF}) module (% of V_{DD})
  - Comparator inputs and outputs externally accessible
  - SR Latch mode
  - Timer 1 Gate Sync Latch
  - Fixed 0.6V V_{REF}
- A/D Converter:
  - 10-bit resolution and 12 channels
- Timer0: 8-bit timer/counter with 8-bit programmable prescaler
- Enhanced Timer1:
  - 16-bit timer/counter with prescaler
  - External Timer1 Gate (count enable)
  - Option to use OSC1 and OSC2 in LP mode as Timer1 oscillator if INTOSC mode selected
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Enhanced Capture, Compare, PWM+ module:
  - 16-bit Capture, max resolution 12.5 ns
  - Compare, max resolution 200 ns
  - 10-bit PWM with 1, 2 or 4 output channels, programmable “dead time”, max frequency 20 kHz
  - PWM output steering control
- Synchronous Serial Port (SSP):
  - SPI mode (Master and Slave)
- I^2C™ (Master/Slave modes):
  - I^2C™ address mask
- In-Circuit Serial Programming™ (ICSP™) via two pins

Device	Program Memory	Data Memory		I/O	10-bit A/D (ch)	Comparators	Timers 8/16-bit	SSP	ECCP+	EUSART
	Flash (words)	SRAM (bytes)	EEPROM (bytes)							
PIC16F631	1024	64	128	18	—	2	1/1	No	No	No
PIC16F677	2048	128	256	18	12	2	1/1	Yes	No	No
PIC16F685	4096	256	256	18	12	2	2/1	No	Yes	No
PIC16F687	2048	128	256	18	12	2	1/1	Yes	No	Yes
PIC16F689	4096	256	256	18	12	2	1/1	Yes	No	Yes
PIC16F690	4096	256	256	18	12	2	2/1	Yes	Yes	Yes

PIC16F631 Pin Diagram

20-pin PDIP, SOIC, SSOP

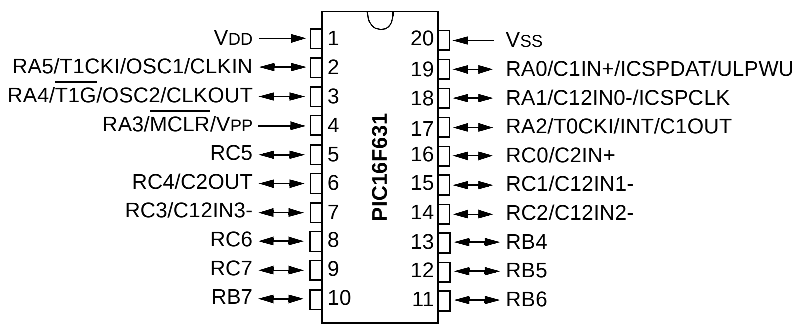


TABLE 1: PIC16F631 PIN SUMMARY

I/O	Pin	Analog	Comparators	Timers	Interrupt	Pull-up	Basic
RA0	19	AN0/ULPWU	C1IN+	—	IOC	Y	ICSPDAT
RA1	18	AN1	C12IN0-	—	IOC	Y	ICSPCLK
RA2	17	—	C1OUT	T0CKI	IOC/INT	Y	—
RA3	4	—	—	—	IOC	Y(1)	$\overline{\text{MCLR}}$/VPP
RA4	3	—	—	$\overline{\text{T1G}}$	IOC	Y	OSC2/CLKOUT
RA5	2	—	—	T1CKI	IOC	Y	OSC1/CLKIN
RB4	13	—	—	—	IOC	Y	—
RB5	12	—	—	—	IOC	Y	—
RB6	11	—	—	—	IOC	Y	—
RB7	10	—	—	—	IOC	Y	—
RC0	16	AN4	C2IN+	—	—	—	—
RC1	15	AN5	C12IN1-	—	—	—	—
RC2	14	AN6	C12IN2-	—	—	—	—
RC3	7	AN7	C12IN3-	—	—	—	—
RC4	6	—	C2OUT	—	—	—	—
RC5	5	—	—	—	—	—	—
RC6	8	—	—	—	—	—	—
RC7	9	—	—	—	—	—	—
—	1	—	—	—	—	—	VDD
—	20	—	—	—	—	—	VSS

Note 1: Pull-up enabled only with external $\overline{\text{MCLR}}$ configuration.

TABLE 1-3: PINOUT DESCRIPTION – PIC16F685 (CONTINUED)

Name	Function	Input Type	Output Type	Description
RC1/AN5/C12IN1-	RC1	ST	CMOS	General purpose I/O.
	AN5	AN	—	A/D Channel 5 input.
	C12IN1-	AN	—	Comparator C1 or C2 negative input.
RC2/AN6/C12IN2-/P1D	RC2	ST	CMOS	General purpose I/O.
	AN6	AN	—	A/D Channel 6 input.
	C12IN2-	AN	—	Comparator C1 or C2 negative input.
	P1D	—	CMOS	PWM output.
RC3/AN7/C12IN3-/P1C	RC3	ST	CMOS	General purpose I/O.
	AN7	AN	—	A/D Channel 7 input.
	C12IN3-	AN	—	Comparator C1 or C2 negative input.
	P1C	—	CMOS	PWM output.
RC4/C2OUT/P1B	RC4	ST	CMOS	General purpose I/O.
	C2OUT	—	CMOS	Comparator C2 output.
	P1B	—	CMOS	PWM output.
RC5/CCP1/P1A	RC5	ST	CMOS	General purpose I/O.
	CCP1	ST	CMOS	Capture/Compare input.
	P1A	ST	CMOS	PWM output.
RC6/AN8	RC6	ST	CMOS	General purpose I/O.
	AN8	AN	—	A/D Channel 8 input.
RC7/AN9	RC7	ST	CMOS	General purpose I/O.
	AN9	AN	—	A/D Channel 9 input.
VSS	VSS	Power	—	Ground reference.
VDD	VDD	Power	—	Positive supply.

Legend: AN = Analog input or output; CMOS = CMOS compatible input or output; TTL = TTL compatible input; ST = Schmitt Trigger input with CMOS levels; HV = High Voltage; XTAL = Crystal

TABLE 1-4: PINOUT DESCRIPTION – PIC16F687/PIC16F689

Name	Function	Input Type	Output Type	Description
RA0/AN0/C1IN+/ICSPDAT/ULPWU	RA0	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN0	AN	—	A/D Channel 0 input.
	C1IN+	AN	—	Comparator C1 positive input.
	ICSPDAT	TTL	CMOS	ICSP™ Data I/O.
	ULPWU	AN	—	Ultra Low-Power Wake-up input.
RA1/AN1/C12IN0-/VREF/ICSPCLK	RA1	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN1	AN	—	A/D Channel 1 input.
	C12IN0-	AN	—	Comparator C1 or C2 negative input.
	VREF	AN	—	External Voltage Reference for A/D.
	ICSPCLK	ST	—	ICSP™ clock.
RA2/AN2/T0CKI/INT/C1OUT	RA2	ST	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN2	AN	—	A/D Channel 2 input.
	T0CKI	ST	—	Timer0 clock input.
	INT	ST	—	External Interrupt.
	C1OUT	—	CMOS	Comparator C1 output.
RA3/$\overline{\text{MCLR}}$/VPP	RA3	TTL	—	General purpose input. Individually controlled interrupt-on-change.
	$\overline{\text{MCLR}}$	ST	—	Master Clear with internal pull-up.
	VPP	HV	—	Programming voltage.
RA4/AN3/$\overline{\text{T1G}}$/OSC2/CLKOUT	RA4	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN3	AN	—	A/D Channel 3 input.
	$\overline{\text{T1G}}$	ST	—	Timer1 gate input.
	OSC2	—	XTAL	Crystal/Resonator.
	CLKOUT	—	CMOS	FOSC/4 output.
RA5/T1CKI/OSC1/CLKIN	RA5	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	T1CKI	ST	—	Timer1 clock input.
	OSC1	XTAL	—	Crystal/Resonator.
	CLKIN	ST	—	External clock input/RC oscillator connection.
RB4/AN10/SDI/SDA	RB4	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN10	AN	—	A/D Channel 10 input.
	SDI	ST	—	SPI data input.
	SDA	ST	OD	I^2C™ data input/output.
RB5/AN11/RX/DT	RB5	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN11	AN	—	A/D Channel 11 input.
	RX	ST	—	EUSART asynchronous input.
	DT	ST	CMOS	EUSART synchronous data.

Legend: AN = Analog input or output; CMOS = CMOS compatible input or output; OD = Open Drain
TTL = TTL compatible input; ST = Schmitt Trigger input with CMOS levels
HV = High Voltage; XTAL = Crystal

TABLE 1-4: PINOUT DESCRIPTION – PIC16F687/PIC16F689 (CONTINUED)

Name	Function	Input Type	Output Type	Description
RB6/SCK/SCL	RB6	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	SCK	ST	CMOS	SPI clock.
	SCL	ST	OD	I^2C™ clock.
RB7/TX/CK	RB7	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	TX	—	CMOS	EUSART asynchronous output.
	CK	ST	CMOS	EUSART synchronous clock.
RC0/AN4/C2IN+	RC0	ST	CMOS	General purpose I/O.
	AN4	AN	—	A/D Channel 4 input.
	C2IN+	AN	—	Comparator C2 positive input.
RC1/AN5/C12IN1-	RC1	ST	CMOS	General purpose I/O.
	AN5	AN	—	A/D Channel 5 input.
	C12IN1-	AN	—	Comparator C1 or C2 negative input.
RC2/AN6/C12IN2-	RC2	ST	CMOS	General purpose I/O.
	AN6	AN	—	A/D Channel 6 input.
	C12IN2-	AN	—	Comparator C1 or C2 negative input.
RC3/AN7/C12IN3-	RC3	ST	CMOS	General purpose I/O.
	AN7	AN	—	A/D Channel 7 input.
	C12IN3-	AN	—	Comparator C1 or C2 negative input.
RC4/C2OUT	RC4	ST	CMOS	General purpose I/O.
	C2OUT	—	CMOS	Comparator C2 output.
RC5	RC5	ST	CMOS	General purpose I/O.
RC6/AN8/$\overline{SS}$	RC6	ST	CMOS	General purpose I/O.
	AN8	AN	—	A/D Channel 8 input.
	$\overline{SS}$	ST	—	Slave Select input.
RC7/AN9/SDO	RC7	ST	CMOS	General purpose I/O.
	AN9	AN	—	A/D Channel 9 input.
	SDO	—	CMOS	SPI data output.
VSS	VSS	Power	—	Ground reference.
VDD	VDD	Power	—	Positive supply.

Legend: AN = Analog input or output; CMOS = CMOS compatible input or output; OD = Open Drain
TTL = TTL compatible input; ST = Schmitt Trigger input with CMOS levels
HV = High Voltage; XTAL = Crystal

TABLE 1-5: PINOUT DESCRIPTION – PIC16F690

Name	Function	Input Type	Output Type	Description
RA0/AN0/C1IN+/ICSPDAT/ULPWU	RA0	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN0	AN	—	A/D Channel 0 input.
	C1IN+	AN	—	Comparator C1 positive input.
	ICSPDAT	TTL	CMOS	ICSP™ Data I/O.
	ULPWU	AN	—	Ultra Low-Power Wake-up input.
RA1/AN1/C12IN0-/VREF/ICSPCLK	RA1	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN1	AN	—	A/D Channel 1 input.
	C12IN0-	AN	—	Comparator C1 or C2 negative input.
	VREF	AN	—	External Voltage Reference for A/D.
	ICSPCLK	ST	—	ICSP™ clock.
RA2/AN2/T0CKI/INT/C1OUT	RA2	ST	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN2	AN	—	A/D Channel 2 input.
	T0CKI	ST	—	Timer0 clock input.
	INT	ST	—	External interrupt.
	C1OUT	—	CMOS	Comparator C1 output.
RA3/$\overline{\text{MCLR}}$/VPP	RA3	TTL	—	General purpose input. Individually controlled interrupt-on-change.
	$\overline{\text{MCLR}}$	ST	—	Master Clear with internal pull-up.
	VPP	HV	—	Programming voltage.
RA4/AN3/$\overline{\text{T1G}}$/OSC2/CLKOUT	RA4	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN3	AN	—	A/D Channel 3 input.
	$\overline{\text{T1G}}$	ST	—	Timer1 gate input.
	OSC2	—	XTAL	Crystal/Resonator.
	CLKOUT	—	CMOS	FOSC/4 output.
RA5/T1CKI/OSC1/CLKIN	RA5	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	T1CKI	ST	—	Timer1 clock input.
	OSC1	XTAL	—	Crystal/Resonator.
	CLKIN	ST	—	External clock input/RC oscillator connection.
RB4/AN10/SDI/SDA	RB4	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN10	AN	—	A/D Channel 10 input.
	SDI	ST	—	SPI data input.
	SDA	ST	OD	I^2C™ data input/output.
RB5/AN11/RX/DT	RB5	TTL	CMOS	General purpose I/O. Individually controlled interrupt-on-change. Individually enabled pull-up.
	AN11	AN	—	A/D Channel 11 input.
	RX	ST	—	EUSART asynchronous input.
	DT	ST	CMOS	EUSART synchronous data.

Legend: AN = Analog input or output; CMOS = CMOS compatible input or output; OD = Open Drain
TTL = TTL compatible input; ST = Schmitt Trigger input with CMOS levels
HV = High Voltage; XTAL = Crystal

2.0 MEMORY ORGANIZATION

2.1 Program Memory Organization

The PIC16F631/677/685/687/689/690 has a 13-bit program counter capable of addressing an 8K x 14 program memory space. Only the first 1K x 14 (0000h-03FFh) is physically implemented for the PIC16F631, the first 2K x 14 (0000h-07FFh) for the PIC16F677/PIC16F687, and the first 4K x 14 (0000h-0FFFh) for the PIC16F685/PIC16F689/ PIC16F690. Accessing a location above these boundaries will cause a wraparound. The Reset vector is at 0000h and the interrupt vector is at 0004h (see Figures 2-1 through 2-3).

FIGURE 2-1: PROGRAM MEMORY MAP AND STACK FOR THE PIC16F631

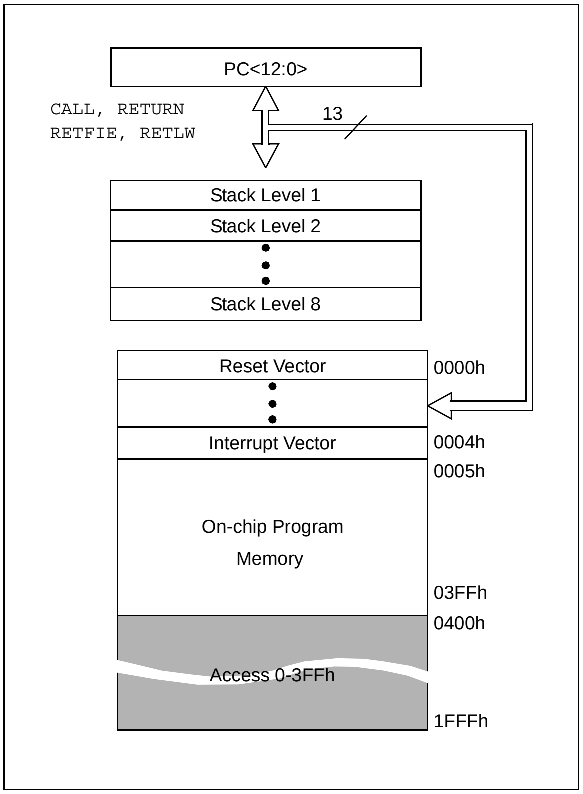


FIGURE 2-2: PROGRAM MEMORY MAP AND STACK FOR THE PIC16F685/689/690

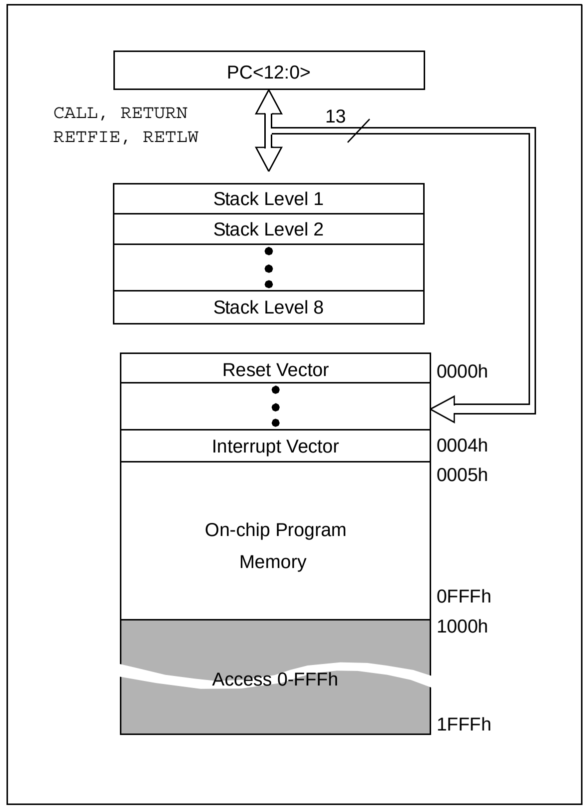
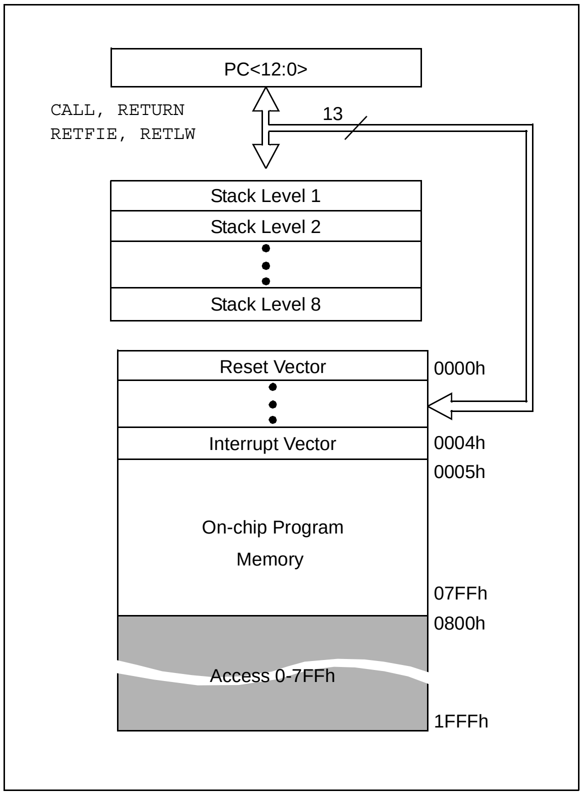


FIGURE 2-3: PROGRAM MEMORY MAP AND STACK FOR THE PIC16F677/PIC16F687



2.2 Data Memory Organization

The data memory (see Figures 2-6 through 2-8) is partitioned into four banks which contain the General Purpose Registers (GPR) and the Special Function Registers (SFR). The Special Function Registers are located in the first 32 locations of each bank. The General Purpose Registers, implemented as static RAM, are located in the last 96 locations of each Bank. Register locations F0h-FFh in Bank 1, 170h-17Fh in Bank 2 and 1F0h-1FFh in Bank 3 point to addresses 70h-7Fh in Bank 0. The actual number of General Purpose Resisters (GPR) in each Bank depends on the device. Details are shown in Figures 2-4 through 2-8. All other RAM is unimplemented and returns '0' when read. RP<1:0> of the STATUS register are the bank select bits:

RP1	RP0		
0	0	→	Bank 0 is selected
0	1	→	Bank 1 is selected
1	0	→	Bank 2 is selected
1	1	→	Bank 3 is selected

2.2.1 GENERAL PURPOSE REGISTER FILE

The register file is organized as 128 x 8 in the PIC16F687 and 256 x 8 in the PIC16F685/PIC16F689/PIC16F690. Each register is accessed, either directly or indirectly, through the File Select Register (FSR) (see **Section 2.4 "Indirect Addressing, INDF and FSR Registers"**).

2.2.2 SPECIAL FUNCTION REGISTERS

The Special Function Registers are registers used by the CPU and peripheral functions for controlling the desired operation of the device (see Tables 2-1 through 2-4). These registers are static RAM.

The special registers can be classified into two sets: core and peripheral. The Special Function Registers associated with the "core" are described in this section. Registers related to the operation of peripheral features are described in the section of that peripheral feature.

Ultrasonic Ranging Module HC - SR04

Product features:

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:
(1) Using IO trigger for at least 10us high level signal,
(2) The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.
(3) IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.
Test distance = (high level time×velocity of sound (340M/S) / 2,

Wire connecting direct as following:

- 5V Supply
- Trigger Pulse Input
- Echo Pulse Output
- 0V Ground

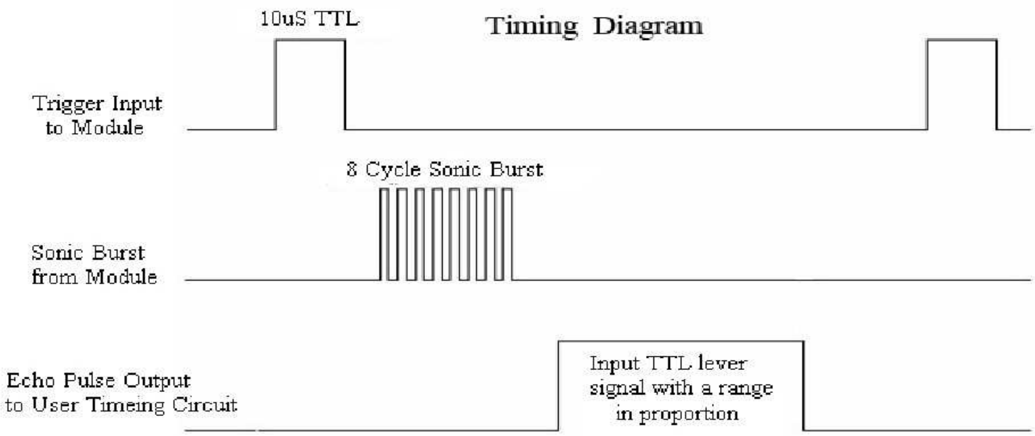
Electric Parameter

Working Voltage	**DC 5 V**
Working Current	**15mA**
Working Frequency	**40Hz**
Max Range	**4m**
Min Range	**2cm**
MeasuringAngle	**15 degree**
Trigger Input Signal	**10uS TTL pulse**
Echo Output Signal	**Input TTL lever signal and the range in proportion**
Dimension	**45*20*15mm**

Vcc Trig Echo GND

Timing diagram

The Timing diagram is shown below. You only need to supply a short 10uS pulse to the trigger input to start the ranging, and then the module will send out an 8 cycle burst of ultrasound at 40 kHz and raise its echo. The Echo is a distance object that is pulse width and the range in proportion .You can calculate the range through the time interval between sending trigger signal and receiving echo signal. Formula: uS / 58 = centimeters or uS / 148 =inch; or: the range = high level time * velocity (340M/S) / 2; we suggest to use over 60ms measurement cycle, in order to prevent trigger signal to the echo signal.



Attention:

- The module is not suggested to connect directly to electric, if connected electric, the GND terminal should be connected the module first, otherwise, it will affect the normal work of the module.
- When tested objects, the range of area is not less than 0.5 square meters and the plane requests as smooth as possible, otherwise ,it will affect the results of measuring.

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Wireless Voice Operating Lift Control System with Safety Care

Miss.Waman Akanksha[1], Miss. Sonawane Pratiksha[2], Miss. Kadlag Tanuja[3], Miss. Shinde Prajakta[4]
Students, Dept. of Electronics Engineering,
Amrutvahini College of Engineering, Sangamner, India[1,2,3,4]

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. SpeechRecognition could be a system that functions to convertauditory communication into the computer file. Thesystem input is human speech. The main purpose ofcoming up with this method is to control the Elevator bymistreatment voice commands by the user. It aims at serving to unfit, short height folks and physicallychallenged persons. This projected system is incrediblyabundant convenient throughout COVID-19 pandemic.*

Keywords: Internet of Things,Transportation Management, GPS Location Tracking, GSM, Accident Alert,

I. 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. Elevator is become the main part of our day-to-day life. Elevator is become a transport device that is very common to us now a days. We use it every day to move goods or peoples vertically in a high building such as shopping center, working office, hotel and many more things. Elevator is a very useful device that moves people in the shortest time to desired floor. Lift is the vital part of everyone's life living in large buildings, and moreover it is the necessary thing in large buildings or any big construction having number of floors to move from one floor to another. Now a day it is becoming prestigious thing for the malls, shopping Markets, colleges, hospitals, hotels. Which are having two or three floors or more than that. So we are trying to make it more automatic through our project. Speech recognition model is the method by which the elevator can be controlled .and by Speech recognition model we will get input to controlling the elevator. Whenever we are dealing with voice control, the first term come in our mind is Speech Recognition i.e. system should know or understand human voice as input to the speech recognition model. Speech recognition is a technology in which the system will understand the words but not its meaning of the words given by the speech of any person to speech recognition module. Speech is a best and ideal method to controlling the elevator. In this project we are also going to give indication to the security in emergency situation. In emergency situation means in case of lift failure .it may be the fault because of power failure or may more reasons of power failure .in emergency condition it will indicate to the security person and that time buzzer will ringing on. [1] 2. Literature survey Vrajesh Prajapati and Mehta at. el.: Voice recognized elevator, we have given the information which describes the voice operated elevator which is also easy in language and important for user. This voice operated elevator mainly useful for handicapped person (blind). Elevator operated on voice so maintenance cost for keypad which is use previously also reduce. A voice recognition program and its connection with the controller can supply sufficient number of commands necessary for the elevator control on which the elevator will operated. The old elevators were having many drawbacks like there was key press problem and time required to press one key was also more. Voice operated elevator is saving time

Elevators are taken into account Associate in nursinginescapable a part of our society. But Elevators primarilybased on it needs humans' physical interaction for itsmovement. So considering completely different aspects ofautomatic

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technology we have a tendency to came up with aconcept of planning the elevator that may be automaticwhich can perform all the task mistreatment voicecommands of users as input rather than physical input withsimply giving a voice command the user can reach thedestined floor.Manual work which might give an ease to the user toachieve their destined floor throughout peak hours and canconjointly provide a ease to physically-challengedindividuals. Elevators are controller devices that use switchmechanism for operation. Either the person wishes to travelin down or upward direction, uses the computer keyboard orperhaps for Associate in emergency stop or to open & shutthe elevator door.In today's life we will notice a colossal kind ofhousing complexes packed in procurable location with multistorage building capability. This project higher fits for blind,unfit and physically challenged people. Trying toward current scenario of COVID-19. Manually operated elevateencompasses a high rate of spreading the virus. Theessential explanation for planning this method is to performelevator operation via voice directions. Speech recognitionsystems are the crucial a part of the project. The speechrecognition of the elevator system permits thecommunication mechanism between the users and also thePIC microcontroller primarily based mechanism.

II. LITERATURE SURVEY

Vrajesh Prajapati and Mehta at. el.: Voice recognizedelevator, we have given the information which describes thevoice operated elevator which is also easy in language andimportant for user. This voice operated elevator mainly usefulfor handicapped person (blind).Elevator operated on voice so maintenance cost for keypadwhich is use previously also reduces. A voice recognition program and its connection with the controller can supplysufficient number of commands necessary for the elevatorcontrol on which the elevator will operated. The old elevatorswhere having many drawbacks like there were key pressproblem and time required to press one key was also more. Voice operated elevator is saving time. [2]

A Survey Paper on Design & Control of an Elevator for Smart City Application it is concluded that the design and control of three floor elevator for smart city application. The main requirement of the multi storage buildings are elevators. Elevators ease the work human being and keep them in the comfortable zone. One can make the better use of PLC in the designing of the elevator control system. This control is based on the input that is received from the operator as well as from the sensors. Elevator control system is needed to control all the functions of the elevator. It is the one which guides the elevator car, Elevator car is one which actually carries the passengers between the different floors; it also controls the opening and closing of doors at different floor, and the safety switches are also controlled by the elevator control system. The ladder logic programming is used to simulate the proposed system. Because of use of PLC, elevator systems are getting better, faster, stronger and better-quality elevators are produced. Hence more importance is given to the design of an elevator control system.

In paper design and implementation of Embedded based elevator control System it is concluded that the elevator control system is one of the important aspects in electronics control module in automotive application. In this investigation elevator control system is designed with different control strategies. First the elevator control system is implemented for multi-storage building. This implementation is based on FPGA based Fuzzy logic controller for intelligent control of elevator group system. This proposed approach is based on algorithm which is developed to reduce the amount of computation required by focusing only on relevant rules and ignoring those which are irrelevant to the condition for better performance of the group of elevator system. Here only two inputs are considered i.e. elevator car distance and number of stops. Based on these data, fuzzy controller can calculate the Performance Index (PI) of each elevator car, the car which has maximum PI gives the answer to the hall calls. This would facilitate reducing the Average Waiting Time (AWT) of the passenger. In the second level, the dispatching algorithm is implemented for multi-storage building. Here six types of dispatching algorithms are considered. Based on the traffic situation and condition, one algorithm out of six is operated, that facilitates reducing the Average Waiting Time of the passenger and also reduces the power consumption of the elevator system. The hardware part of the work comprises a simple D. C. Motor, which can control the up and down movement of the elevator car. This D. C. Motor is controlled through the MC9S12DP256B microcontroller. Here four floor elevator systems have been considered and every floor has two switches, one switch is used for up movement and another switch is used for down movement. Based on the switch pressed, the elevator car can move either in upward or downward direction. Here two sensors are used in every floor. One sensor is used for detecting the elevator car when elevator car reached to its destination floor. This sensor

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detects the car and stops the D.C. Motor. At the same time, another sensor is used for opening and closing the door. Finally, a novel fuzzy based PID controller algorithm is implemented using MC9S12dp256B microcontroller. This algorithm is mainly used for maintaining the constant speed of D.C. Motor with different load conditions.

In paper Voice Operated Elevator with Emergency Indicator it is concluded that elevator is the main part in day to day life .it become transport devices that we are using every day .elevator is useful to move goods and persons. In this project, we are using the microcontroller AT89S52. on this microcontroller the elevator controller is constructed to simulate as elevator in the real elevator. This project dissertation documents the results of a research on a microcontroller-based elevator control system. It provides useful data to those who want to carry out a elevator Control system research. This System is operated on the Voice of any person which will help the handicap person to Travel form one place to another without any help of other. Microcontroller is become main part of each application now a days. Application in each and every automation control like Hand-held communication devices Remote controllers,, automatic and automobiles, security system, telephone printing machines, indicating ,measuring instruments and products of day to day life. The project described here being also a microcontroller based, used for security purpose and in emergency condition. The use of microcontroller in this project is to store the data which is using in the programming for purpose of moving the elevator, process data that will be according to the user wishes.

In paper elevator control system project, it is concluded that as part of the requirements in a juniorlevel measurements & instrumentation course (for an Electrical and Computer Engineering Technology program), students are required to design and implement an elevator control system project. The elevator simulator is pre-built and equipped with a car that travels through three floors, a car hoist system that uses a 12-volt DC motor, floor sensors to detect the position of the car, and an elevator call pushbutton on each floor. Terminal strips are provided for I/O connections. Students are required to use a National Instruments data acquisition system with analog I/O and digital I/O capability. The objective of the project is for students to design the software (using LabVIEW) and hardware interfacing electronics for the simulated elevator control system such that it mimics the operation of a typical elevator. This paper provides a detailed listing of the engineering requirements for the system and the functional test procedure for verifying proper operation of the system. Examples of student work are provided, along with a project assessment. This project is also linked to several ABET criteria and can be used for assessment of the same. Recommendations are provided to help ensure student success on the project. This project has been found to effectively integrate both hardware and software design, while utilizing information covered from many prerequisite courses. Due to the slow response characteristics of this system, this PC-based control project lends itself well to this application.

III. PROPOSED SYSTEM

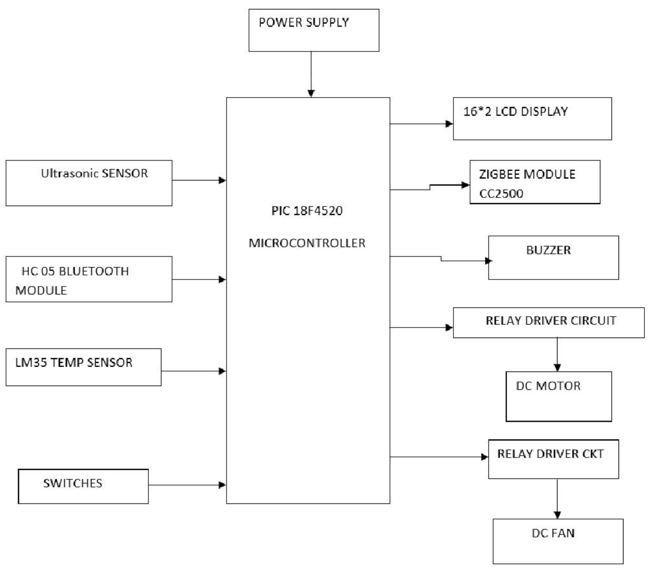

Fig. 1. Block Diagram (Lift Unit)

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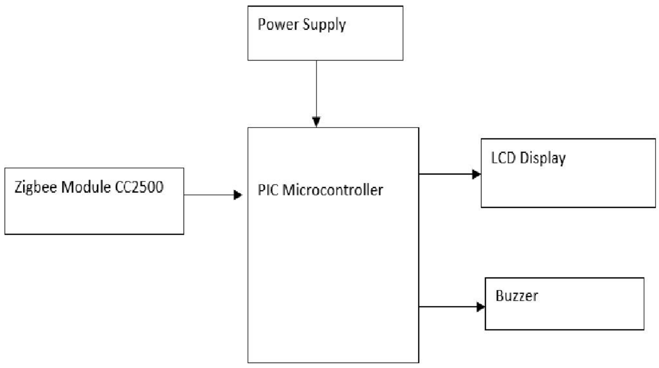

Fig. 2. Block Diagram (Security Cabin Unit)

voice operated system is the main part of this project. Voice to text convertor 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.

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.

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.

PIC 18f4520 Microcontroller

It is an 8-bit enhanced flash PIC microcontroller that comes with nanowatt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end-user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

Data Memory up to 4k bytesn Data register map - with 12-bit address bus 000-FFF

Divided into 256-byte banks

There are total of F banks

Half of bank 0 and half ofbank 15 form a virtual (oraccess) bank that is accessibleno matter which bank isselected – this selection isdone via 8-bit

Program memory is 16-bits wide accessed through a separate program data bus and address bus inside the PIC18.

Program memory stores the program and also static data in the system.

On-chip External

On-chip program memory is either PROM or EEPROM.

The PROM version is called OTP (one-time programmable) (PIC18C) The EEPROM version is called Flash memory (PIC18F).

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Maximum size for program memory is 2M n Program memory addresses are 21-bit address starting at location 0x000000

Fig. 3. PIC18f4520

Bluetooth Module HC05

Bluetooth wireless technology is becoming a popular standard in the communication. it is one of the fastest growing fields in the wireless technologies. It is convenient, easy to use and has the bandwidth to meet most of today's demands for mobile and personal communications. Bluetooth technology handles the wireless part of the communication channel; it transmits and receives data wirelessly between these devices. It delivers the received data and receives the data to be transmitted to and from a host system through a host controller interface (HCI). The most popular host controller interface today is either a UART or a USB. Here, I will only focus on the UART interface, it can be easily show how a Bluetooth module can be integrated on to a host system through a UART connection and provide the designer an optimal solution for Bluetooth enabled systems.

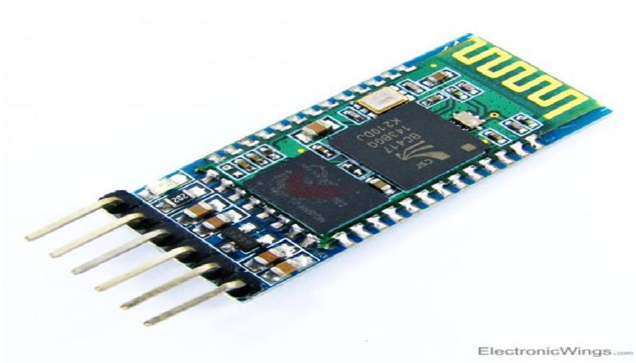

Fig. 4. Bluetooth HC05 Module

ZigbeeModule (CC2500)

It can be used to transmit and receive data at multiple baud rates from any standard CMOS/TTL source. CC2500 Wireless Trans-receiver module is a direct line in replacement for your serial communication it requires no extra hardware and no extra coding to turn your wired communication into wireless one.

It works in Half Duplex mode i.e. it provides communication in both directions, but only one direction at same time (not simultaneously). This switching from receiver to transmitter mode is done automatically.

Features of CC2500 Wireless Module

Supports Multiple Baud rates (4800/9600/19200/38400).Works on ISM band (2.4 GHz) which is reserved internationally so no need to apply for license.

Supports multiple frequencies within the same band rate thus avoiding data collision.

No complex wireless connection software or intimate knowledge of RF is required to connect your serial devices.

Designed to be as easy to use as cables.

No external Antenna required.

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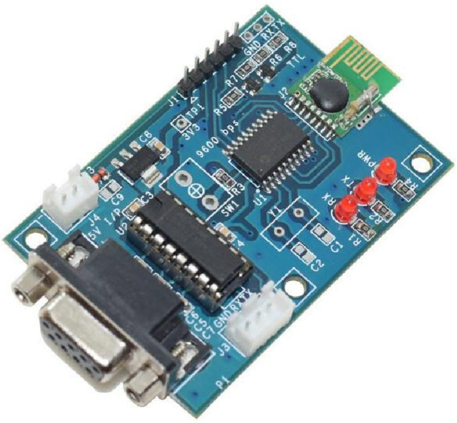

Fig. 5. Zigbee CC2500 Module

Temp Sensor LM35

The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full -55 to +150°C temperature range. Low cost is assured by trimming and calibration at the wafer level. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy. It can be used with single power supplies, or with plus and minus supplies. As it draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. The LM35D is rated to operate over a 0° to +100°C temperature range

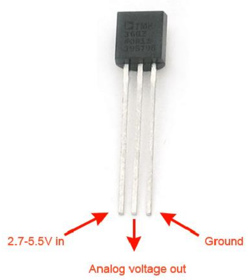

Fig. 6. Temp Sensor

LCD Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

.A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD.

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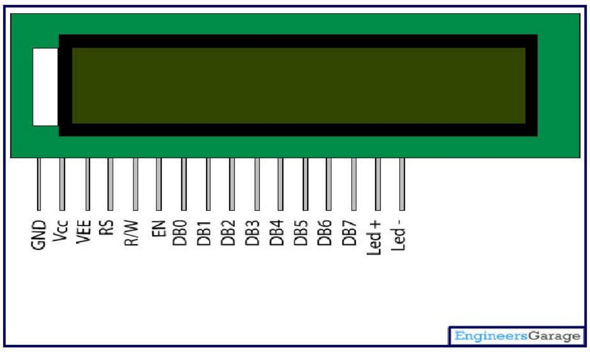

Fig. 7. LCD Display

Ultrasonic Sensor

Ultrasonic ranging module HC - SR04 provides 2cm - 400cm non-contact measurement function, the ranging accuracy can reach to 3mm. The modules includes ultrasonic transmitters, receiver and control circuit. The basic principle of work:

Using IO trigger for at least 10us high level signal,

The Module automatically sends eight 40 kHz and detect whether there is a pulse signal back.

IF the signal back, through high level , time of high output IO duration is the time from sending ultrasonic to returning.

Test distance = (high level time×velocity of sound (340M/S) / 2,

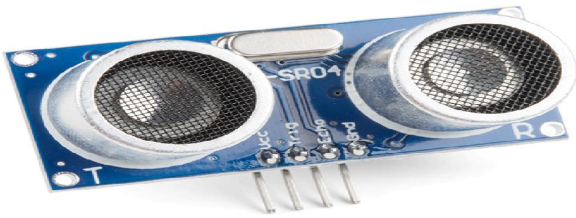

Fig. 8. Ultrasonic Sensor

IV. CONCLUSION

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.

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.

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It gives us great pleasure in presenting the paper on "Wireless Voice operating lift control system with Safety Care". We would like to take this opportunity to thank our guide, prof.Bansode B.N., Professor, Department of Electronics

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