PROJECT REPORT OF

SMART GLOVES FOR COMMUNICATION

A Graduate Project Report submitted to Manipal University in partial fulfilment of the requirement for the award of the degree of

BACHELOR OF TECHNOLOGY
In

Electronics and Communication Engineering

Submitted by

Student Name: HARISH.R

Reg. No.:140907736

Under the guidance of

Dr. UJJWAL VERMA

Department of Electronics and Communication

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institution of Manipal Academy of Higher Education)

MANIPAL – 576104, KARNATAKA, INDIA

MAY 2018

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

MANIPAL INSTITUTE OF TECHNOLOGY

(A Constituent Institution of Manipal Academy of Higher Education)

MANIPAL – 576 104 (KARNATAKA), INDIA

Manipal

03-05-2018

CERTIFICATE

This is to certify that the project titled **SMART GLOVES FOR COMMUNICATION** is a record of the bonafide work done by **HARISH.R** (Reg. No. 140907736) submitted in partial fulfilment of the requirements for the award of the Degree of Bachelor of Technology (BTech) in **ELECTRONICS AND COMMUNICATION ENGINEERING** of **Manipal Institute of Technology**, Manipal, Karnataka, (A Constituent Institution of Manipal Academy of Higher Education), during the academic year 2017 - 2018.

Dr. Ujjwal Verma
Project Guide

Prof. Dr. M. Satish Kumar
HOD, E & C
M.I.T, MANIPAL

ACKNOWLEDGMENT

Our venture would not have been fruitful without the consolation, direction and support by different identities. Above all else, we might want to offer our true thanks towards our task control **Dr. Ujjwal Verma, Department of Electronics and Communication Engineering, Manipal Institute of Technology Manipal**, for his direction, consolation and motivation all through the undertaking work and furthermore generously thank our Department Jury individuals.

We stretch out our appreciation to **Dr. Satish Kumar, Professor and Head, Department of Electronics and Communication Engineering, Manipal Institute of Technology, Manipal,** for his consolation and giving essential offices in the division.

We might want to express our genuine on account of all the educating and non-showing staff of the branch of **Electronics and Communication Engineering, Manipal Institute of Technology, Manipal,** for their understanding and help amid our undertaking work.

ABSTRACT

Correspondence is the main medium by which we can share our considerations or pass on the message yet for a man with incapacity (almost totally senseless) faces trouble in correspondence with typical individual. Along these lines, a man who needs in hearing and talking capacity can't remain in race with ordinary individual. Correspondence for a man who can't hear is visual, not sound-related. By and large moronic individuals utilize gesture based communication for correspondence yet they discover trouble in speaking with other people who don't comprehend gesture based communication. So there is an obstruction in correspondence between these two groups. This work means to bring down this boundary in correspondence The principle point of the proposed venture is to build up a savvy framework which can offer voice to voiceless individual with the assistance of Smart Gloves. It implies that utilizing keen gloves correspondence won't be boundary between two distinct groups. With the assistance of these gloves handicapped individual can likewise motivate opportunity to develop in their particular bearer. Utilizing such gadgets by incapacitated individual likewise influences country to develop.

Idiotic and hard of hearing individuals are generally denied of typical correspondence with other people who don't comprehend the gesture based communication. Gesture based communication is a dialect through which correspondence is conceivable without the methods for acoustic sounds. Rather, communication via gestures depends on sign example, i.e., non-verbal communication, introduction and developments of the arm to encourage understanding between individuals.

There are perhaps around two hundred sign languages in use around the world today. As per 2001 census it has been estimated that there are about 1.3 million people with hearing disability in India, making it the country with the largest number of dumb and perhaps also the largest number of sign language users. It has been observed that

deaf and dumb people sometimes find it really difficult to interact with normal people through their gestures, as only a very few of those can be recognized by most of the people.

The work depicted in this venture is to assemble a communication via gestures interpreter that utilizes hand's development to isolate the letters. This cases these correspondence for Deaf and Dumb individuals with rest of the world.

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Chapter 1

Introduction

1.1 Overview

India constitutes 2.4 million of Deaf and Dumb populace, which holds the world's 20% of the Deaf and Dumb Population. This individual does not have the enhancements which a typical individual should claim. The enormous purpose for this is absence of correspondence as hard of hearing individuals can't tune in and stupid individuals can't talk.

This diminishing proportion of Literate and Employed Deaf and Dumb populace is a consequence of the physical handicap of hearing for hard of hearing individuals and incapacity of representing moronic individuals so it respects absence of correspondence between typical individual and Deaf and Dumb Person. It really turns into a similar issue of two people which knows two distinctive dialects, nobody of them knows any regular dialect so its turns into an issue to converse with each other thus they require an interpreter physically which may not be constantly helpful to mastermind and this same sort of issue happens in the middle of the Normal Person and the Deaf individual or the Normal Person and the Dumb individual. To conquer this issue, we present a one of a kind application. Our application demonstrate is an alluring Interpreter which deciphers. Regular English Sentences as, a content contribution by Normal Person for Deaf Person and Sign Language, in type of Gesture by a Dumb Person to Synthesized English Words which have a comparing importance in Sign Language which deciphers a specific thing, as an Audio Output for Normal Person. This will enable Normal and Deaf and moronic groups by expelling the correspondence to hole between them.

The gesture based communication is an essential and just strategy for correspondence for hard of hearing moronic people. As gesture based communication is a formal dialect utilizing an arrangement of hand motion for correspondence (by the hard of hearing). Gesture based communication image is appeared in figure. In this task Flex Sensor Plays the significant part, which are set on fingers, as fingers twists it changes protection relying upon the measure of curve on the sensor.

1.1.1Issue FORMULATION

The primary point of the proposed venture is to build up a practical framework which can offer voice to voiceless individual with the assistance of Smart Gloves. It implies that utilizing Smart Glove by the hard of hearing individual empowers them to speak with others which additionally crosses over any barrier between individual with handicap and typical individual. Issues looked by the hard of hearing individual with respect to business can be overwhelmed by this technique. So in the proposed work a canny microcontroller based framework utilizing Flex sensors will be produced which can:

•To create coding for the framework to that gets its direction from signal acknowledgment framework utilizing Flex sensors.

•To build up a microcontroller based financially savvy framework to perceive motion and change over into coded shape so it can be shown if code matches with predefined codes.

•Normal individual would text be able to their message utilizing console.

The remote course of action makes the gadget more agreeable to be utilized by the incapacitated individual. Remote and gathering of signs are finished with the assistance of handset.

1.1.2 MATERIAL

1.1.3 Flex Sensor

Marked letters are resolved utilizing flex sensor on each finger. The flex sensors change their protection in light of the measure of curve in the sensor. As a variable printed resistor, the flex sensor accomplishes extraordinary shape factor on a thin adaptable substrate. At the point when sensor put in gloves is twisted, it creates a protection yield associated to the twist range—the littler the sweep, the higher the protection esteem. They require a 5-volt information and yield in the vicinity of 0 and 5V. The sensors are associated with the gadget by means of three stick connectors (ground, live, and yield). In gadget, sensors are actuated in rest mode. It empowers them to shut down mode when not in use.

The yields from the flex sensors are inputted into operation amps and utilized a no inverted style setup to intensify their voltage. The more prominent the level of twisting the lower the yield voltage.
By voltage divider govern, yield voltage is resolved and given by
Vout = Vin *R1/(R1 + R2)(equation 1.1.3) where R1 is the other information resistor to the non-altering terminal.

1.1.4 PIC MICROCONTROLLER

Microcontroller is the core of the gadget. It stores the required information and make utilization of if at whatever point the individual uses the gadget. This gadget helps almost totally senseless individual to report their necessity. By this the individual who is close can comprehend their need and help them. PIC microcontrollers can be customized in Assembly, C or a mix of the two. Other abnormal state programming dialects can be utilized yet implanted frameworks programming is principally composed in C. All yield signals created from flex sensors are in simple shape and these signs should be digitized before they can be transmitted to encoder. In this manner microcontroller PIC16F877A is utilized as the primary controller in this task. It has inbuilt ADC module, which digitizes every single simple flag from the sensors and inbuilt multiplexer for sensor flag choice. It underpins both serial and parallel correspondence offices.

1.1.5 ENCODER/DECODER

The yield from the PIC microcontroller is encoded by encoder. The customized address/information are transmitted together with the header bits Via a RF. It is utilized to rectify the blunder at the beneficiary end, if any mistake had happened. In the beneficiary it is decoded by decoder.

1.1.6 GESTURE RECOGNITION SECTION

The motion director is the important piece of the acknowledgment framework. It contains information to coordinate with approaching information. The framework tries to coordinate approaching information with existing stance. The twist estimations of the fingers and for each stance definition the separation to the present information is ascertained. At that point, the position/introduction information is analyzed in an in like manner way.

1.1.7 VOICE SECTION

After signal acknowledgment framework, information is sent to voice area. In this, information is coordinated with feeded information. In the event that the information is coordinated with feeded information then it is given to speaker and show framework.

1.2 Objectives

- Selection of suitable flex sensors.
- Converting sensed analog signals into digital signals using PIC18F452 IC PIC Development Board.
- Interfacing sensors, flex sensors, LCD module and APR2313A Voice recorder module with PIC Development Board at the detection unit.
- Displaying received data transmitted by PIC Development board module on LCD with the of APR2313A Voice recorder.
- Achieving text to speech conversion through APR2313A Voice recorder and pronouncing it through speakers.

1.3 Literature Survey

The correspondence system which changes over standard vernaculars, used by idiotic individuals, Quadriplegia and paraplegia are deficiencies that result from wounds to the spinal line and neuromuscular issue into talk. It is done in light of a story hand improvement affirmation framework. The system approach contains a hardware module and programming module. In prepare module-The advancement affirmation is done with the help of a sensor glove which incorporates 4 Flex sensors, A PIC IC and that are best composed in endless supply of American Sign Language Signs. The strategy of glove and disentangling signals by considering the turn presentation with respect to gravity and the separating voltage levels are explored. The extending rates of a hand advancement in three different ways is perceived by animating respects was transmitted to a Pic controller. A modified banner certification estimation is conveyed to perceive specific developments in a progression. As a last point, the flag is seen by differentiating the expanding speed regards and the set away designs. According to apparent movement, specific charges are played through speaker using voice chip. For bringing down the correspondence hole between the hard of hearing and quiet group and the ordinary world. So a framework which was intended to be a model to check the possibility of perceiving communication via gestures utilizing sensor gloves. The flex sensor produces simple yield esteems that were changed over into advanced qualities utilizing an ADC converter. The motion is perceived by contrasting the put away qualities and the put away layouts. With this undertaking the hard of hearing or quiet individuals can utilize the gloves to perform communication through signing and it would be changed over in to discourse so typical individuals can without much of a stretch get it. The proposed framework utilizes PIC Microcontroller and flex sensor which acts voltage divider.

A framework which was called as hand motion acknowledgment for imbecilic individuals utilizing Indian gesture based communication. This framework will help them to express their musings as a more advantageous way. Gesture based communication as a sort of motions which causes the stupid individuals to make correspondence like as would be expected individuals. In this exploration, flex sensors

based hand glove was intended to perceive the Indian gesture based communication, its protection gets differed and accelerometer measures the movement of hand. The flex sensor produces simple yield esteems that were changed over into advanced qualities utilizing an ADC converter. The PIC Microcontroller of IC PIC18F452 sends this advanced flag to LCD module. At opposite side APR2313A Voice recorder was utilized to perceive hand signal information which was put away as of now in memory. The yield of the framework was given the assistance of the speaker. So every time refreshing the new words in the database the moronic would talk like an ordinary individual.

A movement based contraption for unfortunately tested individual as a mean of correspondence for a man, who can't hear is visual, not sound-related. All things considered bonehead people use motion based correspondence for correspondence, yet they find inconvenience in talking with other individuals who don't understand correspondence through marking. So there is a block in correspondence between these two gatherings. This work has wanted to cut down this limit in correspondence. The rule purpose of the proposed wander was to develop a monetarily canny structure which can offer voice to voiceless people with the help of Smart Gloves. With the proposed work motion based correspondence was changed over into substance and talk using flex sensor and PIC Microcontroller. It suggests that using keen gloves correspondence won't be a limit between two unmistakable gatherings.

A model was proposed whose crucial point was to make Electronic Speaking Glove, planned to empower a basic correspondence through incorporated talk for the upside of stunned patients. Generally, an amazed individual passes on through correspondence by means of signals which isn't grasped by the bigger piece of people. The proposed system was expected to deal with this issue. Movements of fingers of a customer of this glove would be changed over into fused talk to pass on an equipped for being heard message to others, for instance in an essential correspondence with experts. The glove is inside furnished with various flex sensors that were incorporated twist fragile confirmation parts. For every particular development, internal flex sensors roll out a relating improvement in protection of different parts. The arranging of this data would send an emerge strategy of signs for the PIC controller and talks stream IC which was prearranged for talk required sentences. Recently, specialists have been concentrating open signs recognizing bits of verification and been standard for making applications in the field of put forth a concentrated effort administration and reached out in the zone of fraud or prosthetic hands that can mirror the lead of a trademark human hand.

1.4 Viability of Project

Complex advances in innovation have made arrangements like the Sign Language Translator an expanded feasible answer for some discourse dialect experts. They are particularly useful when serving the requirements of broad country regions and patients with unique needs. Be that as it may, what truly separates this training from the opposition is this being easy to use. This undertaking can be of extraordinary help to individuals with physical difficulties to speak with others.

Chapter 2
BACKGROUND THEORY

2.1 Method and Block Diagram

In this venture information glove is actualized to catch the hand signals of a client. Gloves are planned to change over motion into voice. In this task information glove is actualized to catch the hand motions of a client Smart gloves having sensors in it catches the development of client and proselyte's simple contribution to advanced yield using voltage divider run the show. At that point development is given to microcontroller for additionally handling. Presently motion cluster is transmitted utilizing RF transmitter and beneficiary. Perceived motions are coordinated with prefeeded information and in the event that it matches given to speaker utilizing voice segment.

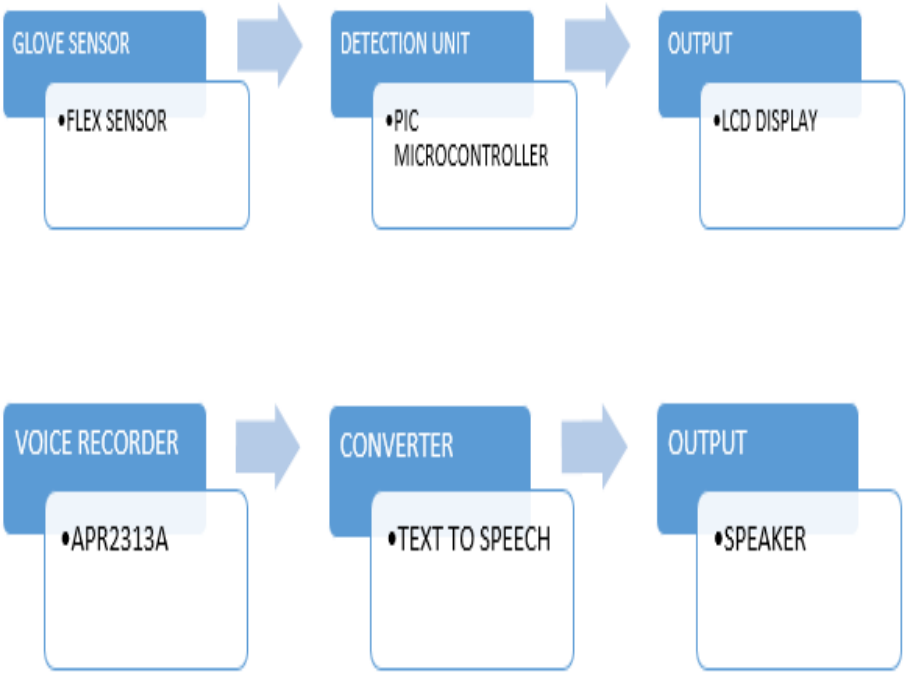

Figure 2.1: Block Diagram of Sign Language Translator

2.2 Description of Modules

The Glove utilizes flex sensors to assemble information on every finger position and the hands movement to separate the letters. The yield of sensors and accelerometer are given to the location unit set on the arm.
The recognition unit comprises of PIC 18F452 IC with PIC Development board, which has inbuilt ADC (Analog to Digital Converter) to digitize the detected yield and a LCD to show the letter individually. The interpretation is transmitted to a LCD.

The LCD Module at the receiver end receives the data and with the help of PIC Development board, text to speech conversion is achieved. The use of APR2313A Voice recorder the glove portable and handy.

2.2.1 Glove Sensor

The glove is attached to flex sensor. These are variable resistors utilized for detecting bowing of the finger with the adjustment in protection esteem. Contacts between the fingers are detected utilizing sensors. Accelerometer is utilized for development and introduction recognition. Particular hand movements are the best way to distinguish the letter J and Z. For letters, for example, D, G and Q, the best way to recognize them is their introduction while D has finger pointed upwards, G has finger confronting sideways and Q has finger confronting downwards. For letters M and N, contact sensors must be utilized to separate on the grounds that the flex sensor perusing will be same for both the cases.

2.2.2 Detection Unit

It comprises of two subunits namely PIC Development board detection unit, along with the LCD module. Input to the glove sensors are added to the PIC18F452 PIC controller which in turn is sent to the transmitter. Transmitter at the detection unit is used for wireless transmission of signal.

2.2.3 Base Unit

The APR2313A Voice recorder gets its contribution through a PIC Development board and yields the outcomes on the screen and speaker. The transmitted signal is received by the apr2313a voice recorder receiver embedded in speaker. Later it is converted from text to speech with the help of a voice recorder. This is then displayed on screen and pronounced through the speakers.

2.2.4 Output Unit

LCD is used at the detection unit to display the signed letters. PIC Microcontroller is used at the foundation to display as well as pronounce the corresponding signed Alphabets with the help of this alphabets it will form a word by using the words it will form a command and it will display on the LCD. In our project we have added eight commands in that four for Voice mode and another four Device mode,

a) Voice mode
Four command they are
1.I want some water
2.I need help
3.I want take my meals
4. I want to go to restroom

b) Device mode
Four command they are
5.Turn on the light
6.Turn off the light
7. Turn on the fan
8.Turn off the fan

Chapter 3
METHODOLOGY

Hardware Description

3.1 Glove Sensor

The glove is attached with flex sensors. These are variable resistors used for identifying bowing of the finger with the change in insurance regard. Contacts between the fingers are identified using sensors. Accelerometer is used for advancement and presentation acknowledgment. Specific hand developments are the most ideal approach to recognize the letter J and Z. For letters, for instance, D, G and Q, the most ideal approach to remember them is their presentation while D has finger pointed upwards, G has finger standing up to sideways and Q has finger defying downwards. For letters M and N, contact sensors must be used to isolate because the flex sensor examining will be same for both the cases.

3.1.1 Flex Sensor

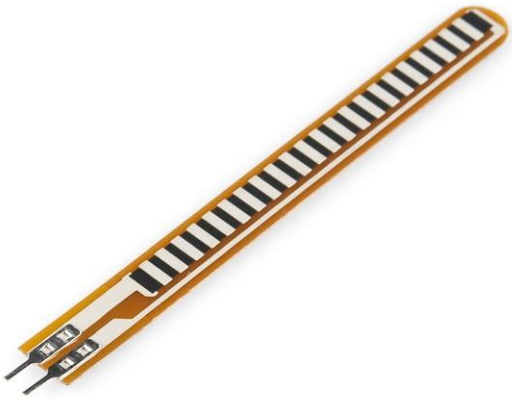

Figure 3.1: Flex Sensor

Flex sensors, are additionally called as curve sensors, measures the measure of avoidance

Caused by bowing the sensor. Conductive ink based sensors are uninvolved resistive gadgets normally created by laying a piece of resistive ink on an adaptable plastic substrate, formed a thin, adaptable strip in lengths in the vicinity of 1 and 5. Very still (when laid level), the curve sensor is specified by an inherent protection 25kω. Less adjoining resistive particles come into contact, in this manner expanding the protection. Regularly the ordinary protection lies in the vicinity of 10kω and 50kω and increments by a factor of 10 at full diversion. The protection can be changed over into a voltage.

Inside the layers of flex sensor substrate is a printed example of conductive ink. To lead power, this ink contains carbon or silver, particles blended into pigmented medium. Normally, the carbon particles are suspended in the ink to abstain from blurring of the shade after some time. Nonetheless, the carbon particles might be delicate to changes in mugginess that can prompt smirching of the ink.

Most conductive ink-based curve sensors in the market are unipolar gadgets, i.e. the protection increments as the avoidance increments in a single course, and are unaltered if twisted the other way. Putting through gadgets consecutive will permit bipolar estimation of catching avoidances in both the course. As length expands, the characteristic protection goes up, as does the protection for every sensor at full diversion. There are diverse cover and covering alternatives to expand solidness and firmness.

It is utilized estimating distinctive level of twists to identify the marked letter.

Properties:

- Hysteresis/Noise are immaterial.

•Resistance is capacity of sweep of ebb and flow, not edge at a certain point.

•High temperature and mugginess resilience.

•Customizable (coatings, covering materials).

3.2 Detection Unit

3.2.1 PIC Microcontroller

PIC (Programmable Interface Controllers) microcontrollers are the world's littlest microcontrollers that can be customized to do an enormous scope of undertakings. These microcontrollers are found in various electronic devices, for instance, phones, PC control systems, ready structures, introduced systems, et cetera. Various types of microcontroller exist, in spite of the way that the best are found in the GENIE extent of programmable microcontrollers. These microcontrollers are changed and duplicated by a circuit-wizard programming.

Each PIC microcontroller design comprises of a few registers and stack where registers work as Random Access Memory (RAM) and stack spares the arrival addresses. The principle highlights of PIC microcontrollers are RAM, streak memory, Timers/Counters, EEPROM, I/O Ports, USART, CCP (Capture/Compare/PWM module), SSP, Comparator, ADC (simple to advanced converter), PSP (parallel slave port), LCD and ICSP (in circuit serial programming) The 8-bit PIC microcontroller is arranged into four sorts based on inside design.

3.2.2 A/D converters

The most essential prerequisite of simple to advanced transformation is the determination. This states how precisely the A/D change measures the simple I/p signals. The regular A/D transformations accessible in the market are 8-bit, 10-bit &12-bit. For instance, if the reference voltage of A/D change is 0-5V, at that point a 8-bit A/D converter breaks this voltage into various parts (256 sections). So it can ascertain the voltage precisely up to 5/256v= 19 mV approx. Then again, a 10-bit A/D converter breaks the voltage into 1024 sections. What's more, subsequently, this converter can compute the voltage precisely up to 5/1024= 4.8mV approx. Accordingly, you can see that the 8-bit A/D converter can't differentiate between 1mV and 18mV. The A/D converter in PIC microcontroller are 10-bit.

The rule wants of this simple to bleeding edge converter is to change over fundamental voltage respects to modernized voltage respects. A/D module of PIC microcontroller contains 5 duties for 28 stick contraptions and 8 responsibilities for 40 stick gadgets. The development of the simple to front line converter which will be used to control by register. The higher bit of the converter which is used in securing the enlist ADRESH and lower bits of the converter are secured to the enlist ADRESL. To activity, it requires 5V of an essential reference voltage.

3.2.3 LCD (Liquid Crystal Display)

A liquid valuable stone show (LCD) is a level board appear, electronic visual show, or video demonstrate that uses the light tweaking properties of liquid jewels. Its low electrical power use engages it to be used as a piece of battery-controlled electronic equipment. LCD module used for the indicating letters all together is 16×2 LCD-JHD 162A.

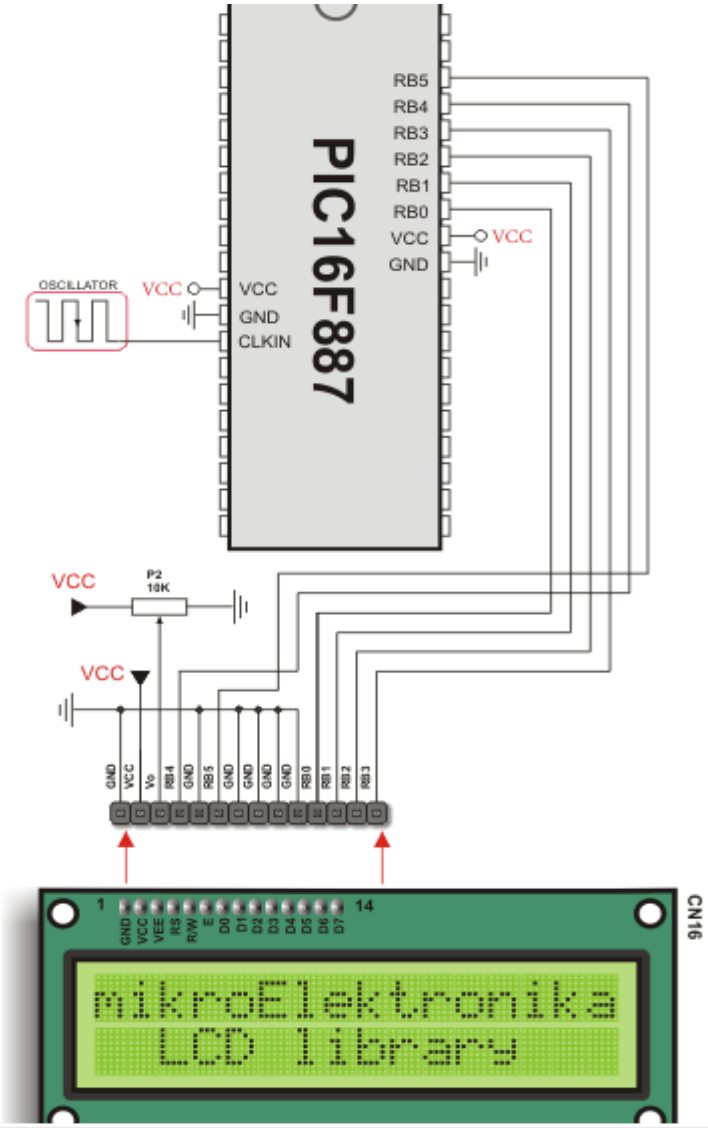

Figure 3.2.3: PIC Microcontroller with LCD Module. (mikro software)

Table 3.2.3: Interfacing Chart for JHD162A LCD
Interfacing Chart:

PIN NO.	SYMBOL	DESCRIPTION	FUNCTION
1.	VSS	GROUND	0V (GND)
2.	VCC	POWER SUPPLY FOR LOGIC CIRCUIT	+5V
3.	VEE	LCD CONTRAST ADJUST-MENT	
4.	RS	INSTRUCTION DATA AND REGISTER SELECTION	RS=0:INSTRUCTION REGISTER. RS=1:DATA INSTRUCTION
5.	R/W	READ/WRITE SELECTION	R/W=0:REGISTER WRITE. R/W=1: REGIS-TER READ
6.	E	ENABLE SIGNAL	
7.	DB0	DATA INPUT/OUTPUT LINES	8 BIT: DB0- DB7
8.	DB1		
9.	DB2		
10.	DB3		
11.	DB4		
12.	DB5		
13.	DB6		
14.	DB7		
15.	LED+	SUPPLY VOLTAGE FOR LED+	+5V
16.	LED-	SUPPLY VOLTAGE FOR LED-	0V

3.3 Base Unit

3.3.1 APR2313A Voice Recorder

Voice Record Module depends on APR2313A, which a multiple-message record/playback gadget. It can offer genuine single-chip voice recording, no-volatile capacity, and playback ability for 7 to 8 seconds. The example is 3.2k and the aggregate 20s for the Recorder. This module utilize is simple which you could coordinate control by push catch on board or by Microcontroller, for example, Arduino, STM32, Chip Kit and so on. From these, you can simple control record, playback and rehash et cetera.

3.3. 2 Feature

- Push-button interface, playback can be edge or level authorized
- Automatic power-down mode
- On-chip 8ω speaker driver
- Signal 3V Power Supply
- Can be controlled both physically or by MCU
- Sample rate and length variable by supplanting a single resistor
- Record up to 20 seconds of sound
- Dimensions: 37 x 54 mm

3.3.3 Applications

On the off chance that you require change record term, an outside resistor is basic to pick the record length and testing rehash, which can go from 8 – 20 seconds (4-12kHz analyzing rehash). The Voice Record Module of our give default interface 100k resistor by short best. So the default record term is 10s.

- VCC– 3.3V power supply
- GND– Power ground
- REC – The REC input is an active-HIGH record flag. The module begins recording at whatever point REC is HIGH. This stick must stay HIGH for the cross of the record. REC surpasses either playback (PLAYL or PLAYE) hail.
- PLAYE – Playback, Edge-activated: When a HIGH-going change is seen on proceeds until an End-of-Message (EOM) marker is experienced or the entire of the memory space is come to.
- PLAYL – Playback, Level-activated, when this data stick level goes for LOW to HIGH, a playback cycle is started.

- Speaker Yields – The SP+ and SP- pins give control drive to enhancers with impedances as low as 8ω.

- MIC – Amplifier Information, the gatherer input exchanges its signs to the on-chip preamplifier.

- FT – Bolster Through: This mode empowers the Amplifier to drive the speaker coordinate.

- P-E – Play the records unendingly.

3.3.4 Record Work Guide

  - Push REC get then the RECLED will light and keep push until the moment that the minute that record end.

  - Release the REC get

  - 3. Select Playback mode: PLAYE, simply require push one time, and will playback a large portion of the

  - record or shut down ; PLAYL, you require dependably push this catch until the point that you need to stop

  - playback record or end ; When short P-E jumper the record will playback time a period

  - until jumper off or shut down

3.4 Software Description

3.4.1 Flow Chart

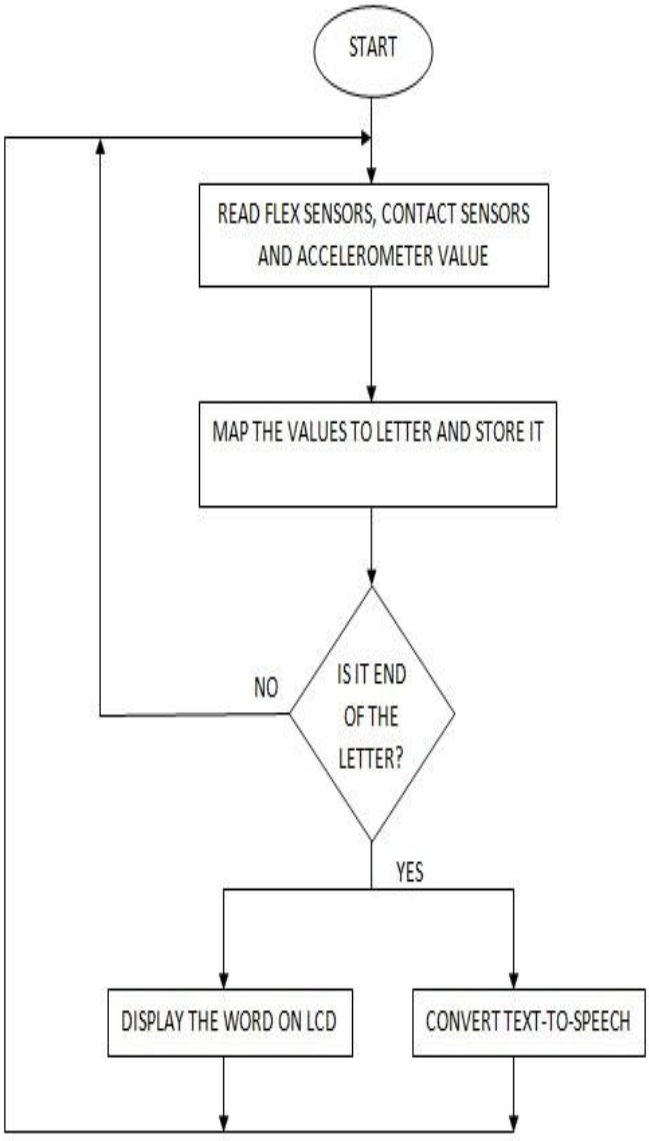

Figure 3.4.1: Flow Chart of Sign to Speech Convert

Flex sensors are uninvolved resistive gadgets normally created by laying a piece of resistive ink on an adaptable plastic substrate, formed a thin, adaptable strip in lengths in the vicinity of 1 and 5. Very still (when laid level), the curve sensor is specified by an inherent protection 25kω. Less adjoining resistive particles come into contact, in this manner expanding the protection. Regularly the ordinary protection lies in the vicinity of 10kω and 50kω and increments by a factor of 10 at full diversion. The protection can be changed over into a voltage.

Inside the layers of flex sensor substrate is a printed example of conductive ink. To lead power, this ink contains carbon or silver, particles blended into pigmented medium. Normally, the carbon particles are suspended in the ink to abstain from blurring of the shade after some time. Nonetheless, the carbon particles might be delicate to changes in mugginess that can prompt smirching of the ink.

Most conductive ink-based curve sensors in the market are unipolar gadgets, i.e. the protection increments as the avoidance increments in a single course, and are unaltered if twisted the other way. Putting through gadgets consecutive will permit bipolar estimation of catching avoidances in both the course. As length expands, the characteristic protection goes up, as does the protection for every sensor at full diversion.

Microcontrollers that can be customized to do an enormous scope of undertakings. These microcontrollers are found in various electronic devices, for instance, phones, PC control systems, ready structures, introduced systems, et cetera. Various types of microcontroller exist, in spite of the way that the best are found in the GENIE extent of programmable microcontrollers. These microcontrollers are changed and duplicated by a circuit-wizard programming.

Each PIC microcontroller design comprises of a few registers and stack where registers work as Random Access Memory (RAM) and stack spares the arrival addresses. The principle highlights of PIC microcontrollers are RAM, streak memory, Timers/Counters, EEPROM, I/O Ports, USART, CCP (Capture/Compare/PWM module), SSP, Comparator, ADC (simple to advanced converter), PSP (parallel slave port), LCD and ICSP (in circuit serial programming) The 8-bit PIC microcontroller is arranged into four sorts based on inside design.

PIC IC and that are best composed in endless supply of American Sign Language Signs. The strategy of glove and disentangling signals by considering the turn presentation with respect to gravity and the separating voltage levels are explored. The extending rates of a hand advancement in three different ways is perceived by animating respects was transmitted to a Pic controller. A modified banner certification estimation is conveyed to perceive specific developments in a progression. As a last point, the flag is seen by differentiating the expanding speed regards and the set away

designs. According to apparent movement, specific charges are played through speaker using voice chip. For bringing down the correspondence hole between the hard of hearing and quiet group and the ordinary world. So a framework which was intended to be a model to check the possibility of perceiving communication via gestures utilizing sensor gloves. The flex sensor produces simple yield esteems that were changed over into advanced qualities utilizing an ADC converter. The motion is perceived by contrasting the put away qualities and the put away layouts. With this undertaking the hard of hearing or quiet individuals can utilize the gloves to perform communication through signing and it would be changed over in to discourse so typical individuals can without much of a stretch get it. The proposed framework utilizes PIC Microcontroller and flex sensor which acts voltage divider.

A framework which was called as hand motion acknowledgment for imbecilic individuals utilizing Indian gesture based communication. This framework will help them to express their musings as a more advantageous way. Gesture based communication as a sort of motions which causes the stupid individuals to make correspondence like as would be expected individuals. In this exploration, flex sensors based hand glove was intended to perceive the Indian gesture based communication, its protection gets differed and accelerometer measures the movement of hand. The flex sensor produces simple yield esteems that were changed over into advanced qualities utilizing an ADC converter. The PIC Microcontroller of IC PIC18F452 sends this advanced flag to LCD module. At opposite side APR2313A Voice recorder was utilized to perceive hand signal information which was put away as of now in memory. The yield of the framework was given the assistance of the speaker. So every time refreshing the new words in the database the moronic would talk like an ordinary individual.

A movement based contraption for unfortunately tested individual as a mean of correspondence for a man, who can't hear is visual, not sound-related. All things considered bonehead people use motion based correspondence for correspondence, yet they find inconvenience in talking with other individuals who don't understand correspondence through marking. So there is a block in correspondence between these two gatherings. This work has wanted to cut down this limit in correspondence. The rule purpose of the proposed wander was to develop a monetarily canny structure which can offer voice to voiceless people with the help of Smart Gloves. With the proposed work motion based correspondence was changed over into substance and talk using flex sensor and PIC Microcontroller. It suggests that using keen gloves correspondence won't be a limit between two unmistakable gatherings.

A model was proposed whose crucial point was to make Electronic Speaking Glove, planned to empower a basic correspondence through incorporated talk for the upside of stunned patients. Generally, an amazed individual passes on through correspondence by means of signals which isn't grasped by the bigger piece of people. The proposed

system was expected to deal with this issue. Movements of fingers of a customer of this glove would be changed over into fused talk to pass on an equipped for being heard message to others, for instance in an essential correspondence with experts. The glove is inside furnished with various flex sensors that were incorporated twist fragile confirmation parts. For every particular development, internal flex sensors roll out a relating improvement in protection of different parts. The arranging of this data would send an emerge strategy of signs for the PIC controller and talks stream IC which was prearranged for talk required sentences.

Flex sensors to assemble information on every finger position and the hands movement to separate the letters. The yield of sensors and accelerometer are given to the location unit set on the arm.

The recognition unit comprises of PIC 18F452 IC with PIC Development board, which has inbuilt ADC (Analog to Digital Converter) to digitize the detected yield and a LCD to show the letter individually. The interpretation is transmitted to a LCD.

The LCD Module at the receiver end receives the data and with the help of PIC Development board, text to speech conversion is achieved. The use of APR2313A Voice recorder the glove portable and handy.

With the current pace of technological advancements one can easily think of alternative ways of translating gestures to text. One such method is to use a glove that detects the gestures made by a user and then displays them. A lot of work has already been done is this area by various researches, but accuracy still remains a major hurdle.

Also each glove is designed for a specific sign variation of language. There is a lot of scope to make a gesture recognition glove which can detect more than one variation of sign language

The glove is attached to flex sensor. These are variable resistors utilized for detecting bowing of the finger with the adjustment in protection esteem. Contacts between the fingers are detected utilizing sensors. Accelerometer is utilized for development and introduction recognition. Particular hand movements are the best way to distinguish the letter J and Z. For letters, for example, D, G and Q, the best way to recognize them is their introduction while D has finger pointed upwards, G has finger confronting sideways and Q has finger confronting downwards. For letters M and N, contact sensors must be utilized to separate on the grounds that the flex sensor perusing will be same for both the cases.

It is separately divided into two subunits namely PIC Development board detection unit, along with the LCD module. Input to the glove sensors are added to the PIC18F452 PIC controller which in turn is sent to the transmitter. Transmitter at the detection unit is used for wireless transmission of signal.

The design of the glove includes both hardware and software components that must work harmoniously to ensure accurate gesture recognition.

A bend sensor measures the amount of bend across it. There are there main ways of designing such a sensor.
conductive ink-based
fiber-optic
conductive fabric or thread or polymer

The conductive ink based sensor are passive resistance devices that. They are constructed by placing a thin layer of resistive ink on a
flexible substrate. This ink allows current to ow through it. When the sensor is bent the due to elongation of the sensor the particles are pulled apart this increasing resistance.

A fiber optic sensor has 3 main components mainly, the light source a detector and the optic fiber itself. When this fiber is bent the light source intensity reduces at the detector. This gives us the amount of bend the fiber has undergone.

The conductive fabric has low accuracy and sensor reading are not repeatable. The optical fiber has higher accuracy but it susceptible to noise in the form of other light that may enter the optical fiber at other points. Hence we choose the conductive ink based sensor for our experiment due to it cost and susceptibility to noise.

A conductive fabric/thread/polymer consists of a resistive substance sandwiched between two layers of conductive fabric/thread/polymer. As it is bent the conductive material is pushed closer and resistance decreases. The Voice recorder gets its contribution through a PIC Development board and yields the outcomes on the screen and speaker. The transmitted signal is received by the apr2313a voice recorder receiver embedded in speaker. Later it is converted from text to speech with the help of a voice recorder. This is then displayed on screen and pronounced through the speakers.

LCD is used at the detection unit to display the signed letters. PIC Microcontroller is used at the foundation to display as well as pronounce the corresponding signed Alphabets with the help of this alphabets it will form a word by using the words it will form a command and it will display on the LCD.

Chapter 4

Working Module

4.1 Module 1: Interfacing Sensors with PIC Microcontroller at Detection Unit

4.1.1 Flex Sensors

Four flex sensors are interfaced with microcontroller i.e. PIC18F452A. Flex sensors are flexed and different resistance values are obtained for different alphabet depending upon the bending of the flex using finger. The resistance value changed into analog voltage value using voltage divider circuit as shown below. This analog

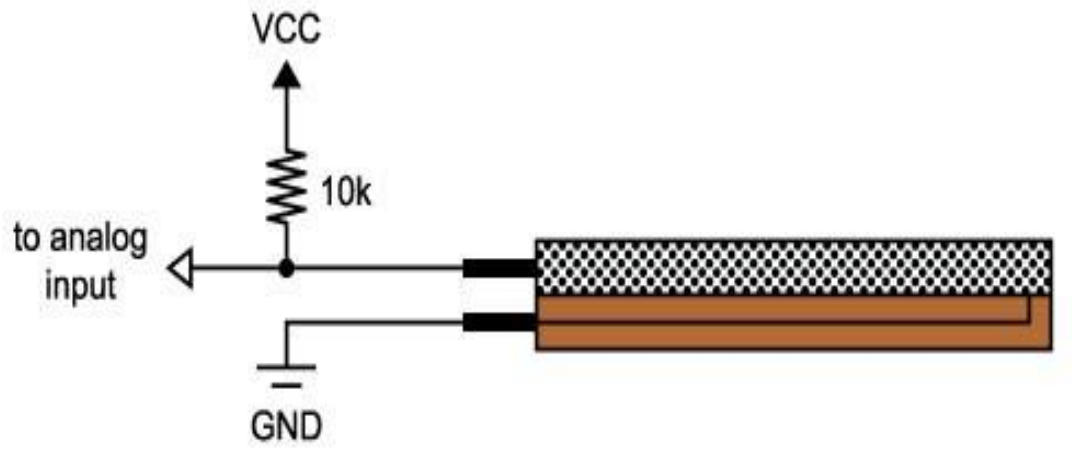

Figure 4.1: Resistance to Voltage Converter Circuit

Voltage is given to the ADC input A0 A3. Analog voltage levels are converted into digital value range. Depending upon different digital value range the signed alphabet is detected.

Table 4.1: Flex Sensor readings for each letters

Alphabets/Fingers	Thumb	Index	Middle	Ring	Little
A	290-345	200-240	350-380	200-230	210-245
B	270-310	300-320	540-560	260-280	310-330
C	290-320	300-330	490-530	250-290	290-310
D	230-260	290-320	350-400	220-260	210-230
E	265-305	220-260	350-390	190-230	210-245
F	270-310	236-284	557-590	265-309	210-240
G	230-260	290-320	350-400	220-260	210-230
H	230-288	310-330	533-594	248-290	224-296
I	222-282	210-271	364-410	224-278	290-310
J	222-282	210-271	364-410	224-278	290-310
K	300-320	290-320	557-597	242-288	226-266
L	300-341	295-320	400-470	254-294	233-263
M	323-345	284-280	424-464	229-269	270-310
N	323-345	284-280	424-464	229-269	270-310
O	330-380	200-240	350-380	200-230	210-245
P	263-320	290-310	434-474	248-290	236-276
Q	300-344	290-310	380-430	220-264	210-276
R	222-282	210-271	364-410	224-278	290-310
S	250-290	190-210	340-390	229-265	210-230
T	330-370	220-270	383-430	210-250	220-276

U	230-288	310-330	533-594	248-290	224-296
V	230-288	310-330	533-594	248-290	224-296
W	230-288	310-330	533-594	300-340	224-296
X	233-272	256-300	360-400	220-286	200-250
Y	310-330	220-270	390-430	210-260	300-330
Z	230-290	290-320	370-420	240-270	190-240

4.2 Module 2: Coding to detect the Letter that has been signed

The detection of signed language alphabet is performed at the microcontroller i.e. PIC 18F452 Microcontroller board. Accelerometer is used to differentiate between the letters with similar flex values within the same group.

With the help of Accelerometer, we differentiate letters which have same flex sensor values. For some letters namely 'M', 'N' and 'T', we use sensors to differentiate, because both the flex sensor values and Accelerometer values remain constant.

4.3 Module 4: Display of the Signed Letter on the LCD

This module comprises interfacing of 16*2 LCD-JHD 162A with PIC18F452. PIC microcontroller via breadboard. This is done for powering up LCD.

4.4 Module 5: Generating Speech Signal for the Detected Letter

The translated letters are transmitted to LCD Module. Using the help of PIC18F452 microcontroller the received signals are displayed on the LCD screen as well as pronounced through speaker.

5.0 Result Analysis

5.1 Mikro Pro Software

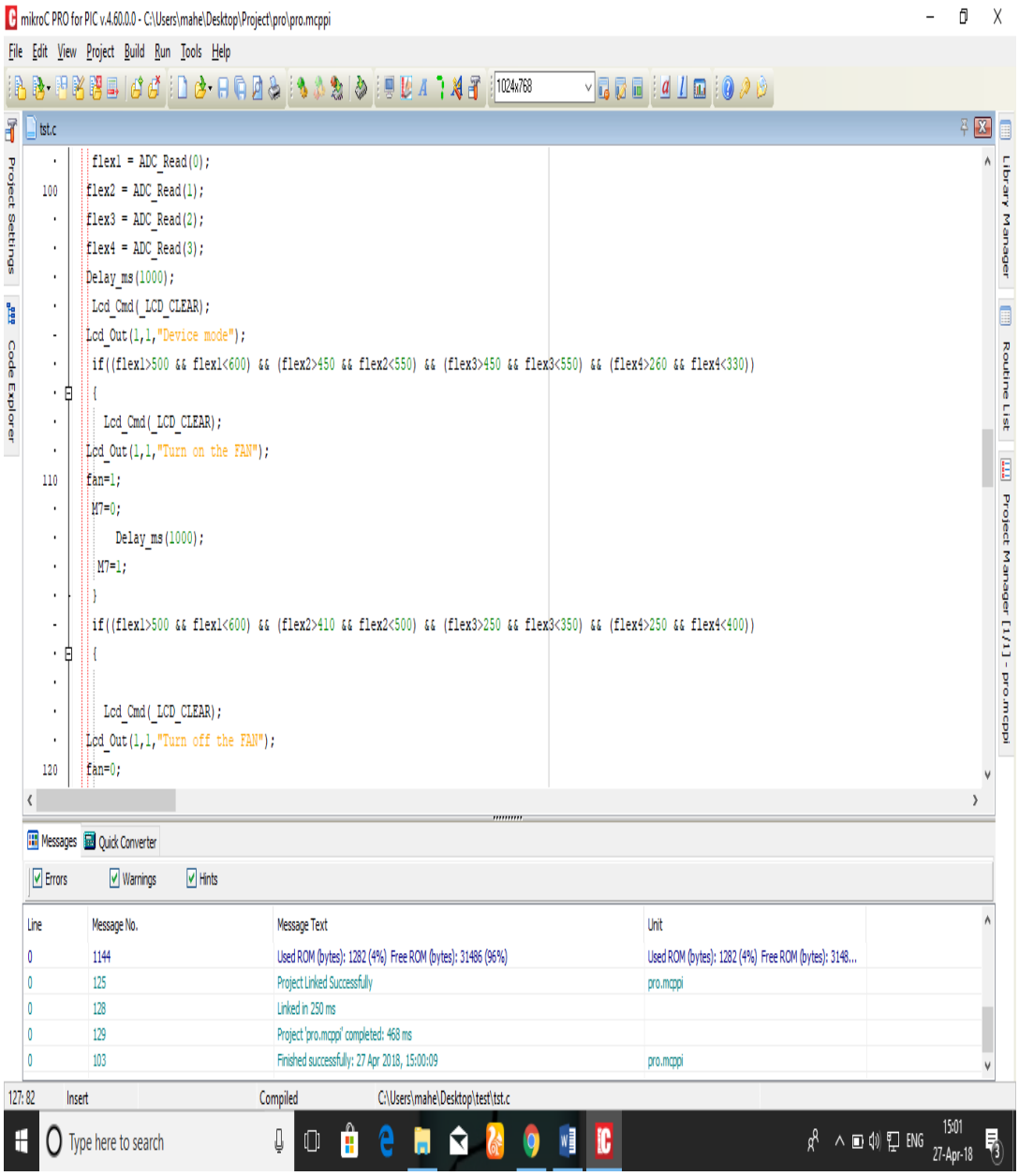

Figure 5.1.1: Mikro pro Software.

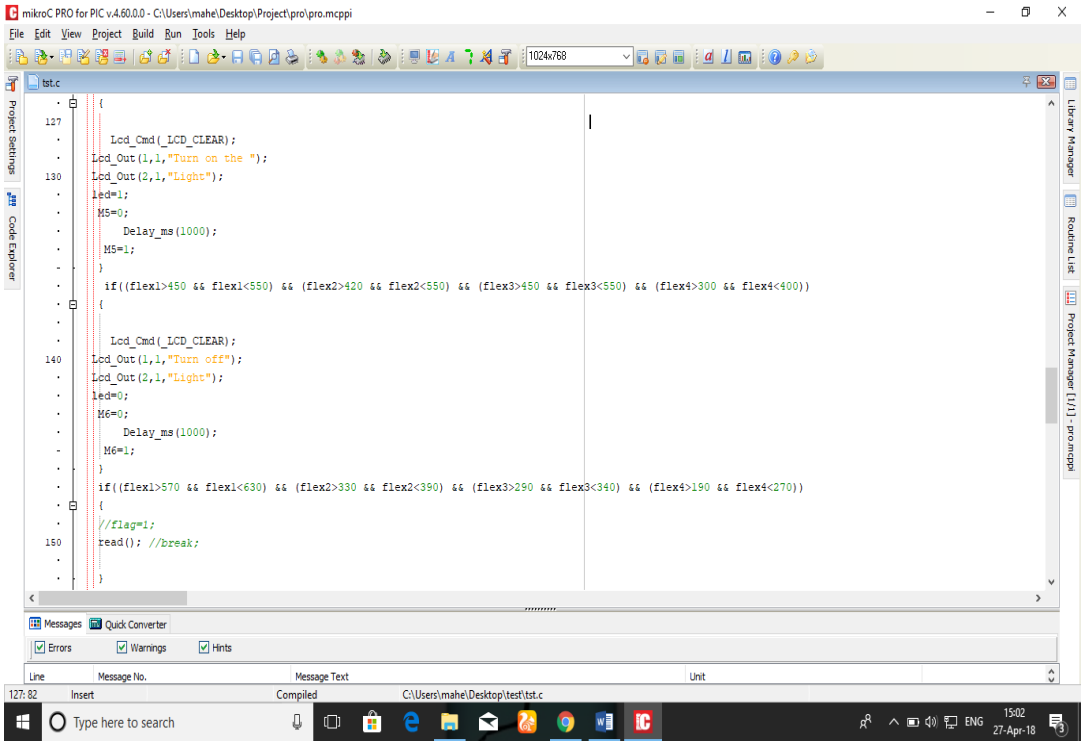

Figure5.1.2: Mikro pro Software.

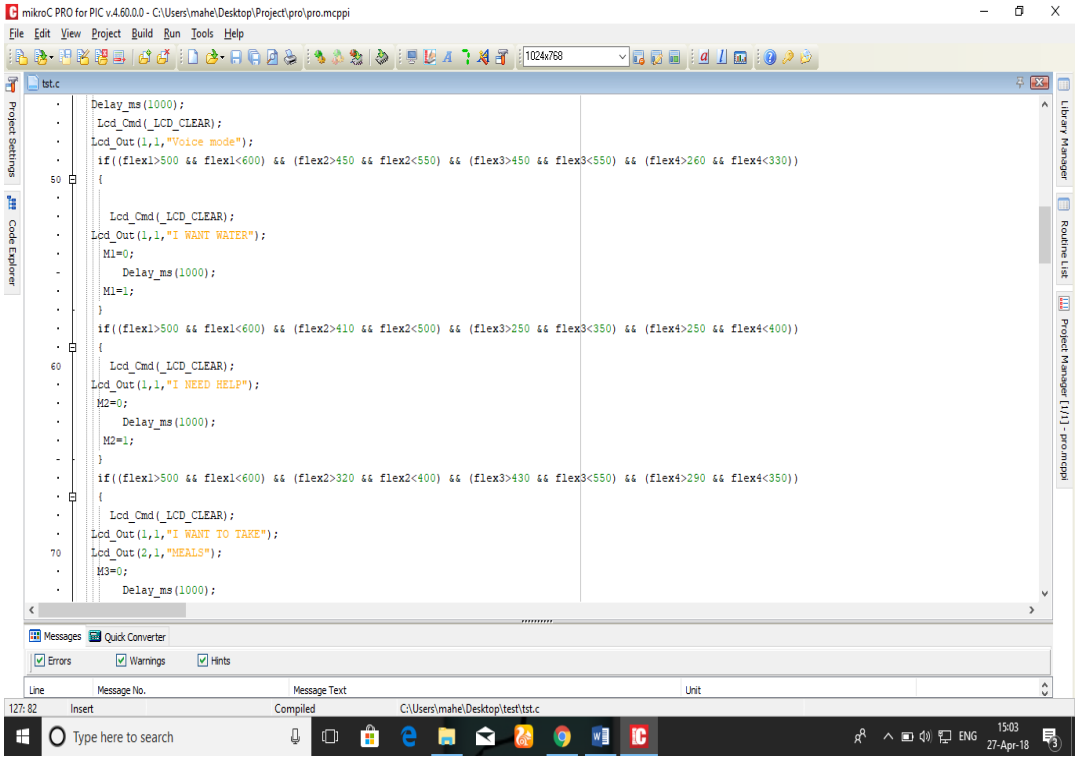

Figure5.1.3: Mikro pro Software.

5.2 Practical Result

INITIALIZING

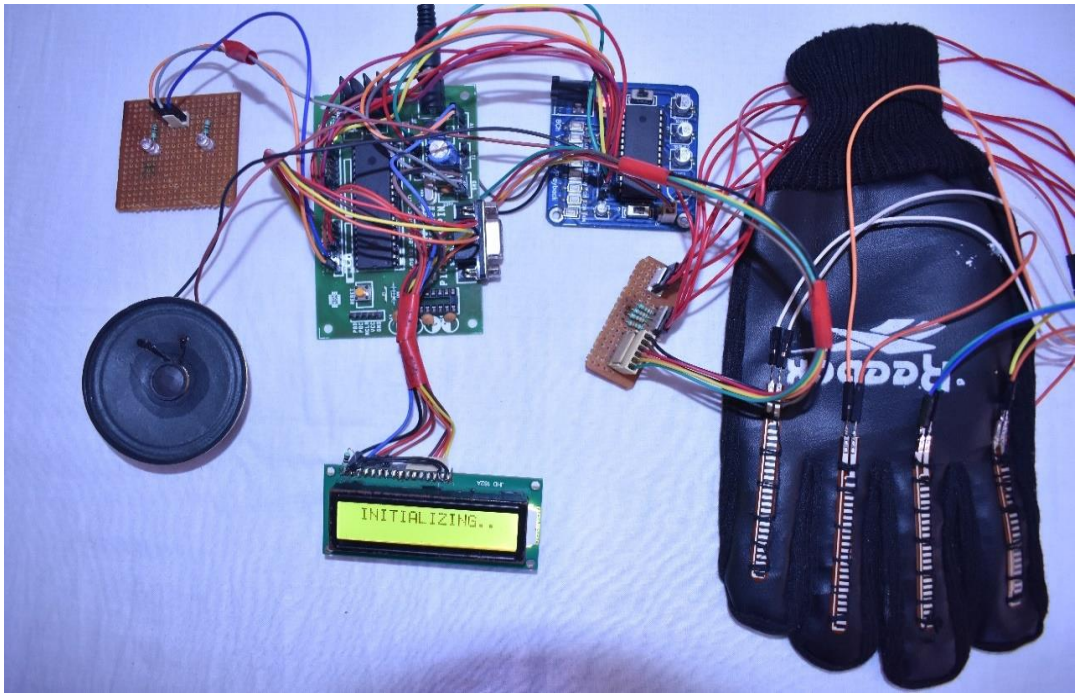

Figure 5.2.1: LCD INITALIZING

DEVICE MODE

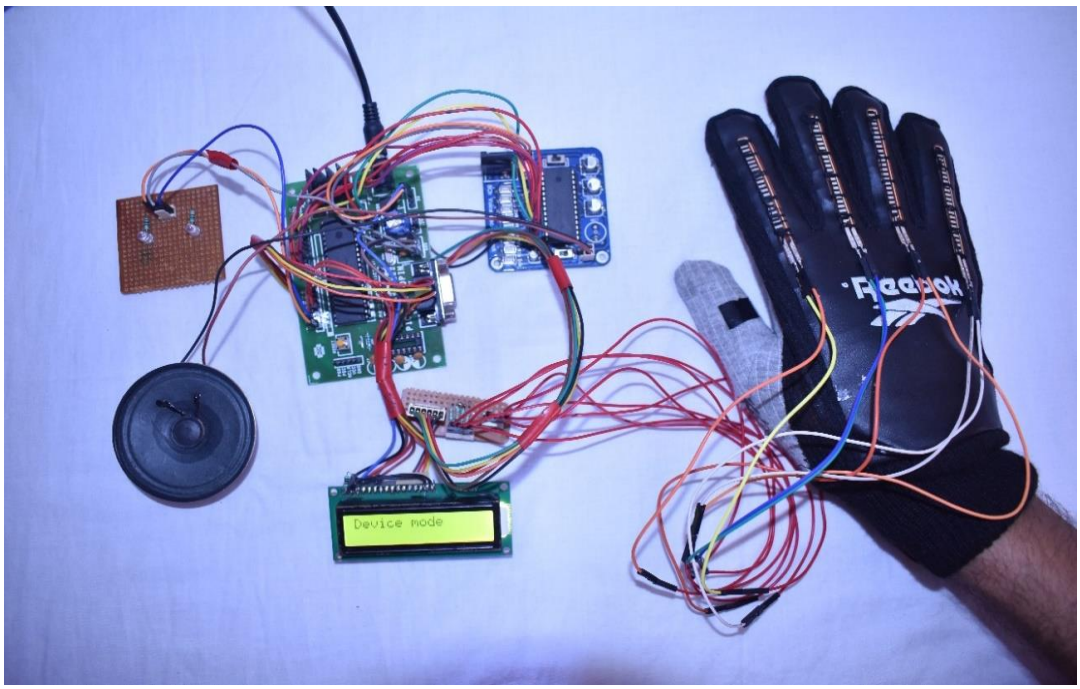

Figure 5.2.2: LCD Device mode

Command 1:TURN ON THE LIGHT

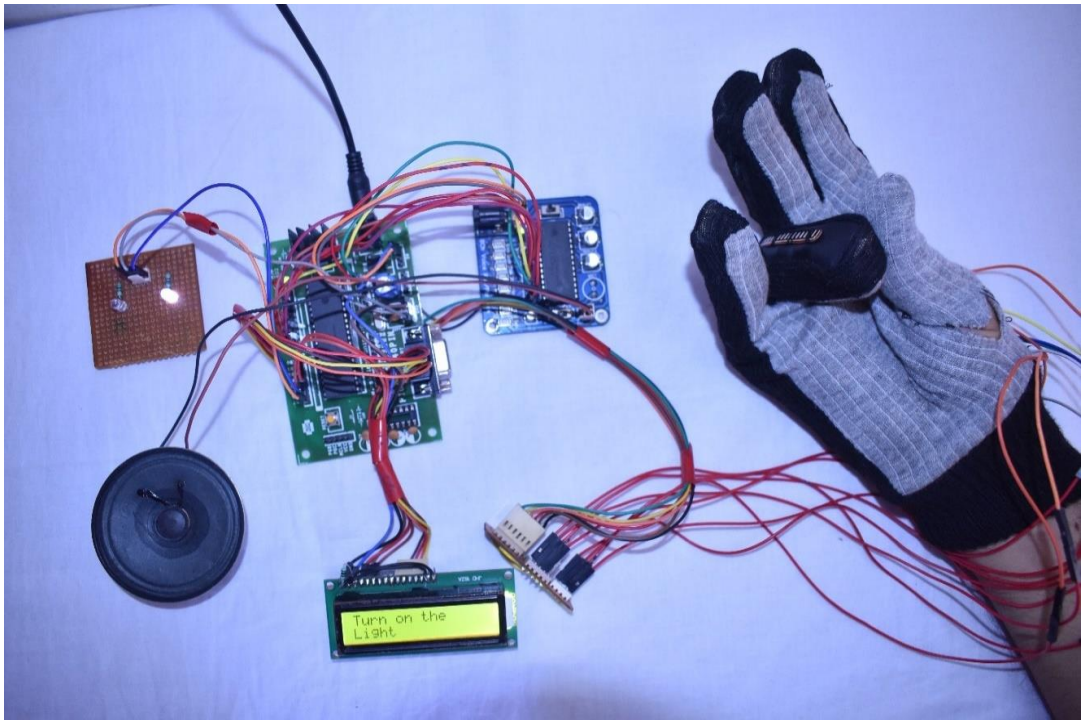

Figure 5.2.3: LCD Command1

Command 2: TURN OFF THE LIGHT

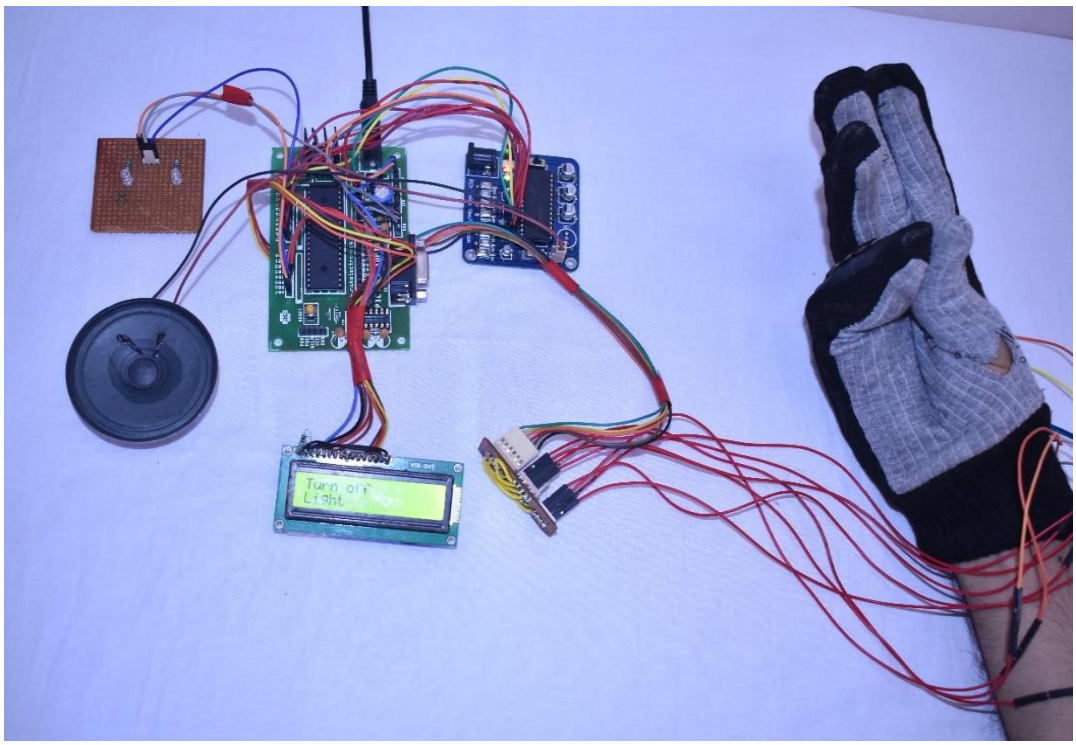

Figure 5.2.4: LCD Command 2

Command 3: TURN ON THE FAN

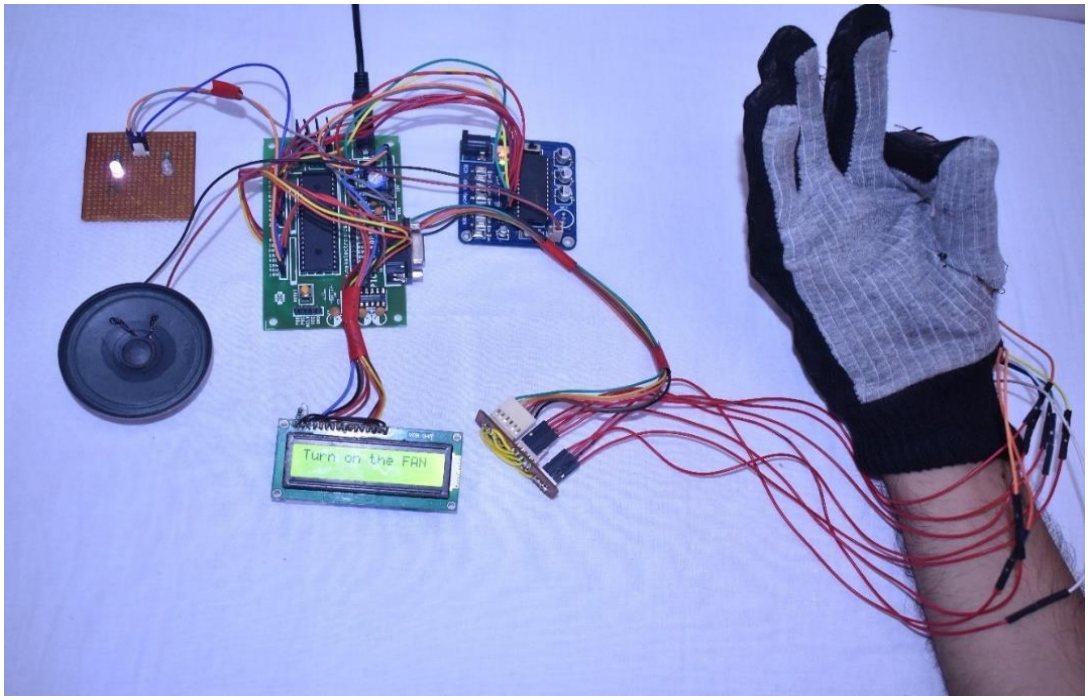

Figure 5.2.5: LCD Command 3

Command 4: TURN OFF THE FAN

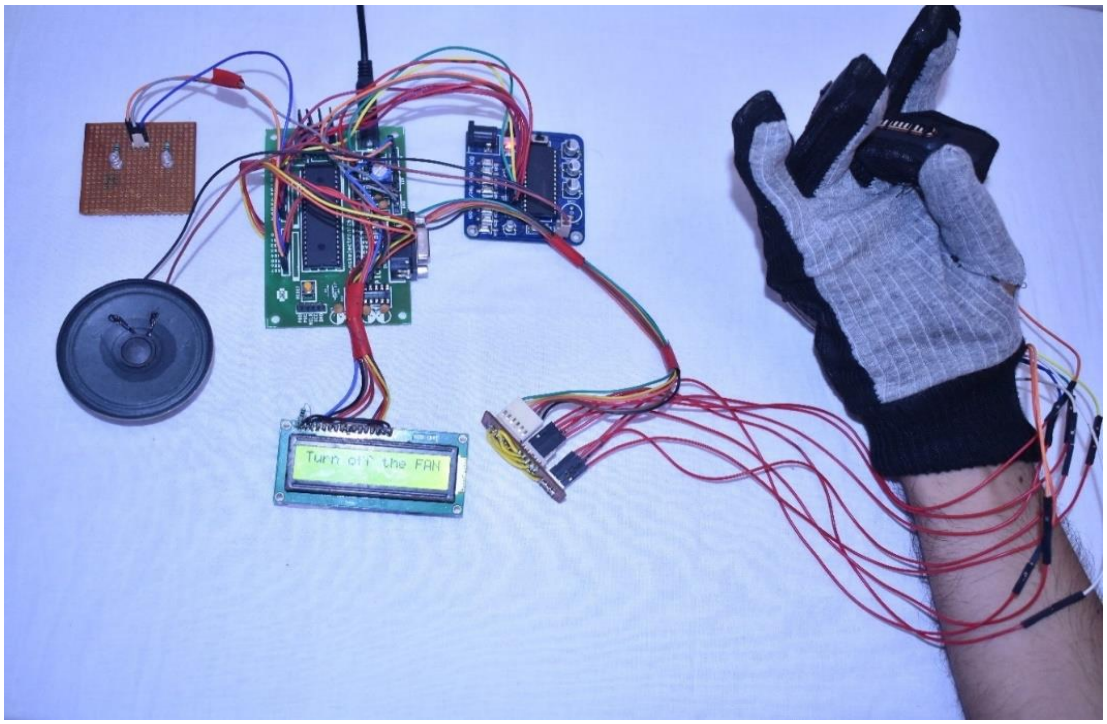

Figure5.2.6: LCD Command 4

VOICE MODE

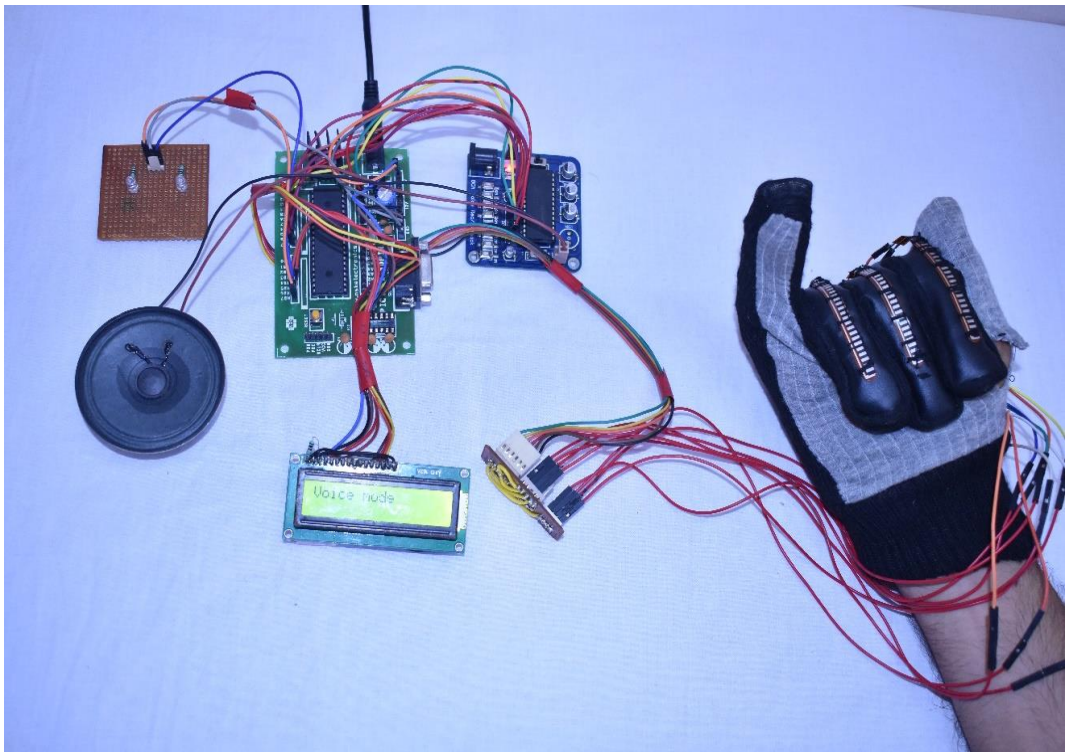

Figure 5.2.7: LCD Voice mode

Command 5: I WANT WATER

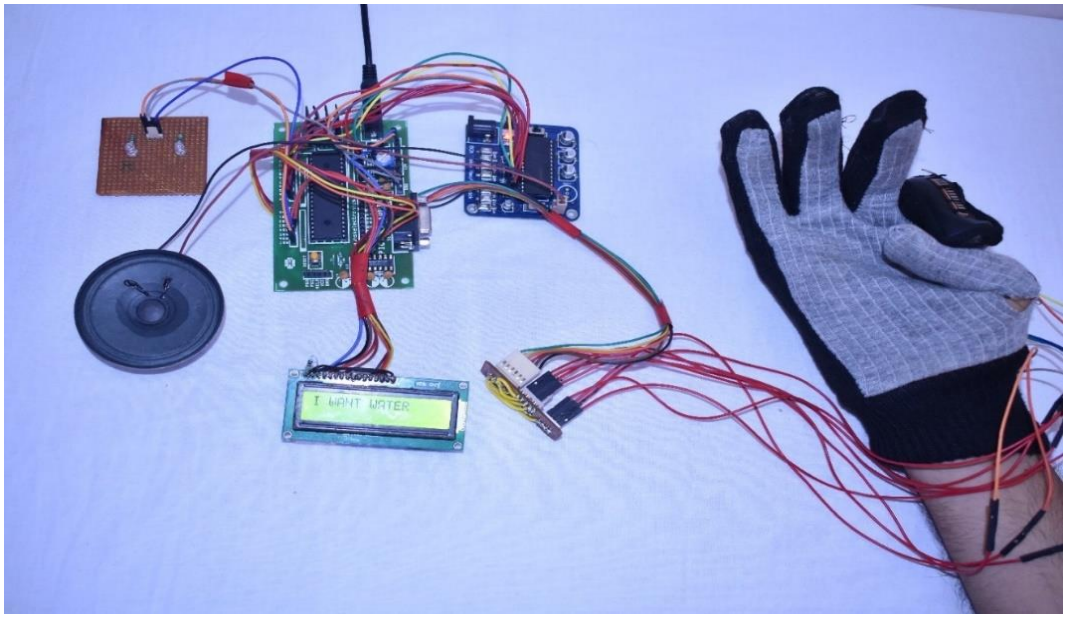

Figure 5.2.8: LCD Command 5

Command 6: I NEED HELP

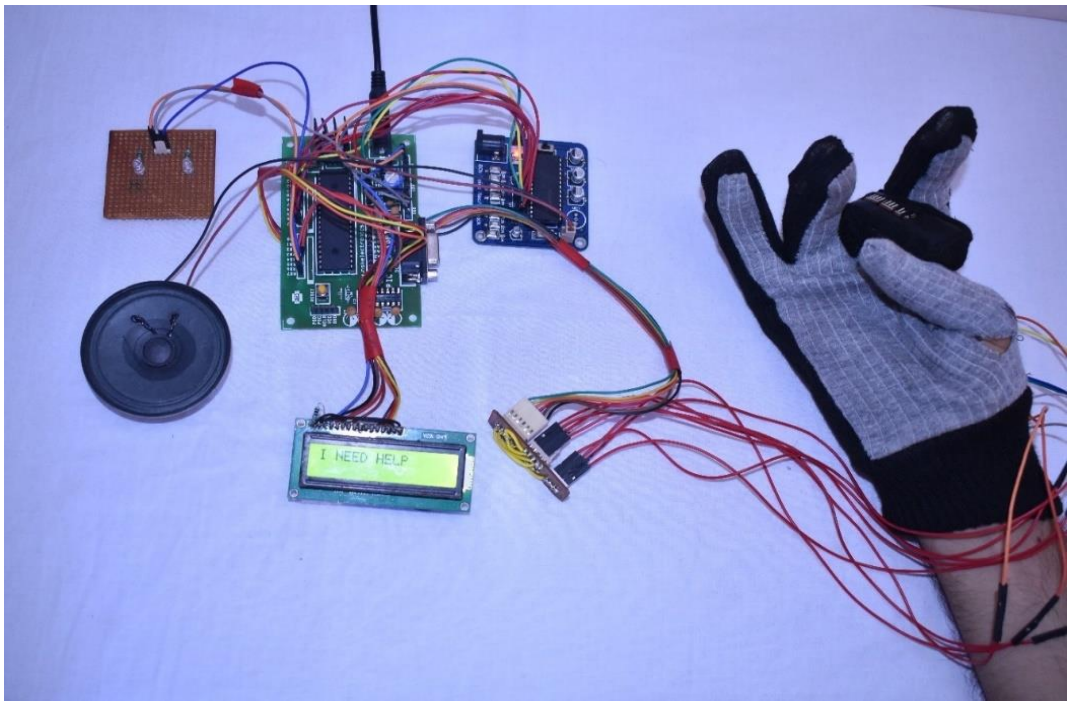

Figure 5.2.9: LCD Command 6

Command 7: I WANT TO TAKE MEALS

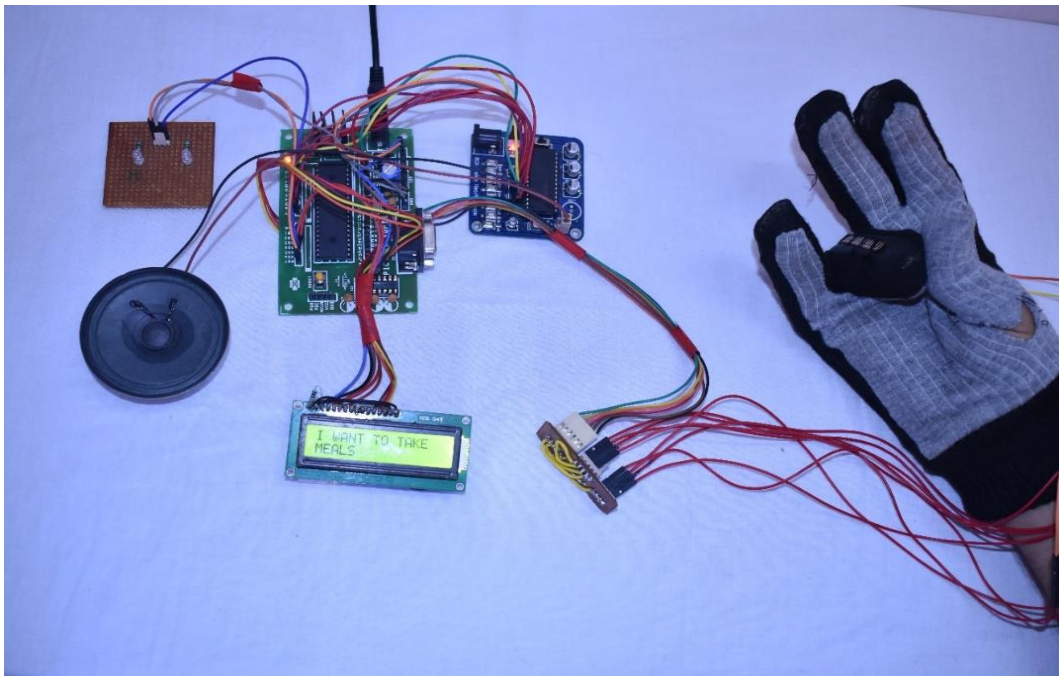

Figure 5.2.10: LCD Command 7

Command 8 :I WANT TO USE REST ROOM

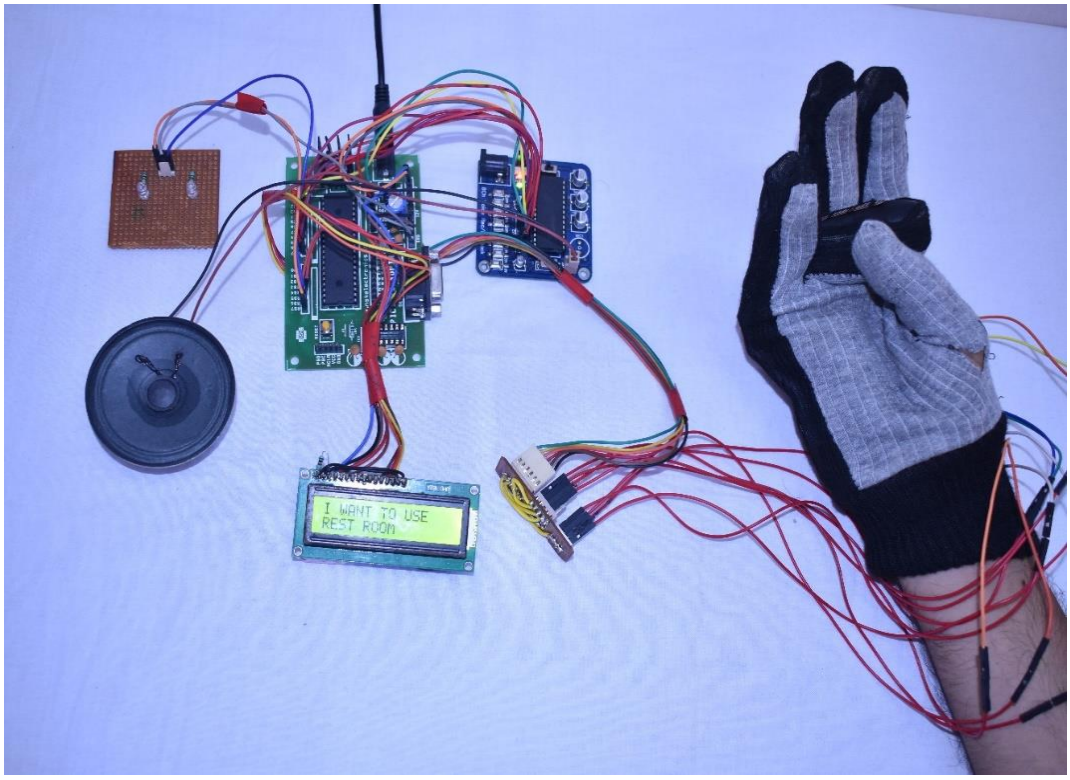

Figure 5.2.11: LCD Command 8

This link described below is of our project:

1. https://www.youtube.com/watch?v=eU4wF9iVYw0
2.https://www.youtube.com/watch?v=7T8Gb0J5Se0&feature=youtu.be

Chapter 6
CONCLUSION AND FUTURE WORK

6.1 Applications

- Sign language translator gives a very clear and easy way of communication for deaf and dumb people.
- The overall architecture of this system is quite simple and easy to implement.
- It is cost effective and can be easily utilized by common man even though he does not have a technical background.
- The system is portable.

6. 2 Conclusion and Future Scope

Gesture based communication is a helpful instrument to facilitate the correspondence between the hard of hearing and unable to speak individuals and the ordinary individuals. However, there is a correspondence boundary. To break this boundary an autonomous communication via gestures interpreter was intended for tragically challenged individuals. The glove is equipped for making an interpretation of communication via gestures signals into discourse through android telephone. A model is intended to check the attainability of perceiving communication through signing utilizing sensor glove. Later it will be changed over into discourse with the goal that ordinary individuals can without much of a stretch get it.

The framework can be made adaptable by making an interpretation of gesture based communication into numerous provincial dialects utilizing Google interpreter. It can likewise be utilized for human machine communication.

Gesture based communication is a technique utilized for correspondence by impaired individual. Here we are changing over gesture based communication into content and discourse with the goal that correspondence isn't restricted between them just, using information gloves correspondence barrier between two distinct groups is wiped out. Utilizing information gloves handicapped individual can likewise develop in their carrier and influences country to develop as level of incapacitated individual are millions in check. Improving their future ,improving country.

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2. M. S.Philomina, "Hand talk: Intelligent communication via gestures acknowledgment for hard of hearing and unable to speak," International Journal of Innovative Research in Science, Engineering and Technology, vol. 4, no. 1, pp. 18785– 18790, 2015.

3. D. V. K. B. Prakash B Gaikwad, "Hand motion acknowledgment for imbecilic individuals utilizing Indian communication through signing," International Journal of Advanced Research in Computer Science and Software Engineering, vol. 4, no. 12, pp. 193– 196, 2014.

4. P. Verma, S. Shimi, and R. Priyadarshani, "Outline of correspondence translator for almost totally senseless individual," International Journal of Science and Research (IJSR), vol. 4, no. 1, 2015.

5. S. F. Ahmed, S. M. B. Ali, and S. S. M. Qureshi, "Electronic talking glove for astounded patients, a tongue to a stupid," in Sustainable Utilization and Development in Engineering and Technology (STUDENT), 2010 IEEE Conference on. IEEE, 2010.

Annexures

Program Code

```
unsigned int flex1;
unsigned int flex2;
unsigned int flex3;
unsigned int flex4;
char TXT[6];
char ABC[6];
char PQR[6];
char XYZ[6];
int flag;
// LCD module connections
sbit LCD_RS at RB4_bit;
sbit LCD_EN at RB5_bit;
sbit LCD_D4 at RB0_bit;
sbit LCD_D5 at RB1_bit;
sbit LCD_D6 at RB2_bit;
sbit LCD_D7 at RB3_bit;

sbit LCD_RS_Direction at TRISB4_bit;
sbit LCD_EN_Direction at TRISB5_bit;
sbit LCD_D4_Direction at TRISB0_bit;
sbit LCD_D5_Direction at TRISB1_bit;
sbit LCD_D6_Direction at TRISB2_bit;
sbit LCD_D7_Direction at TRISB3_bit;
// End LCD module connections
sbit M1 at RD0_bit;
sbit M2 at RD1_bit;
sbit M3 at RD2_bit;
sbit M4 at RD3_bit;
sbit M5 at RD4_bit;
sbit M6 at RD5_bit;
sbit M7 at RD6_bit;
```

```
sbit M8 at RD7_bit;
sbit led at RB6_bit;
 sbit fan at RB7_bit;
 void read()
 {
 while(1){
  flex1 = ADC_Read(0);
 flex2 = ADC_Read(1);
 flex3 = ADC_Read(2);
 flex4 = ADC_Read(3);
 Delay_ms(1000);
  Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"Voice mode");
  if((flex1>500 && flex1<600) && (flex2>450 && flex2<550) &&
(flex3>450 && flex3<550) && (flex4>260 && flex4<330))
  {
    Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"I WANT WATER");
   M1=0;
      Delay_ms(1000);
   M1=1;
  }
  if((flex1>500 && flex1<600) && (flex2>410 && flex2<500) &&
(flex3>250 && flex3<350) && (flex4>250 && flex4<400))
  {
    Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"I NEED HELP");
  M2=0;
      Delay_ms(1000);
   M2=1;
  }
  if((flex1>500 && flex1<600) && (flex2>320 && flex2<400) &&
(flex3>430 && flex3<550) && (flex4>290 && flex4<350))
  {
    Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"I WANT TO TAKE");
 Lcd_Out(2,1,"MEALS");
```

```
  M3=0;
     Delay_ms(1000);
   M3=1;
  }
   if((flex1>450 && flex1<550) && (flex2>420 && flex2<550) &&
(flex3>450 && flex3<550) && (flex4>300 && flex4<400))
  {
    Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"I WANT TO USE");
 Lcd_Out(2,1,"REST ROOM");
  M4=0;
     Delay_ms(1000);
   M4=1;
  }
  if((flex1>560 && flex1<610) && (flex2>320 && flex2<370) &&
(flex3>280 && flex3<320) && (flex4>340 && flex4<380))
  {
  //flag=1;
  //read2(); //
  break;
  }
 }
}
void read2()
{
while(1){
            // Write text in first row
  flex1 = ADC_Read(0);
 flex2 = ADC_Read(1);
 flex3 = ADC_Read(2);
 flex4 = ADC_Read(3);
 Delay_ms(1000);
  Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"Device mode");
  if((flex1>500 && flex1<600) && (flex2>450 && flex2<550) &&
(flex3>450 && flex3<550) && (flex4>260 && flex4<330))
  {
```

```
    Lcd_Cmd(_LCD_CLEAR);
  Lcd_Out(1,1,"Turn on the FAN");
  fan=1;
   M7=0;
      Delay_ms(1000);
    M7=1;
   }
   if((flex1>500 && flex1<600) && (flex2>410 && flex2<500) &&
(flex3>250 && flex3<350) && (flex4>250 && flex4<400))
   {
Lcd_Cmd(_LCD_CLEAR);
  Lcd_Out(1,1,"Turn off the FAN");
  fan=0;
   M8=0;
      Delay_ms(1000);
    M8=1;
   }
   if((flex1>500 && flex1<600) && (flex2>320 && flex2<400) &&
(flex3>430 && flex3<550) && (flex4>290 && flex4<350))
   {
  Lcd_Cmd(_LCD_CLEAR);
  Lcd_Out(1,1,"Turn on the ");
  Lcd_Out(2,1,"Light");
  led=1;
   M5=0;
      Delay_ms(1000);
    M5=1;
   }
    if((flex1>450 && flex1<550) && (flex2>420 && flex2<550) &&
(flex3>450 && flex3<550) && (flex4>300 && flex4<400))
   {
     Lcd_Cmd(_LCD_CLEAR);
  Lcd_Out(1,1,"Turn off");
  Lcd_Out(2,1,"Light");
  led=0;
   M6=0;
      Delay_ms(1000);
```

```
   M6=1;
   }
   if((flex1>570 && flex1<630) && (flex2>330 && flex2<390) &&
(flex3>290 && flex3<340) && (flex4>190 && flex4<270))
   {
   //flag=1;
   read(); //break;
   }
  }
 }
void main(){
  Lcd_Init();
  TRISA  = 0xFF;
  TRISB  = 0;
  TRISD  = 0;
  fan=0;
  led=0;
   M1=1;
  M2=1;
  M3=1;
  M4=1;
  M5=1;
  M6=1;
  M7=1;
  M8=1;

  Lcd_Cmd(_LCD_CLEAR);              // Clear display
  Lcd_Cmd(_LCD_CURSOR_OFF);         // Cursor off
  Lcd_Out(1,2,"INITIALIZING..");              // Write text in first row
  Delay_ms(2000);
  Lcd_Cmd(_LCD_CLEAR);
  fan=1;
  led=1;
  Delay_ms(1000);
  fan=0;
  led=0;
  flag=1;
```

```
 while(1)
 {
  flex1 = ADC_Read(0);
 flex2 = ADC_Read(1);
 flex3 = ADC_Read(2);
 flex4 = ADC_Read(3);
WordToStr(flex1,TXT);
 WordToStr(flex2,ABC);
 WordToStr(flex3,PQR);
 WordToStr(flex4,XYZ);
Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,TXT);
  Lcd_Out(1,9,ABC);
  Lcd_Out(2,1,PQR);
  Lcd_Out(2,9,XYZ);
  Delay_ms(1000);
 if((flex1>560 && flex1<610) && (flex2>320 && flex2<370) &&
(flex3>280 && flex3<320) && (flex4>340 && flex4<380))
  {
   flag=0;
  Lcd_Cmd(_LCD_CLEAR);
 Lcd_Out(1,1,"device mode");
 Delay_ms(1000);
read();
 }
 else
 {
 read2();
  }
 }
Delay_ms(2000);
}
```

PROJECT DETAILS

Student Details			
Student Name	**Harish .R**		
Register Number	140907736	Section / Roll No	059
Email Address	Harishr2301@gmail.com	Phone No (M)	9901319126
Project Details			
Project Title	**Smart Gloves for Communication**		
Project Duration	Four months	Date of reporting	15th January
Expected date of completion of project	3/05/2018		
Internal Guide Details			
Faculty Name	**Dr. Ujjwal Verma**		
Full contact address with pin code	Dept. of E&C Engg., Manipal Institute of Technology, Manipal – 576 104 (Karnataka State), INDIA		
Email address	Ujjwal.verma@manipal.edu		
Co- Guide Details(if any)			
Faculty Name	**Nakul Shetty**		
Full contact address with pin code	Dept. of E&C Engg., Manipal Institute of Technology, Manipal – 576 104 (Karnataka State), INDIA		
Email address	Nakul.shetty@manipal.edu		