Scientific Journal of Impact Factor (SJIF): 5.71

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 6, Issue 08, August -2019

SMART GLOVES FOR DEAF AND DUMB PEOPLE

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2018-2019

Abstract — *Perhaps the single quality most central to the humanness is the ability to exchange the thoughts, the ideas, and feelings with others. The importance of the capacity to connect with other people cannot be overstated. Helen Keller was once asked, if she could have either her vision or her hearing, but not both, which would she choose? Without hesitation, she replied, "My hearing." When asked why, she responded, "Blindness separates a person from things, but deafness separates him from people". Persons with severe and profound disabilities may be especially vulnerable to this problem of separation from the mainstream of society. Federal legislation has defined persons with severe disabilities as those "who because of the intensity of their physical, mental, or emotional problems, need highly specialized education, social, psychological, and medical services in order to maximize their full potential for useful and the meaningful participation in the society and for self-fulfillment. Many individuals who have severe disabilities experience substantial difficulties in communicating effectively with those around them with advent of Technology.*

***Keyword**: LDR, Pic-controller, ADC, PC, LCD.*

INTRODUCTION

In the recent years, there has been an rapid increase in the number of hearing impaired and the speech disabled victims due to the birth defects, oral diseases and theaccidents. When an speech impaired person speaks to an normal person, the normal person finds it difficult to understand and asks the deaf-dumb person to show the gestures for his/her needs. Dumb persons have their own language to communicate with us; the only thing is that we need to understand their language. Sign language is used by the deaf and the mute people and it is a communication skill that uses the gestures instead of the sound to convey the meaning simultaneously combining the hand shapes, the orientations and movement of the hands, arms or the body and the facial expressions to express the fluidly of a speaker's thoughts. But most of the time normal people find it difficult to understand this sign language. The people who cannot speak or have lost their ability to speak in some accident, it becomes difficult for them to convey their message within the society. To overcome this, we have come up with the project called 'SMART GLOVE'. In this project, LDR Sensor plays an major role. The glove is fitted with LDR sensors along the length of each finger and the thumb. The sensors give output in the form of voltage variation that varies with degree of bend. This LDR sensor output is given to the ADC channels of pic-controller. It processes the signals and perform the analog to the digital signal conversion. Further the processed data is sent in an wireless manner to the receiver section. In this section the gesture is recognized and the corresponding output is displayed on LCD. The portability of this project is a major advantage. Thus with the help of this project, the barrier faced by these people in communicating with the society can be reduced to a great extent.

I. LITERATURE REVIEW

There are some projects that have been completed which regards to the application of the IOT based bomb disposal robot.

For the following project we have gone through various reference papers as such.

1)The Kinematic analysis and simulation of 6 D.O.F. of robot for industrial applications. An alternative design of the six-degrees-of-freedom manipulator based on the concept of an in parallel actuated mechanism is presented. The main kinematic equations for an use of the manipulator are derived and the influences of an physical constraints on the range of an motion in a practical design are discussed. They used robo analyzer software for determining the simulation results. There are several possible applications which include an in-parallel mechanism as an part of the manipulation system are suggested, and they have determined the D.H. Parameters for design.[5]

2) This paper describes a visual display that provides depth of objects to be grasped and was developed at the request of a local bomb squad for use with a bomb disposal robot. The display provides four main functions: (1) it allows an operator to extract the distance between the object and an robot's grasper that each pixel represents, (2) it cues the operator when an object is within an predefined distance from the robot grasper, (3) it can track the objects in the video display, and (4) it can continuously display the distance from the robot grasper to an selected object. The display was designed specifically for an Canesta EP200 mounted on the Remotec mini-max robot, but the display functionality is expected to

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be useful for any robot grasper used in the conjunction with a 3D sensor. While the usability of the visual display and its impact on the grasper-related performance has not been formally evaluated, the informal feedback from the subject matter experts is that this display meets their requirements.[9]

The construction of an robotic systems that can move the way humans can do, with respect to the agility, stability and the precision, is an necessary prerequisite for the successful integration of an robotic systems in the human environments. We explain human-centered views on robotics, based on the three basic ingredients (1) actuation; (2) sensing; and (3) control [11]
When comparing with the system that was mentioned in our base paper, our system is equipped with 2 wheels and a free wheeling motor, the system consist of 5 DC motors and 3 DCM driver and a arm cutter which is all controlled by our processor ATmega32 with WIFI module that is WIFIESP 8266. So, our system is able to diffuse the bomb at the site itself. And the design of our robot system is in such way that it is able to move Forward, backward, right, left. The arm of our system is designed in such a way that we can easily locate the target clearly and cut it precisely with commands such as cut and uncut. These all required commands are being applied through a web page that is accessible to any phone. The mobile phone placed on the system uses IP cam application which helps in guiding the robot at a distance. With the help of this technology we can make our robot travel particular distance without actually carrying the robot. The images could be captured by the person sitting at a distance from the attack prone area.

II. EXISTING SYSTEM

The sign language detection and recognition systems have mainly one of the three following methodologies

1) Vision based
2) Image processing technique.
3) Sensors and micro controller based glove.

In the image processing technique, the camera is used to capture the gestures. These gestures are captured in terms of images and these images are analyze using different algorithms to recognize the meaning of a particular gesture.
One such method is discussed in image processing technique, where a desired hand gesture sequence is created by animating the corresponding key gesture frames with the help of extracted information. The disadvantage of image processing based technique is that it requires developing of complex computational algorithms in order to detect the gestures. Further this technique also requires the proper lighting conditions, proper backgrounds and the field of view limitations.
One of the most useful and efficient method is the smart glove method which is also cost efficient. The sensors are placed on the fingers and the gestures are displayed on LCD screen.

III. PROPOSED SYSTEM

A.Block Diagram of System.

THE PROPOSED SYSTEM CONSISTS OF :

1. POWER SUPPLY.
2. PIC18F.
3. LDR SENSORS.
4. 16X2 LCD DISPLAY.

B. Description of proposed system.

In this system, the transmitter side we used a glove which has to be worn by the user. This glove is mounted with the 4 LDR sensors each on the 4 fingers of the glove namely thumb, index, middle, ring. The LDR sensors give their output in the form of change in resistance according to the bend angle. The output from the LDR sensors is given to the ADC channels of the pic-controller. The processed ADC values from the pic controller are compared with the threshold values for the recognition of a particular gesture. The particular gesture is recognize is given to the pic-controller which transmits them through the RF module in a serial manner. For each value received at RF receiver, the pic controller gives corresponding commands to the LCD. Thus we get the output for each gesture and display of each gesture in form of text on the LCD display.

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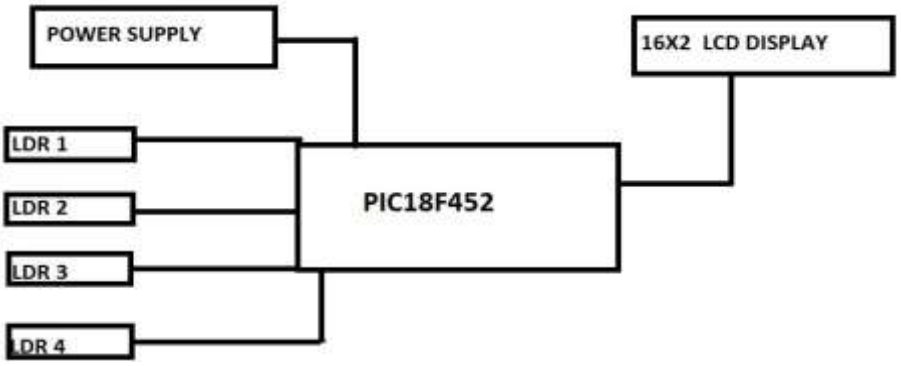


IV. IMPLEMENTATION

To design power supply

To get the 5V regulated output we use LM7805.Output voltage of LM7805 regulator is 5V. Dropout Voltage of LM7805 is 2V, So minimum input voltage required at input of regulator to get 5V output is equal to Output of LM7805 plus Dropout voltage. So the minimum input voltage is the 7V and the maximum input voltage is 35V (Ref.Datasheet) For which LM7805 gives the 5V regulated output. Vdc is equal to Regulator output plus drop across diode. As we have increase Vin for LM7805 Power Dissipation also increases. For LM7805 maximum Power Dissipation is 15W (Ref. Datasheet) In our Design Power Dissipation is equal to Vdc Io=9.32.7W 2.7W15W so it does not need heat sink.

Bulk Decoupling capacitor

We connected 100 uF at output of the regulator as an decoupling capacitor. It is optional. When this devices connected to the 5V supply heavy current from power supply, output of regulator may fall down and become unstable. In such cases, the 100uF provides power to the devices by discharging itself to maintain the 5V output constant. Value of decoupling the capacitor may be 10*uF*.

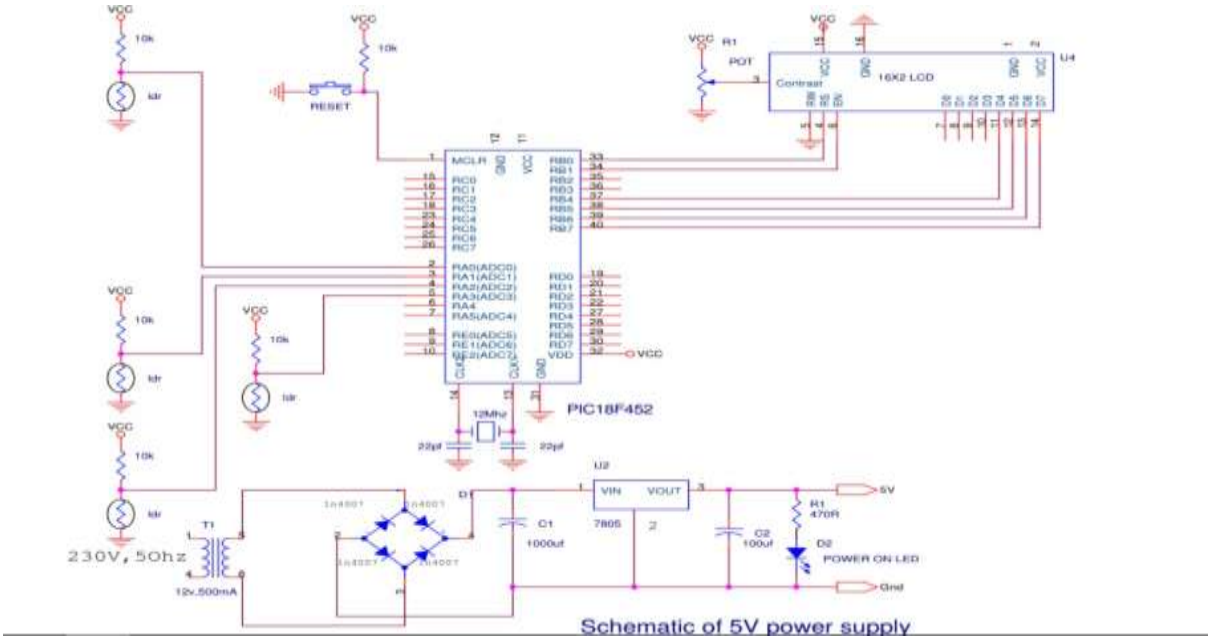
Rectifier Design :

Diode Selection I(f) average equal to Io/2300mA/2 equal to 150mA Now Im equal to 300mA PIV rating=VmpiVc(DC)/2 3.149/215V So diode with PIV rating greater then 15V is suitable.IN4007 is more than sufficient as it has PIV=1000V.

Transformer Design:

RMS secondary output voltage of transformer is Vs=(Vm+n*1)/1.42 n=1 for FWR or HWR n2 for BWR. But Vm =Vdc pi /214.1315(aprox.) So, Vs=(15+2)/1.42 Vs=12V.We know voltage drop across LED when it is in ON state is 1.8 to 2.5v We should put a series resistor to control If .Value of Resistor should be selected such that forward current shall not exceed max value.

Circuit Diagram and Working



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The power supply is connected with an pic micro-controller, LCD is also interfaced with the pic following the sensors.
LDR sensors also known as the light dependent resistor is an Photoconductive cells that are used in many different types of circuits and applications.
Like the human eye, the relative sensitivity of an photoconductive cell is dependent on the wavelength (color) of the incident light. Each of the photoconductor material type has its own unique spectral response of an curve or plot the relative response of an photocell versus wavelength of the light.
The sensitivity of the photo detector is the relationship between an light falling on the device and the resulting an output signal. In case of an photocell, one is dealing with the relationship between the incident light and the corresponding resistance of the cell.
Each sensor is placed on the fingers of the glove whenever there is gesture performed it gets displayed on the LCD.

PCB Designing

There are the all three basic methods to make an PCB:

1) Iron on the Glossy paper method.
2) Circuit by hand on the PCB.
3) Laser cutting edge etching.

Since laser method is the industrial method to make the PCBs, we will go into detail for the first two methods.

PCB Design:

PCB design is usually done by converting your circuit's schematic diagram into the PCB layout using the PCB layout software. There are many cool open source software packages for the PCB layout creation and design.

Some are listed here to give you an head-start:
Cadsoft Eagle PCBWizard Designing a Circuit Schematic in the Cadsoft Eagle: In Eagle: File, Export, Image Be sure to set DPIG to 1200 for better quality

You also need: the FeCl3 powder/solution (same as etching solution), photo/glossy paper, and a permanent black marker, a blade cutter, a sandpaper, kitchen paper, and cotton wool.

PCB Design

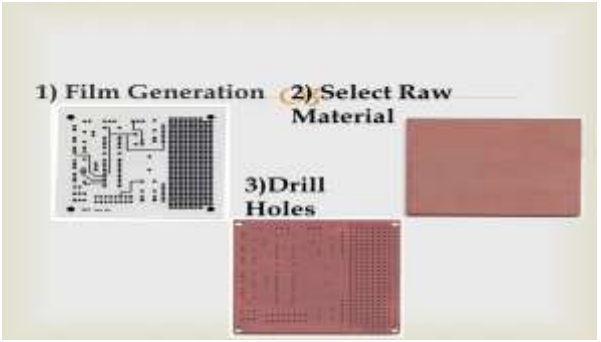

Figure: PCB Steps

STEP 1: Take an printout of the circuit board layout

Take an print out of your PCB layout using the laser printer and the A4 photo paper/glossy paper. Keep in mind the following points:

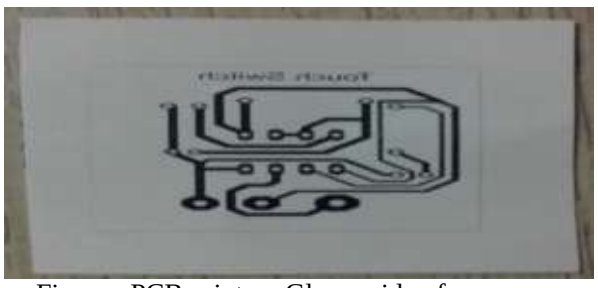

Figure : PCB print on Glossy side of paper

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You should take the mirror print out. Select output in the black both from PCB design software and the printer driver settings. Make sure that the printout is made on the glossy side of the paper.
STEP 2: Cut the Copper Plate for the Circuit Board.

Figure : Copper Clad Plate

Figure 6: Cutting edge

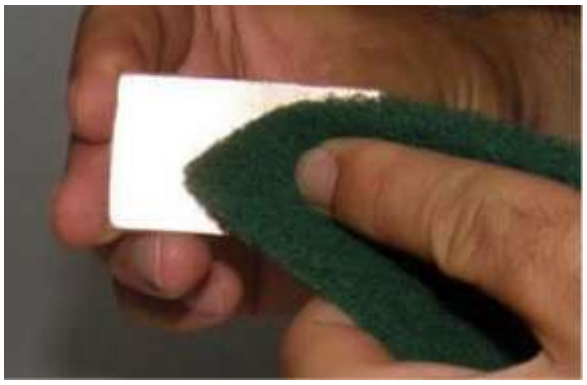

Figure 7: Rubbing away the oxide layer

STEP 3: Transfer the PCB Print on the Copper Plate.

Method 1: Iron on the Glossy Paper Method (For Complex Circuits) Method 2: Circuit by Hand on the PCB (For Simple and Small Circuits) Method 1: Iron on the Glossy Paper Method (For Complex Circuits) Method 2: Circuit by Hand on the PCB (For Simple and Small Circuits) STEP 5: Etch the Plate
You need to be really very careful while performing this step. First, put on the rubber or the plastic gloves. Place some newspaper on the bottom so that an etching solution does not spoil your floor. Take an plastic box and fill it up with an water. Dissolve 2-3 teaspoons of theferric chloride power in the water. Dip an PCB into the etching solution (Ferric chloride solution, FeCl3) for approximately 30 mins. The FeCl3 reacts with an unmasked copper and removes an unwanted copper from the PCB. This process is called as the Etching. Use pliers to take out an PCB and check if the entire unmasked area has been etched or not. In case it is not etched, leave it in the solution for some more time.

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Figure 8: Rubbing away the oxide layer

V. CONCLUSION AND FUTURE WORK

Sign language is one of an useful tools to ease the communication between the deaf and the mute communities and in normal society. Though the sign language can be implemented to communicate, the target person must have an idea of the sign language which is not possible always. Hence our project lowers this kind of barriers. This system is useful for the dumb to communicate with one another and with the normal people. The dumb people use their standard sign language which is not easily understandable by the common people. The sign language is translated into some of the text form, to facilitate the deaf people as well. This text is displayed on the LCD. In order to improve and facilitate the more gesture recognition, motion processing unit can be installed which comprises of the Gyroscope as well and with the help of sensor fusion technique, we can accommodate a number of other gestures as well for better and efficient communication.

VI. REFERENCES

1. ATA-UR-Rehman, Salman Afghani, Muhammad Akmal, RaheelYousaf, "Microcontroller and Sensors Based Gesture Vocalizer", Proceedings of the 7th WSEAS International Conference on signal processing, robotics and automation (ISPRA '08) ISSN: 1790-5117 8 2 ISBN: 978-960-6766-44-2,University of Cambridge, UK, February 20-22, 2008.

2. Vikram Sharma M, Vinay Kumar N and D R Ambika, " Virtul Talk for Deaf, Mute, Blind and Normal Humans", 2013 Texas Instruments India Educators' Conference,978-0-7695-5146-3/13 26.00$ 2013*IEEEDOI*10.1109/*TIIEC*.2013.63*A*

3. Nikhita Praveen, Naveen Karanthand Megha M S, "Sign Language Inter- preter Using A Smart Glove", 2014 International conference on Advances in Electron-ics, Computers and communications (ICAECC). 978-1-4799-5496-1/14/31.00$2014*IEEE*

4. Rohit Rastogi, Shashank Mittal and Sajan Agarwal, "A Novel Approach for Communication among Blind, Deaf and Dumb People", 2015 2nd International Conference on Computing for Sustainable Global Development (INDIA Com), 978-9- 3805-4416-8/15/31.00$2015*IEEE*

5. M.K. Bhuyan Chaitanya and Darsha Sharath Chandra, "Hand Gesture Animation by Key Frame Extraction", 2011 International Conference on Image In- formation Processing (ICIIP 2011) 978-1-61284-861-7/11/26.00$ 2011 – *IEEE*.

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