



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 3, March 2025

Dynamic Gesture Recognition through Low Cost Data Glove

Mr Ananad P, B.E, M.E¹, Sampath Kumar M², Siva Sankaran T³, Srinivasa Senthil T⁴, Vignesh M⁵

Assistant Professor, Department of Computer Science and Design, Sethu Institute of Technology, Virudhunagar

District, Tamil Nadu, India ¹

Department of Computer Science and Design, Sethu Institute of Technology, Virudhunagar District,

Tamil Nadu, India ^{2,3,4,5}

ABSTRACT: This project is based on the need of developing an electronic device that can translate finger gesture into text or speech in order to make the communication take place between the mute communities with the normal people .A data glove is used to convey the finger gesture of a mute person. The data glove is normal rubber or cloth glove, fitted with flex sensors along the length of each finger. Mute people can use the glove to perform hand gesture and the same will be converted into text as well as in speech so that normal people can understand the mute person expression. This device contains a set of 5 flex sensors which give data as input resistance to the microcontroller according to the bending of flex sensors, this resistance is converted into display through a 16 bit LCD display on which the person on the other side with normal abilities can easily read the converted message or if the person is blind can listen the converted message from the speaker or earphones through voice recording and playback device based on MP3 module. This project can also be used as biomedical instrument in hospitals like intensive care unit or operation theatre.

KEYWORDS: Building Maintenance, Android Application, Campus Management, Maintenance Reporting, PHP Server

I. INTRODUCTION

Sign language is a language which instead of acoustically conveyed sound patterns, uses manual communication and body language to convey meaning. This can involve simultaneously combining hand shapes, orientation and movement of the hands, arms or body, and facial expressions to fluidly express a speaker's thoughts. Wherever communities of deaf people exist, sign language will be useful. Sign language is also used by persons who can hear, but cannot physically speak. While they utilize space for grammar in a way that spoken languages do not. Sign languages exhibit the same linguistic properties and use the same language faculty as spoken languages do. Hundreds of sign languages are in use around the world and are at the cores of local deaf cultures. Some sign languages have obtained some form of legal recognition, while others have no status at all.

Deaf and dumb people use sign language to communicate with themselves and with common people. It is very difficult for the common people to understand this language. Though they can show their message in writing, it is not conveyable to the illiterate people. Sign language translating equipments helps in conveying their message to the common people. It translates their message in sign form to the normal understandable text or voice form. All over the world there are many deaf and dumb people. They are all facing the problem of communication. Our project is one such effort to overcome this communication barrier by developing a glove which senses the hand movement of the sign language through sensors and translates it into text and voice output.

II. LITERATURE SURVEY

All the reviewed literature describes the system that overcomes the problem faced by the speech and hearing impaired some of them were discussed here:

1. P.B. Koli, Ashwini Chaudhary, Sonam Malkar, Kavita Pawale & Amrapali Tayde, proposed a method using Image Processing Technique. Here, the gestures of alphabets is used to communicate, the webcam captures the exact positions of the alphabets to determine the co-ordinates. The co-ordinates captured is mapped with the one previously stored and

accordingly that exact alphabet is produced. Later the word is translated into speech and it will be audible to everyone. Continuing in this way, the deaf and dumb persons can able to go through the entire sentence that they wants to communicate.

2. Harshith.C, Karthik.R.Shastry, Manoj Ravindran, M.V.V.N.S Srikanth, Naveen Lakshmikanth, proposed a methodology using Gesture recognition which mainly apprehensive on analyzing the functionality of human wits. The main goal of gesture recognition is to create a system which can recognize specific human gestures and use them to convey information or for device control. The approaches present can be mainly divided into Data-Glove Based and Vision Based approaches. An important face feature point is the nose tip. Since nose is the highest protruding point from the face. Besides that, it is not affected by facial expressions. Another important function of the nose is that it is able to indicate the head pose. Knowledge of the nose location will enable us to align an unknown 3D face with those in a face database.

3. Dama Sampath &B. Narsimha Chary, proposed a system in which they used the sensors to measure the parameters of sign language and send the values to the microcontroller. Here MEMS is used in communication with the respective direction of hand movements. The microcontroller gives the voice announcement as the temperature is increases.

4. Dalia Nashat, Abeer Shoker, Fowzyah Al-Swat and Reem Al-Ebailan, proposed a methodology using mobile application. They introduce a Mobile application that enables communication between uneducated Deaf-Dumb and normal people in our society. They also develop an aid tool for deaf and dumb which can be useful in many fields like restaurants, hospitals and transportation. Moreover, their application introduces an easy translator from sign language to English or Arabic language and vice versa.

5. Priya Matnani, proposed a technology using hand ,body and facial gestures as a means for interacting with computers and other physical devices. This paper discusses the rationale for gesture based control technology, methods for acquiring and processing such signals from human operators, applications of these control technologies, and anticipated future developments. The gesture recognition plays an important part of human-machine interaction systems. The focus is done in systems that are based on accelerometers and on glove based equipments.

III. PROPOSED METHODOLOGY

The hardware and software requirements for the proposed system are presented as follows

- To convert sign language to digital signal
- To store differ voice for differ signs
- To playback voice when particular sign matches
- To program and verify the differ sign signals

INTRODUCTION TO MICROCONTROLLER

Microcontrollers are destined to play an increasingly important role in revolutionizing various industries and influencing our day to day life more strongly than one can imagine. Since its emergence in the early 1980's the microcontroller has been recognized as a general purpose building block for intelligent digital systems. It is finding using diverse area, starting from simple children's toys to highly complex spacecraft. Because of its versatility and many advantages, the application domain has spread in all conceivable directions, making it ubiquitous. As a consequence, it has generate a great deal of interest and enthusiasm among students, teachers and practicing engineers, creating an acute education need for imparting the knowledge of microcontroller based system design and development. It identifies the vital features responsible for their tremendous impact, the acute educational need created by them and provides a glimpse of the major application area.

MICROCONTROLLER

A microcontroller is a complete microprocessor system built on a single IC. Microcontrollers were developed to meet a need for microprocessors to be put into low cost products. Building a complete microprocessor system on a single chip substantially reduces the cost of building simple products, which use the microprocessor's power to implement their function, because the microprocessor is a natural way to implement many products. This means the idea of using a microprocessor for low cost products comes up often. But the typical 8-bit microprocessor based system, such as one using a Z80 and 8085 is expensive. Both 8085 and Z80 system need some additional circuits to make a microprocessor

system. Each part carries costs of money. Even though a product design may requires only very simple system, the parts needed to make this system as a low cost product.

To solve this problem microprocessor system is implemented with a single chip microcontroller. This could be called microcomputer, as all the major parts are in the IC. Most frequently they are called microcontroller because they are used they are used to perform control functions. The microcontroller contains full implementation of a standard MICROPROCESSOR, ROM, RAM, I/O, CLOCK, TIMERS, and also SERIAL PORTS. Microcontroller also called "system on a chip" or "single chip microprocessor system" or "computer on a chip". A microcontroller is a Computer-On-A-Chip, or, if you prefer, a single-chip computer. Micro suggests that the device is small, and controller tells you that the device' might be used to control objects, processes, or events. Another term to describe a microcontroller is embedded controller, because the microcontroller and its support circuits are often built into, or embedded in, the devices they control. Today microcontrollers are very commonly used in wide variety of intelligent products. For example most personal computers keyboards and implemented with a microcontroller. It replaces Scanning, Debounce, Matrix Decoding, and Serial transmission circuits. Many low cost products, such as Toys, Electric Drills, Microwave Ovens, VCR and a host of other consumer and industrial products are based on microcontrollers.

EVOLUTION OF MICROCONTROROLLER

Markets for microcontrollers can run into millions of units per application. At these volumes of the microcontrollers is a commodity items and must be optimized so that cost is at a minimum. .Semiconductor manufacturers have produced a mind-numbing array of designs that would seem to meet almost any need. Some of the chips listed in this section are no longer regular production, most are current, and a few are best termed as "smoke ware": the dreams of an aggressive marketing department.

rduino – uno features:

- Computer on a single integrated chip
 - Processer (CPU)
 - Memory (RAM/ROM/FLASH)
 - I/O Ports (USB,I²C,SPI,ADC,USART)
- Common microcontroller families
 - Intel: 4004,8008 etc.,
 - Atmel: AT and AVR
 - Microchip: PIC
 - ARM: (Multiple Manufactures)
- Controllers used in
 - Cell phones
 - Toys
 - Household applications
 - Cars and
 - Cameras

ATMEGA 328P (Arduino-uno)

- AVR 8-bit RISC architecture
- Available in DIP Package
- Up to 20Mhz clock source
- 32KB Flash memory
- 1KB Static ram
- 23 Programmable I/O Channels
- Six 10Bit ADC Inputs
- Three timers/counters
- Six PWM outputs

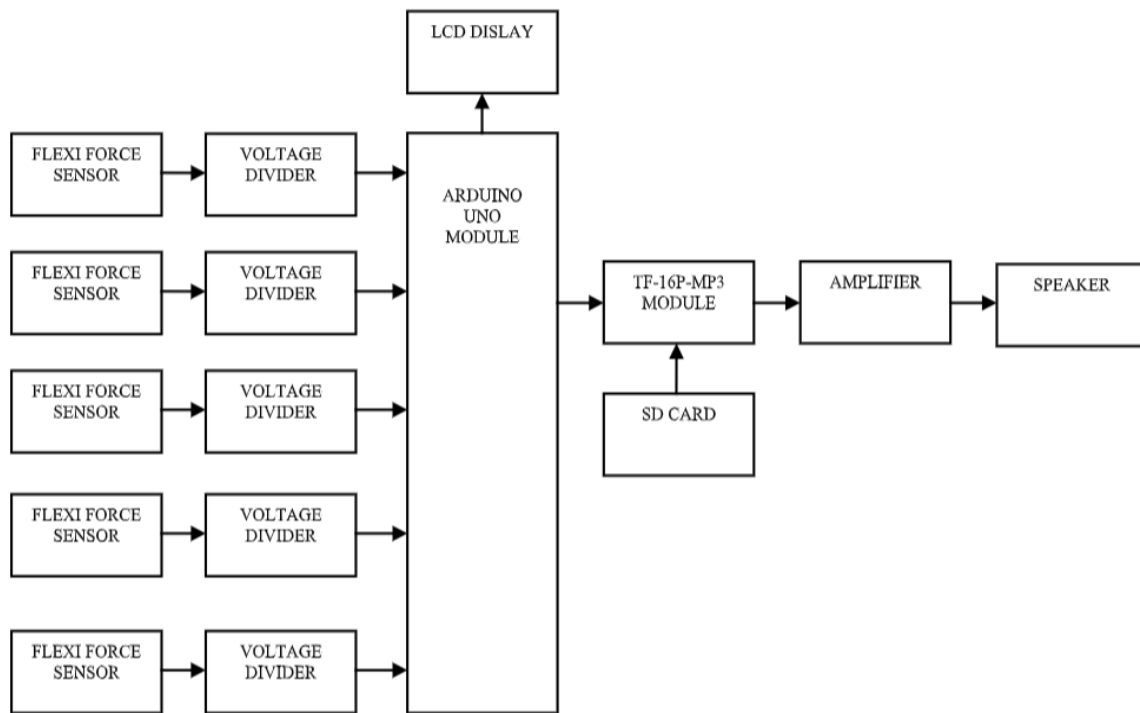


Fig1: Block Diagram

RDUINO UNO:

The ATmega328 microcontroller is the MCU used in Arduino UNO R3 as a main controller. ATmega328 is an MCU from the AVR family; it is an 8-bit device, which means that its data-bus architecture and internal registers are designed to handle 8 parallel data signals.

ATmega328 has three types of memory:

- **Flash memory:** 32KB nonvolatile memory. This is used for storing application, which explains why you don't need to upload your application every time you unplug arduino from its power source.
- **SRAM memory:** 2KB volatile memory. This is used for storing variables used by the application while it's running.
- **EEPROM memory:** 1KB nonvolatile memory. This can be used to store data that must be available even after the board is powered down and then powered up again.

POWER CONSUMPTION:

The MCU accepts supply voltages from 1.8 to 5.5 V. However, there are restrictions on the operating frequency; for example, if you want to use the maximum clock frequency (20 MHz), you need a supply voltage of at least 4.5 V.

DIGITAL I/O PINS:

This MCU has three ports: PORTC, PORTB, and PORTD. All pins of these ports can be used for general-purpose digital I/O or for the alternate functions indicated in the pinout below. For example, PORTC pin0 to pin5 can be ADC inputs instead of digital I/O. There are also some pins that can be configured as PWM output. These pins are marked with “~” on the Arduino board.

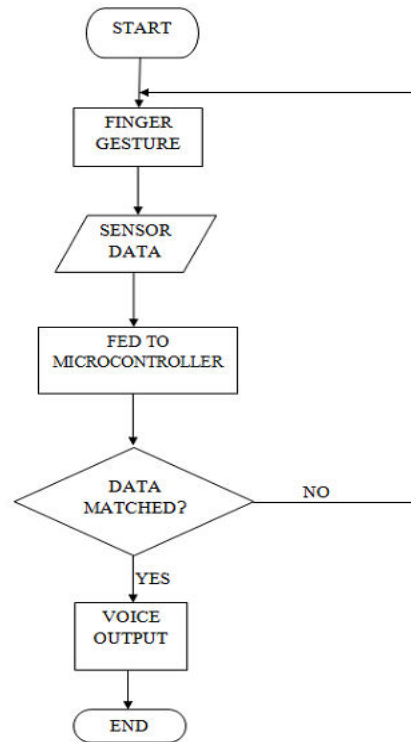


Fig2: Flow Diagram

IV. RESULT AND DISCUSSION

1. Power on:

When power on it'll take few seconds to power up microcontroller unit and then controller initialize the liquid crystal display module and then print the project title on the display the data visible for few seconds after that controller initialize ESP Module.

2. Routine Execution:

After initializing all sensor modules, controller will update fetched voltage and current on the display. User can power on/off loads by using locally installed keypad or else through webpage. Whenever load state changes, corresponding updates will be result on both hardware and cloud end. The display does not contain all information we proposed in this system. Some of parameters hide from hardware unit and that will visible on cloud such as energy, unit and price. Controller will calculate energy with interval of one second by using this method we can calculate the energy, unit and price as well.

3. Final Result:

The Final Result is containing with load voltage, current, date, time with manual controlled load. Data will be updated on the web server whenever unit is added into account.



Fig3: Final Result

V.CONCLUSION

The project is mainly concentrated on IOT network. When we discussed certain points to be notify. First point is we converting conventional energy meter which is electromagnetic into a digital meter. We are doing automatic reading and also connection and disconnection of meters using GSM module. Then meter reading has come faster. It is publically available for the customers as well as for the TANGEDCO. Both the peoples will be using the information as per their requirements and they will be having freedom to check the bill when the meter has been connected and disconnected before the due date and recharge through internet is now possible. All the information will be displayed by using smart app. Finally concluding our projects that we are successfully has read the meter bills and controls the load according the balance amount. Which also be uploaded on the website using IOT concept. Overall the new things we are worked with in our project are Arduino controller and the IOT model.

REFERENCES

1. P.B. Koli, Ashwini Chaudhary, Sonam Malkar, Kavita Pawale&AmrapaliTayde , “Image Processing Based Language Converter for Deaf and Dumb” IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834/p-ISSN: 2278-8735 /20-23 Dec 2006/pp. 25-30.
2. Harshit.C, Karthik.R.Shastry, Manoj Ravindran, M.V.V.N.S Srikanth, Naveen Lakshmikanth, “Survey on Various Gesture Recognition Techniques for interfacing Machines based on Ambient Intelligence” 2010 International Journal of Computer Science and Engineering Survey, Department of Information Technology, Coimbatore, vol.1, No.2 ,November 2010/pp.31-42.

3. S.Ganesh, Dr.Saravana Kumar, Dr. Shankar, Samuel D.Raj, R.Kartik, "A Novel Voice Recognition System For Dumb People", Journal of Theoretical and Applied Information Technology, Vol. 53 No.1/10th July 2013/pp.45-53.
4. AditiKalsh N.S. Garewal, "Sign Language Recognition for Deaf & Dumb", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 3, Issue 9, September 2013/pp.103-106.
5. Dalia Nashat, AbeerShoker, Fowzyah Al-Swat and Reem Al-Ebailan, "An Android Application To Aid Uneducated Deaf-Dumb People", Dalia Nashat et al, International Journal of Computer Science and Mobile Applications, Vol.2 Issue./ 9 September- 2014/ pp. 1-8
6. PriyaMatnani, "Glove Based and Accelerometer Based Gesture Control : A Literature Review" 2015 International Journal of Technical Research and Applications, Department Of Information Technology, Maharashtra, India. Volume 3, issue 6 (November-December,2015)/pp.216- 221.
7. SushmitaMitra and TinkuAcharya, "Gesture Recognition: A Survey", IEEE Transactions On Systems, Man, and Cyber- netics—PART C: Applications and Reviews, VOL. 37, NO. 3, MAY 2007, pp. 311- 324.
8. Ata-Ur-Rehman, Salman Afghani, MuhammedAkmal and RaheelYousaf, "Microcontroller and Sensors Based Gesture Vocalizer", 7th WSEAS International Conference on SIGNAL PROCESSING, ROBOTICS and AUTOMATION (ISPRA '08), University of Cambridge, UK, February 20-22, 2008.



INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

 9940 572 462  6381 907 438  ijirset@gmail.com



www.ijirset.com

Scan to save the contact details