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Hand Gesture Vocalizer

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Abstract:- The process of learning sign language involves intricate finger and hand movements. Unfortunately, individuals who are dumb and deaf are often ostracized by society and may struggle with social interaction. To address this, the project aims to create a fun and interactive learning tool for English sign language. The project utilizes an Arduino Microcontroller that is connected to an LCD, Gyroscope, and a mobile device. The tool is a glove that can convert sign language into human speech, making it understandable for all. This innovation can create a bridge between the deaf and dumb community and the rest of society, thereby promoting inclusivity. However, the challenge lies in reducing the cost to make it more accessible to the general public.

Keywords: *Arduino Microcontroller, Sign language, LCD, Dumb and Deaf People, Mobile Device.*

I. INTRODUCTION

In today's information-driven society, every individual should have the right to access and use information. However, over 20 million people globally are physically challenged, including deaf, dumb, and visually impaired individuals, who face communication challenges. Illiteracy is also prevalent in this group, often caused by the lack of accessible reading material. To address this issue, technological advancements have been developed to enhance communication among the deaf and dumb community, with sign language being their primary means of communication. Our project aims to implement a sign-to-voice conversion system using Arduino, HC05 Bluetooth module, ADXL345, combinational circuit, 16*2 LCD, an application, and an Android device. The combinational circuit comprises metal contact points at the finger joints, which detect finger movements and transmit the data to the LCD via Arduino. The data is then transmitted to the mobile device using the application, where it is converted into a voice form and played through the mobile speaker. The objective of this project is to provide deaf and dumb individuals with a reliable communication tool to promote their social integration into the larger community.

➢ *Related Work*

In Ref(1), the proposed model has the advantage of aiding the deaf and dumb by displaying the affair in an Android operation with oral affair in the speaker. By using wireless periodical harborage modules, data transmission is fast and secured.

The glove has been designed using affordable technology. It uses low- cost but effective flex detectors an Android app is used to convert sign language into textbook and speech (2)

In Ref(3), The aid system of smart gloves makes the stoner feel natural. It translates sign language through textbook and speech to remove the communication hedge between the colorful communities by smart gloves. In the proposed system it can identify the letters of the English ABC, along with a many simple expressions (4)

In Ref(5), the system translates the sign language through textbook and speech to remove the communication hedge between the colorful communities through smart gloves.

➢ *Objective*

- The objective is to develop a convenient, lightweight and portable glove that can assist individuals with disabilities.
- The glove should be effortless to set up and user-friendly.
- The information provided by the glove must be reliable with minimal errors, enhancing the precision and accuracy of the data.
- Constructing the glove should be cost-effective and maintenance should be hassle-free.
- The glove should not impede an individual's daily routine in any way.
- It should aid people with impairments in overcoming the challenges they face on a regular basis.
- The gloves must be resilient, capable of enduring external factors such as heat and water.

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➢ *Proposed System*

Gesture vocalizer is a project that can convert sign language to the human voice. The main idea of creating this project is to convert the sign language of dumb and deaf people to an understandable human voice available for everyone.

This project will convert their sign language to human voice by using a combinational circuit of open and closed contact it. It will also have a gyro sensor to measure the deflection in the motion of the hand. This data will further be processed by Arduino and will be received on LCD available for deaf persons to see. And via using the Bluetooth module it will be available on our mobile devices and we will get the data in sound form.

- *Block Diagram*

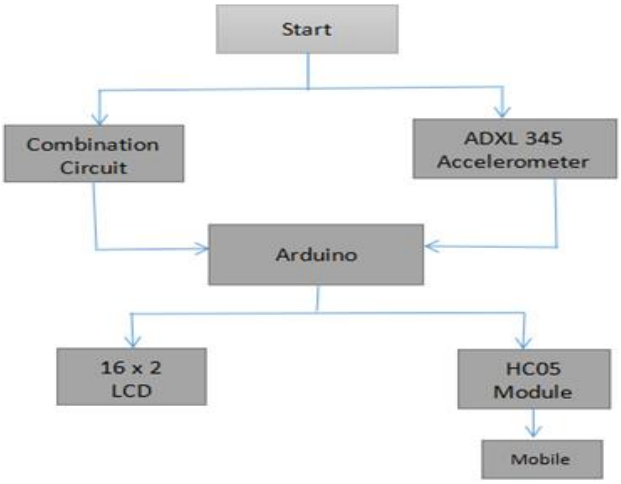

Fig 1 Block Diagram

- *Components*

✓ *Arduino Mega:* The Arduino Mega 2560 is a microcontroller board that utilizes the ATmega2560. It includes 54 digital input/output pins (14 of which can operate as PWM outputs), 16 analog inputs, 4 UARTs (serial communication ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It has everything necessary to support the microcontroller, requiring only a USB cable or an AC-to-DC adapter or battery for power. Additionally, the Mega 2560 is compatible with most Arduino Duemilanove or Diecimila shields, making it a suitable replacement for the older Arduino Mega.

✓ *ADXL 345 Accelerometer:* The ADXL345 accelerometer is a low-power, 3-axis MEMS accelerometer module that supports both I2C and SPI interfaces. The Adafruit breakout boards for these modules have built-in 3.3 V voltage regulation and level shifting, simplifying the connection process with 5V microcontrollers like the Arduino. The ADXL345 provides 4 sensitivity ranges, from ±2G to ±16G, and supports data rates ranging from 10 Hz to 3200 Hz. These sensors are utilized in various applications, such as vehicle stability control, motion detection, and smart munitions.

✓ *HC- 05 Bluetooth Module:* The HC-05 Bluetooth Module is a user-friendly Bluetooth SPP (serial port protocol) module designed for establishing transparent wireless serial connections. It can be configured as either a Master or a Slave, making it an ideal solution for wireless communication. The module operates on Bluetooth V2.0 EDR (enhanced data rate) and has a maximum modulation rate of 3 Mbps. It uses CSR Bluecore 04, an external single-chip Bluetooth system with CMOS technology and Adaptive Frequency Hopping (AFH).

✓ *16*2 LCD Display:* The 16x2 LCD display, with "LCD" standing for "liquid crystal display," is a flat panel display technology utilized in various applications, such as computer monitors, smartphones, and tablets. Unlike cathode ray tubes (CRTs), which use electron beams to display images, liquid crystal displays use a backlight to illuminate each pixel arranged in a rectangular grid. Each pixel consists of a red, green, and blue sub-pixel that can be turned on or off. By adjusting the intensity of each light, different colors can be displayed.

✓ *MIT App Inventor:* MIT App Inventor is a programming tool for beginners and novices, produced as a collaboration between Google and MIT. It employs a visual interface to create practical Android and iOS applications. The software is designed to cater to a wide range of users, from complete beginners to those looking to further advance their programming skills.

➢ *Implementation*

At the input end, we have used a combinational circuit along with an ADXL 345 Gyro sensor which will be operating to generate signal language to signals which will be understandable for Arduino. The output of Arduino is fed as input to 16*2 LCD and via HC05 it is transferred to a mobile device using our created Application. It will convert the incoming text to the application into voice format which will be further processed.

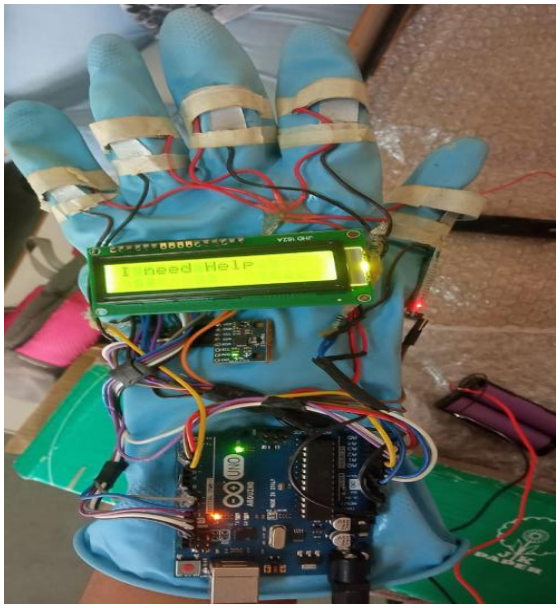

Fig 2 Snap Shot of Implemented Hand Glove

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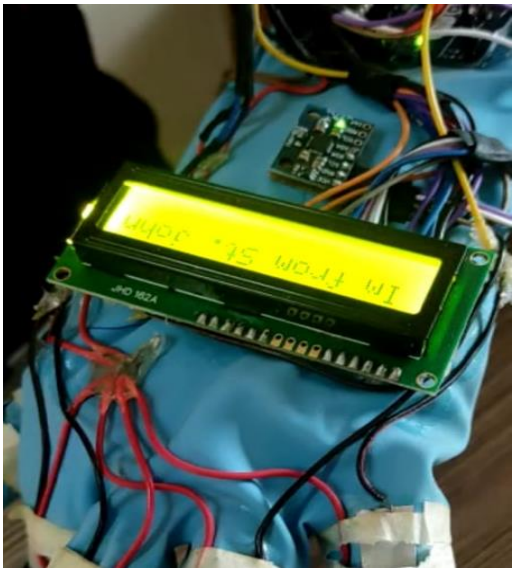

Fig 3 LCD Display

On the 16x2 LCD Display, Output is displayed in text form.

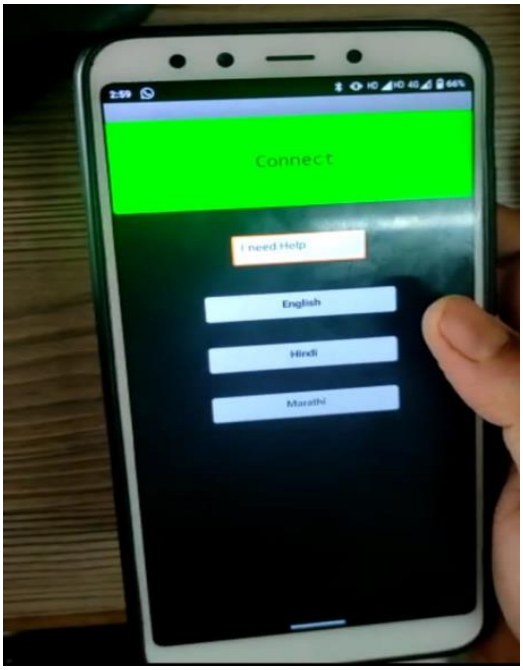

Fig 4 UI of the Mobile Application

This is the UI of a Mobile Application where there are 3 languages used to convert the text into voice form.

II. RESULT

The objective of the project is to create an application that can translate and vocalize text entered on the MIT app in multiple languages and regional dialects. The app aims to enhance user accessibility and understanding of the content provided, making it easier for them to navigate and obtain information. Additionally, the application will offer customization options that cater to individual user preferences, delivering a personalized experience.

III. CONCLUSION

The model presented involves utilizing an Arduino Microcontroller, an LCD, a gyroscope, and a mobile device as output devices. A glove is worn to convert sign language into speech that can be comprehended by anyone. This innovation aims to bridge the gap between the deaf and mute community and society, providing them with an opportunity to integrate fully. However, the main challenge is to keep costs low, ensuring the project's affordability and accessibility to all.

REFERENCES

[1]. R. Senthil Kumar,P. Lenin Pugalenthi,S. Rathika,G. Rithika,S. Sandhya. performance of IoT- predicated Smart Assistance Gloves for Disabled People. 20217th International Conference on Advanced Computing & Communication Systems(ICACCS).

[2]. Krishnamurthy Bhat,ChayalakshmiC.L. Advanced Glove for Deaf and Dumb with Speech and Text Communication on Android Cell Phone. 2020 IEEE International Conference for Innovation in Technology(INOCON) Bengaluru, India. Nov 6- 8, 2020.

[3]. Anisha M R, Ashwin S Nair, Anu Shreya, Chinnannagari Tharun, Neetu K N Design and performance Of Smart Gloves For The Specially Privileged. 2020 Third International Conference on Advances in Electronics, Computer, and Communication(ICAECC).

[4]. Dr.Anupama H S,Dr.Usha B A, Spoorthy Madhushankar Varsha Vivek Yashaswini Kulkarni Automated subscribe Language guru Using Data Gloves. Proceedings of the International Conference on Artificial Intelligence and Smart Systems(ICAIS- 2021) IEEE.

[5]. Priyadarshini M,V.R. Balaji, Trisha R, ShruthiR. subscribe Speaks – An Iot Based Smart Gloves For Dumb. Proceedings of the 6th International Conference on Communication and Electronics Systems(ICCES- 2021) IEEE.

[6]. Aiswarya,V., Raju,N.N., Joy,S.S.J., Nagarajan,T. and Vijayalakshmi,P., 2018,March.Hidden Markov Model- Based subscribe Language to Speech Conversion System in TAMIL. In 2018 Fourth International Conference on Biosignals, Images and Instrumentation(ICBSII)(pp. 206- 212). IEEE.

[7]. Liang,R.H. and Ouhyoung,M., 1998, April. A real-time continuous gesture recognition system for sign language. In Proceedings third IEEE international conference on automatic face and gesture recognition(pp. 558- 567). IEEE.

[8]. Song,N., Yang,H. and Wu,P., 2018, May. A Gesture- to-Emotional Speech Conversion by Combining Gesture Recognition and Facial Expression Recognition. In 2018 First Asian Conference on Affective Computing and Intelligent Interaction(ACII Asia)(pp. 1- 6). IEEE.

[9]. Manikandan,K., Patidar,A., Walia,P. and Roy,A.B., 2018. Hand Gesture Detection and Conversion to Speech and Text. Heera, S.Y., Murthy, M.K., Sravanti, V.S. and Salvi, S., 2017, February. Talking handsAn Indian sign language to speech translating gloves. In 2017 International Conference on innovative mechanisms for industry applications (ICIMIA) (pp. 746-751). IEEE.

[10]. Itkarkar,R.R. and Nandi,A.V., 2013, July. Hand gesture to speech conversion using Matlab. In 2013 Fourth International Conference on Computing, Dispatches and Networking Technologies(ICCCNT)(pp. 1- 4). IEEE.

[11]. Pramada,S., Saylee,D., Pranita,N., Samiksha,N. and Vaidya,M.S., 2013. Intelligent sign language recognition using image processing. IOSR Journal of Engineering(IOSRJEN), 3(2),pp. 45- 51.