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Smart Communication Interpreter for Mute and Deaf People

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Abstract - **As a consequence of birth anomalies and accidents, the number of hearing impaired and speech challenged sufferers has increased dramatically in recent years. When a deaf-dumb person speaks to a normal person, the normal person struggles to understand and demands that the deaf-dumb person display gestures to meet his or her needs. Dumb individuals speak to us in their own language. The only need is that we need to understand their language. Sign language is a communication capacity used by deaf and dumb people that uses hand signs, orientations, and movement of the hands, arms, or body, as well as facial expressions, to transmit the thoughts of a speaker fluently. However, most people struggle to understand this sign language. People who are unable to speak or have lost their ability to speak as a result of an injury find it difficult to transmit their message in society. We created an electronic speaking glove for this project. Dumb individuals may easily converse with normal people by merely wearing the glove. The system's circuitry translates some activities, such as receiving a speech for each chosen button, making it easier for deaf/dumb people to converse with normal people. In this system, an LCD display is also employed; normal people's voice is detected word by word and shown as text on the LCD display, making it easier for normal people to converse with deaf/mute people. As a result, this initiative will assist to bridge the communication gap between mute, deaf, and hearing persons.**
Keywords: **Deaf-Dumb, Sign Language, Electronic Speaking Glove, LCD**

I. INTRODUCTION

There has been a dramatic rise in the number of hearing impaired and speech challenged victims in recent years as a result of birth abnormalities, oral illnesses, and accidents [1]. When a deaf-dumb person talks to a normal person, the normal person finds it difficult to comprehend and requests that the deaf-dumb person demonstrate gestures for his or her requirements [2]. Dumb people communicate with us in their own language. The only need is that we grasp their language. Sign language is used by deaf and dumb people and is a communication ability that combines hand forms, orientations, and movement of the hands, arms, or body, as well as facial expressions, to communicate fluently a speaker's ideas. However, most individuals find it difficult to interpret this sign language. People who are unable to talk or have lost their capacity to speak due to an accident find it challenging to communicate their message within society. While deaf people use hand signs to communicate with one another, the general population frequently struggles to understand these movements. In such instances, sign language interpreters who have mastered the procedures involved are always required. It might be aggravating for them to continuously seek the assistance of an interpreter while attempting to interact with their classmates. Furthermore, sign language is not a universal language. For sign language, there is no single standard, globally approved system. When India joined the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD), India promised the world that dumb and deaf people would be treated equally and have the same rights as other Indian citizens [3]. However, the lack of a unified sign language paradigm hinders attempts to treat the deaf and speech handicapped persons equally. The aforementioned causes inspired our initiative to solve this critical problem. As a result, the Smart Communication Interpreter for Deaf and Dumb persons was created.

II. EXISTING SYSTEM

More than 500 million individuals worldwide have a physical, sensory, or mental disability [4]. Physical and social limitations often impede their full involvement in society and the enjoyment of equal rights and opportunities. Handicap is a result of the interaction between impaired people and their surroundings [5]. It happens when individuals have cultural, physical, or social hurdles that prohibit them from accessing the many societal institutions that other people have. Thus, handicap is defined as the loss or restriction of opportunities to participate in communal life on an equal footing with others. In terms of the interaction between the impaired person and his surroundings, the issue of disability has a significant social component. The relationship with the environment, rather than the physical, sensory, or mental condition, dictates the impact of disability on a person's everyday life [6].

The majority of sign language detection and identification systems use one of two methodologies: vision-based or image-processing techniques, and sensors/ microcontroller-based gloves [7]. The camera is utilized to collect motions in the image processing approach. These motions are collected as photographs, which are then evaluated using various algorithms to determine the meaning of a certain gesture. One such approach involves animating the corresponding key gesture frames with the use of extracted information to construct a desired hand gesture sequence [8]. The downside of image processing-based techniques is that they need the development of complicated computing algorithms to recognize gestures. This approach also needs adequate

lighting, backdrops, and field of vision limits. Communication in the present sensor and microcontroller-based glove is solely one-way, allowing a silent person to communicate with a normal person. A normal individual has no way of communicating with a silent or deaf person.

III. PROPOSED SYSTEM

Generally, mute persons communicate through sign language, but they have trouble communicating with those who do not understand sign language. This effort tries to break down communication barriers. It is based on the necessity to create an electronic device that can convert sign language into voice in order to facilitate communication between mute populations and the general public. Furthermore, this technology can transform voice into text to display on a display device. As a result, communication between normal and dumb/deaf persons is enhanced in both directions. It is a social cause effort in which deaf and dumb people can easily communicate. As a result, we created a prototype to bridge the communication gap between impaired and non-disabled persons.

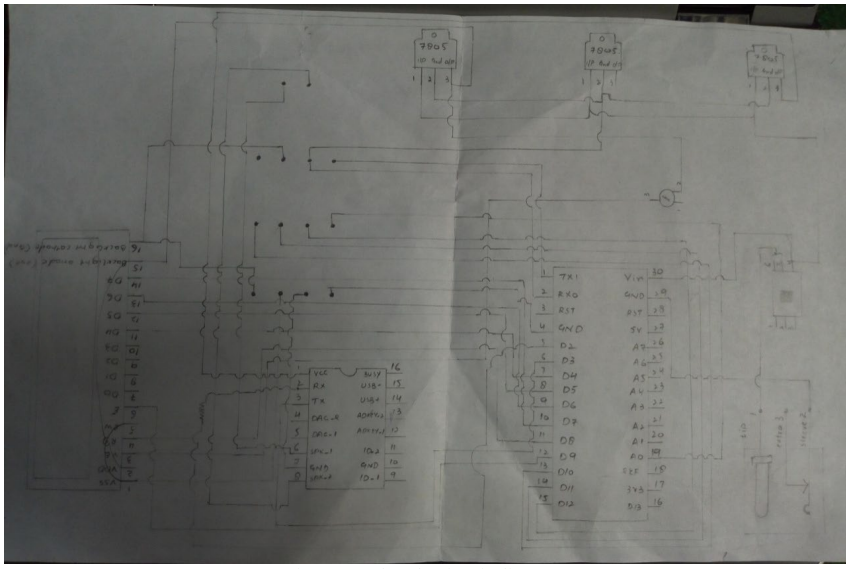

Fig. 1 Handmade circuit diagram

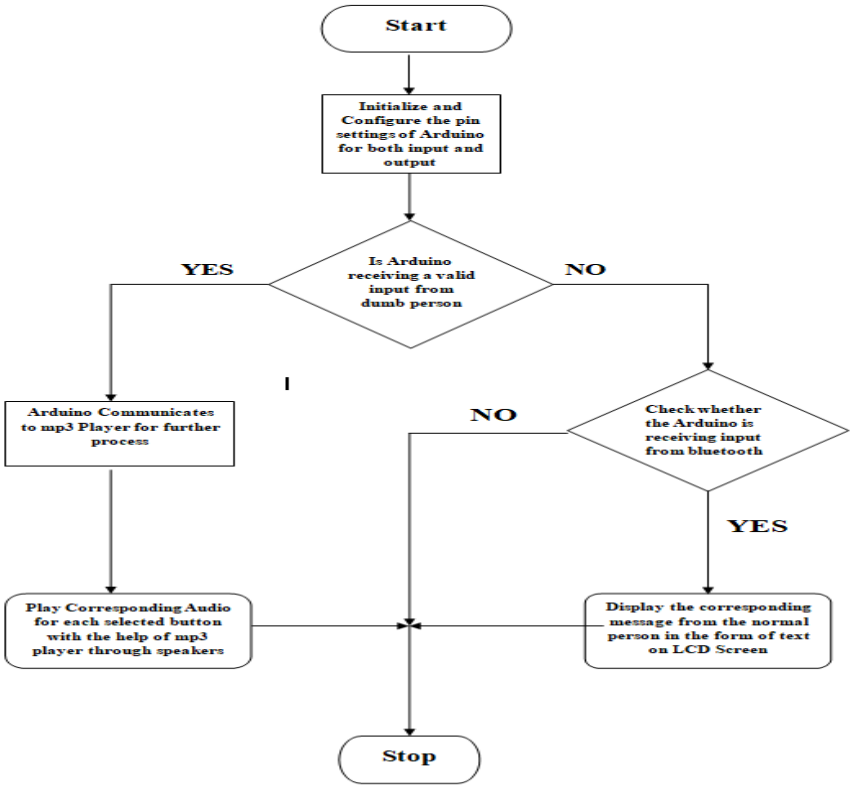

Fig. 2 Flowchart for smart communication interpreter for mute and deaf people

A wired glove, which is a normal cloth driving glove with buttons, is utilized. Mute persons may use the glove to make hand gestures that are transformed into speech, allowing normal people to comprehend their emotions.

A typical person's speech is input into the system through Bluetooth, which is then transformed into text and shown on the LCD screen. Deaf individuals can comprehend what regular people are saying this way.

IV. STUDY OF FEASIBILITY

A. Technical Feasibility

For implementation, the project needs basic software and hardware resources. The system is adaptable and simple to extend.

B. Operational Feasibility

The project suits the needs of the users. It is not interfering with any other system or application operations.

C. Economic Feasibility

A cost-benefit analysis demonstrates that the advantages surpass the system's expenses, and the project's goals can be met with the resources available.

D. Reliability

The system is dependable and recovering from faults is very simple. It is entirely portable and runs on a 9V tiny radio battery.

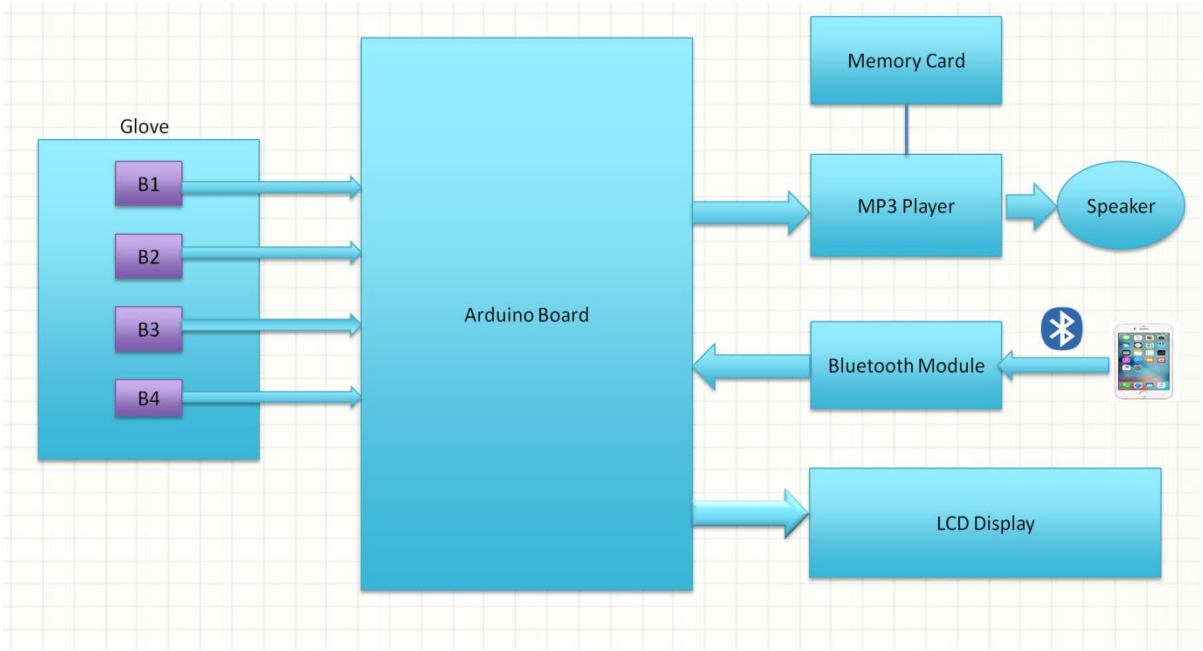

Fig. 3 Block diagram for Smart Communication Interpreter for deaf and dumb with two way communication process

Initializing and configuring the Arduino's pin settings for input and output before determining whether or not the dumb person's input was accepted as valid. Based on information from a specific button, simple if-else conditions are then built. The MP3 player is connected to the Arduino in such a manner that the output is created via the speaker and the recordings on the memory card of the MP3 player are played based on the circumstances.

Since the Arduino's Rx and Tx pins are linked to the Tx and Rx pins of the MP3 player, respectively, the two devices may interact serially. Arduino manages the level, which recording is to be played, etc. for the MP3 player but does not do the actual job. The following audio, "Smart Communication Interpreter for deaf & dumb people prepared by Samiya Baba under the guidance of Dr. Indu Bala," is played for the first 20 seconds without being controlled by the Arduino.

A certain message will be played by the mp3 player via the speaker depending on the input values that Arduino reads from the buttons and the condition that is being met. We now have an LCD with a 4-bit Arduino interface. Additionally, we have a Bluetooth module that is linked serially to an Arduino using the serial pins Rx and Tx and is paired with a mobile phone on one side. Our voice will be converted to strings using the "AMR Voice" program on the mobile phone that is being utilized.

The Bluetooth module transmits this transformed voice, and the Arduino receives it through the serial pins of the Bluetooth module at the same time. The Arduino transmits the string to the connected LCD using pins D0-D7 after receiving it from the Bluetooth module. Normal people utilize this Bluetooth function to converse with deaf people.

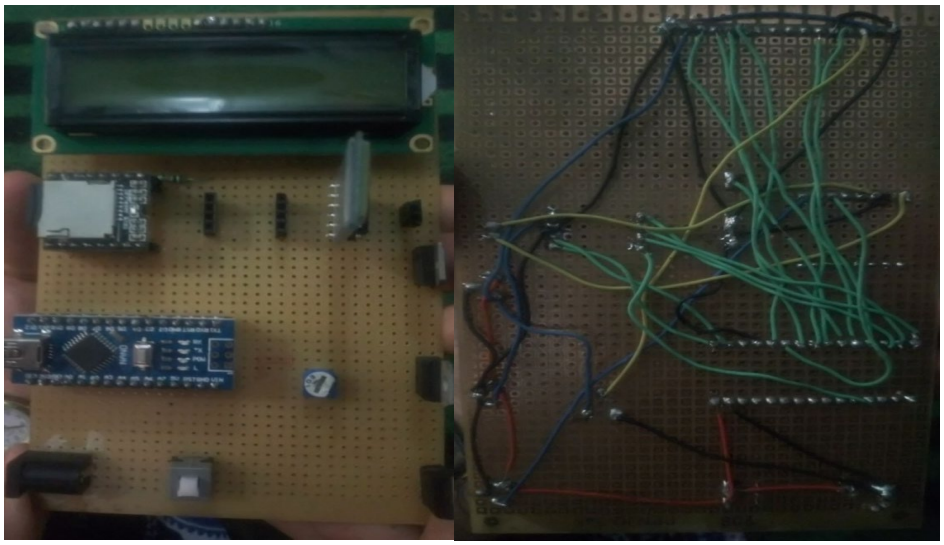

Fig. 4 Front and Back view of circuit

Fig. 5 AMR_Voice app to communicate

Now imagine that a dumb individual is wearing a glove with buttons on it. The buttons will send readings to Arduino based on the buttons he chooses, and the mp3 player will play the recording under the conditions Arduino specifies. The impaired deaf person will then use the AMR Voice software on his cellphone to interact with another person. This program will translate the spoken word into text and transmit it via Bluetooth to the Arduino, who will then display it on the LCD screen.

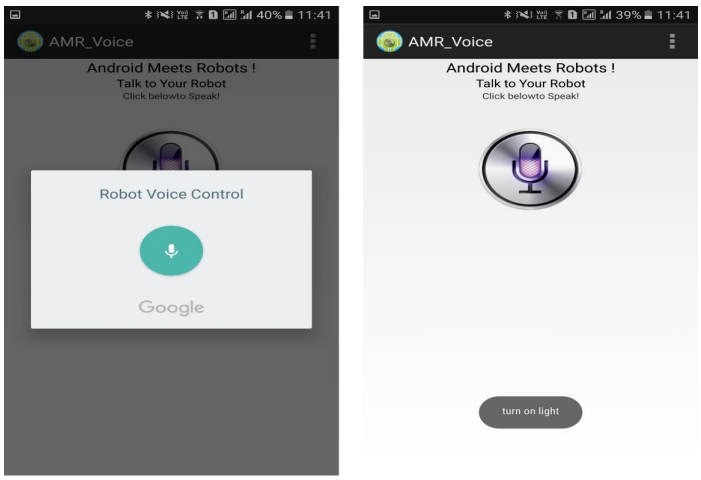

Fig. 6 AMR sending converted voice to Bluetooth

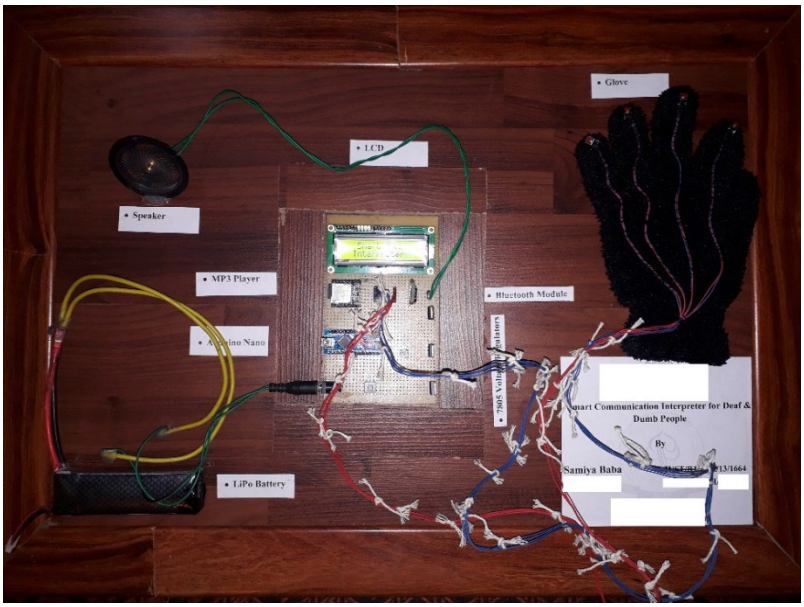

Fig. 7 Final Project look

V. CONCLUSION

This system is useful for dumb and deaf people to communicate with one another and with the normal people. The dumb people use their standard sign language which is not easily understandable by common people gestures. This system converts the sign language into voice which is easily understandable by dumb and normal people. The sign language is translated into some text form, to facilitate the deaf people as well. This text is display on LCD. This system is useful for dumb and deaf people to communicate with one another and with common people. This project is basically designed to minimize the communication gap between the deaf and dumb people and the normal one. With this project the dumb people can use the glove which is used to perform gesture and it will be converted into voice so that normal people can easily understand and also display it on LCD so that people who cannot hear can read it on the screen.

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