Dr. D. Y. Patil Institute of Technology, Pimpri Pune
Department of Electronics & Telecommunication Engineering

DR. D. Y. PATIL INSTITUTE OF TECHNOLOGY, PIMPRI, PUNE -18.

Department of Electronics & Telecommunication Engineering

" Gesture Recognition System "

Group No. 08

AHINT SONAWANE	Roll No. TETA01
VISHAL OVHAL	Roll No. TETA29
RAVINDRA MARGALE	Roll No. TETA21

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“ Gesture Recognition System ”

(IOT)

Problem Statement:

Communication is a fundamental aspect of human interaction, and for individuals with speech impairments or in environments where vocalization is challenging, traditional methods of expression may be limited. Existing assistive communication technologies often rely on touchscreens, keyboards, or other input devices, which may not be suitable for everyone. In such cases, there is a need for a more intuitive and inclusive interface that enables individuals to communicate effectively without relying on conventional speech or writing methods.

The Gesture Recognition System addresses this problem by offering a novel solution that leverages hand gestures as a means of generating synthesized speech. The existing challenges include the need for robust and accurate gesture recognition algorithms, the development of a customizable and user-friendly gesture-to-speech mapping system, and the integration of adaptive learning mechanisms to enhance the overall performance of the interface.

Furthermore, there is a gap in the current assistive technology landscape regarding real-time, natural, and expressive communication for individuals with speech impairments. The Gesture Recognition System aims to fill this gap by providing a solution that not only recognizes a diverse set of gestures but also adapts to the user's preferences over time, creating a more personalized and effective communication tool.

In summary, the problem statement for the Gesture Recognition System revolves around the limitations of existing communication aids for individuals with speech impairments and the need for a more intuitive, adaptable, and inclusive interface that enables effective communication through hand gestures.

Objectives:

Facilitate Expressive Communication: Enable deaf and mute individuals to express themselves more effectively by translating hand gestures into synthesized speech, overcoming traditional barriers to communication.

Cultural Sensitivity: Consider cultural variations in sign language and gestures to ensure that the Hand Gesture Vocalizer accommodates different communication forms and provides a culturally sensitive means of expression.

Assistive Learning Support: Integrate features to support the learning and adoption of the Hand Gesture Vocalizer, including tutorials, guides, and feedback mechanisms to assist users in becoming proficient in using the system for communication.

Real-Time Feedback and Correction: Implement a system that provides real-time feedback on the accuracy of gestures and offers corrections or suggestions, aiding users in refining their gestures for improved recognition.

Enhance Social Interaction: Design the Hand Gesture Vocalizer to promote social interaction by allowing users to communicate seamlessly with both individuals who understand sign language and those who do not, fostering a more inclusive social environment.

System Specifications:-

PIC Microcontroller:

Select the appropriate PIC microcontroller model (e.g., PIC16, PIC18, PIC32) based on project requirements. Ensure adequate Flash memory for program storage and RAM for runtime data. Sufficient number of I/O pins for interfacing with sensors, Bluetooth module, and other peripherals.

Flex Sensor:

Interface with gesture recognition sensors, such as accelerometers, gyroscopes, or camera-based sensors. Real-time processing capability for gesture recognition. Implement an interrupt-driven mechanism for immediate response to detected gestures.

Bluetooth Module:

UART interface for communication with the PIC microcontroller. Bluetooth Low Energy (BLE) for efficient wireless communication. Incorporate pairing functionality for secure connections**.**

LCD 16x2:

Liquid Crystal Display with a 16x2 character format. Command registers for storing command instructions given to the LCD. Data registers for storing data are to be displayed on the LCD. Utilized for user interface purposes

Block Diagram:

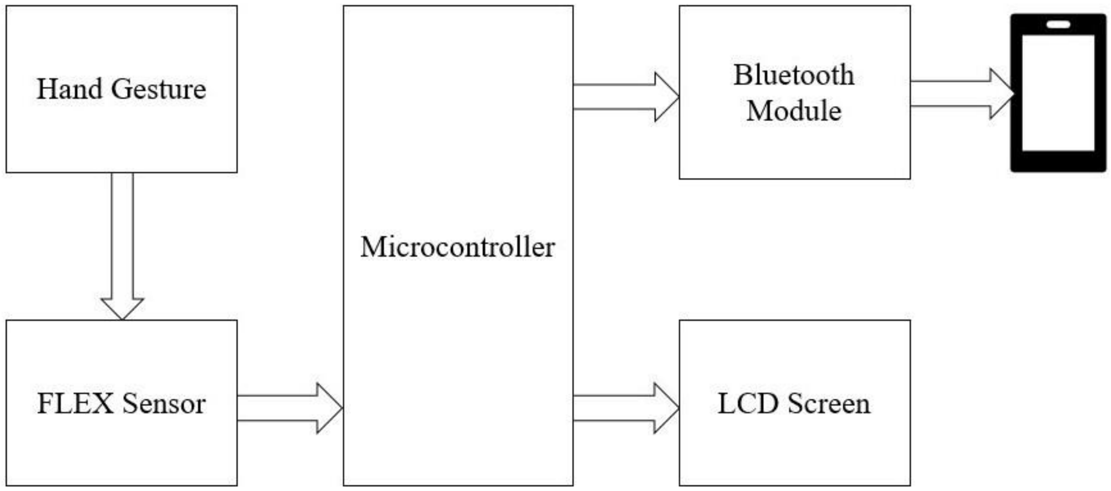

Fig 1.1 (Gesture Recognition System)

Deaf-mute humans need to talk with regular human beings in their everyday lives. The deaf-mute people use sign language to talk with other humans. However, it is viable for the ones who have passed through unique training to recognize sign language. Sign language uses hand gestures and different means of non-verbal behaviors to deliver their supposed meaning. It includes combining hand shapes, orientation and hand actions, hands or body movement, and facial expressions concurrently, to fluidly explicit the speaker's thoughts.

The project is based on the need to develop an electronic glove that can translate sign language into speech to lower the communication barrier between mute communities and normal people. Wireless electronic gloves are used, which are everyday material driving gloves fitted with flex sensors along with every finger. Mute human beings can use gloves to perform hand gestures which can be converted into speech so that regular humans can apprehend their expressions.

Human beings interact with each other to deliver their ideas and reviews to the people around them. But this isn't always the case for deaf-mute people. Sign language paves the manner for deaf-mute people to communicate. Through signal language verbal exchange is feasible for a deaf-mute person without the manner of acoustic sounds. Thus, to bridge this gap, this project intends to implement a real-time video processing-based speech assistant system for the speech-impaired

Outcomes:

- It can be used by the Deaf and Dumb community in order to increase interaction in society.

- The prototype can further be developed for people who are paralyzed because of stroke or accident, to help them easily communicate with little effort.

- The device functionality can be expanded to increase automation functions to make the lives of people who are physically challenged easy.

- Users will experience increased independence in daily life, as they can communicate without relying solely on sign language or written methods.

Applications:

Education and Learning Platforms: Implementation in educational settings to facilitate communication between deaf students, teachers, and peers, creating a more inclusive learning environment.

Workplace Communication: Integration into workplace communication tools to enhance the ability of deaf and mute individuals to communicate effectively with colleagues, clients, and supervisors.

Healthcare Communication: Use in healthcare settings to enable communication between deaf patients and healthcare providers, ensuring effective interaction during medical appointments and emergencies.

Emergency Services: Use in emergencies to ensure that deaf and mute individuals can effectively communicate with emergency responders and receive timely assistance.

Dr. Priti Shende	Prof.Monica Gunjal	Dr. Khushbu Katre/Ms.Madhavi Repe	Dr.D.G.Bhalke
Mini Project Guide	Batch Incharge	Mini Project Coordinator	HoD, E&TC