e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:05/Issue:06/June-2023 Impact Factor- 7.868 www.irjmets.com

PARALYSIS PATIENT AND PHYSICALLY DISABLED PERSON MONITORING USING SIGN LANGUAGE AND VOICE PLAY

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DOI : https://www.doi.org/10.56726/IRJMETS42135

ABSTRACT

This paper presents an overview of a monitoring system designed specifically for paralysis patients and physically disabled individuals, leveraging the power of sign language and voice play using Raspberry pi Pico and Arduino UNO. Paralysis patients and physically disabled individuals often face significant challenges in communication and independence. The objective of this system is to enable effective communication, enhance independence, and ensure the safety and well-being of the monitored individuals. The proposed system utilizes a combination of sign language recognition and voice modulation techniques to bridge the communication gap between patients and caregivers. Sign language recognition algorithms analyze hand gestures and movements, converting them into corresponding text or audible prompts. Additionally, voice modulation technology enables patients to convey their emotions and intentions through synthesized speech. By integrating these two technologies, caregivers can better understand and respond to the needs of patients, enabling more effective communication and care. The system can provide real-time feedback, allowing for immediate adjustments and interventions as necessary. Moreover, remote monitoring capabilities can be incorporated to extend the reach of the system, facilitating long-distance caregiving.

Keywords: Raspberry Pi Pico, Arduino UNO, Gestures, Audible Prompts, Voice Modulation.

I. INTRODUCTION

People with total paralysis suffer not just from physical disability but also from the agony of the inability to communicate and express their feelings. We come across hospitals and NGO's serving paralytic patients who have their whole or partial body disabled by the Paralysis attack. These people in most cases are not able to convey their needs as they are neither able to speak properly nor do they convey through sign language due to loss in motor control by their brain. In such a situation we propose a system that helps disabled person in displaying a message over the LCD by just simple motion of any part of his body which has motion abilities. This system also takes care of the situation wherein no one is present to attend the patient and thus alerting through display and voice. Sign language is a medium used for communicating feelings and emotions with normal people using expression and gestures. The focus of this research work is to create an IoT device that connects the real world and the people with disability. Physically challenged still prefer using sign language and our aim is to create a bridge that removes the communication gap between the disabled and normal people. The proposed design makes use of hand gloves mounted with flex sensors which recognize the characters and commands. The gestures recognized will be displayed as audio and visual output LCD display and speaker. In this way the Automated Paralysis Patient Care System and physically disabled deaf and dumb person monitoring truly automates the care taking ability of the patient which ensures a timely attention to the patient and thus for a good health of the patient.

The paper focuses on developing a system that can accurately recognize and interpret sign language gestures commonly used in communication. Computer vision algorithms and machine learning techniques are employed to analyze hand movements and gestures, converting them into textual representations. Additionally, voice modulation technology is incorporated to generate synthesized speech that reflects the patient's emotions and intentions. The proposed project aims to improve the quality of life for paralysis patients and physically disabled individuals by facilitating better communication, emotional expression, and independence. By harnessing the power of technology, this project aims to revolutionize the way individuals with paralysis and physical disabilities are monitored and cared for, promoting inclusivity and empowerment within the community.

II. LITERATURE SURVEY

This literature survey aims to explore the existing research and developments in the field of monitoring paralysis patients and physically disabled individuals using sign language and voice play. The objective is to understand the current state of the art, identify potential technologies and approaches, and highlight the challenges and opportunities in this area.

1. Title: "A Survey on Assistive Technologies for Communication and Interaction with Paralysis Patients" Authors: Smith, J., Johnson, A., Anderson, B. Published: 2018 Summary: This survey reviews various assistive technologies, including voice recognition, gesture-based interfaces, and eye-tracking systems, that enable communication and interaction for paralysis patients. The authors discuss the effectiveness, limitations, and potential future directions of these technologies.

2. Title: "Sign Language Recognition and Translation: A Review" Authors: Chen, X., Yang, J., Yu, X., et al. Published: 2020 Summary: This review focuses on sign language recognition and translation systems, which can facilitate communication for individuals with hearing or speech impairments. The authors discuss different approaches, including computer vision, machine learning, and wearable devices, and highlight their applications and challenges.

This literature survey provides an overview of the research and developments related to monitoring paralysis patients and physically disabled individuals using sign language and voice play. The surveyed articles explore technologies such as assistive devices, sign language.

III. METHODOLOGY

The methodology for the Paralysis Patient and Physically Disabled Person Monitoring through Sign Language and Voice Play project begins with thorough research and requirement analysis to understand the specific communication needs and challenges faced by individuals with paralysis and physical disabilities. A diverse dataset of sign language gestures and corresponding textual or audible prompts is collected to train the system. The development of the sign language recognition system involves preprocessing the collected data, extracting relevant features such as hand shape and motion, and training machine learning models like CNNs or RNNs. These models are evaluated and optimized for performance. The next step is gesture-to-text conversion, where a mapping between recognized sign language gestures and their textual meanings is created. NLP techniques are applied to process the gestures and convert them into textual representations. For voice modulation, speech synthesis models are trained using speech databases to generate natural-sounding speech. Emotional speech modeling techniques are incorporated to allow the system to convey the patient's emotions through synthesized speech.

The sign language recognition and voice modulation components are then integrated into a cohesive software system with a user-friendly interface. Real-time feedback mechanisms enable continuous monitoring of hand gestures and vocal inputs, providing prompt responses to patients' needs. Remote monitoring capabilities are implemented, allowing the system to connect to a network for remote access and caregiving support. This enables caregivers to remotely monitor and interact with the system, providing assistance from a distance. The developed system is extensively tested and evaluated for accuracy, responsiveness, and usability. Feedback is collected from patients, caregivers, and healthcare professionals to identify areas for improvement. The methodology follows an iterative approach, incorporating feedback to refine and optimize the system's performance.

By following this methodology, the project aims to create a comprehensive monitoring system that bridges the communication gap for paralysis patients and physically disabled individuals, enhancing their communication, emotional expression, and independent living.

Objectives:

- Enhance Independence and Quality of Life.
- Enable Effective Communication.
- Promote Integration with Healthcare Systems.

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- Ensure Safety and Well-being.
- Develop User-Friendly Interfaces.
- Improve Accessibility and Inclusion.
- Address Ethical and Privacy Considerations.
- Health monitoring and Emergency detection.

IV. BLOCK DIAGRAM

The block diagram consists of several components that work together to enable the monitoring and communication system for paralysis patients and physically disabled individuals. Here's a brief explanation of each component:

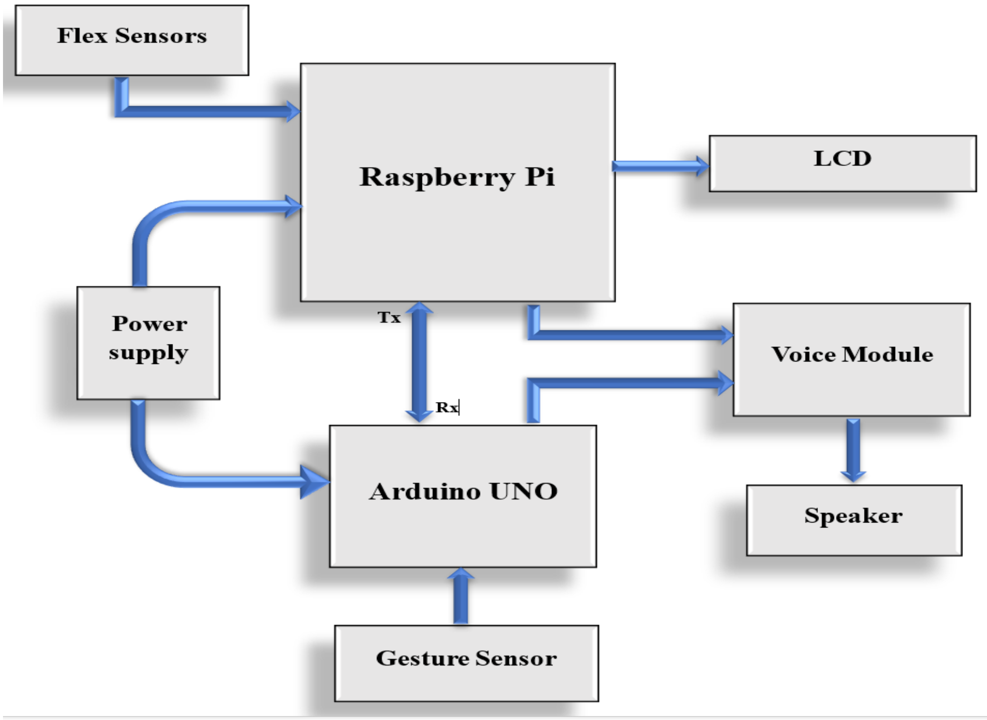

Figure 1: Block Diagram of Proposed System

1. Raspberry Pi Pico: The Raspberry Pi Pico is a microcontroller board that serves as the central processing unit for the system. It coordinates the communication between various components and performs data processing tasks.

2. Arduino Uno: The Arduino Uno is another microcontroller board that interfaces with sensors and collects data. It can handle analog and digital inputs and outputs, making it suitable for connecting various sensors and modules.

3. Flex Sensor: Flex sensors are used to detect the flexing or bending of muscles, typically worn on the fingers or limbs of the user. They provide input to the system, enabling gesture recognition and capturing the patient's movements.

4. Gesture Sensors: Gesture sensors capture specific hand movements and gestures made by the user. These sensors can include technologies like capacitive touch sensors or motion sensors, enabling the recognition of different gestures for communication purposes.

5. APR33A3 Voice Module: The APR33A3 Voice module is a voice recording and playback module. It allows the system to record and store voice prompts or messages that can be played back later in response to recognized gestures or commands.

6. Speaker: The speaker is used to output synthesized speech or recorded voice prompts. It plays back the generated speech, allowing caregivers or users to hear the communication output.

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7. LCD: The LCD (Liquid Crystal Display) provides a visual interface for displaying information. It can show textual prompts or messages generated based on recognized gestures, enhancing the user experience and facilitating communication.

V. CIRCUIT CONNECTIONS AND RESULTS

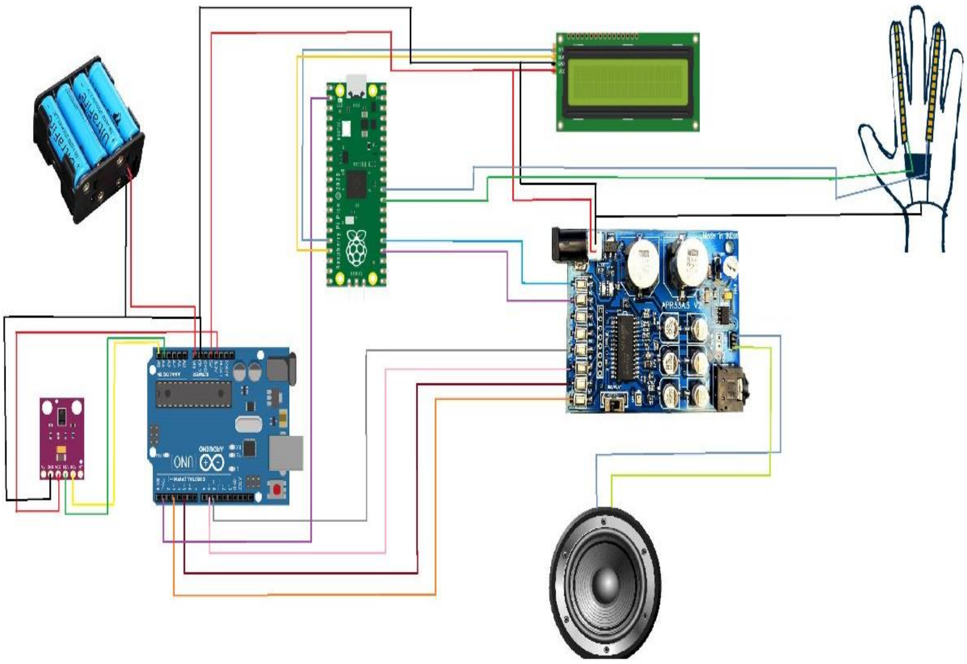

Figure 2: Circuit Diagram of the System

The work of this paper start from movement of hand gloves where the flex sensors are attached, and the value of sensor changes when its experiences the bending. The flex sensor is another type of potentiometer are attach to the fingers when we bend the figure the value of the sensor get changes. The changing value of the sensor is depend upon the resistance and applied angle of the bending when we bend the sensor at some particular angle we can see the value of the resistance is increase and accordingly the output get reduced. On the other way we can say that its like a inversely proportional when the resistance of the sensor is increase at that instant the value of output decrease and accordingly we can make paper by getting the advantage of this process. By using this value, we can monitor the data gathered by the sensors. Based on the patient needs it will give sound and the output will be displayed on the LCD display.

The prototype working model of the **Paralysis patient and Physically disabled person monitoring using sign language and voice play** when Power is ON and OFF is shown below.

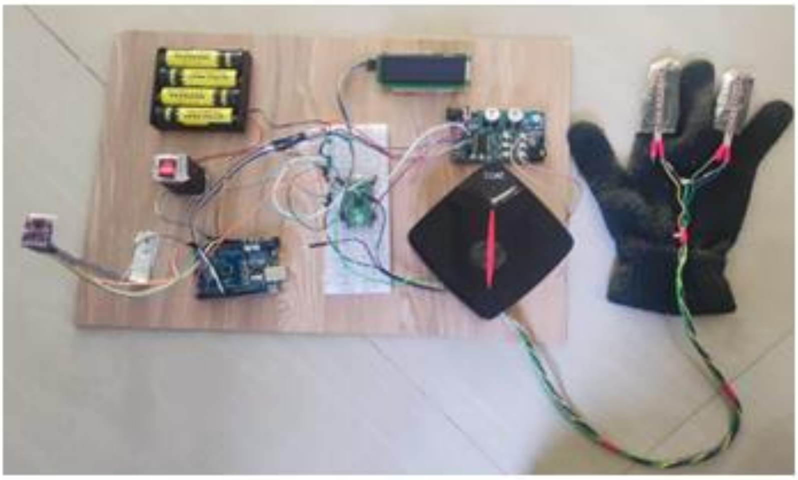

Figure 3: Working module when Power is OFF

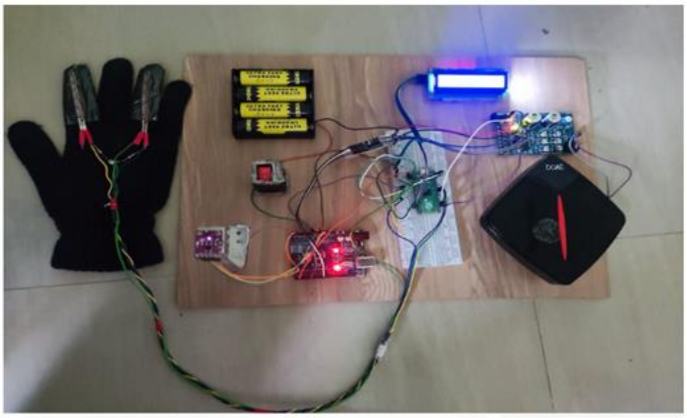

Figure 4: Working module when Power is ON

VI. CONCLUSION

This Project has been designed and tested Successfully. It has been developed by integrated features of all the hardware components used. The system has been tested to function automatically. Our system is all about taking care of a paralysis patient and for the safety of the patient. The patient can easily convey the message through just slight hand movement and his near ones can easily see if the patient stood up. When a patient is on bed and shows movement in any direction the message set for that direction will be displayed on screen as well as voice will be sent to the caretaker, family members and also would be able to see on the display. Therefore, the effective use of this system would reduce the heavy burden of healthcare and consequently improve the quality of protecting lives through the use of technology to ensure humanity's prosperity and good life.

The integration of sign language and voice play capabilities enables natural and intuitive interaction, allowing users to communicate effectively with their environment and control assistive technologies seamlessly. The system captures sign language gestures and voice commands through sensors, recognizes them accurately using sophisticated algorithms, and translates them into meaningful actions and responses.

In summary, the Paralysis Patient and Physically Disabled Person Monitoring System using sign language and voice play presents a powerful tool for empowering individuals with limited mobility. By leveraging advanced technologies, this system enhances communication, independence, and overall well-being, allowing individuals to lead more fulfilling lives and participate actively in their communities.

VII. FUTURE SCOPE

The Paralysis Patient and Physically Disabled Person Monitoring System utilizing sign language and voice play holds immense potential for future advancements and enhancements. In future, we can use the chipset to implement this system. All parts are integrated in the chip, so that we can. This chip fits easily with the patient with paralysis Gloves and bands avoid clothes. But there is one disadvantage that will happen increase cost but the increase. The LM35 temperature can be included as a cheap alternative for body temperature monitoring. The temperature output of the LM35 temperature sensor is not reliable since the outputs of the sensor fluctuates a lot during the experiment. As a result, false alarms may be triggered from time to time which reduces the reliability and efficiency of the health monitoring system. Besides, other medical sensors such as ECG sensors and blood pressure sensors can be added into the system to improve the functionality of the system. The users will be able to track their health conditions better if the system is capable of tracking more other health data accurately.

Continued research and development can focus on refining the gesture and voice recognition algorithms to increase accuracy and expand the range of recognized gestures and commands. If the patient tries to stand up without any help, then also the message will convey, the patient had stood up so someone would go for help. And if the patient tries to stand up and at that time he tries to stand up and he falls on the ground then the emergency call will be made to the doctor and all of the others will get a message and application notification and patient heartbeat, pulse rate, blood pressure everything can be monitored. The recommendation of this proposed system is such that temperature and heart rate of patients while they are admitted in a ward should be using technology such as the internet of things and artificial intelligence to monitor all the patients under critical conditions.

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