IoT Based Paralysis Patient Health Monitoring System with Hand Gestures

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Abstract: This paper proposes an IoT-based healthcare system to improve the safety and comfort of paralysis patients. The system continuously monitors vital signs using sensors connected to a microcontroller (like Arduino or ESP32). If any needs (such as Food, Water, Help, or an emergency, etc.) are detected, the system automatically sends an alert to family members via Telegram or a display message. It also includes a simple communication module with a gesture-based and push button, so that patients can call for help even if they cannot move properly. By providing real-time monitoring and quick alerts, this system reduces the burden on family members and ensures faster emergency response, making home care safer and more reliable for paralyzed patients.

I.INTRODUCTION

Paralysis is a serious medical condition that results in the loss of muscle function in one or more parts of the body. It can occur due to various reasons such as stroke, spinal cord injuries, neurological disorders, or severe accidents. Individuals suffering from paralysis often experience significant difficulty in performing daily activities and communicating their needs. In many cases, patients may not be able to speak clearly or move freely, which makes it challenging for caregivers and family members to understand their requirements. Because of these limitations, continuous monitoring and effective communication support are essential for ensuring the safety, comfort, and well-being of paralysis patients.In traditional healthcare systems, monitoring paralysis patients usually requires constant supervision by caregivers or medical staff. This approach can be time-consuming and may not always provide immediate information. Paralysis is a serious medical condition that results in the loss of muscle function in one or more parts of the body. It can occur due to various reasons such as stroke, spinal cord injuries, neurological disorders, or severe accidents. Individuals suffering from paralysis often experience significant difficulty in performing daily

activities and communicating their needs. In many cases, patients may not be able to speak clearly or move freely, which makes it challenging for caregivers and family members to understand their requirements. Because of these limitations, continuous monitoring and effective communication support are essential for ensuring the safety, comfort,and well-being of paralysis patients.In traditional healthcare systems, monitoring paralysis patients usually requires constant supervision by caregivers or medical staff. This approach can be time-consuming and may not always provide immediate information about the patient's health condition. If a patient experiences discomfort, pain, or a sudden change in health status, it may take time for caregivers to notice the situation.

II. LITERATURE SURVEY

2.1 GSM-based Paralysis Patient Monitoring System

The paralysis patient cannot convey their need properly in such a situation; we propose a system that helps a disabled person display a message over the LCD by just simple motion with any part of their body that has motion abilities. A GSM-based paralysis patient monitoring system is an important development in assistive healthcare technology aimed at improving the quality of life for patients with limited mobility. Traditional care methods often require continuous physical supervision, which can be challenging for caregivers and may not always ensure immediate response during emergencies. To overcome these limitations, GSM (Global System for Mobile Communication) technology is integrated with microcontroller-based systems such as Arduino or embedded platforms. In the literature, several studies highlight the effectiveness of GSM technology in enabling remote patient monitoring and communication. Researchers have developed systems where patients can send predefined messages using simple input methods such as push buttons or minimal gestures. This is particularly beneficial for paralysis patients who cannot speak or move freely. Internet connectivity makes it a practical solution for rural and remote regions. Compared to IoT-based systems that rely on Wi-Fi or cloud connectivity, GSM-based systems are often considered more robust in terms of network availability, though they may offer limited data transmission capabilities.

2.2 **Automated Paralysis Patient Monitoring System**

An automated paralysis patient monitoring system is a significant advancement in healthcare technology designed to provide continuous supervision and timely assistance to patients with severe mobility limitations. Traditional caregiving methods often rely heavily on manual observation, which can lead to delays in detecting emergencies or addressing patient needs. To overcome these challenges, automated systems integrate microcontrollers such as Arduino or ESP32 with various

biomedical sensors to monitor vital parameters like heart rate, body temperature, and sometimes oxygen levels. These systems operate with minimal human intervention, automatically analyzing sensor data and identifying abnormal conditions based on predefined thresholds, thereby ensuring faster and more reliable responses.

In the literature, researchers have explored multiple approaches to automation in patient monitoring, focusing on improving accuracy, efficiency, and ease of use. Many systems incorporate intelligent alert mechanisms that notify caregivers through communication technologies such as GSM, Wi-Fi, or mobile applications when irregularities are detected. Additionally, some designs include user input methods like push buttons or gesture recognition modules, allowing patients to communicate

their needs despite limited physical abilities. Automation also extends to features like real-time data logging, remote monitoring, and integration with digital displays, which provide instant feedback on patient status. These innovations help reduce caregiver workload while maintaining.

III. PROPOSED METHOD

Paralysis patients face significant challenges in their daily lives due to limited mobility and inability to communicate their needs effectively. They often depend heavily on caregivers for basic activities such as requesting food, water, or medical assistance. In many cases, patients are unable to call for help during emergencies, which can lead to delayed response times and potentially life-threatening situations.

Therefore, there is a need for an efficient, cost-effective, and user-friendly system that can continuously monitor the health status of paralysis patients and provide a reliable means of communication. The system should be capable of detecting abnormal conditions, generating immediate alerts, and enabling patients to express their needs using simple input methods such as gestures or buttons. Addressing these challenges will improve patient safety, enhance independence, and reduce the burden on caregivers by ensuring timely and responsive healthcare support.

IV. MODULES

In addition to health monitoring, the system automatically triggers alerts to caregivers. detected based on predefined threshold values and the patient's health condition. If any abnormality is detected, it is processed by the microcontroller to monitor thecontinuously collect real-time data, which includes temperature and oxygen levels. These sensors measure vital parameters like heart rate, body ESP32 with various biomedical sensors to integrates a microcontroller such as Arduino or patients with limited mobility. The system and an efficient communication mechanism for designed to provide continuous health monitoring and patient monitoring and assistance. The proposed system is an IoT-based paralysis incorporates user-friendly communication.

Them withareliablemeansofcommunicationand unable to speak or move freely, as it provides bnfca o ainswoaeodwtr reegnyassac. enables interface that وis especially .systems. Overall, the proposed solution provides a secure, tamper-proof, and efficient file-sharing environment with improved privacy, reliability, and scalability. In addition, the system supports efficient data sharing among multiple users by implementing dynamic access control policies through smart contracts. These policies can be updated or revoked in real time without affecting the decentralized storage, which also improves system scalability and availability, as files are distributed across multiple nodes rather than relying on a single server. Overall, the proposed system provides a robust solution for secure file sharing by combining decentralization, encryption, and automated access control. It significantly reduces the risks of data breaches, unauthorized access, and data loss, making it suitable for applications in healthcare, finance, education, and enterprise environments where data security and privacy are of utmost importance.

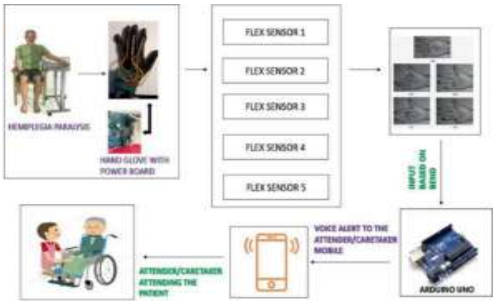

Figure 1:System Architecture

V. RESULTS

Fig. 2. : Display Screen

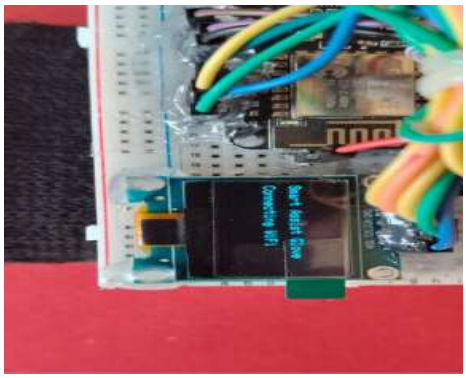

Fig. 3. . : Display Screen

Fig.4. : HelpDisplay Message

Fig. 5: Food Telegram Message

VI CONCLUSION

The IoT-Based Paralysis Patient Health Monitoring System with Hand Gestures is developed to assist paralysis patients in communicating their basic needs and monitoring their basic conditions effectively. The system allows patients to convey simple requests such as water, food, help, and emergency through hand gestures. These gestures are detected by sensors and converted into messages that can be displayed or sent to caregivers. At the same time, the system monitors important health parameters like water, food, help, Emergency alert, ensuring that the patient's condition is continuously observed. This prototype helps reduce the dependency of patients on constant human assistance and allows caregivers to respond quickly to patient needs. Overall, this paper demonstrates how IoT technology and gesture-based communication can improve the safety, comfort, and quality of life for paralysis patients

VII FUTURE SCOPE

In the future, this system can be enhanced by integrating advanced technologies to improve its functionality and reliability. A mobile application can be developed to send real-time alerts and health data to caregivers and family members from any location. Cloud technology can also be used to store patient health records for long-term monitoring and analysis by doctors. Artificial Intelligence can be implemented to improve the accuracy of gesture recognition and allow more complex communication options for patients. Additional medical sensors such as ECG, blood pressure, and fall detection sensors can also be included to provide more detailed health monitoring. Furthermore, the system can be developed as a compact wearable device, such as a smart glove or wristband, making it more comfortable and convenient for paralysis patients to use in their daily lives.

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