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Wireless Messaging System for Paralysis Patients

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ABSTRACT

In healthcare, those grappling with paralysis encounter immense hurdles in expressing their needs. Our Wireless Messaging System, featuring an LCD display, Bluetooth connectivity, and a buzzer, addresses this challenge head-on. This innovation empowers individuals with compromised motor functions, enabling effective communication. The LCD ensures clear messaging, while Bluetooth expands accessibility to compatible devices [1]. During emergencies, the buzzer prompts swift caregiver response. This project signifies a major stride in assistive technology, elevating the quality of life for those with mobility limitations. Through wireless communication, we aim to offer a dependable means of expression, ultimately enhancing the lives of individuals navigating these distinctive challenges [2].

Key words: Assistive Technology, Bluetooth Connectivity, Mobility Limitations, Motor Function, Paralysis, Wireless Messaging System.

1. INTRODUCTION

In today's dynamic healthcare landscape, there exists a critical need to bridge the communication gap confronting individuals contending with the challenges of paralysis. This formidable obstacle, stemming from compromised motor functions, demands innovative and effective solutions.

Introducing the Wireless Messaging System, meticulously designed for the specific needs of paralysis patients, represents a technological breakthrough poised to redefine how these individuals convey their essential messages [2]. By seamlessly integrating an advanced LCD display, robust Bluetooth connectivity, and an alerting buzzer, this system transcends the limitations imposed by conventional communication aids. The LCD display ensures the delivery of precise, legible messages, while Bluetooth technology extends accessibility to a wide range of compatible devices.

This project stands as a monumental achievement in assistive technology, promising to significantly elevate the overall quality of life for individuals contending with mobility limitations due to paralysis [5] [6]. Through the powerful medium of wireless communication, our mission is unequivocal to provide a dependable means of expression, ultimately enriching the lives of those navigating the distinctive challenges posed by paralysis. This Wireless Messaging System doesn't merely represent an advancement; it embodies a transformative stride forward in the pursuit of enhanced communication, autonomy, and a higher quality of life for those who need it most.

2. EXISTING SYSTEM

In earlier communication aid systems, infrared technology was commonly employed. These systems utilized an infrared transmitter, often worn on the user's body, and a receiver unit connected to a computer or display. The user would select predefined messages by aiming the transmitter at the receiver, which would then interpret the signal and display the corresponding message on a screen.

These systems were limited by line-of-sight requirements, meaning the transmitter had to be pointed directly at the receiver for successful communication. This posed challenges for patients with severe mobility limitations. Additionally, they often required extensive calibration and setup, which could be time-consuming [3].

While effective for some, these early aids were not as adaptable or user-friendly as modern solutions. The technology did not have the range and accessibility offered by Bluetooth in today's wireless messaging systems [5]. Furthermore, they lacked integration with portable devices like smartphones, limiting their functionality.

Advancements in Bluetooth technology have since revolutionized assistive communication aids, providing greater range, flexibility, and ease of use. This progress has significantly improved the quality of life for paralysis patients, allowing them to communicate more efficiently and effectively [4].

3. PROPOSED SYSTEM

The proposed System, featuring a user-friendly interface, offers a transformative solution for individuals with paralysis. It employs a keypad for message input on the transmitter side, with the Arduino seamlessly processing these inputs into a cohesive message. This message is then transmitted wirelessly through the HC-12 module.

On the receiving end, the HC-12 module captures and relays the message to the ESP32 microcontroller for further processing. The message is vividly displayed on the LCD screen, providing essential visual feedback. Additionally, an alerting buzzer ensures immediate attention. By integrating Bluetooth technology, the system's usability is expanded, allowing for remote access to received messages, significantly enhancing overall convenience and functionality. The system employs a Bluetooth terminal app to establish a connection with a mobile device, identified as 'paralysisbot'. Pairing is required for communication, utilizing Bluetooth Classic technology with a range of 100-200 meters for effective signal transmission.

This innovative system stands as a resolute answer to the distinct communication challenges encountered by individuals affected by paralysis.

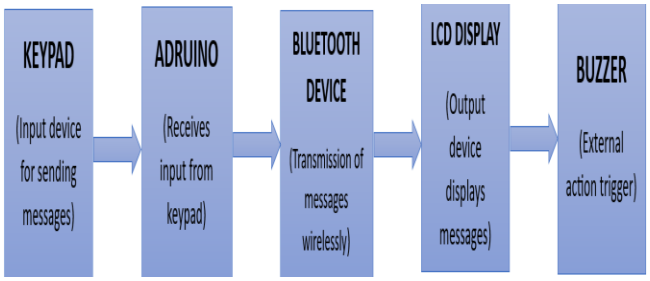

Figure 1 Block diagram of proposed system

3.1.Operation Flowchart

The operation flow of the Wireless Messaging System is illustrated in a detailed flowchart. It begins with the initialization of the HC-12 module on the transmitter side. The program then enters a loop to monitor keypad input.

This comprehensive flowchart elucidates the systematic operation of the system, from message creation to reception, ensuring a thorough understanding of its functionality [2].
On the transmitter side, the process begins with the initialization of the HC-12 module. The program then enters a loop where it checks for keypad input. If a key is pressed, it is transmitted via the HC-12 module. This loop continues to check for key presses and transmit them as necessary.

On the receiver side, the HC-12 module is initialized, and both the LCD display and buzzer are initialized. The program enters a loop to check for received data. If data is received, it is read, displayed on the LCD, and an audible alert is activated. This loop continues to ensure timely processing of received messages. The flowchart provides a comprehensive visual representation of the system's operation, aiding in understanding its sequential processes.

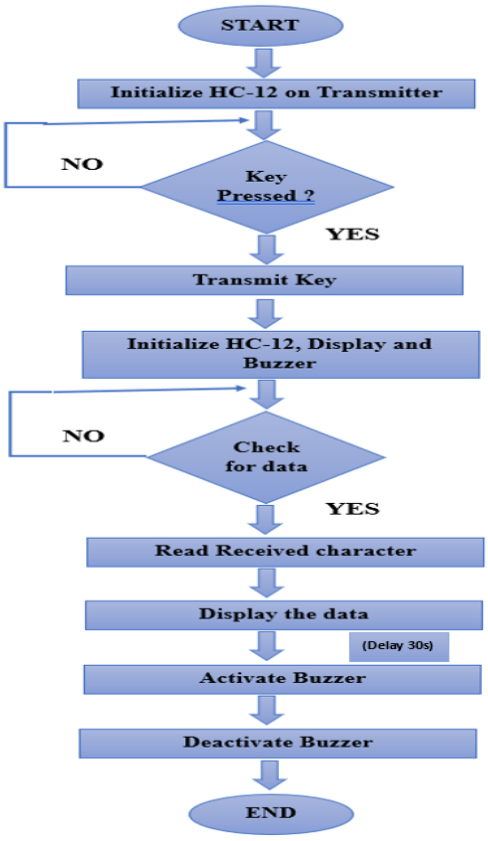

Figure 2 Flow Chart of the system

4. LITERATURE SURVEY

Wireless Brain-Computer Interface for Paralysis" by Lebedev et al. Introduces a wireless BCI system enabling individuals with paralysis to control computers and send messages using brain signals. Communication and Computer Access for People with Disabilities: A Survey" by Simpson et al. Provides a comprehensive overview of technologies, including wireless communication systems, aimed at enhancing communication for individuals with disabilities, including paralysis. Assistive Technologies for

People with Paralysis: From Internet to Communication" by Rajan et al. Reviews technologies, including wireless messaging systems, enabling internet access and effective communication for people with paralysis.

Towards a Paradigm Shift in Assistive Technology: Adaptive Self-Expressive Interfaces for ALS Patients" by Roda et al. Explores adaptive interfaces allowing ALS patients, including those with paralysis, to express themselves and communicate using alternative methods. Eye-Gaze Communication System for Paralyzed Patients" by Arefin et al. Proposes an eye-gaze communication system utilizing eye-tracking technology for paralyzed patients to compose and send messages wirelessly.

5. RESULT

We have successfully implemented a Wireless Messaging System tailored for individuals with paralysis. The system seamlessly integrates a transmitter circuit, featuring an Arduino microcontroller, keypad, and HC-12 transceiver module, with a receiver circuit comprising an ESP32 microcontroller, a 16x2 LCD display, a buzzer, and another HC-12 module [3]. Through the transmitter, users can input messages via the keypad, which are then transmitted wirelessly to the receiver. The ESP32 on the receiver promptly displays these messages on the LCD screen, Bluetooth Terminal app to which the system is connected and triggers a buzzer for emergency alerts.

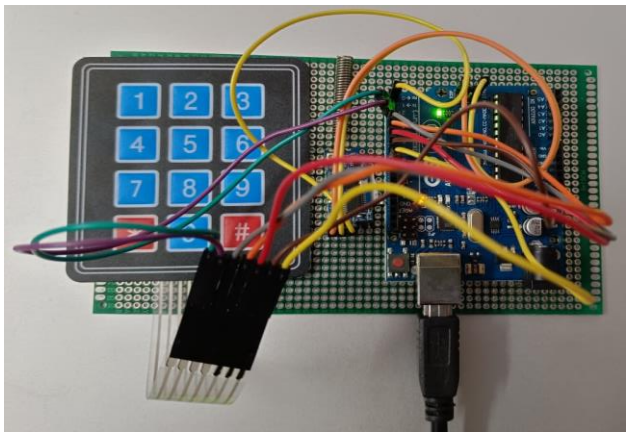

Figure 3 Transmitter side

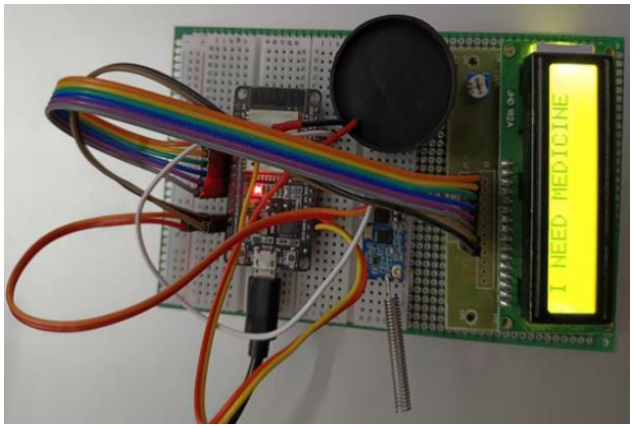

Figure 4 Receiver side

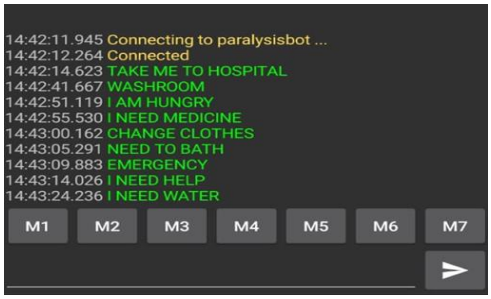

Figure 5 Bluetooth Terminal

This accomplishment represents a significant advancement in assistive technology, significantly improving communication for those with limited mobility.

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