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Head Gesture Based Wheel Chair with Health Monitoring

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ABSTRACT:

Mobility and health monitoring are critical for individuals with physical disabilities, and this project introduces a Head Gesture-Based Wheelchair System integrated with real-time health monitoring to enhance user independence and safety. The system utilizes an Arduino Uno microcontroller with an accelerometer sensor to detect head movements, enabling hands-free control of the wheelchair in forward, backward, left, and right directions. Additionally, a pulse sensor monitors the user's heart rate continuously. This data is displayed on an LCD and can be transmitted wirelessly using Bluetooth or Wi-Fi modules for remote health tracking and emergency response.

Keywords : Assistive Technology, Gesture Control, Health Monitoring, Arduino-Based System, Real-Time Tracking, MPU6050 Sensor, Pulse Sensor, LM35 Temperature Sensor, Mobility Aid, Accessibility Innovation.

Introduction:

Mobility and health monitoring are two critical aspects of improving the quality of life for individuals with physical disabilities, particularly those suffering from paralysis or severe motor impairments. Traditional wheelchairs, while essential for movement, often require manual or joystick-based control—posing challenges for users with limited upper limb functionality. Furthermore, the absence of integrated health monitoring increases the dependency on caregivers and limits early detection of medical issues.

Recent advancements in embedded systems, sensor technology, and wireless communication have enabled the development of intelligent assistive devices. In this context, gesture-based control systems offer a non-invasive, intuitive interface for users to interact with mobility aids. Head gesture recognition, in particular, leverages natural head movements to enable hands-free navigation, thereby promoting autonomy and dignity.

An additional feature of the system is a user-friendly website interface that stores and displays patient health data, including real-time temperature and pulse readings sourced from ThingSpeak. The website also supports emergency alert communication via WhatsApp Web, enabling caregivers and doctors to receive immediate notifications in critical situations. This enhances the responsiveness of the healthcare system, especially for users in home care or remote settings.

Methodology:

1.Hardware Setup:

- Arduino Uno as main controller.
- Accelerometer (e.g., MPU6050) to detect head gestures:
  - o Forward tilt = move forward
  - o Backward tilt = move backward
  - o Left tilt = turn left o Right tilt = turn right

• Motor driver (L298N) to control DC motors of the wheelchair.

• Ultrasonic sensor (e.g., HC-SR04) to detect obstacles in front of the wheelchair within a range of 100 cm.

• Buzzer connected to the Arduino to provide an audible alert when an obstacle is detected within the threshold distance.

• Pulse sensor to measure heart rate.

• Temperature sensor (e.g., LM35 or DHT11) to measure body temperature.

• WiFi module (ESP8266) to send health data to Thingspeak and the healthcare website.

2.Programming & Logic:

• Use Arduino IDE to program gesture control and sensor integration.

• Use threshold values from accelerometer to identify head directions.

• Program if an object is detected within 100 cm, activate the buzzer to alert the user.

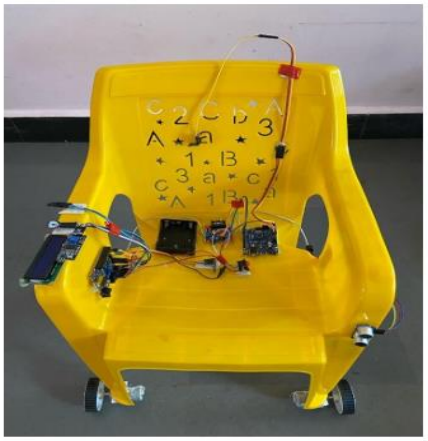
• Read data from health sensors and format for ThingSpeak.

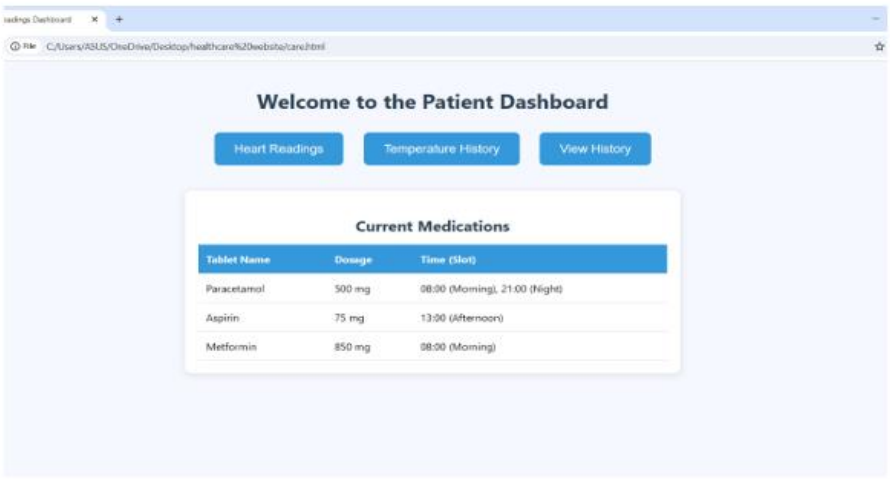
• Send data every few seconds to ThingSpeak via Wi-Fi.

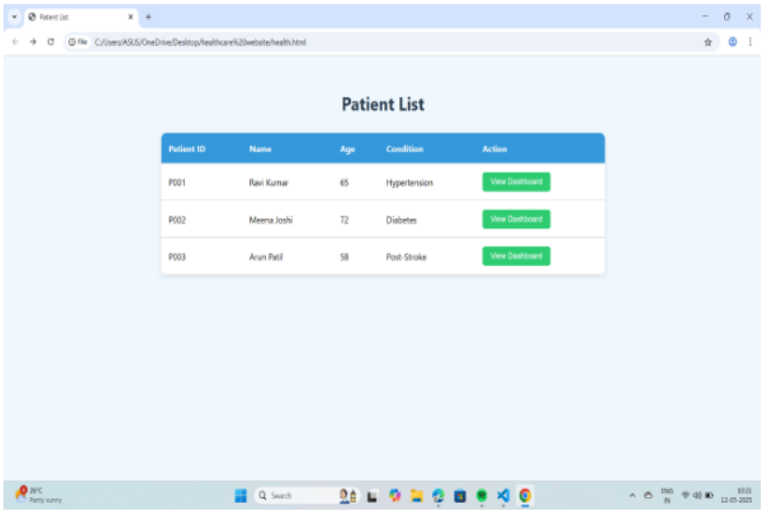
• Continuously monitor pulse and temperature readings. If values exceed predefined safe limits, trigger an automatic alert system to send messages to registered family members or caregivers.

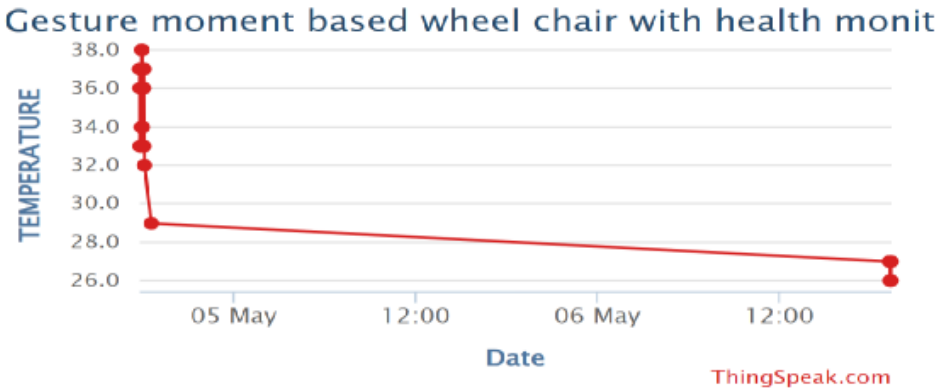
Results:

1. Wheelchair moves smoothly in 4 directions based on head movements.
2. Real-time pulse rate and temperature are displayed and stored on ThingSpeak.
3. Offers improved mobility and safety for physically challenged individuals.
4. Data can be accessed remotely by caregivers or doctors for monitoring.
5. Real-time health parameters are displayed on a healthcare website for better tracking and accessibility.
6. The system detects emergency conditions (abnormal pulse or temperature) and sends alert messages to family members or caregivers.









Conclusion

The gesture-based wheelchair with integrated health monitoring system provides an innovative and affordable solution for individuals with physical disabilities, especially those who are paralyzed or have limited hand mobility. By using head gestures detected through the MPU6050 tilt sensor, users can easily navigate the wheelchair without relying on hand operated controls. The inclusion of vital sign monitoring through a pulse sensor and LM35 temperature sensor ensures that the user's health condition is continuously tracked in real time. The system effectively combines mobility and healthcare assistance, enhancing user independence, safety, and confidence. With data visualization and remote monitoring enabled via the ESP8266 WiFi module and ThingSpeak platform, caregivers can stay informed about the user's condition anytime, from anywhere. Additional features like the push button for

emergency stops, object detection with ultrasonic sensors, and buzzer alerts make the system practical and user-friendly. Overall, this project demonstrates how smart assistive technologies can transform the lives of differently-abled individuals by improving their quality of life, reducing dependency, and promoting independent living.

REFERENCES:

List all the cloth used from numerous assets for making this venture proposal
Research Papers:

[1] D. Prasad, S. Raut, and R. Kokate (2018) developed a smart wheelchair controlled by head gestures using IoT for disabled people. DOI: 10.1109/ICSCET.2018.8537288
[2] K. V. Akshay, B. R. Nikitha, and H. C. Nagaraj (2019) designed a head gesture-controlled smart wheelchair with health monitoring features. DOI: 10.1109/ICCSP.2019.8697871
[3] N. Anusha and G. P. Kumar (2020) proposed an IoT-based health monitoring system for physically disabled individuals providing real-time data. DOI: 10.1109/ICACCS48705.2020.9074187
[4] M. V. Kumar, S. Roy, and A. Das (2019) implemented a smart wheelchair focusing on intelligent control for physically challenged people. DOI: 10.1109/ICCT46177.2019.8968937
[5] M. Singh and S. Rani (2021) developed a health monitoring and wheelchair movement system using IoT and Arduino to assist disabled persons. DOI: 10.1109/ICOEI51242.2021.9453132
[6] H. Gupta, A. Agrawal, and D. Goyal (2022) designed an IoT-based health monitoring and wheelchair control system using Arduino and ESP8266. DOI: 10.1109/ICIEM54373.2022.9753796
[7] R. K. Yadav and P. Shrivastava (2017) created an intelligent head gesture-controlled wheelchair with obstacle avoidance for safer navigation. DOI: 10.1109/ICPCSI.2017.8392104