A Prototype Robotics Wheelchair with An IOT Based Paralyzed Patient Health Care Monitoring System

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Abstract

This project presents an implementation of wearable, portable, low power consumption, real-time remote bio-signals monitoring system based on the internet of thing technology. This internet technology along with modern electronic devices could offer promising solutions in this field. Based on that, this project utilizes a web or mobile application as an IoT platform to monitor remotely the live pulse rate signal, BPM and the body temperature of patients. The signals are measured and processed by using a microcontroller-based device (Arduino). The main contribution of this paper is sending an electrocardiogram to a web or mobile phone to be watched by a doctor. If some abnormal conditions are detected, the IoT alert send to doctor and relations, This assists in heart diseases diagnosing before the worst case can happen. Finally, the obtained results of this project are illustrated on both smartphone and personal computer (PC) as well.

Index Terms— Microcontroller, LCD, flex sensor, remote sensor, ultrasonic sensor ,temperature sensor , cloud connectivity, data processing ,IoT

INTRODUCTION

In a world where technology's embrace extends to even the most intricate aspects of our lives, a new era of healthcare and mobility has dawned. We proudly present an innovation that transcends boundaries: an IoT-based patient healthcare monitoring system seamlessly integrated with a smart wheelchair, designed specifically to empower and enhance the lives of paralyzed individuals at its core, this system leverages an array of advanced sensors, embedded within both the patient's wheelchair and their own wearable devices. These sensors tirelessly monitor crucial health metrics, such as heart rate, respiratory rate, body temperature, and even posture. By harnessing the innovation extends beyond health monitoring. The smart wheelchair, intricately connected to the IoT ecosystem, adds an element of unparalleled mobility. Designed with the unique needs of paralyzed individuals in mind, this wheelchair offers intelligent navigation, obstacle detection, and even self-adjusting seat positions. The fusion of mobility and monitoring paints a new horizon of independence.In the realm of healthcare and mobility, this IoT-based patient healthcare monitoring system, accompanied by the ingenious smart wheelchair, represents a paradigm shift. It's a fusion of technology and compassion that breaks barriers and uplifts lives. Welcome to the future of care, where innovation is the bridge between health, mobility, power of the Internet of Things (IoT), this vital data is seamlessly transmitted to a central hub, empowering caregivers, healthcare professionals, and patients alike with instant.

Background:

The robotics aspect of the wheelchair involves motorized wheels or actuators that allow the user to control the wheelchair's movement with ease. These motors can be operated through various methods, such as joystick controls or even voice commands, making it more accessible for individuals with limited mobility .The IoT-based patient healthcare monitoring system is a crucial component of this prototype. It involves the integration of sensors, connectivity, and data processing capabilities. Sensors placed on the wheelchair and the user's body can monitor various health parameters, such as heart rate, blood pressure, body temperature, and even posture. These sensors transmit data to a central hub or a cloud-based platform via wireless connectivity, such as Wi-Fi or Bluetooth .The collected health data is then processed and analyzed in real-time. The system can raise alerts or notifications if any anomalies are detected, allowing caregivers, healthcare professionals, or family members to intervene if necessary. This proactive approach to health monitoring can help prevent potential health issues and provide timely medical attention.

OBJECTIVE:

The objective of creating a prototype robotic wheelchair with an IoT-based patient healthcare monitoring system is to enhance the mobility and independence of individuals with mobility challenges, while also providing real-time monitoring of their health vitals and status. This integrated system aims to improve the overall quality of life for users by combining advanced robotics, IoT technology, and healthcare monitoring, ensuring safety, comfort, and timely medical intervention when needed. improving their overall well-being and fostering a sense of belonging within the community.

the prototype robotics wheelchair with an IoT-based patient healthcare monitoring system combines advanced robotics, sensor technology, and connectivity to create a versatile and intelligent assistive device. It enhances the user's mobility while simultaneously ensuring their health and well-being through continuous monitoring and early intervention.

LITERATURE REVIEW:

TITLE: 1.Safety wheel chair for paralysis patien 2.patient health monitoring system

AUTHOR: Issa saleh Ali ,Vidhya Lavanya ,aniloy Frank , Rachana

DESCRIPTION:

The objective of the prototype wheelchair with a healthcare monitoring system for paralyzed patients is to provide comprehensive care and support to individuals with limited mobility. This involves designing a wheelchair that integrates advanced sensors and technology to monitor vital signs, pressure points, and body positioning. The system aims to enhance patient safety, prevent complications like pressure ulcers, and enable caregivers and healthcare providers to remotely monitor the patient's health status for proactive interventions.

The robotics wheelchair features advanced autonomous navigation, allowing seamless movement both indoors and outdoors. Its ergonomic design guarantees maximum comfort and ease of use. The IoT-based healthcare monitoring system is seamlessly integrated, providing continuous health data collection and analysis.

EXISTING SYSTEM:

The project utilised telecommunications technology, and GSM module SIM900A was employed in this project to include telecommunications progression. A few circuits and pieces of software are utilised simultaneously to control all the primary and auxiliary devices. A few parts are utilised, including a microcontroller and a GSM module. The patient will be able to communicate anything they wish using the GSM module by sending a message by utilising the gesture sensor. This sensor's purpose is to allow the patient to communicate by simply moving the body part to which it is fastened.

In addition, the data will be shown on the LED screen so that we can understand what the patient is trying to say.

Some of the existing systems are;

1.Vital Signs Monitoring: Sensors for heart rate, blood pressure, and oxygen saturation levels can help monitor the patient's overall health.

2.Fall Detection and Prevention: Accelerometers and gyroscopes can detect falls or sudden movements, triggering alerts for caregivers.

3.Remote Monitoring: Caregivers and healthcare providers can access real-time data through a mobile app or web portal, enabling timely interventions.

4.Emergency Alerts: In case of emergencies, the system can send alerts to caregivers or medical professionals.

5.Navigation and Control: The wheelchair might incorporate smart navigation features for easier movement and control.

PROPOSED METHODOLOGY:

When a patient has a spinal cord injury, a stroke, or any ailment that affects the human body's neurological system, they are said to be in a paralysed state. A patient who meets the criteria

for this condition is regarded as handicapped. Rehabilitation of paralysed people is challenging since even the smallest change goes unnoticed, taking days, weeks, or even years to complete. Due to the existing

circumstances, onlookers or medical professionals are unable to detect any aberrant conditions or minute body movements that serve as always-unnoticed life-saving signs.

SYSTEM REQUIREMENTS:

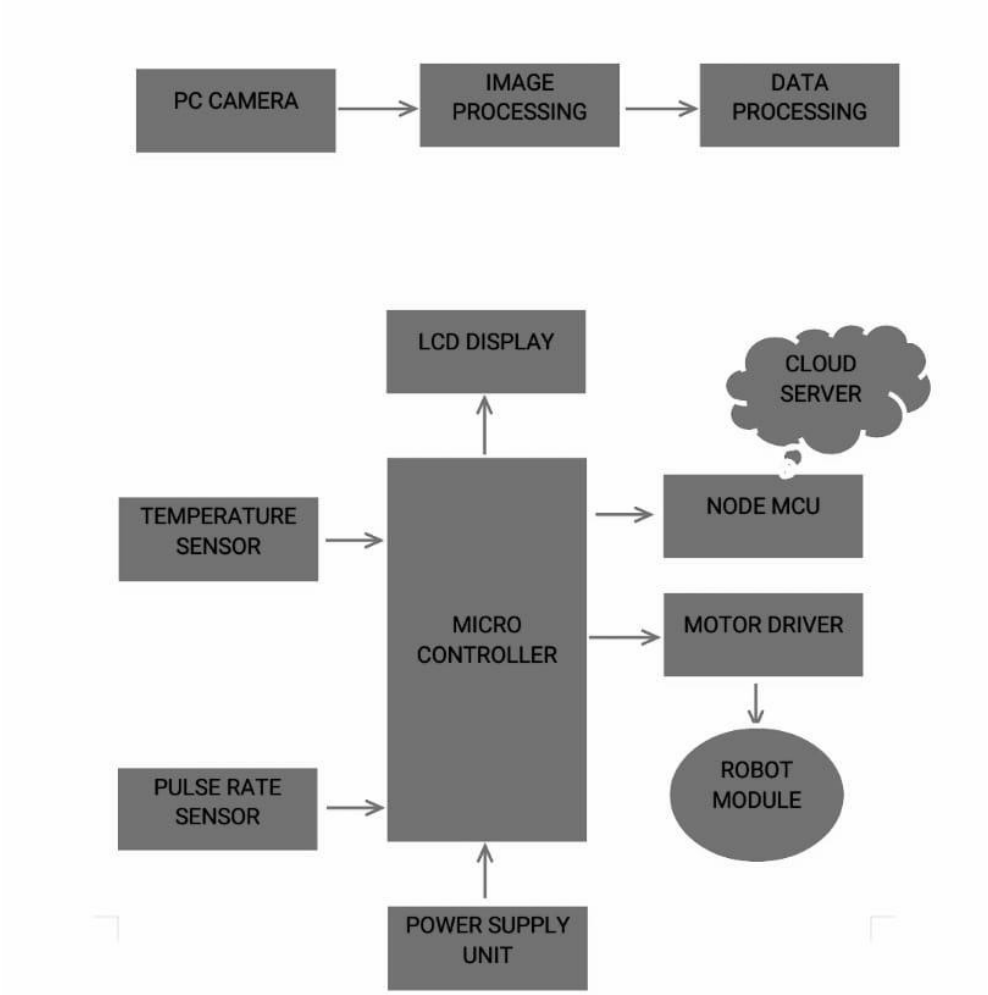
SOFTWARE TOOLS

- Arduino IDE
- Embedded C
- PHP MY SQL
- Python

HARDWARE TOOLS

- Micro controller
- Wi-Fi
- Temperature Sensor
- Pulse Rate Sensor
- Motor Driver
- Robot Module
- LCD display
- Monitoring unit
- Power supply unit

BLOCK DIAGRAM :



RECEIVER SIDE:

BENEFITS :

Enhanced Mobility: The robotics wheelchair allows patients with limited mobility to move around more independently, improving their overall quality of life.

IoT Healthcare Monitoring: The integrated monitoring system continuously tracks vital signs, medication schedules, and other health parameters, providing real-time data to healthcare providers and ensuring timely interventions.

Safety: The robotics wheelchair can have obstacle detection and collision avoidance features, reducing the risk of accidents and enhancing the user's safety.

Remote Monitoring: Caregivers and medical professionals can remotely monitor the patient's health status and receive alerts in case of emergencies, enabling quicker response times**.**

Data-Driven Insights: The collected data can be analyzed to identify trends and patterns in the patient's health, leading to better-informed medical decisions.

Improved Patient Comfort: The robotics wheelchair can be designed for optimal ergonomic comfort, reducing discomfort and potential health issues caused by extended periods of sitting.

Future Scope:

Developing a prototype robotics wheelchair with an IoT-based patient healthcare monitoring system could greatly enhance mobility and care. It has the potential to improve the quality of life for individuals with mobility challenges while providing real-time health data to caregivers or medical professionals. This combination of technology could lead to safer and more efficient patient care in the future.The prototype serves as a foundation for future advancements in robotics and healthcare technology, potentially leading to even more sophisticated solutions.

Conclusion:

. In conclusion, the development of a prototype robotic wheelchair integrated with an IoT-based patient healthcare monitoring system marks a significant advancement in enhancing the quality of life for individuals with mobility challenges. This innovative solution not only provides increased independence and mobility but also offers real-time monitoring of vital health parameters, ensuring timely medical intervention when necessary. By seamlessly integrating robotics and IoT technology, this prototype showcases the potential for a more integrated and holistic approach to patient care and well-being. As this field continues to evolve, further refinements and enhancements can be expected, ultimately contributing to a more inclusive and technologically advanced healthcare landscape. This innovative solution combines the functionalities of a state-of-the-art wheelchair with real-time patient monitoring, offering numerous benefits for both patients and healthcare providers.The integration of robotics technology into the wheelchair design has shown the potential to greatly enhance the mobility and independence of individuals with mobility impairments. The prototype's advanced navigation and obstacle avoidance features ensure safe and efficient movement, allowing users to navigate various environments with ease. This not only improves the quality of life for wheelchair users but also reduces the physical strain on caregivers, as well as the risk of accidents.

The IoT-based patient healthcare monitoring system further extends the capabilities of the prototype. By collecting and analyzing real-time health data, such as heart rate, blood pressure, temperature, and more, the system provides a comprehensive view of the patient's well-being. This enables timely detection of any abnormalities or changes in health status, allowing for prompt medical intervention when needed. The system's remote monitoring capability facilitates continuous observation even when healthcare professionals are not physically present, ensuring a higher level of patient care. While the prototype demonstrates significant promise, there are certain considerations that need to be addressed for its successful implementation. These include ensuring the system's data security and privacy, optimizing the user interface for ease of interaction, and addressing any technical challenges that may arise during real-world usage. Additionally, the cost-effectiveness and accessibility of the technology must be taken into account to ensure its widespread adoption.

the integration of a prototype robotics wheelchair with an IoT-based patient healthcare monitoring system has the potential to revolutionize the way individuals with mobility impairments are cared for. This cutting-edge solution not only enhances mobility and independence but also enables proactive and personalized

healthcare monitoring. With further refinement and development, this technology could significantly improve the quality of life for patients and provide valuable insights for healthcare professionals.

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