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Smart Wheel Chair

Dr. P. Venkata Rao[1], G. Krupa Rani[2], K. Vinodh Kumar[2], B. Sandeep[2], G. Ajay Kumar[2]

[1]Professor, Department of ECE, Godavari Institute of Engineering and Technology (A), Rajahmundry, Andhra Pradesh, India
[2]Department of ECE, Godavari Institute of Engineering and Technology (A), Rajahmundry, Andhra Pradesh, India

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ABSTRACT

Individuals with disabilities and/or elderly individuals need aid in their mobility. Typically, a wheelchair is a gadget that provides assistance. Conventional wheelchairs are controlled manually and have a significant weight, which increases the load on the user. Therefore, wheelchairs that are automated and include sensors and a data processing unit are con-sidered a distinct category of wheeled mobile robots, sometimes referred to as "smart wheelchairs". The current technology utilizes a joystick to con-trol the movement of the wheelchair, with buttons being used to initiate and cease wheel motion. It is challenging for those with disabilities to accu-rately push the necessary button. Despite the existence of smart wheel-chairs equipped with gesture control, they suffer from a deficiency in accu-rately determining their position. The suggested technology is a novel inte-gration of a wheelchair and a health monitoring system. The wheelchair may be operated in both manual and automated modes. In manual mode, the wheel is operated using a joystick, while in automated mode, the direc-tion of the wheel is controlled by gestures utilizing an MPU6050 sensor and accelerometer. The SPO2 sensor, which is connected to the wheelchair, is used to gather health information. Therefore, facilitating the individual's self-reliance. The important data is saved in a different location, while the analysis report is accessible via an internet application. The data is collected and supervised using Internet of Things (IoT) technology, and it can be accessed by the user using the BLYNK application. The patient's vital signs are regularly updated and may be accessed online at any time, serv-ing as their digital health record.

Keywords: IOT, SPO2,Smart WheelChair, MPU6050 sensor and accele-rometer, BLYNK.

1. INTRODUCTION

In the 21st century, human existence is getting more fast-paced and advanced. Currently, there is a widespread pursuit of technology and its advancements. Given the fast speed of modern life, it is easy for the average person to keep up with technology. However, we must consider the impact for those with disabilities in our society. Within society, individuals are engrossed in their own endeavors, while handicapped and elderly individuals rely on others for their movement. There are just a limited number of individuals who provide adequate care for these individuals. To enhance their autonomy and address their mobility needs, we proposed the development of an autonomous wheelchair. Operating a wheelchair in our surroundings poses a difficulty for those who rely on their arms or

hands. The wheelchair is designed to address these issues. The automatic wheelchair is a convenient mode of mobility for those with physical disabilities. The art depicts a wheelchair that is operated using hand gestures utilizing the technology of gesture control. Wheelchairs are used by the elderly population and anyone with disabilities or injuries. The primary objective of this initiative is to promote independence among the elderly and those with physical disabilities. The wheelchair may be operated by the user using their gestures.

2. LITERATURE SURVEY

M.S. Arsha, et al[1]. Has suggested the development of a voice-controlled wheelchair for those with physical disabilities. The mobility of the wheelchair is facilitated by using Arduino, a microprocessor, and a Geetech speech recognition module. The Arduino will operate the motors according to the provided instructions.

Chowdhury, et al[2]. Intelligent wheelchair designed for those with disabilities. This prior art describes the development of a smart wheelchair designed specifically for those with disabilities. The wheelchair is operated via the use of specific instructions. The claims they have made include that if a user encounters a hazardous scenario, an emergency notification will be sent to them.

Noman, A. T., et al[3]. Proposed is a novel design approach for a gesture-controlled smart wheelchair that utilizes a microcontroller. The 2018 International Conference on Innovations in Science, Engineering, and Technology. The wheelchair may be operated and its direction controlled by using the smartphone's built-in gesture feature and the TTP224 touch sensor.

Shayban Nasif et al[4]. The project titled "Wireless Head Gesture Controlled Wheelchair for Disabled Individuals" is being conducted at the Electrical and Electronic Engineering (EEE) department at Rajshahi University. This project involves the creation of a wheelchair that can be operated without the need of hands, specifically designed for those with physical disabilities. The system operates by using the Head Gesture Recognition Technique, which relies on an Acceleration sensor.An acceleration sensor is used for gesture detection, while an RF module is utilized for smart wireless control.

Soni, G. K., et al[5]., The suggested task is to create and implement a system that uses hand gestures to control the direction of a wheelchair. This will be achieved by using an AVR microcontroller for processing and control. Their system offers real-time recognition and utilizes the Glove approach to collect hand gesture data. This technique enables the operation of the wheelchair by hand motions, using the accelerometer sensor.

3. OVERVIEW OF EXISTING SYSTEM

Smart and intelligent wheelchair systems are assistive technologies that merge a power wheelchair, equipped with motors for mobility, with a computer system and sensors. Advanced machine learning technology enables seamless interaction between the wheelchair system and the user. These wheelchairs are specifically designed to improve the mobility and self-reliance of those with impairments. A prevalent characteristic seen in these wheelchairs is the use of sensors. Currently, all the available systems use wheelchairs that are controlled by voice commands or operated using a joystick. Voice-controlled wheelchairs use sensors to detect orders spoken by the patient and operate accordingly. Joystick-controlled manual wheelchairs that may be operated by either the patient or a caregiver.

4. PROPOSED SYSTEM

The suggested system of intelligent wheelchairs aims to integrate cutting-edge technology in order to improve functioning and enhance the user experience. The objective of these suggested systems is to tackle particular difficulties encountered by persons with impairments and provide inventive solutions. An integral component of the proposed system is the use of sophisticated sensors. The suggested device utilizes artificial intelligence to function and represents a distinctive fusion of a wheelchair and a health monitoring system. The wheelchair may be operated in both manual and automated modes. In manual mode, the wheel is operated via a joystick, while in automated mode, the direction of the wheel is controlled by gestures utilizing an MPU6050 sensor and accelerometer. The SPO2 sensor, which is connected to the wheelchair, is used to gather health information. Therefore, facilitating the individual's self-reliance. The critical data is saved in a distinct location, while the analysis report is accessible via an internet application. The data is collected and supervised using Internet of Things (IoT) technology,

and may be accessed by the user using the BLYNK application.

Components Used in the Proposed System:

- ARDUINO NANO
- ESP32
- NRF24 MODULE
- MPU6050 SENSOR
- L298N MOTOR DRIVER
- JOYSTICK MODULE
- MAX30100 (PULSE OXIMETER)
- DHT11 SENSOR
- DS18B20 SENSOR
- BATTERY
- 12V DC MOTORS

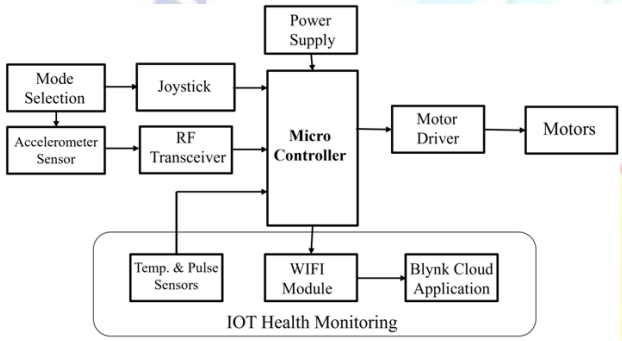

Fig1: Proposed Block Diagram

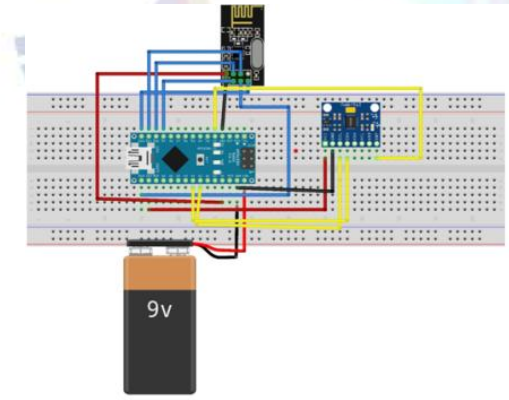

Fig2: Circuit Diagram Transmitter

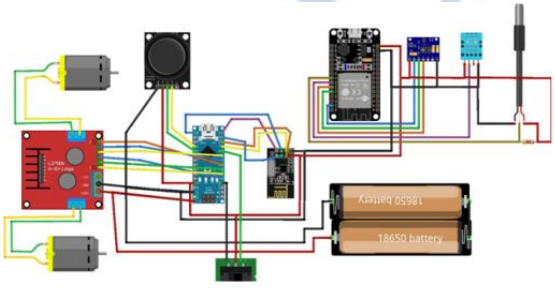

Fig3: Circuit Diagram Receiver

5. RESULTS AND DISCUSSIONS

MODE SELECTION: user can select the mode either Manual or Automatic.

Table1: Manual Mode: wheelchair operated through Joystick

Joystick Module	Wheelchair direction
↑	Forward
↓	Backward
←	Left
→	Right
Middle of the axis	Stop

Table2: Automatic Mode: wheelchair operated through head gestures.

Head Gestures	Wheelchair Direction
Tilt front	Forward
Tilt back	Backward
Tilt left	Left
Tilt right	Right

Health Monitoring:

MAX30100 Sensor: Detects patients pulse and Spo2 levels

DHT11 : Detects Temperature and Humidity

DS18B20: Detects Patients Body temperature

All the above data can be monitored via Blynk App communicated with ESP32.

Fig4: Transmitter: Receiver

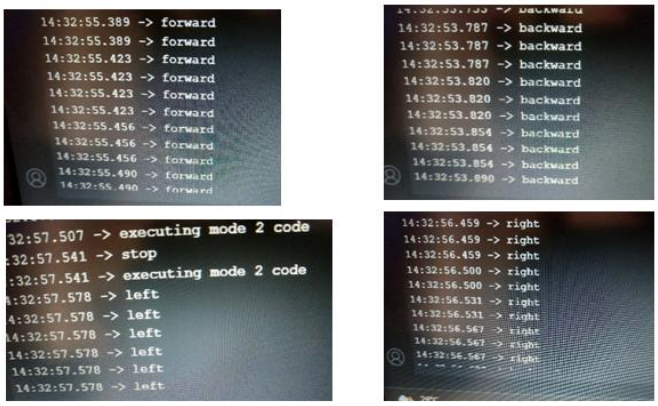

Fig5: Serial Monitor Outputs

Fig6: HEALTH MONITORING: (Blynk App Output)

6. CONCLUSION AND FUTURE SCOPE

A preliminary iteration of the suggested system has been constructed. This demonstrates the integration of a wheelchair and a health monitoring system into a single cohesive unit. The availability of both automated and manual modes allows the user to use the wheelchair according to their preference and convenience. The inclusion of SPO2 and DHT11 sensors on the operational board enables the measurement of the patient's vital signs without the need for external intervention. The patient is responsible for measuring and updating their health indicators, including temperature, blood oxygen level, and heart rate, in the BLYNK App designed for their own digital health chart. The BLYNK App allows for monitoring of all this data from both PCs and phones, using the implementation of IoT. Additional enhancements may be implemented to this system in order to enable remote control of smart devices without physical displacement. By use of automation, both passive and active equipment may be engaged and operated using a master controller attached to the wheelchair. In addition, the chair is equipped with the capability to connect speakers or headphones, allowing for the playback of calming music without requiring an external audio system.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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