

# Smart Wheelchair For Old And Disabled People

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## ABSTRACT

In today's world, many people are suffering from certain permanent disabilities due to accidents, paralysis, or, old age. They often depend on others for help concerning movement. But they can become self-independent and perform some daily activities on their own with the help of a Smart wheelchair. It is a MEMS(Microelectromechanical system) based wheelchair along with IOT support for their assistance. It not only helps in mobility but is also helpful for such people who are not able to speak and want to convey their basic needs.

## Keywords

Disabled ; self independent ; Smart Wheelchair ; MEMS ; IOT

## 1. INTRODUCTION

The World Health Organization (WHO) estimates that out of the 650 million people with disabilities in the world, around 10 million require wheelchairs for their day-to-day mobility. This highlights the importance of finding innovative solutions to improve the quality of life for individuals with disabilities. The proposed system is a groundbreaking approach that uses physical hand gestures to generate electrical signals, which are then converted into digital signals of appropriate magnitude and transmitted through a transmitter. This new technology represents a significant advancement in the field of assistive devices, providing greater accessibility and independence for individuals with disabilities. The use of stone commands, or a mortal machine interface, allows users to control the wheelchair with simple hand gestures, improving the ease of use and mobility for the user. The paper provides a necessary solution for individuals who experience difficulty moving due to paralysis, amputation, or injury. The proposed wheelchair design can make a real difference in the lives of those who need it most, by providing a greater sense of independence and accessibility to those who may have limited mobility. The proposed wheelchair is an excellent example of how technology can bring comfort and ease to those in need. Historically, technology has often been a source of difficulty for individuals with disabilities. However, this design represents a paradigm shift in the interaction between humans and machines, bringing together technology and affordability for the betterment of society. In summary, the proposed wheelchair design represents a significant

advancement in assistive technology for individuals with disabilities. By translating physical hand gestures into electrical signals, the system provides greater accessibility, independence, and ease of use for users. The paper highlights the potential benefits of this technology, providing a crucial solution for those who experience difficulty moving due to paralysis, amputation, or injury.

## 2. METHODOLOGY

### 2.1 MEMS System

The Proposed System works for two applications first and for most applications is motion detection, Second application is an IOT system. Using Micro electro mechanical system and Internet of things all the above applications will be constructed. System will be examined with different sets of motion which will result in movement of wheel chair in different directions. Hardware is capable of pre-processing the acquired data and it will transmit that data to mobile application. In this Hand Gesture Controlled Wheelchair an ADXL345 accelerometer is used as a sensor which will be giving analog signal on moving it in X, Y, Z axis respectively. Radio Frequency transmitter is used to transmit the signal wirelessly

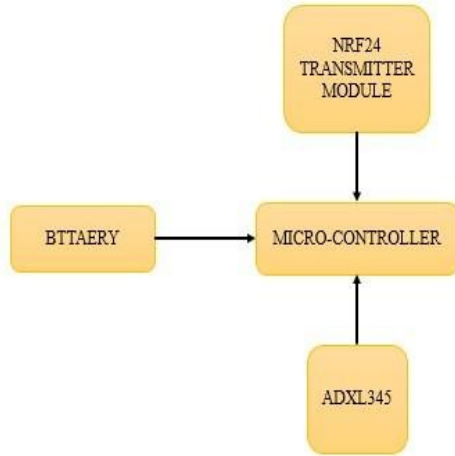


Figure 1 : MEMS Transmitter

Now the receiver receives the signal and it is further sent to microcontroller as an input. After receiving an input signal, the microcontroller compares the data that has been preinstalled in the controller. If the input data matches the preinstalled data then the signal is given to L298N IC on receiving the signal the L298N IC gives the signal to relays and then the wheelchair starts moving.

The motor used in the wheelchair is permanent magnet 12 volt DC motor. The wheelchair will move forward when both of its wheels rotate in a forward direction. Conversely, the wheelchair will move backward if both wheels rotate in a backward direction. When left motor rotates and right motor shaft is stationary then the wheelchair moves in right direction, and when right motor rotates and left motor is stationary then the wheelchair moves in left direction.

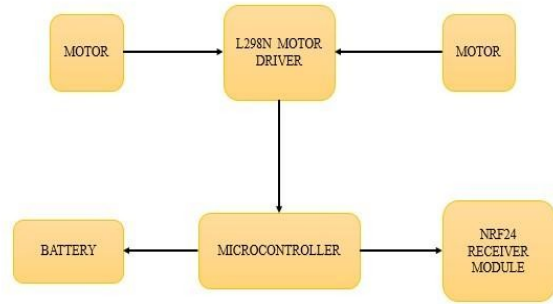


Figure 2: MEMS Receiver

## 2.2 IOT System

The IOT based gloves have been developed as a means for patients to communicate with their caretakers, nurses, or loved ones remotely. The gloves incorporate a micro-controller based circuit, including a hand motion recognition circuit, a transmitter circuit, and a receiver circuit. The hand motion circuit is designed to detect hand movements using an accelerometer sensor, which is then wirelessly transmitted to the receiver circuit through radio frequency. Once the receiver circuit receives these commands, they are displayed on an LCD display and transmitted online to an IOT server. This allows the patients' messages to be displayed online, providing an effective means of communication between the patient and their caretakers, nurses, or loved ones. The Internet of Things (IOT) is a network of physical objects embedded with electronics, software, sensors, and network connectivity. This allows these objects to collect and exchange data, enabling more direct integration between the physical world and computer-based systems. With the IOT, objects can be sensed and controlled remotely, leading to improved efficiency, accuracy, and economic benefits. In the context of the IOT based gloves, this technology is used to facilitate communication between the patient and their caretakers, nurses, or loved ones, providing an effective means of conveying messages remotely. The use of the accelerometer sensor and wireless communication enables the system to detect hand movements and transmit them to the receiver circuit, allowing the patient's messages to be displayed on an LCD display and transmitted online to the IOT server. Overall, the IOT based gloves represent a significant advancement in assistive technology, providing an effective means of communication between patients and their caretakers, nurses, or loved ones. The use of the IOT allows for improved efficiency, accuracy, and economic benefits, while the incorporation of hand motion recognition technology enables the system to detect hand movements and convey messages wirelessly.

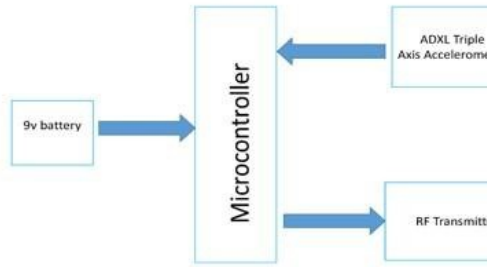


Figure 3: IOT Transmitter block diagram

### 3.3 Better accessibility and integration:

Electric wheelchairs could be designed to integrate more seamlessly with other assistive devices and technology such as home automation systems, mobile apps, and wearable sensors. This could help users to maintain greater independence and control over their daily lives.

### 3.4 Enhanced safety and security:

Electric wheelchairs could be equipped with advanced safety features such as emergency braking systems, anti-tip mechanisms, and obstacle detection sensors.

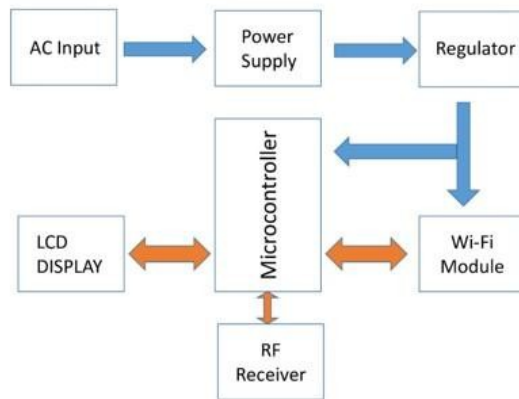


Figure 4: Receiver block diagram

## 3. DISCUSSION AND FUTURE SCOPE

### 3.1 Improved mobility and navigation:

Electric wheelchairs could be equipped with advanced sensors and artificial intelligence that allow them to navigate complex environments more easily. This could include the ability to avoid obstacles, detect changes in terrain, and adjust speed and direction automatically.

### 3.2 Greater comfort and customization:

Electric wheelchairs could be designed with a greater focus on user comfort and customization. This could include features such as adjustable seating, cushioning, and backrest, as well as customizable control interfaces and settings.

### 3.5 Sustainability and environmental impact:

Electric wheelchairs could be designed with a greater focus on sustainability and reducing their environmental impact. This could include the use of more efficient batteries and motors, as well as the ability to be charged using renewable energy sources such as solar or wind power.

## 4. CONCLUSION

We successfully implemented the prototype of the proposed system and our chair was moving in accordance with the hand gestures and also we were able to display the required message on LCD screen .

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