# Prototype of Next-Gen Multi-Purpose Wheelchair with Gesture Control for Enhanced Mobility

[1]P. Varun Teja, [2]V. Kusaraju, [3]M. Dileep Kumar, [4]M. G. Sai Swamy, [5]K. Ramprasad

[1,2,3,4]Students, Department of Mechanical Engineering, N. S. Raju Institute of Technology, Affiliated to JNTUGV, AP, INDIA
[5]Assistant Professor, Department of Mechanical Engineering, N. S. Raju Institute of Technology, Affiliated to JNTUGV, AP, INDIA

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**ABSTRACT -**

The Next-Gen Multi-Purpose Wheelchair with Gesture Control is designed to help people with disabilities move easily. It feels more user-friendly because it commands movement using hand gestures. Safety is assured with a crisis notification system and sensors that identify difficulties to avoid incidents. This clever and reasonably priced wheelchair increases being independent and improves everyday mobility.

Technology has make a drastic change in the medical field but there are still some people facing some problems. This completely automated wheelchair was designed with patients and senior citizens in mind. In addition to being an intelligent wheelchair, this an Arduino UNO-controlled deception wheelchair with the aid of a few specialized tools and systems. The Arduino is programmed to receive commands from voice recognition module and smartphone (Bluetooth) and operate the motor driver and motors. This was made to address various mocking issues, like the difficulty physically challenged individuals have moving and the energy patients waste pushing a manual wheelchair. In addition, pushing the wheelchair alongside the patient wears the helper out. Additionally, patients frequently sustain injuries when moving from a wheelchair to a bed.

Keywords: Smart wheelchair, Deception, Arduino UNO, Motor, Motor driver, low cost and disability.

## INTRODUCTION -

Multipurpose wheelchairs improve mobility and freedom by fusing the latest innovations with adaptability. They make life simpler for personnel and users by providing a variety of demands. It control improves accessibility by enabling people to control gadgets with hand gestures. It makes navigating in wheelchairs easier. Generally, the communication port is the parallel port which takes the commands given to the wheel chair in the form of electrical signals. Four wheels are used in the wheel chair for proper balancing. A wheelchair is a transportation device used by people who have difficulties walking due to medical conditions or disability. Either rotating the wheels or using the grips will move it. Wheelchairs come in a wide variety of forms and possibilities nowadays, including motorized wheelchairs, transport wheelchairs, and manual wheelchairs. In general, a wheelchair is made up of mechanical parts such the seat and back upholstery, castors, armrests, footrests, and hand rims. Yet, the current wheelchair has drawbacks, such as not being mechanically sufficient to satisfy user needs. Wheelchairs have since advanced in many ways, such as being easy to use, having more options, being lightweight, and having adjustable seats. Improving life style of the physically challenged people to a great extent. In recent times there have been a wide range of assistive and guidance systems available in Wheelchair to make their life less complicated. In recent times there have been various control systems developing specialized for people with various disorders and disabilities. The systems that are developed are highly competitive in replacing the old traditional system.

Application of Automatic Wheelchair:

- Hospitals
- Health care center
- Old age home
- Physically handicapped individuals
- In industries as robot to carry goods.
- Automatic gaming toys.
- Communication
- Control of Mechanical systems
- Sports
- Feedback in Computer Based Learning environment

**PROBLEM STATEMENT -**

A handicapped person with locomotive disabilities needs a wheelchair to perform functions that require him or her to move around. User can do so manually by pushing the wheelchair with his hands. However, many individuals have weak upper limbs or find the manual mode of operating too tiring. Hence it is desirable to provide them with a motorized wheelchair that can be controlled by a mobile app interface. Since the motorized wheelchair can move at a fair speed, it is important that it be able to detect obstacles automatically in real time. All this should be achieved at a cost that is affordable for as many handicapped people as possible, as well as for organizations that support them. With these requirements in mind, we propose an automated wheelchair using IoT with real-time obstacle detection capability

**METHODOLOGY -**

Preliminary ideas were gathered from different sources of literature and evaluated before the wheelchair was designed. Catia v5 software was used to design. Prototype of Next-Gen Multi-Purpose Wheelchair with Gesture Control for Enhanced Mobility. The design was built at the workshop of the Mechanical Engineering Department. we use Catia V5 software foe the design in 3d model.

**A. Joystick Control**

In this control method, analog input from the joystick is processed and then translated into as per requirements. By using the joystick, the user can navigate across the menu as well as drive the wheelchair. The directional commands of the joystick shall be as direct as gamepads. In addition to tilting the joystick, the joystick will also have a push-button which will allow the user to enter or exit an option

**B. Gesture Control**

To achieve a gesture-based control system, we have incorporated an accelerometer module. This technique is extremely versatile and can be attached to any part of the user's body, where it is convenient for performing gestures . Before initiating a system, the user will request the device to train for: forward, backward, left, and right

movement gestures. Subsequently, the user may initiate the drive. When the given gesture matches with previously learned gestures, the motors are driven accordingly. If the system detects sudden fall or significant acceleration, the gesture-driving will instantly stop. The drive has to be reinitiated by the joystick or voice commands.

### C. Emergency Response

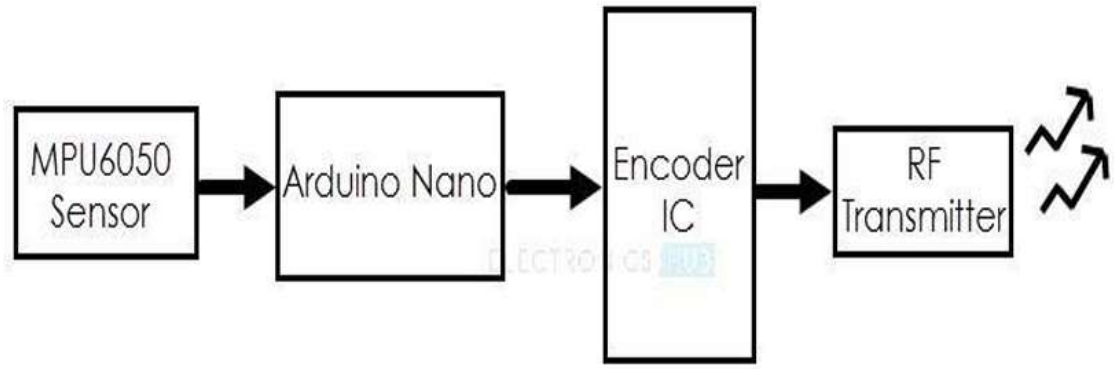
System Besides the diverse control method of the wheelchair, we are also implementing safety measures and emergency response systems in our project. In case of an emergency, the user can activate the emergency response system. Activating so, the coordinates of the user's location will be estimated using the GPS module. The location data will be sent to a person of authority as well as receive a call. Furthermore, a loud siren will be rung to attract the attention of the people nearby.

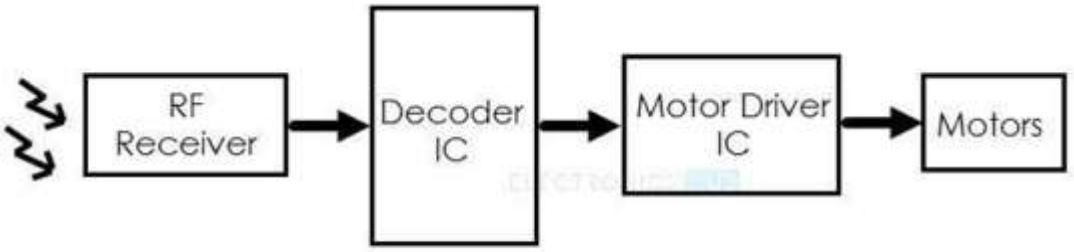
### D. Other features

The chair is designed to give freedom to the users which also indicates that the user may take the chair outside. To cope up with the outside world, we have integrated a Flashlight and a siren to the chair. Both can be accessed manually as well as from the system menu. The siren also acts as an alarm system that notifies people around the user if any kind of health problem or accidents occur to the user. In addition, the user can also ring the siren as a horn as needed and use in low-light environments.

### E. BLOCK DIAGRAM

TRANSMITTER SECTION:

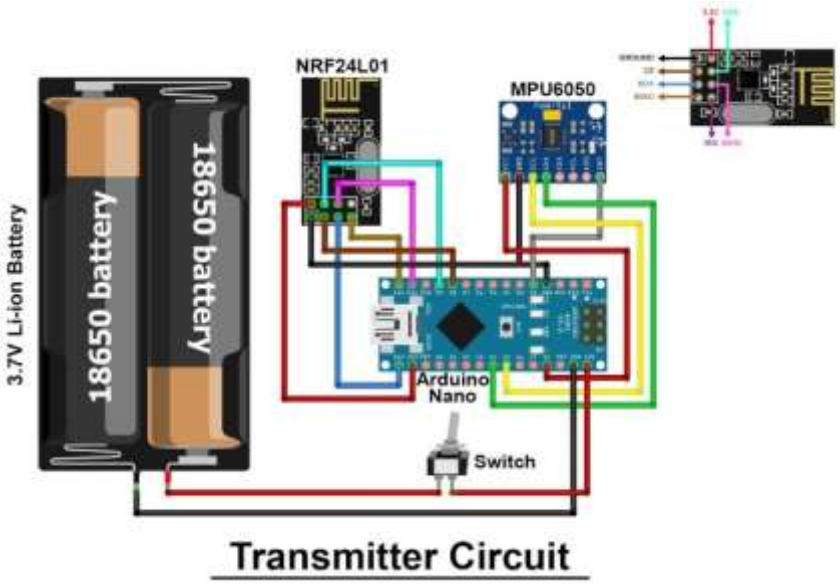





RECEIVER SECTION:

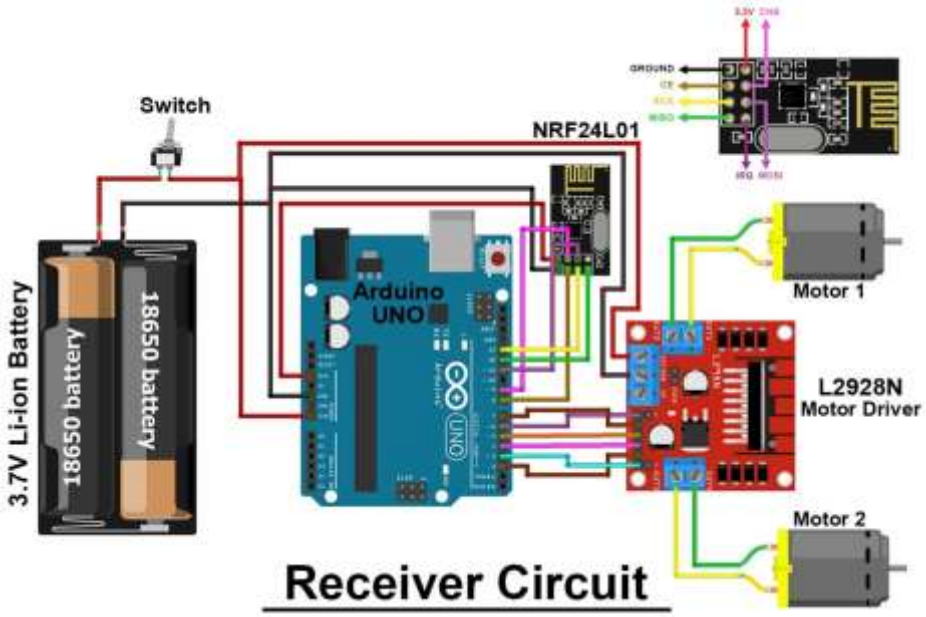
F. **CIRCUIT DIAGRAM**

**TRANSMITTER SECTION:**




Transmitter Circuit

**RECEIVER SECTION:**




Receiver Circuit

**FUTURE SCOPE AND RESEARCH -**

A suitable variable speed drive needs to be installed to regulate the speed while driving.

Smart wheelchair will be an important necessity in future. Smart wheelchair provide great opportunity for development of sensors and mobile robots technology. Development of these things can reduce the cost factor to a great extent. Hardware and software evelopment are also an important part of smart wheelchair success. Working on reviews and feedbacks can help to improve the current issues of wheelchair system and also new ideas can be imagined.

**CONCLUSIONS -**

There are several issues faced by the manufacturers and researchers which needs to be addressed so that, smart wheelchair becomes a commercial success and be widely used. One common main issue is cost versus accuracy. Inexpensive and advanced sensors can help to overcome this problem. Smart wheelchairs which can be used generally used for all types of disability are still not available. Smart wheelchairs should also contain the ability to monitor the patient conditions and react accordingly. Currently available smart wheelchairs can be easily used in indoor conditions but, for outdoor environment it requires supervision by a companion for safety. Also, smart wheelchair for independent use by mentally challenged people should be researched. Smart wheelchair have great scope in future and technological advancement in the field of robotics and sensors will lead to commercial success as well.

1. Automated wheelchair can be used to help handicapped people, especially those who are not able to move.

2. Our project was the complete addition of the electronic circuits, the hardware designing & software knowledge.

3. Various related work in the field of Automated Wheelchair.

4. Limitation of Existing System.

5. The system was successfully implemented to move the wheelchair left, Right, Forward, Backward or Stay in same position.

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