Design And Fabrication Of Wireless Remote Control Wheel Chair

Mr Yashesh Ahirwar, D Abhishek , Y Bharath Kumar, A Madhu, M Sathvik Reddy

1Assistant Professor, MECH, Sree Dattha Institute Of Engineering And Science, Sheriguda, Telangana, India
2 student, MECH, Sree Dattha Institute Of Engineering And Science, Sheriguda, Telangana, India
3 student, MECH, Sree Dattha Institute Of Engineering And Science, Sheriguda, Telangana, India
4 student, MECH, Sree Dattha Institute Of Engineering And Science, Sheriguda, Telangana, India
5 student, MECH, Sree Dattha Institute Of Engineering And Science, Sheriguda, Telangana, India

ABSTRACT

This project is about designing and building a wheelchair that can be controlled using a wireless remote. It is mainly created to help elderly people and physically challenged individuals who find it difficult to move on their own. In many cases, such people depend on others to push their wheelchair, which can be inconvenient. To solve this problem, we developed a system where the wheelchair can move with the help of a remote control, reducing the need for manual effort. The wheelchair works using simple electronic components like motors, a control circuit, and a wireless module. When the user presses buttons on the remote, signals are sent to the wheelchair, which then moves in the required direction such as forward, backward, left, or right. The system is designed in a way that it is easy to operate, even for someone with very little technical knowledge. Special care is taken to make the wheelchair safe, stable, and reliable. The design also focuses on keeping the cost low so that it can be affordable for more people. This type of wheelchair can be very useful in homes, hospitals, and care centers, where mobility support is needed regularly.

Keywords *: - Wirless Control , Remote-Operated Wheelchair, Easy Mobility, Assistive Device, Motorized Movement, User-Friendly System, Elderly Suypport.*

1. INTRODUCTION

Nowadays, many elderly people and physically challenged individuals face difficulty in moving from one place to another. Most of them depend on someone else to push their wheelchair, which can be uncomfortable and reduces their independence. In hospitals and homes, this becomes a daily challenge for both the patient and the caretaker.To solve this problem, our project focuses on designing a wheelchair that can be controlled using a wireless remote. With the help of simple buttons, the wheelchair can move in different directions without the need for manual pushing. This makes it easier for users to move around with less effort and more comfort.

The system uses basic electronic components like motors, a control unit, and a wireless communication device to receive signals from the remote. When a button is pressed, the wheelchair responds accordingly and moves in the desired direction. The main aim of this project is to create a system that is simple, safe, and affordable so that more people can use it easily.

2. LETRATURE REVIEW

R. Kumar studied a motorized wheelchair system that uses simple electronic controls. His work mainly focused on making the wheelchair move using basic switches and motors. He showed that using motors can reduce the physical effort required by the user.

S. Sharma worked on a wireless-controlled wheelchair using RF (radio frequency) technology. In his research, the wheelchair could be controlled from a distance using a remote. This helped users move without direct physical control, improving convenience.

M. Patel developed a smart wheelchair using a microcontroller system. His work focused on improving accuracy and control of movement. The system was more reliable and could handle multiple directions smoothly.

A. Singh introduced an advanced wheelchair using wireless and sensor-based technology. His design included safety features like obstacle detection, which helps avoid accidents while moving.

P. Reddy worked on a low-cost wheelchair design that can be easily affordable for common people. His focus was on reducing cost while maintaining basic functionality and usability.

3. METHODOLOGY

In this project, we followed a step-by-step process to design and build the wireless remote control wheelchair.

First, we planned the overall design of the wheelchair by deciding the main components required, such as motors, wheels, battery, control circuit, and wireless module. We made sure the design is simple, stable, and suitable for carrying a person safely. Next, we worked on the mechanical setup. The base frame of the wheelchair was prepared, and the wheels and motors were properly fixed. The motors were connected to the wheels so that they can control the movement of the wheelchair.

After that, we focused on the electronic system. A control unit (like a microcontroller or motor driver) was connected to the motors. Then, a wireless receiver module was attached to the control system to receive signals from the remote. In the next step, we designed the remote control section. The remote consists of simple buttons that send signals (like forward, backward, left, and right) through a wireless transmitter. When a button is pressed, the signal is sent to the wheelchair.

Once both transmitter and receiver were ready, we connected everything together. The battery was used to supply power to the motors and electronic components. Finally, we tested the system. We checked whether the wheelchair responds correctly to the remote commands and moves smoothly in all directions. Any errors were corrected to improve performance, safety, and reliability.

This step-by-step method helped us successfully build a wireless remote control wheelchair that is easy to use, efficient, and helpful for users.

4. MATERIAL PERFORMANCE ANALYSIS

In this project, different materials and components were selected carefully to ensure the wheelchair is strong, safe, and works efficiently. For the **frame**, we used materials like mild steel or aluminum. Mild steel is strong and durable, which helps in carrying the weight of the user safely. Aluminum is lighter in weight and helps improve movement and efficiency. The choice of material affects the overall strength, weight, and cost of the wheelchair. The **wheels** are made of rubber with a strong rim to provide good grip and smooth movement on different surfaces. Good quality wheels reduce friction and help the wheelchair move easily without much power. The **motors** play a very important role in performance. DC motors are used because they are simple, cost-effective, and provide enough torque to move the wheelchair. The motor performance decides the speed and load-carrying capacity of the system. The **battery** is used as the power source. A rechargeable battery is selected to provide continuous power to both motors and electronic components. Battery capacity affects how long the wheelchair can operate without charging. The **wireless module and control system** ensure smooth communication between the remote and the wheelchair. A stable signal is important for proper control and safety. If the signal is weak, the performance may be affected.

.

5. EXPERMENTATION

The experimentation of the swing-powered electricity generator was carried out to analyze how effectively mechanical energy from the swing can be converted into electrical energy. Initially, the fabricated model was set up with all components such as the swing, shaft, gears, chain drive, and generator properly aligned. The system was checked to ensure smooth motion and proper transmission of energy from the swing to the generator. Once the setup was ready, different experimental trials were conducted.

In the first experiment, the swing was operated manually at different speeds (slow, medium, and fast) to observe the variation in electrical output. A multimeter was connected to the generator output to measure voltage and current. It was observed that as the speed of swinging increased, the rotational speed of the generator also increased, resulting in higher voltage output. This confirms that power generation depends directly on the speed of motion .

Further experimentation included checking the effect of mechanical efficiency by observing losses due to friction in bearings, chain, and gears. It was found that proper lubrication and alignment improved performance and reduced energy loss. According to studies, mechanical transmission systems play a key role in improving the efficiency of swing-based generators .

Overall, the experimental results proved that the swing-powered electricity generator is capable of converting human mechanical energy into usable electrical energy. Although the output is small, it is sufficient for basic applications and demonstrates an effective method of energy conservation and renewable power generation .

6. EXISTING SYSTEM, PROPOSED SYSTEM AND MODULE SPLIT-UP

In the current system, most wheelchairs are either **manual** or **basic electric wheelchairs**. Manual wheelchairs require another person to push, which makes the user dependent on others. This can be difficult in daily life, especially in homes or hospitals. Some electric wheelchairs are available, but they are usually controlled using joysticks. These can be hard to use for people who have limited hand movement. Also, many advanced systems are expensive and not affordable for everyone.So, the existing systems have problems like:

- Dependency on others
- Difficult controls for some users
- High cost
- Limited flexibility

To overcome these problems, we designed a **wireless remote control wheelchair**. In this system, the wheelchair can be controlled using a simple remote with buttons.The user or caretaker can easily control the movement like forward, backward, left, and right without physical effort. This makes the system more convenient and user-friendly.

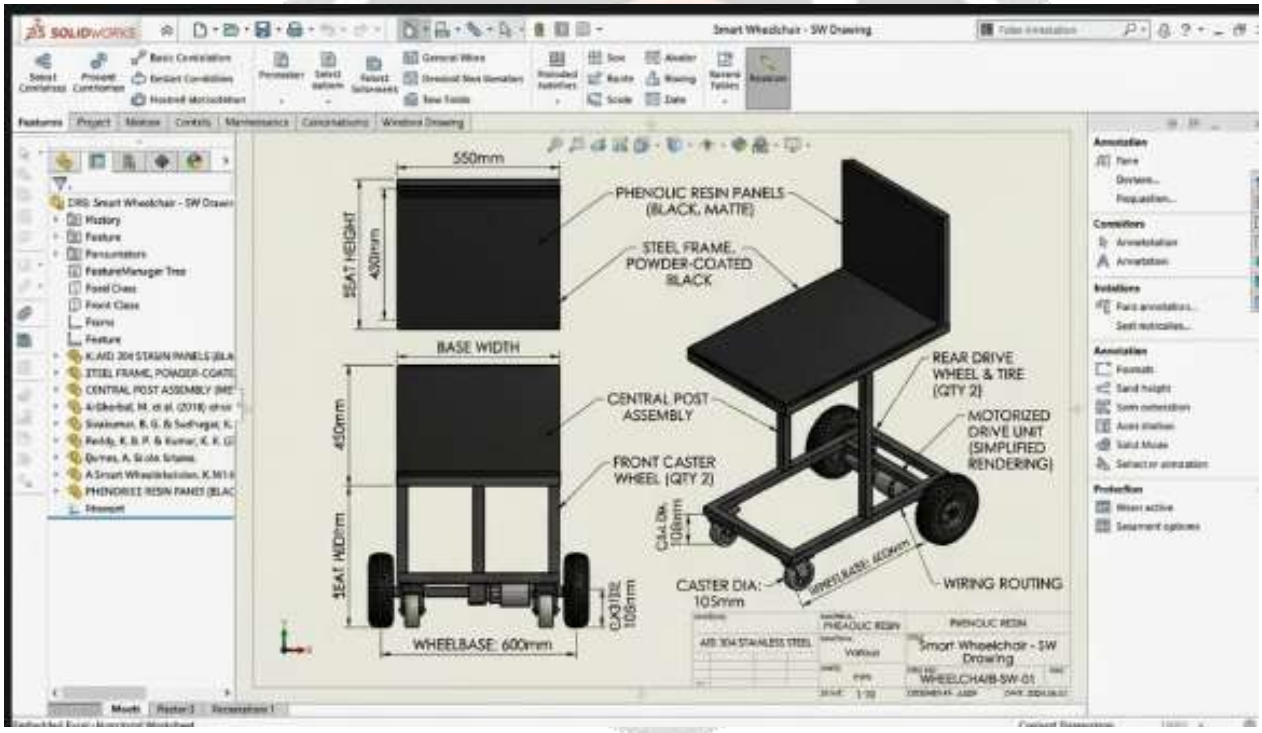
Our system focuses on:

- Easy control using wireless remote
- Less physical effort
- Low cost and simple design
- Better independence for users

This makes it suitable for use in homes, hospitals, and care centers.

The project is divided into different parts (modules) for better understanding and working:

1. **Power Supply Module**
   This provides power to all components like motors and control circuits using a rechargeable battery.
2. **Control Unit Module**
   This is the main part that controls the working of the wheelchair. It receives signals and gives commands to the motors.
3. **Wireless Communication Module**
   This includes a transmitter (remote) and receiver. It sends and receives signals between the remote and the wheelchair.
4. **Motor and Drive Module**
   Motors are connected to the wheels and help in movement. Based on signals, they rotate to move the wheelchair.
5. **Mechanical Structure Module**
   This includes the frame, wheels, and body of the wheelchair, which provides strength and support.
6. **User Interface (Remote Control) Module**
   This is the handheld remote with buttons that the user presses to control direction and movement.



SEMI ASSEMBLY

7. RESULTS AND DISCUSSION

After completing the project and testing the wheelchair, we observed that the system works properly and meets the basic requirements of mobility assistance. The wheelchair was able to move smoothly in all directions such as forward, backward, left, and right using the wireless remote. The response to the remote commands was quick, and there was very little delay between pressing a button and the movement of the wheelchair.

During testing, the wireless system worked effectively within a limited range. Within this range, the connection was stable and reliable. However, when the distance increased beyond the limit, the signal became weaker, which affected control. This shows that the system works best within a certain operating distance.The motors performed well and were able to carry the weight of a person without any major issues. The movement was stable, and the wheelchair maintained balance even while turning. This indicates that the mechanical design and motor selection are suitable for normal usage.

The battery performance was also satisfactory. The wheelchair could run for a reasonable amount of time on a full charge, making it useful for daily activities. However, long-term usage may require better battery capacity.From a safety point of view, the wheelchair remained stable on flat surfaces. But it may need additional features like obstacle detection or braking systems for more advanced safety.

Overall, the project was successful in developing a low-cost, easy-to-use wireless remote control wheelchair. It provides better comfort and independence compared to manual systems. With some improvements, this system can be made more efficient and suitable for real-world applications.

8. CONCLUSION

In this project, we successfully designed and built a wireless remote control wheelchair that helps people move easily without depending on others. The system uses simple electronic components and a remote control to move the wheelchair in different directions.

The wheelchair performed well during testing. It responded quickly to commands, moved smoothly, and was able to carry weight safely. The design is simple, cost-effective, and easy to use, which makes it suitable for elderly and physically challenged people.

This project shows that with basic technology, we can create useful solutions that improve daily life. Overall, the wireless remote control wheelchair provides better comfort, independence, and convenience to users. With some future improvements, it can be made even more efficient and widely usable.

9. FUTURE SCOPE OF WORK

In the future, this project can be improved in many ways to make it more advanced and useful.

One important improvement is adding obstacle detection sensors, so the wheelchair can automatically stop if something comes in its path. This will increase safety and prevent accidents.

We can also add voice control, where the user can give commands by speaking instead of using a remote. This will help people who cannot use their hands properly.

Another improvement is using a mobile app (Bluetooth/Wi-Fi control) so the wheelchair can be controlled through a smartphone. This makes the system more modern and flexible.

The battery system can be upgraded to last longer and charge faster. We can even use solar panels to support charging and make it more energy-efficient.

In addition, we can include GPS tracking, which helps in locating the wheelchair easily, especially in hospitals or large areas.

For better comfort, the design can be improved with automatic seating adjustment and better cushioning.

Overall, by adding smart technologies and improving safety features, this wheelchair can become more efficient, user-friendly, and suitable for real-world applications on a larger scale.

REFERENCES

· Katsuhiko Ogata – Modern Control Engineering, 2010.Basic control system concepts.

· Muhammad H. Rashid – Power Electronics: Circuits, Devices, and Applications, 2011. Motor and power electronics understanding.

· V.K. Mehta & Rohit Mehta – Principles of Electrical Engineering, 2014. Electrical fundamentals.

· IEEE, 2018. Research papers on smart wheelchair systems.

· ScienceDirect, 2019. Studies on wireless control and assistive devices.

· Arduino Documentation, 2020. Microcontroller programming and interfacing.

· Wikipedia, 2023. General background concepts.

· B.L. Theraja & A.K. Theraja – A Textbook of Electrical Technology, 2013. Electrical circuits and applications.

· S. K. Sahdev – Basic Electrical Engineering, 2018. Basic electrical system understanding.

· International Journal of Engineering Research and Technology (IJERT), 2021. Papers related to wireless and smart wheelchair design.