

## SMART WHEELCHAIR USING SOLAR PANEL

Shubham Arsul<sup>1</sup> ; Shilpa Tathe<sup>2</sup> ; Sohel Shekh<sup>3</sup>, Prof.RM Sahare Mam

Electrical Engineering, Government college of Engineering Nagpur, India

Email : <sup>1</sup>[shubhamarsul3@gmail.com](mailto:shubhamarsul3@gmail.com) <sup>2</sup>[shilpatathe2019@gmail.com](mailto:shilpatathe2019@gmail.com)

<sup>3</sup>[sohelshekh2019@gmail.com](mailto:sohelshekh2019@gmail.com)

### 1. Abstract

There are 26.8 million people with disabilities in India according to the 2011 census of India and continuously increase day by day other than medical treatment, these people are totally depend on other person not by the physically handicapped person. Without help of the other person the disabled person can move by their own using smart wheelchair. Other wheelchair use battery that is charge by electricity, as we know electricity is expensive and scares in rural areas. The main component of the smart wheelchair is solar panel, which is free source of electrical energy. The design we construct for the smart wheelchair is easier to use for the disabled person. The main component of wheelchair are wheelchair structure, solar panel, DC series motor, switch, wheel and ultrasonic sensor .we use ultrasonic sensor in wheelchair which detects the obstacle in path of the wheelchair and stop it immediately. Smart wheelchair can bring many benefits to disabled person and peoples in society. This paper aims to review latest technology in smart wheelchair and discuss future research in this area.

### 2. Introduction

Disability is one of disorder that takes a long time to become normal perhaps months, years and sometimes disability is permanent to avoid such type of problem we use smart wheelchair. Disable person also have their own work and they want to do it by themself by their own and this done by only smart wheelchair. Number of wheelchair required either AC power or fossil fuels to charge the battery. This can also be done by renewable energy sources or solar energy to power electricity supply. Solar energy is one of the most important source of energy and it is abundand and free. Our project "smart wheelchair using solar panel" is based on automatic wheelchair which is driven by DC motor and gets power generated by solar panel. A wide range of wheelchairs that support motion control, gesture control, Bluetooth control, etc. are continuously on the market. Most wheelchairs require either AC power or fossil fuels (for wheelchairs for internal combustion engines) to charge the battery .The Automation involves the movement of the wheelchair forward, backward, right, and left with the help of Remote control which is connected to the PCB circuit board. Motorized wheelchairs are useful for those who are not able to impel a manual wheelchair or who may need to employ a wheelchair for distances or over terrain which would be strenuous in a manual wheelchair .Our smart wheelchair today works on 12V DC supply to the motor through the relay circuit. This paper gives an idea about construction working and component used in smart wheelchair and the energy is supply to the

wheelchair from the solar energy (solar panel) which can reduce the ultimate fuel cost .This create our wheelchair ecofriendly.

### 3.Proposed model

In below block diagram, we can see that the system consists of following major components

- Solar panel
- Rectified AC power supply
- Battery
- Direction control (Remote control)
- DC Motors
- Microcontroller
- Motor driver

In this system, energy is supplied from the battery through the solar panel and through the charging controller, which protect the battery from overcharging. we can also use to charge the battery from a rectified AC power source. Then power flows from the battery to the directional controller. Directional controllers include diodes, rectifiers, capacitors, microcontrollers, and relays that direct the movement of the wheelchair. Finally, there is the placement of the DC motor with the gearbox assembly or the smooth motion the front motor is for LEFT and RIGHT direction and the rear motor is for FORWARD and BACKWARD direction.

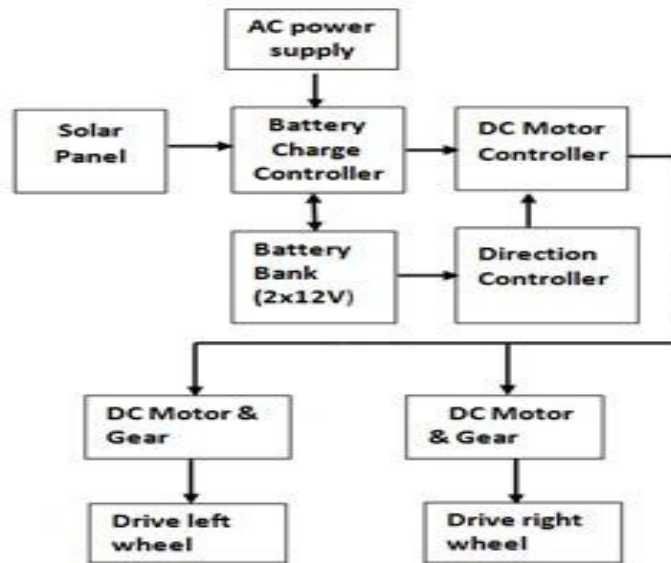


fig.1.functional block diagram of solar powered

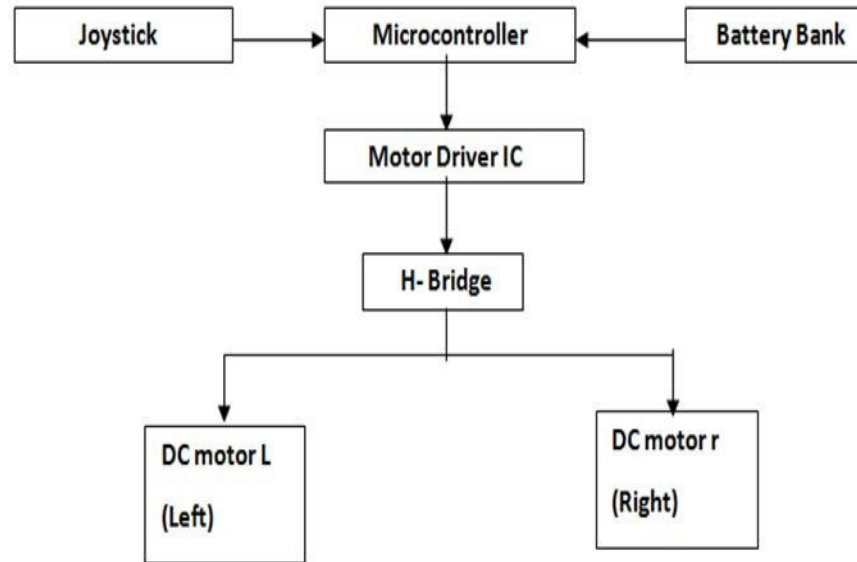


fig.2.Block diagram of controlling circuit

#### 4. Construction and Working

The “smart wheelchair using solar panel” has a plastic pvc pipe chair fabricated on frame. The frame has two part the front part is moveable and the rear part is fixed. This frame has wheels aligned to it, together forming a wheelchair. There are total 4 wheels two in the front side and two in the rear side of the wheelchair. while two are caster wheel and two are rare, where caster wheel are moving 360 degree There is a placement of two DC Motors, one is aligned with the two front wheels for the purpose of direction control mainly LEFT and RIGHT. Once the command is given to the microcontroller to remote control.

The solar panel on the top of the wheelchair will collect energy from the sun and convert it into electrical energy. The electrical energy generated by the solar panel will be stored in the battery connected to the panel. When the person using the wheelchair needs to move, the motor will draw power from the battery and convert it into mechanical energy. The mechanical energy generated by the motor will then move the wheelchair's wheels, allowing the person to move around.

The controller installed on the wheelchair will regulate the flow of power from the battery to the motor, ensuring that the motor operates efficiently. As it known that the button of remote works on XY axis so the direction of the wheelchair also depends on the XY axis .The positive X-axis is for forward direction and

negative axis is for backward direction .same with Y-axis the positive Y-axis is for right direction and negative Y-axis is for left direction.as far as the wheelchair is getting command the wheelchair will be motion in either direction and when the remote comes to its original position the wheelchair comes to rest and it.

#### 5.Advantages

- Electric Powered
- Quick and Easy Movement
- Useful for Children
- Provide better support
- Utilization of clean energy source reduces pollution and save energy wasted.
- Offer reliable and abundant energy source to charge the wheelchair almost anywhere exposed to sunlight
- Improve the energy reserve capacity.

#### 6.Future Application

- Increased mobility for individuals with disabilities: Solar power motorized wheelchairs can provide a sustainable and cost-effective alternative to traditional electric wheelchairs. With the ability to charge via solar power, individuals with disabilities will be able to travel longer distances and for longer periods without needing to worry about running out of battery.
- Environmental sustainability: Solar power motorized wheelchairs are an environmentally sustainable option, as they generate power from a renewable source of energy. This reduces the reliance on traditional energy sources, which can have negative environmental impacts.
- Cost savings Solar power motorized wheelchairs can be cost-effective over the long term, as they do not require regular charging from traditional electricity sources. Over time, this can lead to significant cost savings for individuals with disabilities and their families.
- Improved access to mobility in rural and remote areas: Solar power motorized wheelchairs can provide increased access to mobility for individuals living in rural and remote areas, where traditional electricity sources may not be readily available. This can improve quality of life and

increase opportunities for social and economic participation.

- Potential for integration with smart technology: As smart technology continues to advance, there is potential for solar power motorized wheelchairs to be integrated with smart technology, such as voice-activated controls or automatic obstacle detection. This could further enhance the user experience and increase the independence of individuals with disabilities.

### 7.conclusion

- For further development, the project can be developed as follows Addition of wireless system.
- Sensors can also be attached to different sections on the left, right and rear.
- There is also the execution of intelligent home navigation that allows people with disabilities and the elderly to
- traverse the entire home and get help from a technical interface.

### 8.Result

- Solar power motorized wheelchairs can provide a sustainable and cost-effective means of transportation for individuals with disabilities, leading to increased mobility and independence.
- Environmental benefits: Solar power motorized wheelchairs can help to reduce reliance on traditional energy sources, leading to reduced greenhouse gas emissions and other negative environmental impacts.
- Potential for innovation: Solar power motorized wheelchairs represent an area of potential innovation, with opportunities for further development and integration with smart technology.

### 9.References

- 1869 The first wheelchair patent was issued in the United States.
- 1940 The first patent was issued for an electric wheelchair.
- Abdul Razak Shehab, "International Journal on Engineering Technology and Sciences (IJETS)", Volume2 Issue 1, January 2015, Mohan Kumar R., Lohit H. S., Manas Ranjan Mishra, Md. Basheer Ahamed "International Journal of Electrical and Electronics Research" Volume 2, Issue 2, Month: April-June 2014.

- University of California, Irvine: In 2020, a team of engineering students at the University of California, Irvine designed and built a solar-powered wheelchair that could travel up to 5 miles per day. The project aimed to provide an environmentally friendly and cost-effective mobility solution for people with disabilities.
- Abdul Razak Shehab, “International Journal on Engineering Technology and Sciences (IJETS)”, Volume Issue 1, January 2015