

Solar Power Motorized Wheelchair – A Model

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Abstract

People are switching over the renewable source of energy for their requirements, Solar energy is one of the source which is free of cost and present in abundance so by automating the wheelchair with the help of power generated by solar energy it can cut the overall cost of fuel and become eco-friendly in nature and can set a limit in the world of Automation. In this paper “Solar Powered wheelchair”, its construction, working and component used is studied in detail, and all the project work is done in Nagpur In today’s world there are many disabled persons who find it difficult to perform movements or perform daily activities. This types of persons are mainly dependent on others for their assistance. But they can become self-independent and perform some daily activities on their own with the help of assistive devices. The most widely used assistive devices are Wheelchairs. Wheelchairs is basically a chair fitted with wheels, which can help people move around who cannot walk because of illness, disability or injury. But there are many disabled people with weak limbs and joints who cannot move the wheelchair. Thus, Smart Wheelchair can benefit a lot to them and everyone in society. Smart Wheelchairs are electric powered wheelchairs with many extra components such as a computer and sensors which help the user or guardian accompanying wheelchair to handle it easily and efficiently. The recent development in the field of Artificial Intelligence, Sensor technologies and Robotics help the growth of wheelchairs with new features. This paper is to review the current state of art of Smart Wheelchairs and discuss the future research in this field. This project aims to develop a Solar based Wheel Chair System for the physically handicapped people at an accessible cost. An assistive technology known as motor controlled with solar power chairs is used to deal with loss of mobility for the patients who are not able to walk normally due to some injury or some other age related walking disabilities (permanent or under treatment). There is a vast development in the field of wheelchairs. Researchers are going on to develop reliable, low cost and easy to use devices. Out of all the advantage of using Motorized System when patients become completely paralyzed, the only resource available to them for moving is wheel chair. Non bio-signal based devices provide 100% accuracy and require less training for patients but the usage of these by using the solar power for charging of the battery flexibility in usage increases .Wheel chairs is limited to patients with partial or complete flexibility in their body parts

Key words: Wheel Chair, DC series motor, Solar PV panel, Solar Charge Controller, Lead acid battery, Voltage regulator, Motor controller

Introduction

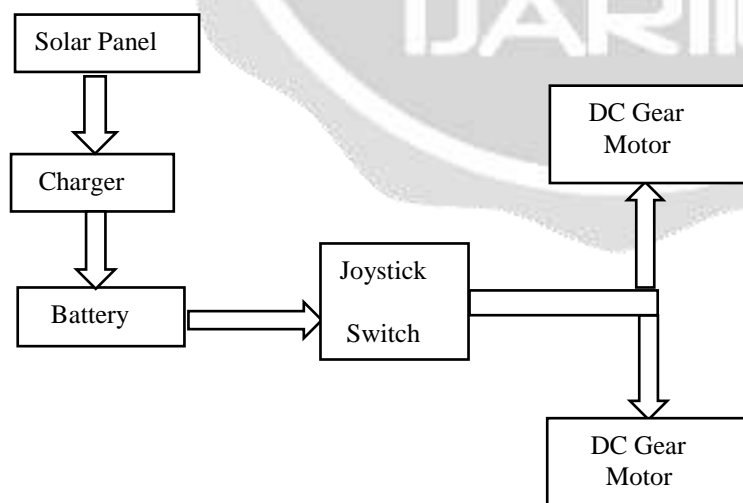
Person mobility means freedom for the physically challenged. One of the best invention in the techno field that helped both an elderly and the handicapped is the mobility vehicle. The fact that they are no on longer depending on someone else to perform daily duties is a big step a forward. A large variety of mobility vehicles are available, from which one is to be selected as per requirements. Mobility vehicles are design based on the usage i.e. either indoor or outdoor. They make the use of their conventional energy for recharging. The cost of the vehicle may not be an affordable one for the lay man. Personal mobility means freedom for the physically

challenged. Our project “Solar Powered Wheelchair” is based on the Automatic wheelchair which is driven by the DC motors and it gets the power generated by the Solar Panel. The Automation involves the movement of the wheelchair forward, backward, right, and left with the help of Joystick which is connected to the PCB circuit board. The whole wheelchair works on the 12 volt DC supply to the motors through the relay circuit. This paper gives an idea about the construction, working and component used in the Automatic Wheelchair and supplying energy to this Wheelchair through solar energy (solar panel) which ultimately reduces fuel cost and creates the whole wheelchair eco-friendly. A motorized wheelchair or electric-powered wheelchair is a wheelchair that is propelled by means of an electric motor. 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.

Objective

- The principle motive of this project is to manipulate the wheel using remote, for this purpose an android application is created.
- The working system will provide the person with a terrific end result to pick out that remote platform as it provides open equipment for this feature.
- Motorists are managed by controller. in this controller configuration utility connected to the Joystick system the usage of the master-slave.
- Solar smart Wheelchair is designed and designed for human beings with disabilities and is powered through sun energy and battery.
- To facilitate disabled individuals which can be operated with lesser effort.
- Offer reliable and abundant energy source to charge the wheelchair almost anywhere exposed to sunlight.

Block Diagram



Construction

The “Solar Powered Wheelchair” has a metallic chair fabricated on the metal frame. The frame has two part the front part is moveable and the rear part is fixed. This frame have 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. 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 ATmega16 through joystick control the the front motor operates for approx. 5 sec and the moveable part of the frame turns to an angle and then the motor stop, turning the wheelchair in either direction. The Other motor with gear system is placed on the right wheel of the rear side of the frame. The left wheel is aligned with the right wheel with the shaft connected to it. This motor is for the movement of the whole wheelchair in the FORWARD and BACKWARD directions. These motors are attached to a Printed Circuit Board which have 4 relays, Opto-couplers ,transistors, diodes, resistors , microcontroller ATmega16 ,LED screen, IC 7805, Pot, capacitor bank placed in it. This PCB board is placed between the Leadacid battery and Motors There is a placement 20Watts/12V solar panels on the top of the wheelchair. The above solar panel is fabricated on the metal frame with an inclination to absorb maximum sunlight and the frame is attached to the lower frame of the wheelchair which also provides a roof to the wheelchair.

Working

- The solar wheelchair is made up of DC motor, a battery, wheels, solar panel. The Solar panel is a charging system which charges the battery while in operation. The D.C. motor forms the heart of the machine and provides the driving force for the drives the wheels. The system is powered by an electrical switch which completes the circuit comprising the DC motor and the battery.
- Solar Wheelchair are based on the use of small but powerful engine that provides enough torque to carry the weight of person. In most cases, the motor is situated separately from the wheels with the help of chain but in solar wheelchair motor is in direct contact with wheels. There also a mechanical support is provided for balance the chair. It uses the photovoltaic panel to generate the energy needed to power the solar wheelchair.
- The proposed solar power wheelchair is appropriate for those who are unable to propel a manual wheelchair. It also reduces the strain on shoulders and arms so one can continue to perform transfers safely. Our proposed solar power wheelchair facilitates user in different way. The features are:
 - _ Implementation of the controlling circuit and fixed it in a specially designed wheelchair.
 - _ Solar panels in this solar wheel chair are constructed with lightweight plexi glass where the standard glass sheeting is nowadays used in solar panel construction. The advantage of light weight plexi glass is it is approximately 18 times strong than normal glass. As it is a light weight glass it is comparatively easy to move with it in the wheel chair.
 - _ Cost efficiency.
 - _ It has speed close to normal peoples walking speed. So no chance of accidents to cause.
 - _ There will be no strain in moving the joystick.
 - _ There is a button for tilting the seat as required. So a long sitting on the chair will not affect the patients backbone.
 - _ The wheelchair has a great balance. The design is made keeping the balance.

Result



Conclusion

The attempt made in fabricating a Solar Powered Wheel Chair with the available indigenous material is successful. The working of the wheel chair shows the indigenous infrastructure and the capabilities of the wheel chair. The Recharging capacity of the panels is satisfactory. The desired functionality of the Steering Mechanism is achieved. The attempt made in fabricating a Solar Powered Wheel Chair with the available indigenous material is successful. The working of the wheel chair shows the indigenous infrastructure and the capabilities of the wheel chair. The Recharging capacity of the panels is satisfactory. The desired functionality of the Steering Mechanism is achieved. Our project "Solar Powered Wheelchair" has been successfully developed, and has achieved its aim and objective successfully. It is capable to control the wheelchair motion for disabled people using renewable source of energy that is solar power. Improvements can be made by running the wheelchair on direct solar power without battery.

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