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Hybrid Supply Operated Wheel Chair for Disable Person

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Abstract:- The need for multifunctional wheelchair especially present in care of immovable people .This design and development of an multifunctional wheelchair that would perform all functions of present in today's wheelchair. Wheelchair with adjustable portion of back rest and leg rest also convert to bed to wheelchair and vice versa and also remote control with which we can provide all necessary movement .And simple designs and good mechanical properties.

Due to the invention of the wheelchair, the quality of living of the disable person is improved because they are mobile in nature. Generally selection of power chair depends upon following factors such as; type of surface on which it will be driven, the need to settle thresholds and curbs & clearance width in consistent environment. This wheelchair takes the input from the user by using the switch and Bluetooth connection in mobile phones. It will gives motion into power in required direction.

I. NTRODUCTION

Hybrid supply operated solar wheel chair is driven by means of electric motor. This wheelchair specially used by disable persons who are unable to use manual wheelchair. The persons who are physically challenged by paralysis also can use this wheelchair more efficiently. This wheelchair is god gift for those who are not able to handle manual wheelchair because it requires less force or efforts to drive it.

The need for multifunctional wheelchair especially present in care of immovable people .This design and development of an multifunctional wheelchair that would perform all functions of present in today's wheelchair. This wheelchair also makes feel to disable persons as independent. This wheelchair consumes less electric power due to contribution with the solar power energy circuit to drive it. No power fluctuations in this because it drives safely with the use of switch and Bluetooth connection of Android Phones. It will gives motion into power in required direction. It uses solar energy in a day due to abundant solar radiations available in nature.

It uses voltage regulator to regulate supply voltage. Hybrid supply operated solar wheelchair uses the different kinds of sensors to sense the road surface irregularities. In this type of wheelchair the indication display is provided to show the battery usage, road irregularities etc. In this type of wheelchair we use the sensors to detect the things which are coming behind it. This wheelchair gives comfort and safety to the disable persons.

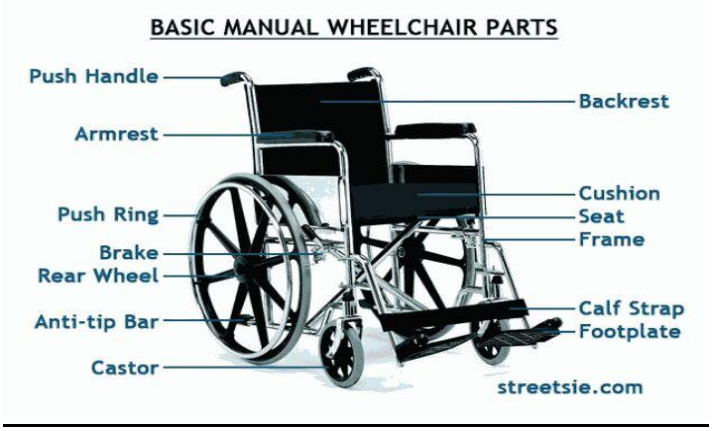

Fig 1:- Basic Manual Wheelchair Parts

II. BASIC FUNCTIONAL DIAGRAM

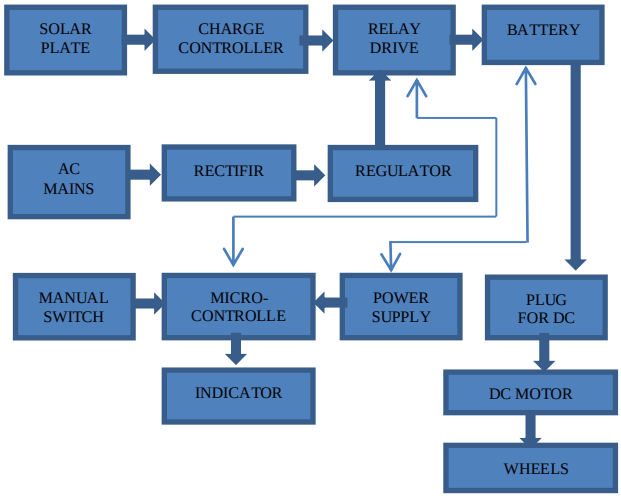

Fig 2:- Basic block Diagram Representation of Solar Operated Hybrid Wheelchair

III. PROBLEM STATEMENT

The motor used for this wheelchair for its motion , after a long research in market we find that , as per our requirement we

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should used DC motor .The fixing of a dc motor to the wheel of the wheelchair how to couple shaft of the motor and wheel than found in the market , than we made coupling as per our requirement and solve problem .

IV. OBJECTIVE

- The solar energy is directly found in nature which is free of cost type of energy for lifetime. Hence we save electricity bill.
- There is no use of any type fossil fuels. So automatically this system saves the fuel.
- Solar panel charge a battery and run motor through the battery power.
- Adjusting a table for use some useful work.
- Specific service to the human in a safe and confirmable manner

V. COMPONENTS USED

Various types of electrical components were used for making the solar operated dust collector. A list of these components used with their range and the specific quantities that were required for making the solar operated dust collector is given in the following table.

Components used	Ranges	Quantity
Solar plate	10 Watt	1
Battery	12V/7.5AH	1
Charge controller	-	1
Rectifier	230AC/12DC	1
Voltage regulator	LM7812	1
Micro-controller	R DUNO UN0	1
DC motor	12V/7.5A/100RPM	1

Table 1:- Components Used

A. S0lar Plate

The solar panel used in the solar operated wheel chair is of the rating of 10 W. The main point that should be kept in mind while making a solar operated wheel chair is the mounting of the solar panel. The panel should be mounted in such a way that it receives maximum sun rays so that it gives its maximum efficiency. For design, we have mounted the solar panel in SOUTH-EAST direction during the time 6 AM to 11.30 AM. After that the panel is changed to a SOUTH-WEST direction. The solar cell used in the wheel chair is multi-crystalline. The reason behind using the multi crystalline cell is that it is more efficient than the mono-crystalline cell and the rate of conversion of energy is faster in the former. 36 cells are used in the PV module of this vehicle. The upper frame of this solar module is covered with thick glass to avoid breakage of the solar panel.

B. Battery

All stand-alone and utility interface PV systems require battery storage. Photovoltaic modules charge the batteries during daylight hours and the batteries supply the power as its needed, often at night and during cloudy weather. Utility intertie PV systems supply power directly to the utility grid: no battery storage is needed, however some inverters now incorporate features which make battery use an option. The two most common types of rechargeable batteries in use are lead-acid and alkaline. Lead acid batteries have plates made of lead, mixed with other materials, submerged in a sulfuric acid solution. Alkaline batteries can be either nickel-cadmium or nickel-iron batteries. They have plates made of nickel submerged in a solution of potassium hydroxide. We do not list these battery types in this catalogue because of their very high cost. But because these have up to five times the usable life of lead acid batteries, we can supply the nickel cadmium type if requested. Nickel iron batteries require higher peak voltages to become properly charged than photovoltaic modules will produce, therefore we do not sell this battery type.

C. Charge Controller

Charge controller is important part in isolated solar system. It is also known as Solar regulator. The main aim of solar regulator is to ensure the batteries are working in optimal conditions to prevent overcharging and to dip discharge. It disconnects solar panel when batteries are full to prevent overcharging and disconnects the load when necessary for the deep discharge. There are many controllers available in market. The aim of this thesis is to design a charge controller. The design is based on the regulator which can control more lead-acid batteries at the same time. This design is suitable only for lead-acid batteries because it is mostly used in the isolated photovoltaic applications. The advantage of using lead-acid batteries is the high capacity, good price per piece as compared to the other batteries.

D. Rectifier

A rectifier is an electrical device that converts alternating current, which periodically reverse direction, to direct current. Which flows in one direction, is known as rectification. Rectifier has many uses but often found serving as components for DC power supplies. Rectification may serve in roles other than to generate DC for use as source of power. Because of the AC nature of input sine wave, the process of rectification alone produces a DC current. The use of rectifier mainly power supply for battery.

E. Voltage Regulator

A regulated voltage is necessary for working of many digital electronic devices. It is used to work without fluctuations and noise level. In many cases smooth regulated input voltage must be supplied for the microcontroller. Voltage regulators are mostly used for regulating voltage.

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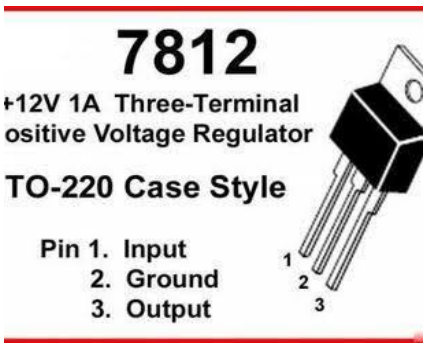

Fig 3:- Voltage regulator

They are of different types. For ex. 7805 IC regulator regulates the 5 volt. IC regulator is used for to regulate the unregulated input voltage and provide with a constant, regulated output voltage

F. Micro-Controller

The main function of micro-controller is to indicate charging/discharging of battery by using programming. Peripheral Interface Controller (PIC) is microcontroller developed by Microchip, PIC microcontroller is fast and easy to implement program when we compare other microcontrollers like 8051. The ease of programming and easy to interfacing with other peripherals PIC became successful microcontroller. We know that microcontroller is an integrated chip which consists of RAM, ROM, CPU, TIMERS, and COUNTERS etc. PIC microcontroller is consists of RAM,ROM,CPU, timers, counter ,ADC, DAC(digital to analog converter).PIC can support different protocols like CAN,SPI,UART for interfacing with other devices. . PIC is used to modify Harvard architecture and it also supports RISC (Reduced Instruction Set Computer) by the above specification of RISC and Harvard we can easily find that PIC is faster than the 8051 based controller.

G. DC Motor

- *PMDC motor specification*

Voltage	12 volt
Ampere	7.5 amp
Rpm without gearbox	1500 rpm
Rpm with gearbox	30 rpm
Motor shaft dia	10mm

Table 2:- Motor Specification

- *Selection of Motor*

weight of chair	25 kg
weight of motor	10 kg
weight of battery	15 kg
solar panel	10 kg
weight of human	100 kg
Total	160 kg

Table 3:- Selection of Motor

Calculation Of Motor Torque

$\omega = 2\pi N / 60$

$\omega = 2 \pi 30 / 60$

$\omega = 3.14$ rad / sec

Acceleration $= r * \omega^2$

$a = 25 * (3.14)^2$

$a = 246.49$

Force $= M * a$

$F = 200 * 246.49$

$F = 49298$ N

Torque $= F * D$

$T = 49298 * 3.411 * 10^{-4}$

$T = 16.82$ N.m

Where as:

ω = Angular acceleration

N= Speed in rpm

r= Radius of wheel

a = acceleration

M = mass

F = Force

VI. FEATURES OF DC MOTOR

- Long-life, externally replaceable brushes; various grade materials available for high / low voltage applications
- Superior protection provided by totally enclosed, high strength, zinc-plated steel housing
- Shaft configuration optional
- Machined aluminium end-cap for precise locating; round or square. Precision-tapped mounting holes provided to your specifications
- Silicon steel laminations
- Diamond turned commentator for quiet operation and long brush life

VII. CONCLUSION

We conclude that, on the basis of our hospital, old-age home and market survey, we made a best design of wheelchair and bed for old age home people. We also provide the up and down motion of back and leg portion and also we automate (means remote control) forward, backward motion.

The benefits of our project are

- Ease to maintain
- Customized usability
- Easy adjustable
- Durable
- High strength
- Elegant design
- Cost benefit

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