



# Energy Efficient Electric Vehicle with Energy Recapturing Technology

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**ABSTRACT:** Our project is a specially designed Green electric vehicle. One of the rear wheel is a motor and front wheel is an electric generator, the rear motor wheel drives the vehicle. The vehicle is driven by the energy stored in the 48V lead acid battery. The battery is charged by the generator on front wheel and also by the solar panels placed in the vehicle. An emerging technologies used in the vehicle is an emergency breaking system and an energy recapturing technique by reusing the wasted energy due to inertia force. The battery of this electric vehicle is charged by both voltages produced from electric generator and the solar panel. We have also given provision for electric charging during non sunshine days

## I. INTRODUCTION

An **electric vehicle (EV)**, also referred to as an **electric drive vehicle**, uses one or more **electric motors** or **traction motors** for propulsion. An electric vehicle may be powered through a collector system by electricity from off-vehicle sources, or may be self-contained with a battery or generator to convert fuel to electricity.

Clearly fossil fuel reserves are finite. It is only a matter of when they get run out. Globally – every year we currently consume the equivalent of over 11 billion tons of oil in fossil fuel. If we carry on at this rate, our non oil deposits will be gone by 2052. It also causes environmental problems and human health hazards. Due to this fact we have to take sufficient steps for the maximum utilization of the renewable energy. The main problems associated with present electric vehicles are,

**Recharge Points:** Electric fuelling stations are still in the development stages. Not a lot of places you go to on a daily basis will have electric fuelling stations for your vehicle, meaning that if you're on a long trip and run out of a charge, you may be stuck where you are.

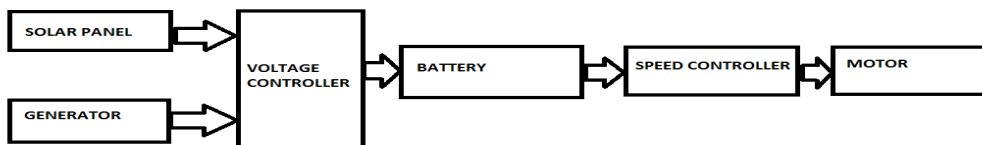
**Electricity isn't Free:** Electric cars can also be a hassle on your energy bill if you're not considering the options carefully. If you haven't done your research into the electric car you want to purchase, then you may be making an unwise investment. Sometimes electric cars require a huge charge in order to function properly – which may reflect poorly on your electricity bill each month.

**Longer Recharge Time:** While it takes couple of minutes to fuel your gasoline powered car, an electric car take about 4-6 hours to get fully charged. Therefore, you need dedicated power stations as the time taken to recharge them is quite long.

This lead us to design our green electric vehicle to overcome these disadvantages and the basic parts and functions are discussed below

## II. ELECTRICAL SYSTEM MODEL AND WORKING

Here we use two recharging methods, they are (1) Solar panel (2) Energy from the front wheel generator. The output from the solar panel and from the front wheel generator is fed to a voltage controller and constant DC voltage is fed to battery. The output from the main battery is fed to the speed controller and from there to drive the motor.



### III. MECHANICAL DESIGN OF THE VEHICLE

The figure 1 shows the mechanical design of the vehicle. This is a special design as compared to other four wheel vehicle. The special design provide easiness to drive the vehicle for anyone, especially for handicapped persons and students. This design reduces accident causes. The vehicle is provided with two brakes on the front and back wheels.

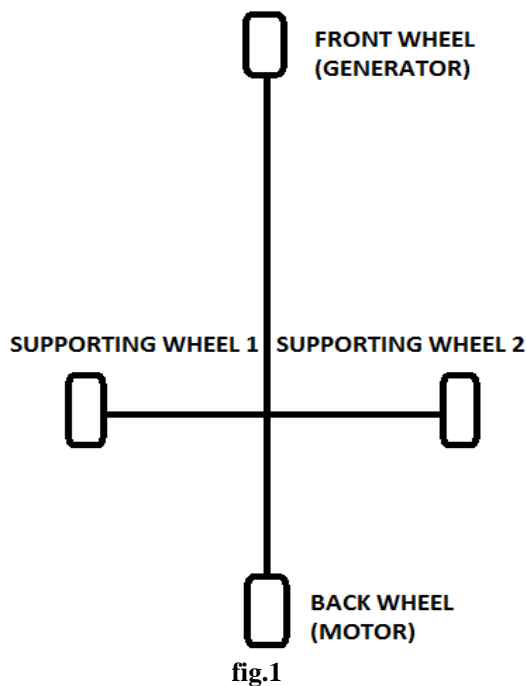


fig.1

The back wheel of the vehicle is a dc motor and the front wheel is a generator. Two supporting wheels are provided for the safety purpose.

### IV. ELECTRIC COMPONENT SPECIFICATION

#### Battery

As they are inexpensive compared to newer technologies, lead–acid batteries are widely used even when surgecurrent is not important and other designs could provide higher energy densities. Large-format lead–acid designs are widely used for storage in backup power supplies in cell phone towers, high-availability settings like hospitals, and stand-alone power systems. For these roles, modified versions of the standard cell may be used to

improve storage times and reduce maintenance requirements. Here we use four 12V battery, which connected in series which gives the output of 48V, 3A

### Solar panel

solar panels arranged to generate commercial electricity, are becoming more and more frequent these days. While still between 2-5 times as expensive to produce as electricity from fossil fuels, electricity generated from solar panels is free, nearly infinitely abundant, and non-polluting. Many environmentally-minded communities across America have set up solar power stations to help generate private or commercial solar energy. we use three 18V 2 amp solar panels.

### DC Generator

Electrical power **generators**, also known as alternators, transform mechanical energy into electrical energy. They can be used for backup or emergency power or as an alternator on board a vehicle. **Generators** can produce either AC or DC power. We use 48Volt DC generator which is inbuilt on the front wheel.

### Motor

DC motors are electric motors that are powered by direct current (DC), such as from a battery or DC power supply. Their commutation can be brushed or brushless. The speed of a brushed DC motor can be controlled by changing the voltage alone. DC motors better suited for equipment ranging from 12VDC systems in automobiles to conveyor motors, both which require fine speed control for a range of speeds above and below the rated speeds. We use 48Volt brushless DC generator, which used to drive the vehicle. it is placed in the rear wheel.

### Controllers

**48V 500W Electric Scooter Speed Controller.** Designed for 48 Volt DC electric scooter and bike motors up to 500 Watts. Maximum current 25 Amps. Under Voltage protection 42 Volts. Current limiting feature prevents controller and motor damage due to over-current conditions. Under voltage protection feature prevents over-discharge and extends battery life. Compatible with all standard 3-wire variable speed hall-effect throttles. Charge controllers or voltage regulators protect batteries from being overcharged, which can shorten their life as well as the life expectancy of the equipment being powered. Electronic circuitry in the regulator measures battery voltage, which rises as the battery state-of-charge (SOC) increases.

## V. RECAPTURING INERTIA FORCE

Here we use the Newtons first law of motion that is, in the absence of external force, a body in state of rest will be in rest and a body in state of motion will be in motion. When the vehicle keeps moving, the body and the parts inside the vehicle will move in the same velocity. When the driver suddenly applies the brakes the car will be stopped but due to the inertia force the driver will be moving in the same velocity of the car. In this method we apply this inertia force to a weighted mass attached to the two springs. This spring is connected to the body of the vehicle .

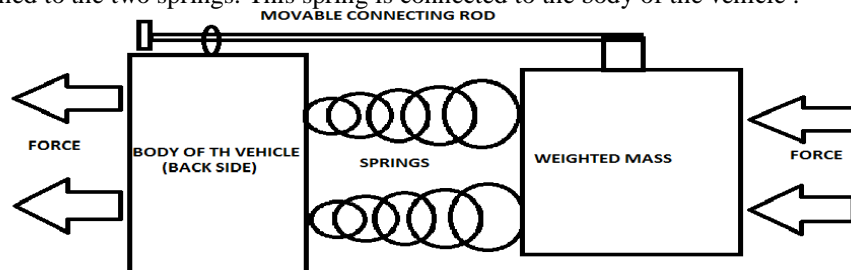


fig.2



The weighted mass is free to move linearly. when we reduce the accelerator to zero the inertia force on the weighted mass will stress the spring. This force is directly applied to the body of the vehicle and the vehicle gets further movement without using the energy stored in the vehicle . The force from the weighted mass will depend upon the velocity of the vehicle and the total mass of the weight.

### VII. EMERGENCY BRAKING SYSTEM

This is a new braking system in automobiles. The safety Brake System is used at the time of sudden failure of both the front and back brakes. The safety brake system is implemented on the front wheel of the vehicle. When an emergency situation occurs, the output terminals of the front wheel generator are short circuited by using a switch. Due to this action the generator gets locked and opposes the further movement of the front wheel

### VIII. CONCLUSION

Air pollution and sound pollution as well affects the human health. Due to this fact we have to take sufficient steps for the maximum utilization of renewable energy. So that this vehicle help to reduce pollution and use of fossil fuels An important technology used is that the vehicle consists of an emergency breaking system and it recaptures the wasted energy due to inertia force and its helps in vehicle motion which increase the efficiency .The battery of this electric vehicle is charged by both voltage produced from the electric generator and solar panel and we have also given provision for electric charging during non sunshine days

### VIII. APPENDIX

Sl.No:	Components	Specifications	Quantity
1	Battery	12V,,75A Lead Acid Battery	4
2	Solar Panel	18V,2A	3
3	DC Generator	48V,DC	1
4	DC motor	48V,,BLDC	1
5	Controllers	Speed and voltage controller	1 each

### IX. RESULT

This project was a grand success.The energy required for recharging the main battery of the vehicle is obtained from the solar panel and from the front wheel generator.the vehicle design is best suited for smooth road applications..The project completed on given time.

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