# HYBRID ELECTRIC VEHICLE

**Patil Aishwarya Dnyandeo[1], Thombare Rupali Keshav[2], Raut Pooja Dilip[3]**

*[1,2,3]B. E. Student, Dept. of Electrical Engg, S. B. Patil College of Engineering, Maharashtra, India*

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**Abstract –** *This paper presents the design and construction of hybrid electric vehicle. The design of hybrid vehicle consists of Solar Power, Wind Power. And Plug-in supply is used for continuous electric vehicles battery charging. The modeling of solar and wind power and vehicle's battery performance checked by using PROTEUS-8 software. And modeling Result shows the appropriate power output.*

***Key Words***: hybrid vehicle, solar energy, wind energy, battery, plug-in

## 1. INTRODUCTION

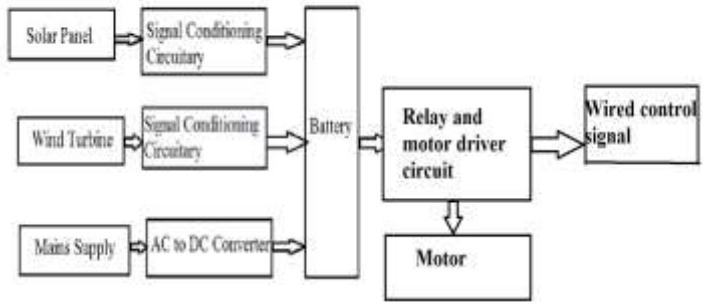
By the investigation of the global growth of population and vehicles in the next 50 years, the global population will increase from 6 billion in 2000 to 10 billion in 2050, and the global vehicles will increase from 700 million to 2.5 billion consequently. If all vehicles are powered by internal combustion engines, the gasoline and diesel oil will be depleted quickly, and the emission will result in greenhouse effect. So, the energy conservation and environmental protection are growing concerns around the world.

Meanwhile, fuel duty taxes were imposed by government; higher crude oil price plus fuel duty taxes result in higher fuel prices. So, Automobile Companies forced to develop electric vehicles with high-fuel economy.

The idea of solar charging panel utilizes solar PV modules to convert solar energy to DC electricity. The DC energy can be stored in a battery bank using a charge controller. A relay circuitry is employed to convert the required voltage for the output. Thus it develops an energy system for electric car which includes the solar wind turbine generator system (WTGS) transforms the wind energy into electrical energy. In fact, wind turbine that

Has several blades, gearbox transform wind energy into mechanical energy then this later was transformed by the generator. Thus objective of this project is to design an Electric Vehicle with a solar energy and wind energy to improve the performances of vehicle. Solar panel -battery-wind turbine, plug in supply scheme as its input energy sources. The solar panel which is mounted on the car absorbs solar energy during the day time and supplies power to the DC motor.

## 2. Block Diagram of HEV




Block Diagram of Hybrid Electric Vehicle

## 3. SYSTEM COMPONENTS:

The following are the major parts of the system that will make up the proposed hybrid electric vehicle system.

### 3.1 SOLAR PANEL:

A solar cell converts light energy into electrical energy. This conversion is based on the phenomenon of photovoltaic effect. Sunlight consists of photons with different energy levels depending upon the spectrum from which they belong. When sunlight strikes the surface of the photovoltaic materials it ejects electrons which results in the generation of electricity. This phenomenon is known as photovoltaic effect.

In theory, solar cells can convert about 30 percent of the incident solar radiation energy into electricity. Commercial cells today, depending on technology, typically have an efficiency of 5 -12 percent for thin films and 13 – 21 percent for crystalline silicon based cells. The first solar cell was built by Charles Fritts in around 1883 using junctions formed by coating selenium with an extremely thin layer of gold. The technology was developed long ago and at that time efficiency was below 1%. New technologies came up; new developments occurred and based on the technological development different generation of solar cells have been categorized.

### 3.2 WIND ENERGY:

Wind_turbines convert the energy in wind to electricity by rotating propeller-like blades around a rotor. The rotor turns the drive shaft, which turns an electric

generator. Three key factors affect the amount of energy a turbine can harness from the wind: wind speed, air density, and swept area. Wind turbines produce electricity by using the natural power of the wind to drive a generator. The wind is a clean and sustainable fuel source, it does not create emissions.

**3.3. TRANSFORMER:**

Transformers are capable of either increasing or decreasing the voltage and current levels of their supply, without modifying its frequency, or the amount of Electrical Power being transferred from one winding to another via the magnetic circuit.

The two coil windings are electrically isolated from each other but are magnetically linked through the common core allowing electrical power to be transferred from one coil to the other. When an electric current passed through the primary winding, a magnetic field is developed which induces a voltage into the secondary winding.

**3.4 RELAY:**

When power is supplied to relay current start flowing through the control coil as a result electromagnetic starts energizing. Hear points A, B, C are used as control points. When power is applied to input terminal due to electromagnetic effect, B and C are connected thus closes the contacts causing a short circuit for the power to the load. If the relay was already de-energized when the contacts were closed, then the contact move opposite and make an open circuit. When power supply is cut off point A and C are connected. This force is mainly provided by two factors they are spring and gravity.

Single Pole Double Throw (SPDT) - these types of relay comprise of 5 terminals two for coil one for common terminal(C) and rest two can be connected to the common terminal.

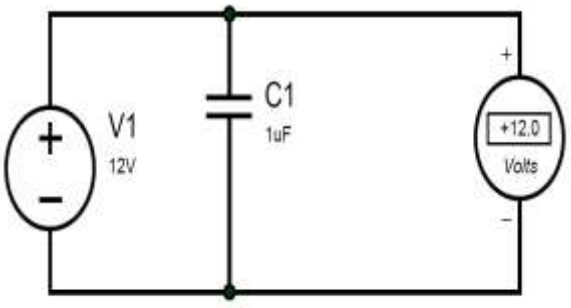
**5 DC Geared motors**

A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction.

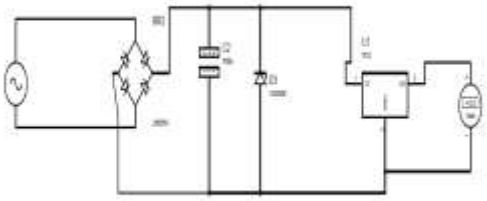
**4. SIMULATION OF HEV**

Layout software: PROTEOUS8
CIRCUIT DIAGRAM SIMULATION

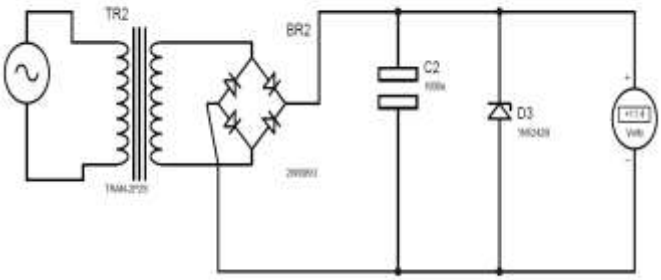
**4.1. SOLAR SIGNAL CONDITIONING CIRCUIT:**




**4.2. WIND TURBINE CIRCUIT CONDITIONING CIRCUITARY:**



**4.3. MAINS SUPPLY SIGNAL CONDITIONING CIRCUITARY:**




## 5. CONCLUSION:

At current levels of technology, installing SOLAR and wind powered. Vehicles provide a feasible method to improve the performances of the vehicles. The simulation results of the proposed systems show that the performance of the vehicle was improved.

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**BIOGRAPHIES**

[1] Patil Aishwarya Dnyandeo.
B. E. Student, Dept. of Electrical Engg,
S. B. Patil College of Engineering, Maharashtra, India

[2] Thombare Rupali Keshav.
B. E. Student, Dept. of Electrical Engg,
S. B. Patil College of Engineering, Maharashtra, India

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