

# ELECTRIC VEHICLE (Construction and Working principle)

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**Abstract** - We all know that, fossil fuel is demolishing day by day so, we have a great challenge to find alternative way to overcome this issue. Now, our main focus is our Automobile sector, the recent development and technology changes this sector very dramatically. The one is Electric vehicle (EV), the main aim of paper is to explain the importance of electric vehicle and how we are reducing greenhouse gas emission from the Environment. This Paper deals with basic concept of electric vehicle and also explained all possible type of electric vehicle. At last we have given a brief description of electric vehicle (EV).

**Key Words:** Fossil fuel, alternative way, Electric vehicle (EV), emission, Environment

## 1. INTRODUCTION

In recent some years, Greenhouse gas problem increases day by day and also the gasoline fuel rate increases nearly about 90 Rs/li. In daily life routine, public transportation is very important but the fuel rate, some people avoid using bikes or cars. So, many automobile manufacturer and new companies put their effort to convert the conventional vehicle into electric vehicle that provide reliable solution.

A vehicle is propelled with electric motors and draw power from onboard electric source is an electric vehicle. It is more durable and mechanically simpler than gasoline vehicle. It gives more fuel efficiency than gasoline because it does not produce emission like Internal combustion engine. However, automobile industry is not completely moving towards pure electric cars because there is inherent problem of existing batteries technology. For storing the electric energy, most common storage device used in Electric vehicle is battery. It can store large amount of energy in a small volume and weight.

The recent report shows that there were more vehicle running on a gasoline product in past few years but now the report has been changed with increasing the usage of Hybrid and Electric vehicle. Presently people are more inclined towards the Hybrid vehicle but the future will be totally based on electrification.

## 2. COMPONENTS OF ELECTRIC VEHICLE (EV)

There are three important components in electric vehicle namely,

1. Motor
2. Motor Controller
3. Battery

### 2.1 MOTOR

The main function of motor is to convert supplied electric energy current in to mechanical energy. Brushless DC motor (BLDC) have been much focused for many motor manufacturers. These are more effective in term of System cost, size, higher in efficiency, excellent controllability and also power saving than other motor. It has only two basic main parts Rotor and stator. The rotor is rotating part which carry permanent magnet and stator is stationary part and containing stator winding. The structure of stator is similar to the induction motor. It is made up of steel lamination with axially cut for winding.

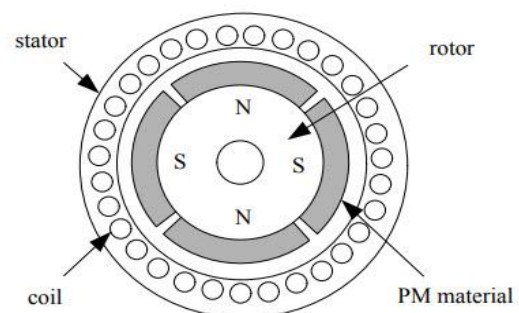


Fig -1: BLDC Motor

### 2.2 MOTOR CONTORLLER

In most of the electric vehicle, Brushless DC motor is used which is better than brushed DC motor, permanent magnet DC motor. Brushless DC motor does not have brush and commutator, the electric vehicle which uses brushless DC motor has to use motor controller which helps to control various properties of motor to take sufficient current and

voltage applied to motor. When accelerating pedal is press, this linked variable resistor type controller gives signal to the motor controller to adjust speed as per our needs. The motor controller has no power when vehicle is at rest position.

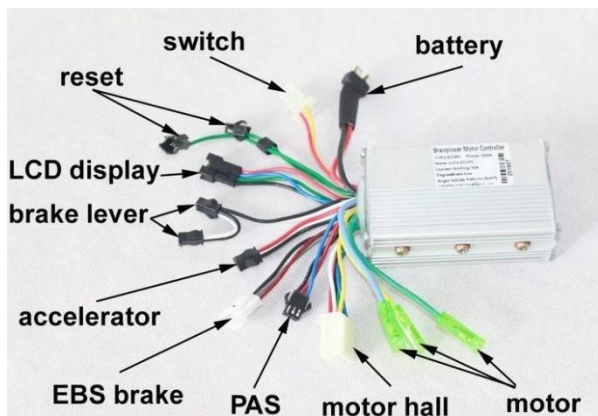


Fig -2: Motor controller

### 2.3 BATTERY

The main function of battery is to store electric energy. Most Hybrid and electric vehicle used lithium ion batteries. This storage system is usually essential for hybrid electric vehicle, Plug in hybrid electric vehicle and all types of electric vehicles. Due to advancing technologies, most of automobile manufacturer uses rechargeable batteries. The different type of batteries along with their characteristics are shown in Table.

Battery type	Lead - Acid	Ni - Cd	Ni - Mh	Lithium - ion
Power density	180	150	250-1000	1800
Nominal voltage	2V	1.25V	1.25V	3.6
Energy Density	30-50	45-80	60-120	110-160
Overcharge Tolerance	High	Moderate	Low	Very low
Life cycle	200-300	1500	300-500	500-1000
Operating temperature	-20-60°C	-40-60°C	-20-60°C	-20-60°C
Self-discharge	Low	Moderate	High	Very low

Table -1: Types of Battery

### 3. CONSTRUCTION AND WORKING PRINCIPLE OF ELECTRIC VEHICLE

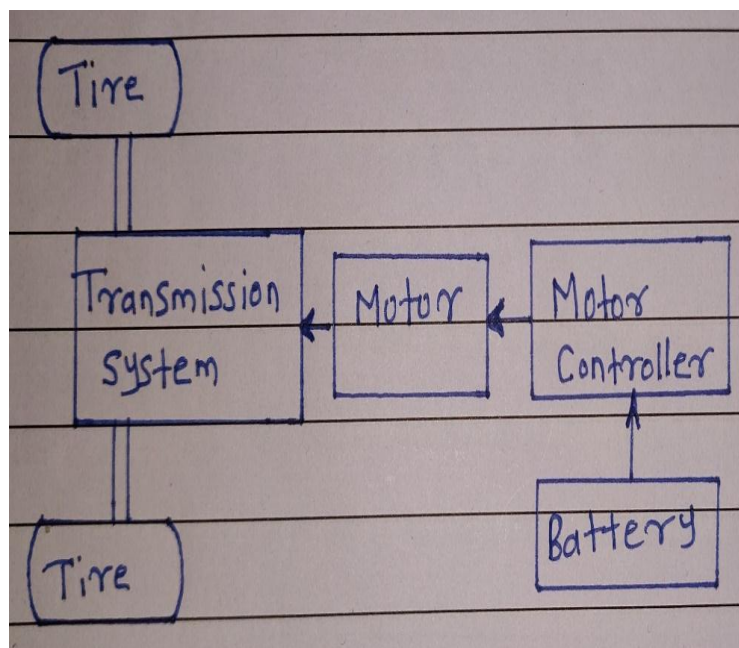


Fig -3: Construction and working principle of Electric Vehicle (EV)

Basically, electric vehicle is necessary for saving fossil fuel. The figure shows the simple construction of electric vehicle. It consists of battery, motor controller, motor which is connected to the transmission system. Here, battery is the energy source which is charged by taking electric current from the grid (In Solar power electric vehicle, Battery is charged with the use of solar pv panel which is attached on the roof of the vehicle). These batteries are rechargeable. Most electric vehicle uses lead acid battery but in new type of electric cars, use lithium ion batteries because it can store more energy than lead acid battery in same physical space. The efficiency and life span of battery is far better than other type of batteries, but it is costlier than lead acid battery. After that controller control the flow of energy from energy source to the motor. Motor transmit the power to the wheels of the vehicle by the use of transmission system.

### 4. TYPES OF ELECTRIC VEHICLE

There are three type of electric vehicle;

- a) Battery Electric Vehicle (BEV)
- b) Hybrid Electric Vehicle (HEV)
- c) Range Extended Electric Vehicle

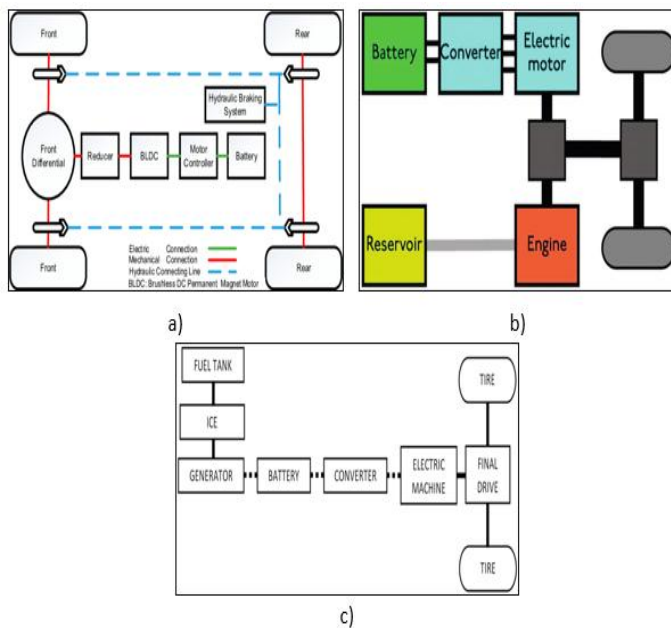


Fig -4: Types of electric vehicle

- a) Battery Electric vehicle consist of an electric motor which is powered by battery connected to it. Electric motor is used for the movement in this type of vehicle. It does not produce emission. In traffic, BEV delivers high torque to the wheels and smoother acceleration than Internal combustion engine. It is noiseless while operating motor. But on other side there are some disadvantages like, high production cost, limited top speed, more recharge time required.
- b) Hybrid electric vehicle is a combination of electric motor and new traditional Internal combustion engine. This vehicle can work with both electric and gasoline powered vehicle. When electric motor stop giving power then switch into Fuel mode. In HEV low speed mechanical electric motor used specifically in city traffic. When vehicle use electric power, there is no emission.
- c) Range extended electric vehicle mostly designed to run by the battery but have gasoline generator to recharge battery when charging is low.

### 5. ADVANTAGES OF ELECTRIC VEHICLE (EV)

1. No fuel, No pollution.
2. It required less maintenance.
3. Total operation is noise free.
4. It generates high starting torque.
5. We can charge at home.

6. Less Running cost than gasoline powered vehicle.
7. It helps to save fossil fuels.

### 6. DISADVANTAGES OF ELECTRIC VEHICLE (EV)

1. It is quite Expensive.
2. Not for long range travelling because availability of less number of electric charging power station.
3. It requires more time for recharging the battery.

### 7. CONCLUSION

This paper contains basic information of electric vehicle. It gives introduction of electric vehicle and their need for controlling the emission. The working of this system is fully noise free. It is smoother than gasoline powered vehicle and also it saves the non-renewable recourses. Especially Automobile sector move towards the Hybrid electric vehicle and also in future, the progress will be going on to improve life span of battery.

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