

## HYBRID ELECTRIC VEHICLE THE ENHANCED TECHNOLOGY

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**Abstract:** *In a world where environment protection and energy conservation are growing concerns, also With growing oil prices and escalating environment worries, cleaner and supportable energy solutions are demanded. Present transportation contributes large amount of energy consumption and emission of pollutants, the development of electric and hybrid vehicles (EV/HEV) has taken on an accelerated pace. This technology have the potential to reduce the fossil fuel use, decrease the pollution and allows the renewable energy sources for transportation. Initially the analysis of hybrid electric vehicle performance is done with battery of higher amp-hr capacity .In advanced state the converter circuit is implemented to reduce the battery rating. Different cases have been observed with different charging and discharging circuitry of battery. Hybrid electric vehicles are admired because of their ability to achieve related performance to a standard automobile while prominently improving fuel efficiency and tailpipe emissions.*

### I. INTRODUCTION

What is a hybrid? A hybrid vehicle combines any two power (energy) sources. Possible combinations include diesel/electric, gasoline/fly wheel, and fuel cell (FC)/battery. Typically, one energy source is storage, and the other is conversion of a fuel to energy. The combination of two power sources may support two separate propulsion systems. Thus to be a True hybrid, the vehicle must have at least two modes of propulsion. For example, a truck that uses a diesel to drive a generator, which in turn drives several electrical motors for all-wheel drive ,is not a hybrid. But if the truck has electrical energy storage to provide a second mode, which is electrical assists, then it is a hybrid Vehicle. These two power sources may be paired in series, meaning that the gas engine charges the batteries of an electric motor that powers the car, or in parallel, with both mechanisms driving the car directly..

What is hybrid Electric Vehicle?

Any vehicle that combines two or more sources of power that can directly or indirectly provide propulsion power is a hybrid. The most commonly used hybrid is gasoline-electric hybrid car which is just a cross between a gasoline-powered car and an electric car. A 'gasoline-electric hybrid car' or 'hybrid electric vehicle' is a vehicle which relies not only on batteries but also on an internal combustion engine which drives a generator to provide the electricity and may also drive a wheel. In hybrid electric vehicle the engine is the final source of the energy used to power the car. All electric cars use batteries charged by an external source, leading to the problem of range which is being solved in hybrid electric vehicle.

In this paper, it proposes a number of hybrid electric drive train topologies exist, such as the series, the parallel, and the combined (or series-parallel) topology. Within each topology, a number of variants exist. This HEV power train is of the series-parallel type, such as the one found in the Toyota Prius car. This HEV has two kinds of motive power sources: an electric motor and an internal combustion engine (ICE), in order to increase the drive train efficiency and reduce air pollution. It combines the advantages of the electric motor drive (no pollution and high available power at low speed) and the advantages of an internal combustion engine (high dynamic performance and low pollution at high speeds).

### Hybrid Electric Vehicle Structure

The hybrid Electric Vehicle consist of following parts:

- Gasoline engine - The hybrid car has a gasoline engine much like the one you will find on most cars. However, the engine on a hybrid is smaller and uses advanced technologies to reduce emissions and increase efficiency.
- Fuel tank - The fuel tank in a hybrid is the energy storage device for the gasoline engine. Gasoline has a much higher energy density than batteries do. For example, it takes about 1,000 pounds of batteries to store as much energy as 1 gallon (7 pounds) of gasoline.
- Electric motor - The electric motor on a hybrid car is very sophisticated. Advanced electronics allow it to act as a motor as well as a generator. For example, when it needs to, it can draw energy from the batteries to accelerate the car. But acting as a generator, it can slow the car down and return energy to the batteries.
- Generator - The generator is similar to an electric motor, but it acts only to produce electrical power. It is used mostly on series hybrids (see below).
- Batteries - The batteries in a hybrid car are the energy storage device for the electric motor. Unlike the gasoline in the fuel tank, which can only power the gasoline engine, the electric motor on a hybrid car can put energy into the batteries as well as draw energy from them.
- Transmission - The transmission on a hybrid car performs the same basic function as the transmission on a conventional car. Some hybrids, like the Honda Insight, have conventional transmissions. Others, like the Toyota Prius, have radically different ones, which we'll talk about later.

II. MODELS OF HEV

First one is Parallel hybrid systems have both an internal combustion engine and an electric motor that can both individually drive the car or both coupled up jointly giving drive. This is the most common hybrid system as of 2016. If they are joined at an axis (in parallel), the speeds at this axis must be identical and the supplied torques add together. (Most electric bicycles are of this type.) When only one of the two sources is in use, the other must either also rotate, be connected by a one way clutch or freewheel.

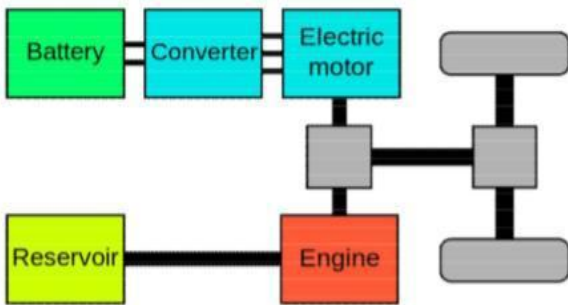


Figure 1 Parallel hybrid vehicle system

Second is series hybrid electric vehicle consisting of series arrangement of sources as shown in figure. In effect the entire mechanical transmission between the ICE and the wheels is removed and replaced by an electric generator, some cable and controls, and electric traction motors, with the benefit that the ICE is no longer directly connected to the demand.

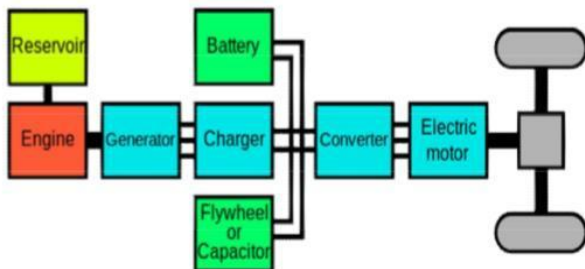


Figure 2 Series hybrid vehicle system

The last is series parallel hybrid electric vehicle that incorporate power-split devices, allowing for power paths from the ICE to the wheels that can be either mechanical or electrical. The main principle is to decouple the power supplied by the primary source from the power demanded by the driver.

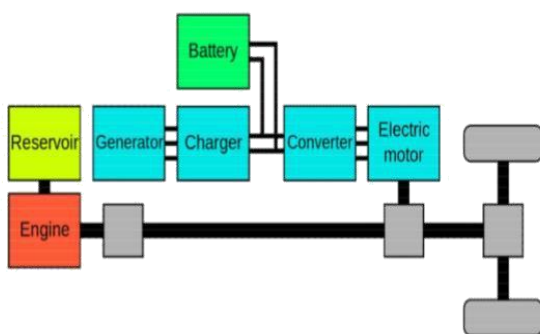


Figure 3 Series Parallel Hybrid electric vehicle

III. BENEFITS OF HYBRID ELECTRIC VEHICLES

**Environmentally Friendly:** One of the biggest advantage of hybrid car over gasoline powered car is that it runs cleaner and has better gas mileage which makes it environmentally friendly. A hybrid vehicle runs on twin powered engine (gasoline engine and electric motor) that cuts fuel consumption and conserves energy.

**Financial Benefits:** Hybrid cars are supported by many credits and incentives that help to make them affordable. Lower annual tax bills and exemption from congestion charges comes in the form of less amount of money spent on the fuel.

**Less dependence on Fossil Fuels:** A Hybrid car is much cleaner and requires less fuel to run which means less emissions and less dependence on fossil fuels. This in turn also helps to reduce the price of gasoline in domestic market.

**Regenerative Braking System:** Each time you apply brake while driving a hybrid vehicle helps you to recharge your battery a little. An internal mechanism kicks in that captures the energy released and uses it to charge the battery which in turn eliminates the amount of time and need for stopping to recharge the battery periodically.

**Built From Light Materials:** Hybrid vehicles are made up of lighter materials which mean less energy is required to run. The engine is also smaller and lighter which also saves much energy.

**Higher Resale Value:** With continuous increase in price of gasoline, more and more people are turning towards hybrid cars. The result is that these green vehicles have started commanding higher than average resale values. So, in case you are not satisfied with your vehicle, you can always sell it at a premium price to buyers looking for it.

IV. CONCLUSION

Using the concept of Hybridization of cars results in better efficiency and also saves a lot of fuel in today's fuel deficit world. A hybrid gives a solution to all the problems to some extent. If proper research and development is done in this field, hybrid vehicle promises a practical, efficient, low pollution vehicle for the coming era. One can surely conclude that this concept and the similar ones to follow with even better efficiency & conservation rate are very much on the anvil in today's energy deficit world.

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