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HYBRID TECHNOLOGY, THE FUTURE OF AUTOMOBILE VEHICLE

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ABSTRACT

Today automobile industry is known for more expanding industry. As the population is goes on increasing the requirement of vehicle is also increasing in proportion. Their many types of automobile vehicles are available in market as per various segments as per the customer requirement from various manufacturers, but along with increasing number as automobile vehicles the pollution problem is also being crucial as due to these vehicle large amount of CO_2 is comes in atmosphere which results in depleting the ozone layer very rapidly.

To find out solution for this there is new technology introduced recently which is known as Hybrid technology which is far more advance and developed that uses gasoline and electricity as their fuel as per the requirement which results into low pollution, reduced fuel consumption and many more. Because of these and many more benefits hybrid technology is going to be the future of automobile industry.

KEYWORDS: Automobile Vehicle, Electric Vehicle, Fuel Efficient, Hybrid Technology,

Lithium Nickel Battery

1. INTRODUCTION

A Hybrid vehicle works on two principle energies one is electrical energy and another one is IC engine energy i.e. the energy generated by fuel. For electrical energy number of batteries are used which supply energy to the traction motor and traction motors directly provide energy to the wheels of vehicle which propels the vehicle. While in case of fuel which is stored in fuel tanks is used to propel the IC engine which generates the power and torque to propel the vehicle and supplied to the wheels by same transmission system which is used in normal vehicle. As per the type of hybrid vehicle and stage of hybrid technology electrical energy and fuel energy ratio are maintained and are used to drive the vehicle accordingly.

In some cases largely in micro or medium hybrid cases at the time of starting minimum some basic speed which is already set by the driver up to that speed vehicle is driven by the IC engine power as ic power produces more power and torque to propel the vehicle with good acceleration and speed and after crossing the set limit ic engine automatically get shuts off and electrical power takes the vehicle in its control by shutting down ic engine automatically, as at high speed less torque required electrical power carries vital role in that.

In cases of full hybrid or electrical vehicle there is no need of ic engine power as in these vehicle high torsion motors are provide which provides high amount of torque and power which can take car from rest position to

high speed in less time. Also in all types of hybrid vehicle as battery is going to use to store energy which is used to drive the car it is also necessary that it should get charged to use again and again. For that special type of alternators are provide at each wheel which generates the electricity from rotating wheel and stores it in battery so that it can be used further whenever it is necessary.

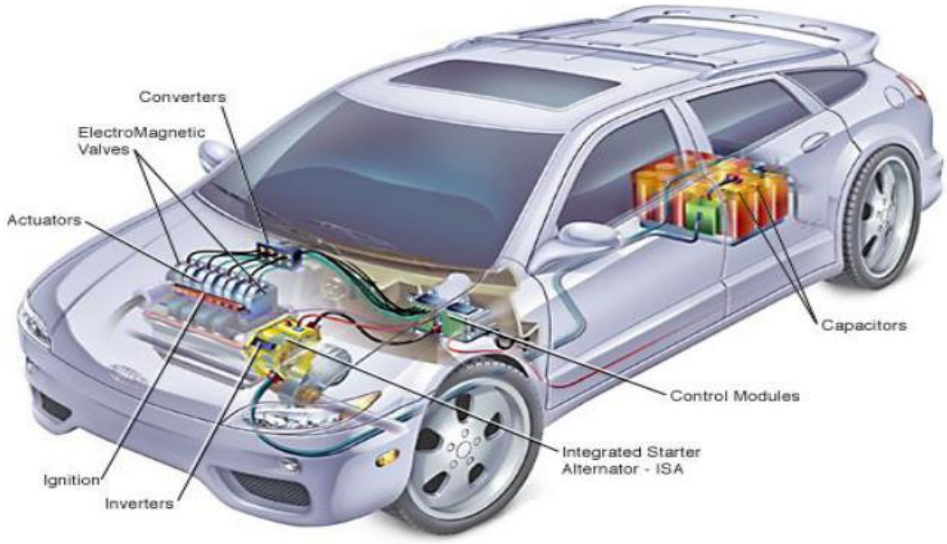

Figure 1.1 Hybrid vehicle structure [1]

1.1 Types of Hybrid Technology [9]

- Series Hybrid Technology
- Parallel Hybrid Technology
- Power Split Hybrid Technology

1.1.1 Series Hybrid Technology

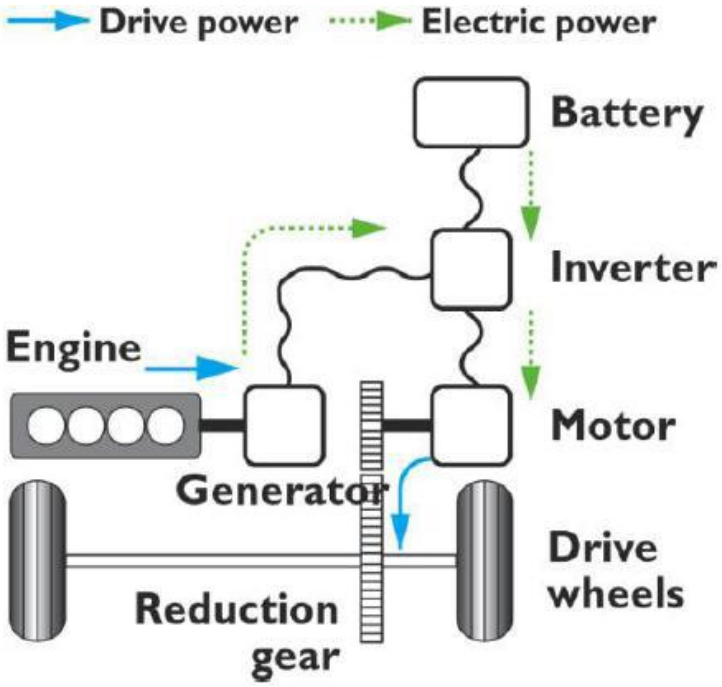

Figure 1.1.1 Layout of Series Hybrid Technology

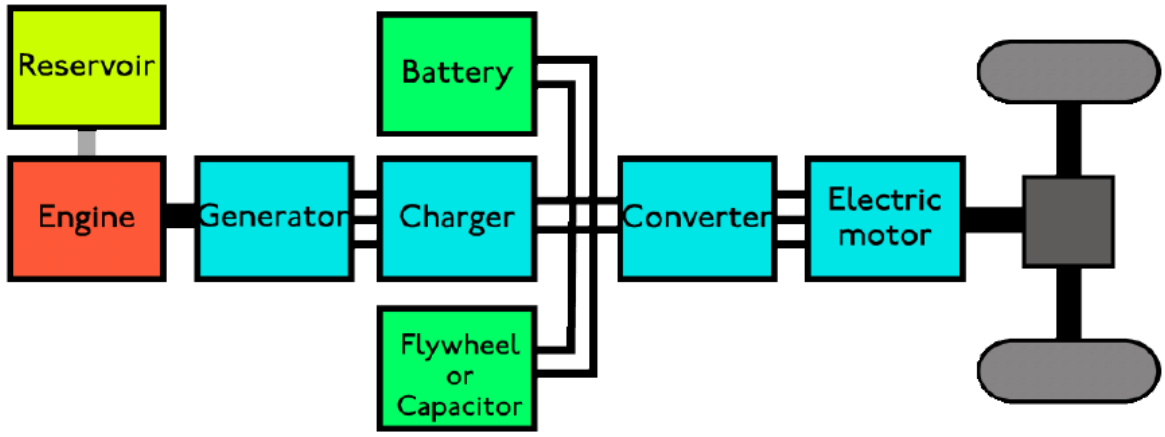

Figure 1.1.2 Block diagram for Series Hybrid Technology

In case of series hybrid IC Engine and elcrical motors are connected in series. When car is started from rest IC engine provides the power and as soon as car gets set speed limit it gets turned off automatically and electrical motor get started. So in case of series hybrid at a time only single power can be provided to the vehicle.

1.1.2 Parallel Hybrid Technology

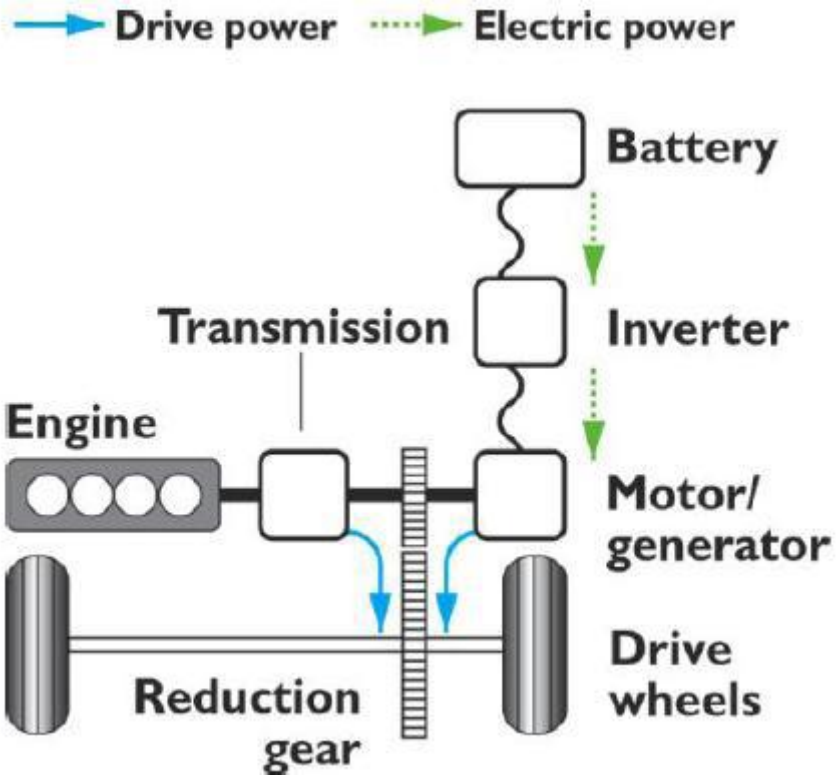

Figure 1.1.3 Layout of Parallel Hybrid Technology

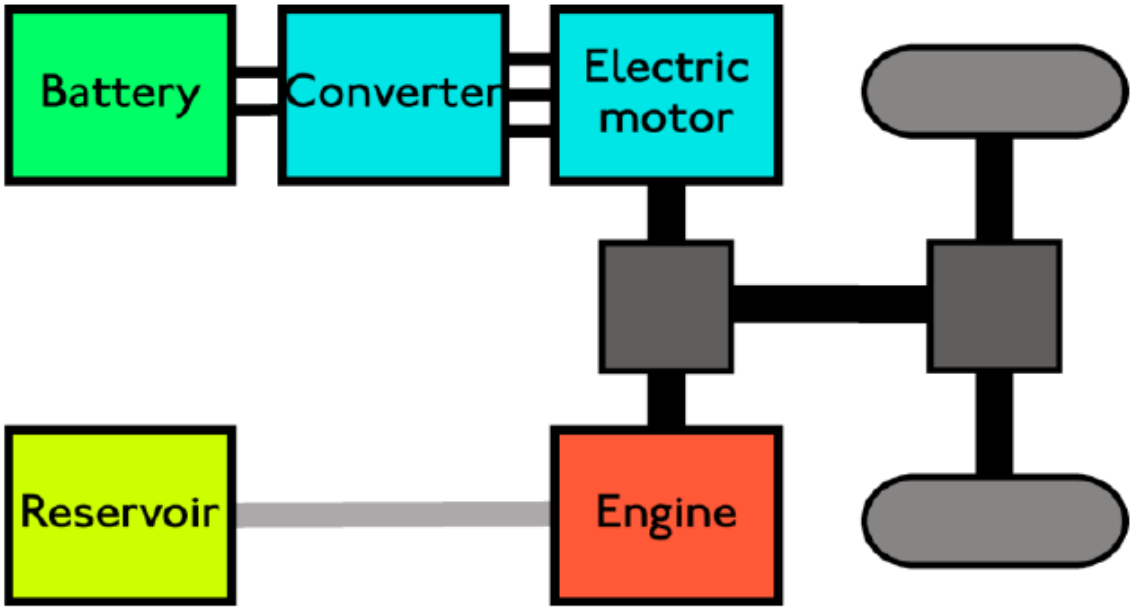

Figure 1.1.4 Block diagram for Parallel Hybrid Technology

In case of parallel hybrid IC Engine and electrical motors are connected in parallel. As per our requirement of power and torque we can switch from IC engine to electrical engine or vice versa. So in case of parallel hybrid at a time we can use any power as per our requirement by just switching from one power source to another.

1.1.3 Power Split Hybrid Technology

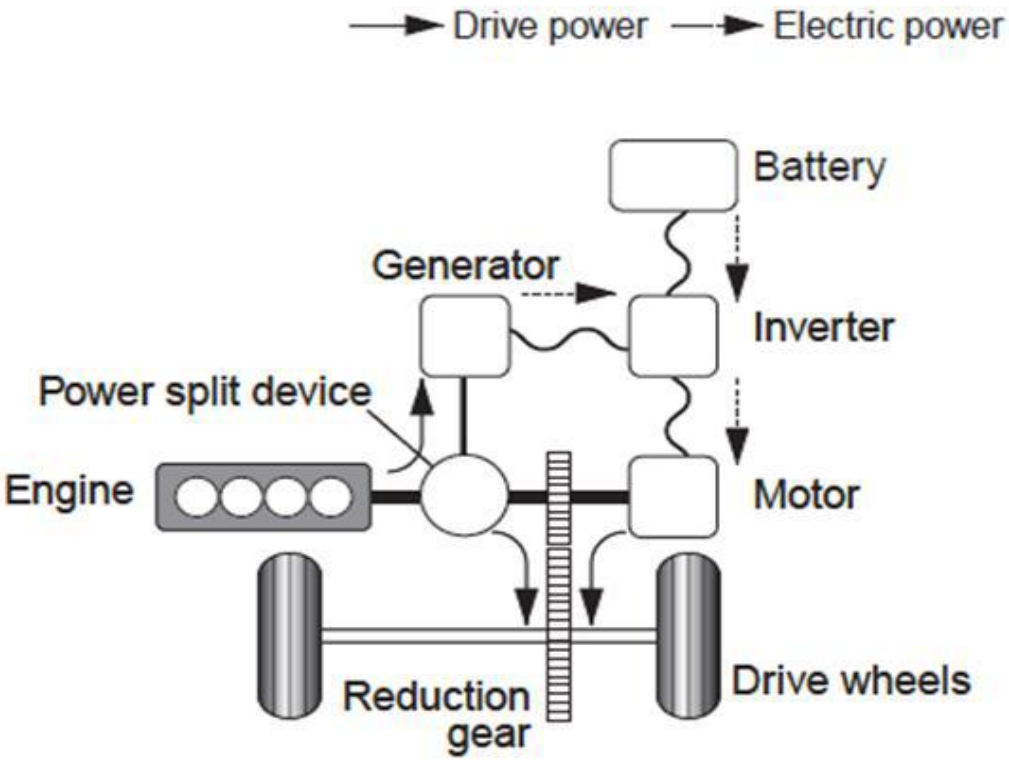

Figure 1.1.5 Layout of Power Split Hybrid Technology

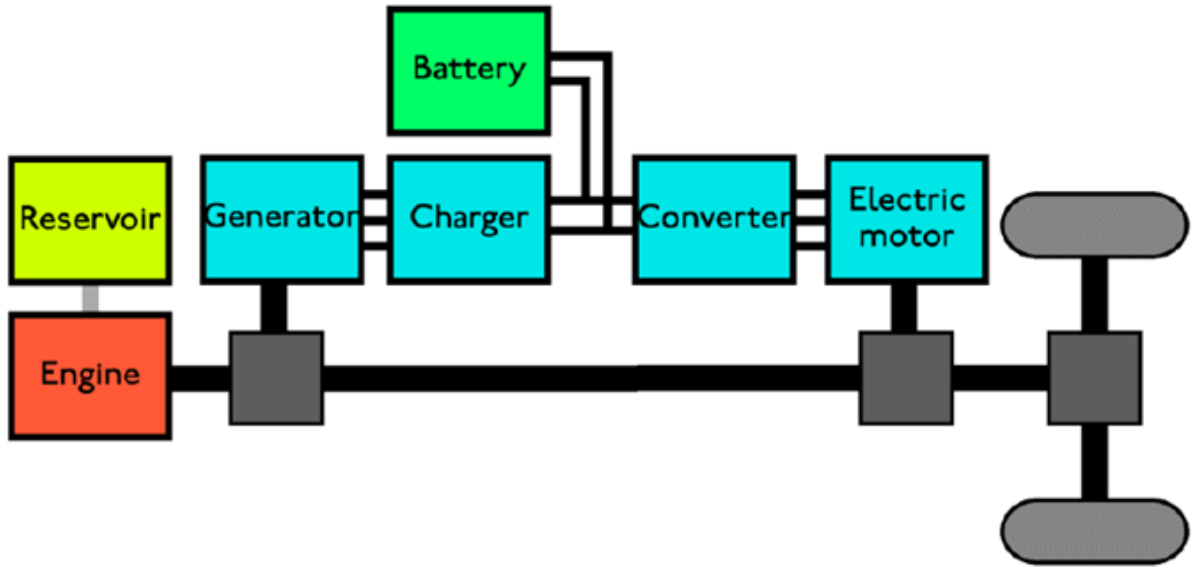

Figure 1.1.6 Block diagram for Power Split Hybrid Technology

In case of Power Split hybrid IC Engine and electrical motors are both connected to the wheels on a single propeller shaft.. As per our requirement of power and torque we can switch from IC engine to electrical engine or can take power from both the sources if required.

1.2 Stages of Hybrid Technology used in vehicle [5]

- Micro& Mild Hybrid
- Mild & Full Hybrid
- Plug in Hybrid & Electric Hybrid

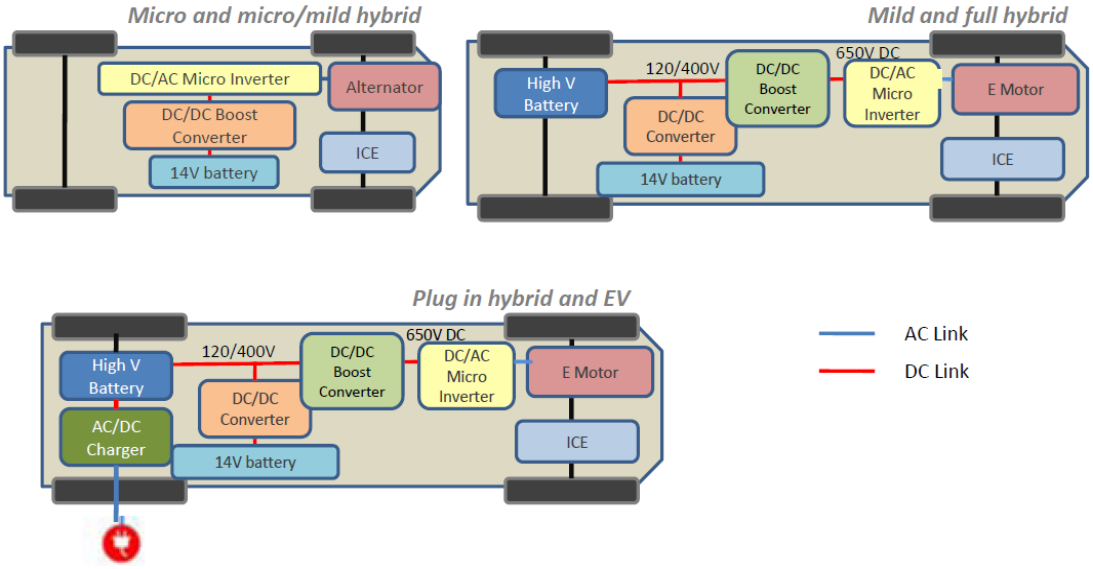

Figure 1.2.1 Stages of Hybrid Technology

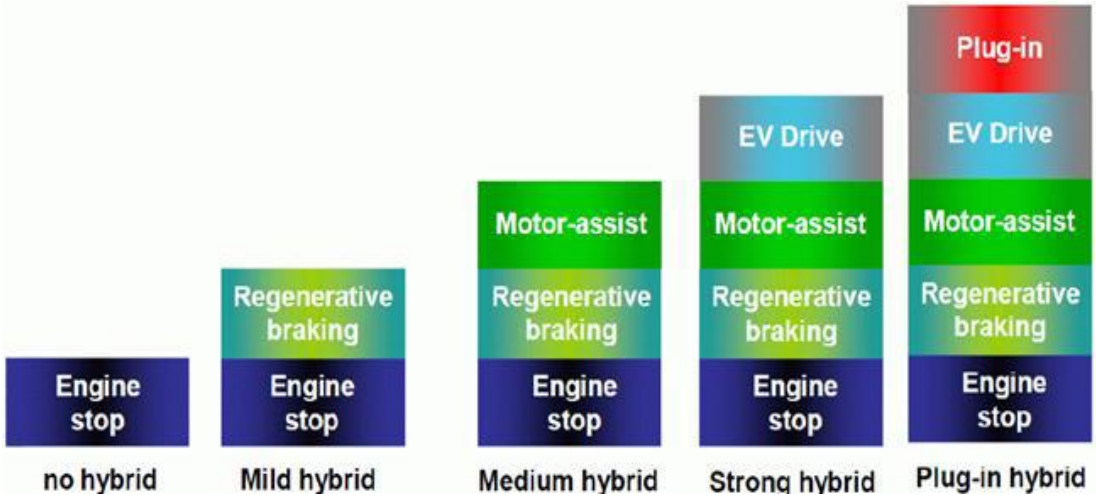

Figure 1.2.2 Overview of various stages used in Hybrid Technology

II BATTERIES USED IN HYBRID VEHICLE

- Nickel metal hybrid battery
- Lithium ion battery.

These are two types of batteries are used in hybrid cars due to their following advantages:

- Environmentally friendly.
- Constitution bulk of gasoline.
- Lithium-ion batteries have highest energy density.
- Storage large quantities of electricity.
- Production of Higher output (boosting vehicle power), higher efficiency (avoiding wasteful use of electricity), And Provides excellent durability.
- Reduction of weight of the vehicle And also achieves improved fuel economy of 30%.
- Reduction of the CO_2 emission.

2.1 Nickel Metal Hybrid (NiMH) battery [2][5]

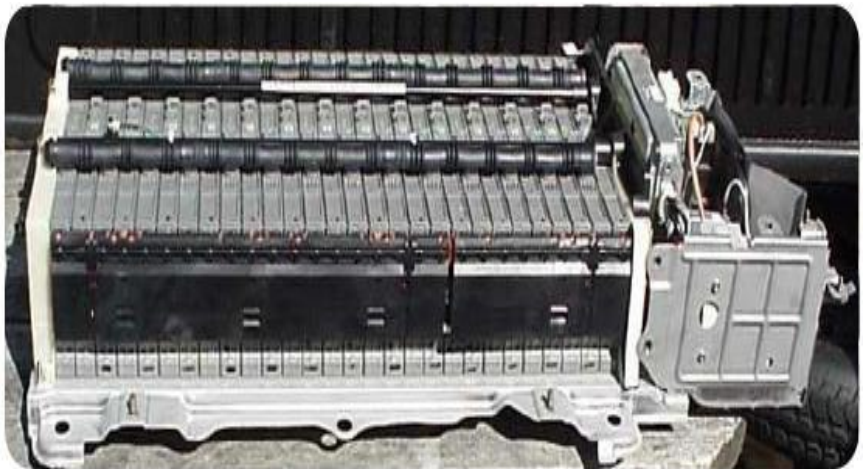

Figure 2.1.1 NIMH Battery

Advantages

- Energy density of 30-80 Wh/kg.
- Having exceptionally long lives if used properly.

Disadvantages

- High self-discharge.

2.2 Lithium-ion Battery [2][5]

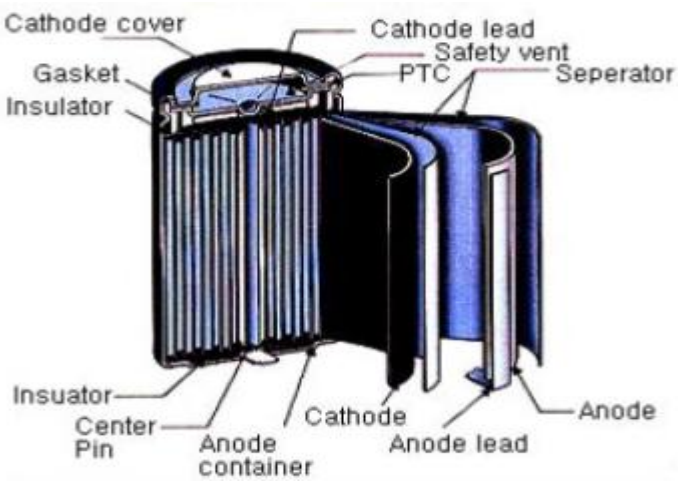

Figure 2.2.1 Lithium-Ion Battery

Advantages:

- High energy density.
- Solid electrolyte.
- Typically 40% smaller and weight half than NiMH.
- Open circuit voltage of approximately 3-4 volt at full charge.
- More environmentally friendly.

Disadvantages:

- Overcharging may cause damage to electrodes.
- Dangerous if not properly handled
- Safety features required for both cell and battery pack.

III MAIN ELECTRICAL COMPONENTS OF HYBRID VEHICLE

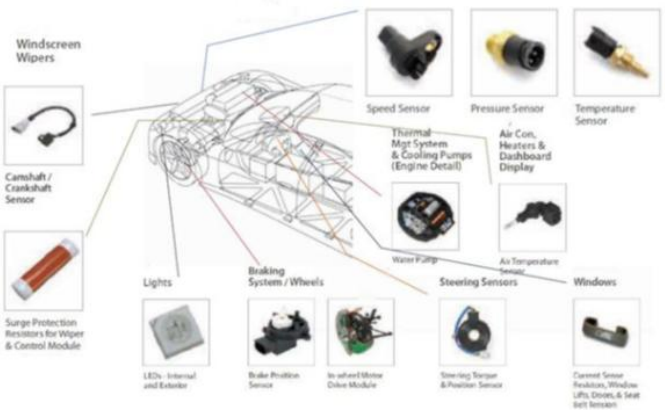

Figure 3.1. Main Electronic Components (At front side) [7]

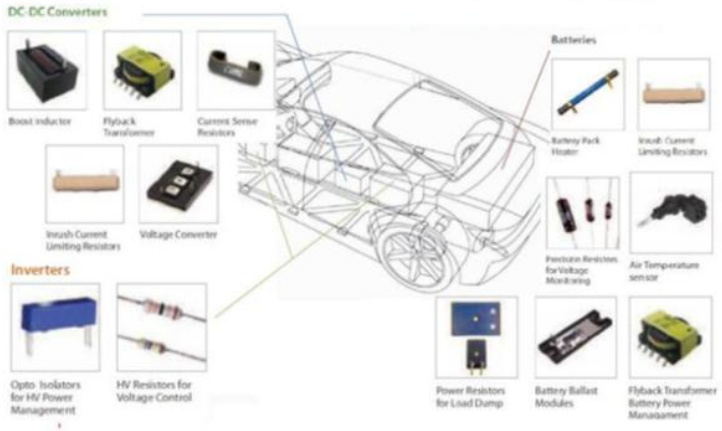

Figure 3.2. Main Electronic Components (At rear side) [7]

IV CONCLUSION

Hybrid technology consists of two engines, IC Engine as well as Electric Engine. It provides power to car by according to requirement. It is having enormous benefits over the conventional cars. Because of use of this technology the fuel efficiency of car is increased by considerably high amount compare to other cars also these cars are emitting less greenhouse gases which is very useful for atmosphere.

Because of these and many more such benefits cars with Hybrid Technology equipped are selling with much more number and will be takeover the market soon. They are the future of automotive industry as they having tremendous benefits like zero carbon emission, less fuel requirement and many more.

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