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Review on Electric Vehicle

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Abstract: Due to the problems caused by the gasoline engine on the environment and people, the automotive industry has turned to the electrical powered vehicle. This report explains how an electric vehicle works and compares the electric vehicle to the internal combustion engine and hybrid vehicle. The report provides some of the advantages and disadvantages of the electric vehicle. At a time when the fuel prices are rocketing sky high , the daily running cost of a vehicle and its cost of ownership are hitting the roof and there is a dire need to protect our environment , alternative means of transport are few . Electric vehicle are slow expensive with limited range the solution comes in the form of electrical vehicle .

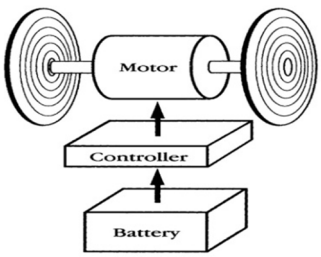
Keywords: Plug in hybrid electric vehicles, Energy management System Electric Vehicles, Energy transmission, Battery technology.

I. INTRODUCTION

India is one of the top ten automotive markets in the world today and having highly increasing middle class population with buying potential and the steady economic growth. But petrol price has increased more than 50% in 13 different steps in last two years. Here comes the potential need for alternative technologies in automobiles such as electric vehicles (EV) in India. Although the initial investment is around 1.5 times than conventional IC engine, but time has come when cost of environment is now more concern than the cost of vehicle The purpose of this report is to describe the technology used to produce an electric vehicle and explain why the electric engine is better than the internal combustion engine. It includes reasons why the electric vehicle grew rapidly and the reason it is a necessity to better the world today. The report describes the most important parts in an electric vehicle and hybrid vehicle. It compares the electric to the hybrid and internal combustion engine vehicle. It also includes the future of the electric vehicle. The overall impact of the electric vehicle ultimately benefits the people. Compared to gasoline powered vehicles, electric vehicles are considered to be ninety-seven percent cleaner, producing no tailpipe emissions that can place particulate matter into the air. articulate matter, carcinogens released into the atmosphere by gas-powered vehicles, "can increase asthma conditions, as well as irritate respiratory systems". The paper begins with a history of the electric vehicle, specifically the lows and highs of production and the reasons for the change. The next section provides a technical description of an electric vehicle, including the parts, their functions, and the theory of operation. The following section describes the hybrid car, including parts, their functions and the theory of operation. Based on this understanding, I then compare the internal combustion engine, the hybrid engine, and the electrical engine in terms of efficiency, speed, acceleration, maintenance, mileage, and cost. The paper concludes with sections the advantages and disadvantages of the electric vehicle. 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. EVs include road and rail vehicles, surface and underwater vessels, electric raft and electric spacecraft. EVs first came into existence in the mid-19th century, when electricity was among the preferred methods for motor vehicle propulsion, providing a level of comfort and ease of operation that could not be achieved by the gasoline cars of the time. The internal combustion engine (ICE) has been the dominant propulsion method for motor vehicles for almost 100 years, but electric power has remained commonplace in other vehicle types, such as trains and smaller vehicles of all types.

II. WORKING OPERATION

The electric vehicle (EV) is propelled by an electric motor, powered by rechargeable battery packs, rather than a gasoline engine. From the outside, the vehicle does not appear to be electric. In most cases, electric cars are created by converting a gasoline-powered car. Often, the only thing that clues the vehicle is electric is the fact that it is nearly silent.



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The electric motor gets its power from a controller and the controller gets its power from rechargeable battery. The electric vehicle operates on an electric/current principle. It uses a battery pack (batteries) to provide power for the electric motor. The motor then uses the power (voltage) received from the batteries to rotate a transmission and the transmission turns the wheels. Four main parts make up the electric vehicle: the potentiometer, batteries, direct current (DC) controller. The three main component of electric bike are electric motor , controller and battery . When you switch on the bike , the current is passed from the battery . The controller takes power from the battery and passing the current to motor, before passing the current to motor . The electrical motor the convert electrical energy to mechanical energy. The mechanical energy moves the vehicle. Controller stands as the buyer of power from battery and gives out power to motor accordingly. Variable potentiometers are connected between accelerator and the controller. These potentiometers tells the controller how much power it is supposed to deliver. When the accelerator is released it deliver 0v and the are fully pressed, it gives maximum output.

III. DESCRIPTION OF PARTS AND THEIR FUNCTIONS

A. Motors

There are a number of motors available for electric vehicle: DC motors, Induction motor, DC brushless motor, Permanent magnetic synchronous motor and Switched reluctance motor.

1) *DC Motors:* It is a classical motor and has been used in motor control for a long time. All the power involved in electromechanical conversion is transferred to the rotor through stationary brushes which are in rubbing contact with the copper segments of the commutator. It requires certain maintenance and has a shorter life time. However, it is suitable for low power application. It has found applications in electric wheel-chair, transporter and micro-car. Today, most of the golf-carts are using DC motors. The power level is les than 4kW.
2) *Induction Motor:* It is a very popular AC motors . It also has a large market share in variable speed drive application such as air-conditioning, elevator or escalator. Usually a vector drive is used to provide torque and speed control.
3) *DC Brushless Motor:* The conventional DC motor is poor mechanically because the low power winding, the field, is stationary while the main high power winding rotates. The DC brushless motor is "turned inside out. The high power winding is put on the stationary side of the motor and the field excitation is on the rotor using a permanent magnet. The motor has longer life time than the DC motor but is a few times more expensive. Most of the DC motor can be replaced by the brushless motor with suitable driver. Presently, its applications find in low power EV.
4) *Permanent Magnetic Synchronous Motor:* The stator is similar to that of an induction motor. The rotor us mounted with permanent magnets. It is equivalent to an induction motor but the air-gap filed is produced by a permanent magnet. The driving voltage is sinewave generated by Pulse Width Modulation (PWM).
5) *Switched Reluctance Motor:* It is a variable reluctance machine and its famous recently because of the fault tolerance because each phase is decoupled from other. The power stage is different from other the motor discussed in 2-4. Each phase winding is connected in a flyback circuit style.

B. Batteries

The battery is the main energy storage in the electric vehicle. The battery in-fact governs the success of the electric vehicle. Recently there are massive works being reported in battery development. The battery such as Li-ion is now being used by new generation of electric vehicle. The danger of the instability of the battery has been studied by many reported. It seems that the LiFePO4 type is preferable because of its chemically stable and inherently safe. Other Li-ion such as LiCoO2, LiMn2O4 and Li(Ni1/3Mn1/3Co1/3)O2 may has the thermal and overcharge concern . For low cost solution, the lead-acid battery is still dominant part of the market. The battery has found applications in electric wheel chair, Golf-cart, micro-car and neighborhood town air. The recent RoHS has also stopped the use of NiCd battery.

C. DC Controller

The controller takes power from the batteries and delivers it to the motor. The controller can deliver zero power (when the car is stopped), full power (when the driver floors the accelerator pedal), or any power level in between. If the battery pack contains four 12-volt batteries, wired in series to create 48volts, the controller takes in 48 volts direct current, and delivers it to the motor in a controlled way. The controller reads the setting of the accelerator pedal from the two potentiometers and regulates the power accordingly. If the accelerator pedal is 25 percent of the way down, the controller pulses the power so it is on 25 percent of the time and off 75 percent of the time. If the signals of both potentiometers are not equal, the controller will not operate Motor. The motor receives power from the controller and turns a transmission. The transmission then turns the wheels, causing the vehicle to run.

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IV. CLASSIFICATIONS OF ELECTRIC VEHICLE

Taking the power supplement and propulsion devices into account, EV could be classified into three different types: pure electrical vehicle (PEV), hybrid electrical vehicle (HEV) and fuel cell electrical vehicle (FCEV). Table 1 shows a brief classification of different EVs. The PEV is purely fed by electricity from the power storage unit, while the propulsion of PEV is solely provided by an electric motor. The driving system of HEV combines the electric motor and the engine, while the power sources involve both electricity and gasoline or diesel. FCEV is driven by an electric motor and could be directly or indirectly powered using hydrogen, methanol, ethanol or gasoline.

Table 1: Comparison of different Electric Vehicle

Types	PEV	HEV	FCEV
Drive Section	Electric machine	Electrical machine, internal combustion engine (ICE)	Electrical machine
Energy sources	Battery, ultracapacitor	Battery, ultracapacitor, ICE unit	Fuel cell
Energy Supplements	Electricity and power system	Electricity and power system, gasoline station	Hydrogenide

Nowadays, we can encounter different types of EVs, according to their engines technology. In general, they are sorted in three types

1) *Plug-In Hybrid Electric Vehicles (PHEVs):* Hybrid vehicles are propelled by a conventional combustible engine and an electric engine charged by a pluggable external electric source. PHEVs can store enough electricity from the grid to significantly reduce their fuel consumption in regular driving conditions. The Mitsubishi Outlander PHEV provides a 12 kWh battery, which allows it to drive around 50 km just with the electric engine. However, it is also noteworthy that PHEVs fuel consumption is higher than indicated by car manufacturers.
2) *Hybrid Electric Vehicles (HEVs):* Hybrid vehicles are propelled by a combination of a conventional internal combustion engine and an electric engine. The difference with regard to PHEVs is that HEVs cannot be plugged to the grid. In fact, the battery that provides energy to the electric engine is charged thanks to the power generated by the vehicle's combustion engine. In modern models, the batteries can also be charged thanks to the energy generated during braking, turning the kinetic energy into electric energy. The Toyota Prius, in its hybrid model (4th generation), provided a 1.3 kWh battery that theoretically allowed it an autonomy as far as 25 km in its all-electric mode .
3) *Fuel Cell Electric Vehicles (FCEVs):* These vehicles are provided with an electric engine that uses a mix of compressed hydrogen and oxygen obtained from the air, having water as the only waste resulting from this process. Although these kinds of vehicles are considered to present "zero emissions", it is worth highlighting that, although there is green hydrogen, most of the used hydrogen is extracted from natural gas. The Hyundai Nexo FCEV is an example of this type of vehicles, being able to travel 650 km without refueling.

V. EMISSIONS

Compared to gasoline powered vehicles, electric vehicles are considered to be ninety - seven percent cleaner, producing no tailpipe emissions that can place particulate matter into the air Global Warming: Ozone Layer The process of carbon dioxide emitted into the atmosphere, also known as global warming, diminishes the Earth's ozone layer, which is what occurs at this time. A factor that makes electric vehicles clean is their ability to use half the number of parts gasoline powered vehicle does, including gasoline and oil.

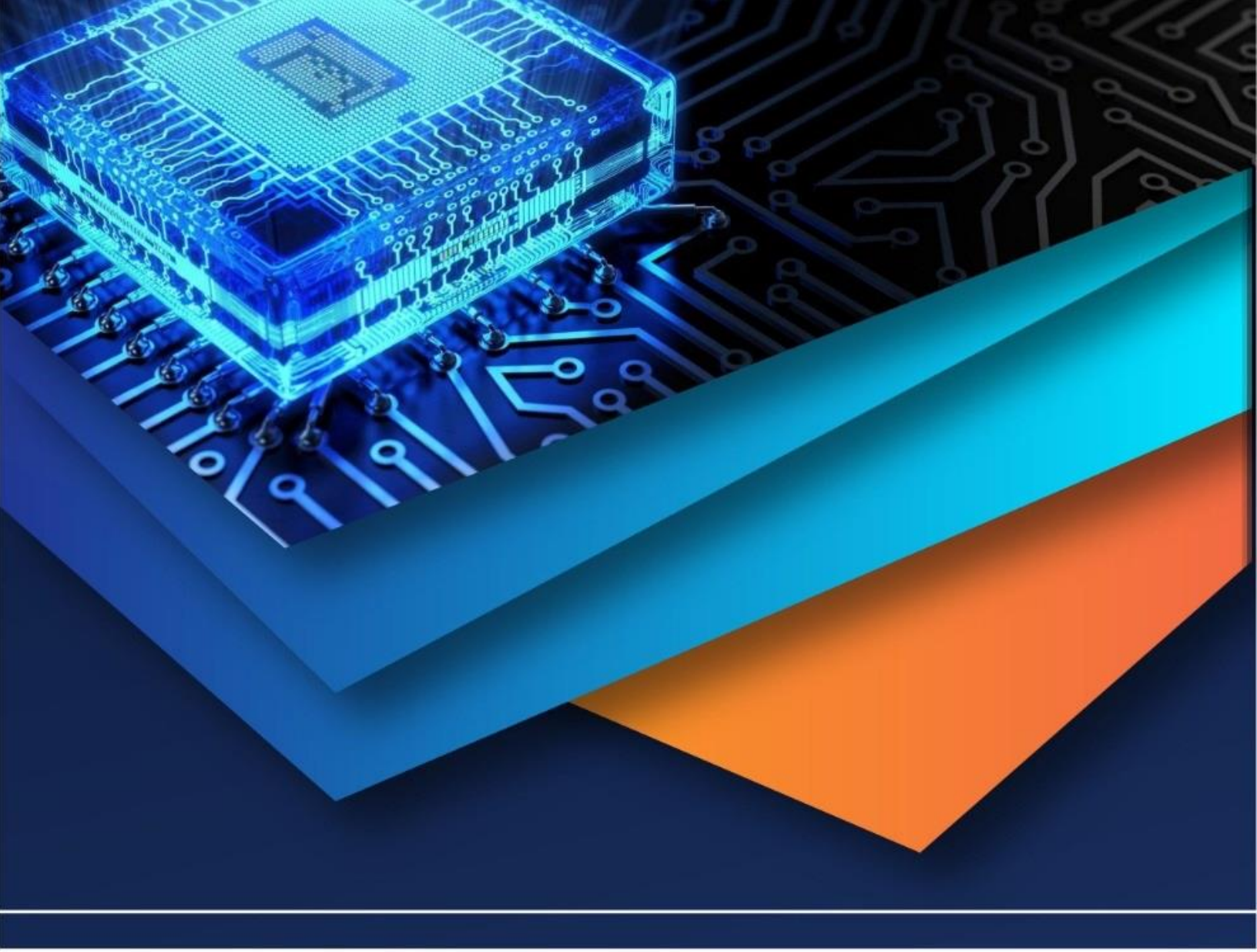
VI. CONCLUSION

As seen in this report, the electric vehicle has many advantages and benefits over the internal combustion engine. It is cleaner and much more efficient; however, it also has disadvantages. It is heavier, limited to the distance it can travel before recharge, and costs more. The future of the EV relies on its battery. If researchers can produce or find the "super battery", the EV's future is promising. As of today, each vehicle has its own characteristic that makes it better than the other. Only time and technological improvements will tell which vehicle will excel in the future. The above proposed project named " ELECTRIC VEHICLE" will be designed on the objective of providing an alternative source of transportation as well as an economical we believe this project, if effectively used may be considered as an innovative and a good solution for the large emission of CO2 as far as a developing nation like India is concerned.

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