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Smart Hybrid Vehicle: Case Study

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Abstract: *Have you pulled your car up to the gas petrol pump lately and been shocked by the high price of gasoline? As the pump clicked past Rs 1400 or 1500, maybe you thought about trading in that SUV for something that gets better mileage. Or maybe you are worried that your car is contributing to the greenhouse effect. Or maybe you just want to have the coolest car on the block. Currently, there is a solution for all this problems, it's the hybrid electric vehicle.*

The vehicle is lighter and roomier than a purely electric vehicle, because there is less need to carry as many heavy batteries. The internal combustion engine in hybrid- electric is much smaller and lighter and more efficient than the engine in a conventional vehicle, In fact, most automobile manufacturers have announced plans to manufacture their own hybrid versions. Hybrid electric vehicles are all around us. Most of the locomotives we see pulling trains are diesel-electric hybrids. Cities like Seattle have diesel-electric buses these can draw electric power from overhead wires or run on diesel when they are away from the wires. Giant mining trucks are often diesel-electric hybrids Subunarines are also hybrid vehicles some are nuclear-electric and some are diesel- electric. Any vehicle that combines two or more sources of power that can directly or indirectly provide propulsion power is a hybrid.

Keywords: electric vehicle.

I. INTRODUCTION

A hybrid vehicle, abbreviated HEV, is one that uses both an internal combustion engine (ICE) and an electric motor to propel the vehicle. Most hybrids use a high- voltage battery pack and a combination electric motor and generator to help or assist a gasoline engine.

The ICE used in a hybrid vehicle can be either gasoline or diesel, although only gasoline-powered engines are currently used in hybrid vehicles. An electric motor is used to help propel the vehicle, and in some designs, capable of propelling the vehicle alone without having to start the internal combustion engine.

The presence of the electric power train is intended to achieve either better fuel economy than a conventional vehicle or better performance. There are a variety of HEV types, and the degree to which they function as EV's varies as well. The most common form of HEV is the hybrid electric car, although hybrid electric trucks (pickups and tractors) and buses also exist. Modern HEVs make use of efficiency-improving technologies such as regenerative braking, which converts the vehicle's kinetic energy into electric energy to charge the battery, rather than wasting it as heat energy as conventional brakes do. Some varieties of HEVs use their internal combustion engine to generate electricity by spinning an electrical generator (this combination is known as a motor- generator), to either recharge their batteries or to directly power the electric drive motors. Many HEVs reduce idle emissions by shutting down the ICE at idle and restarting it when needed, this is known as a start-stop system. A hybrid-electric produces less emissions from its ICE than a comparably-sized gasoline car, since an HEV's gasoline engine is usually smaller than a comparably-sized pure gasoline- burning vehicle (natural gas and propane fuels produce lower emissions) and if not used to directly drive the car, can be geared to run at maximum efficiency, further improving fuel economy.

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II. METHODOLOGY

Hybrid electric vehicles are powered by an internal combustion engine and one or more electric motors, which uses energy stored in batteries. A hybrid electric vehicle cannot be plugged in to charge the battery. Instead, the battery is charged through regenerative braking and by the internal combustion engine.

II. Material used -

1. Electric Motors
2. Batteries
3. Solar plate
4. Light indicator
5. Wheels
6. Battery charge sensor

III. WORKING PRINCIPLE

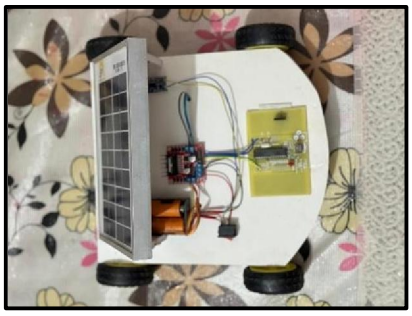

Fig no: -01-Smart hybrid vehicle

1. Integrated Starter Generator (ISG): The ISG replaces the conventional alternator and acts as both a motor and a generator.
2. Torque Assist: During acceleration, the ISG's motor function supplements the engine's power, improving performance and reducing engine load.
3. Brake Energy Regeneration: When braking, the ISG converts kinetic energy into electrical energy and stores it in the dual-battery system.
4. Dual-Battery System: This system typically includes a Lithium-Ion battery and a Lead-Acid battery.
5. Dle Start-Stop: The engine automatically shuts off when idling and restarts quickly using the stored energy in the batteries when the clutch is depressed (in manual transmissions) or when the driver presses the accelerator (in automatic transmissions).
6. 6. Brake Energy Regeneration: The stored energy from braking is used to power the ISG, which in turn assists in the Idle Start- Stop and Torque Assist functions.

IV. CONCLUSION

Means a hybrid vehicle is a vehicle that uses two or more distinct power sources to move the vehicle. The term most commonly refers to hybrid electric vehicles (HEVs), which combine an internal combustion engine and one or more electric motors.

Modern HEVs make use of efficiency-improving technologies such as regenerative braking, which converts the vehicle's kinetic energy into electric energy to charge the battery, rather than wasting it as heat energy as conventional brakes do. Some varieties of HEVs use their internal combustion engine to generate electricity by spinning an electrical generator (this combination is known as a motor- generator), to either recharge their batteries or to directly power the electric drive motors. Many HEVs reduce idle emissions by shutting down the ICE at idle and restarting it when needed; this is known as a start-stop system. A hybrid-electric produces less emissions from its ICE than a comparably-sized gasoline car, since an HEV's gasoline engine is usually smaller than a comparably-sized pure gasoline-burning

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REFERENCES

[1] https://en.m.wikipedia.org/wiki/Hybri d electric vehicle
[2] http://www.hybridcars.com/history- of-hybrid-vehicles
[3] https://www.fueleconomy.gov/feg/h ybridtech.shtml.
[4] https://drive.google.com/file/d/0BylK fvgX-GD6RFNWamxCUjI4bWc/view
[5] http://www.123seminarsonly.com/Se minar-Reports/007/7042641-Control- of-Hybrid-Electric-Vehicles-With-Diesel-Engines.pdf
[6] http://pediain.com/seminar/www.ped iain.com-plugin-hybrid-electric-vehicle- seminar.pdf