

Modified Hybrid Vehicle - A Perfect Combination of Gasoelectric Car and Bike

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Abstract: *With the leading world and advancement in new technologies, there has been excessive usage of Petroleum and its isotopes which is leading to scarcity of the natural resources like crude oil, fossil fuel and many more. And on other hand as day by day population have been increasing due to these reasons traffic is also affected and it is the major reason of air and noise pollution. So, Automobile industries have started doing research and development for a vehicle which consume less fuel and give effective outputs in making automobiles eco-friendly. That is why they introduced Hybrid Technology. This paper presents use of motorbike engine as a main power source and a battery and motor system as secondary power source. This project's main aim is to make it cost efficient for those who can't afford a real hybrid car and on the same hand it is also consume less fuel then an actual hybrid car.*

Keywords: Battery, Cast iron frame, DC Motor, Motor-bike engine (110CC)

1. Introduction

"Hybrid Electric Vehicle"

A vehicle is called hybrid when it contains two or more power source. Many people have been using hybrid vehicle like a motorbike with pedal of bicycle installed in it so if the fuel get consumed they can pedal it and reach to destination. It save fuel as well as provide a good exercise

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. Submarines 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.[1]

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.[2]

Hybrid Structure

There are various ways to give transmission in hybrid car by combining two power sources. One of them we are utilizing in this project, it has a fuel tank, which supplies gasoline to the engine. But it also has a battery that supplies power to an electric motor. Both the engine and the electric motor can produce power for transmission but it can be used alternatively, and the transmission then turns the wheels. According to concept of hybridization of car, this hybrid vehicle project is not that advanced that like hybrid car but it is definitely a better advancement in the field of hybrid bike.

It is a perfect collaboration of hybrid car and bike because it has structure and technology of car using components like engine of bike.

Using this concept in hybrid vehicle project results in better efficiency and also saves a lot of fuel even more than a hybrid car. Although at present the concept has been put in to maximum utilization by many of the automobile companies. 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. This project achieves even better efficiency & conservation rate for today's energy deficit world.

2. Literature Survey

Automotive hybrid technology became widespread beginning in the late 1990s. The first mass-produced hybrid vehicle was the Toyota Prius, launched in Japan in 1997, and followed by the Honda Insight, launched in 1999 in the United States and Japan.[4][5]

Modern HEVs make use of efficiency-improving technologies such as regenerative brakes which convert the vehicle's kinetic energy to electric energy to charge the battery. Some varieties of HEV use their internal combustion engine to generate electricity by spinning an electrical generator to either recharge their batteries or to directly power the electric drive motors; this combination is known as a motor-generator. 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 and if not used to directly drive the car, can be geared to run at maximum efficiency, further improving fuel economy. (Natural gas and propane fuels produce fewer emissions.)

Although Ferdinand Porsche developed the Lohner-Porsche in 1901, hybrid electric vehicles did not become widely

available until the release of the Toyota Prius in Japan in 1997, followed by the Honda Insight in 1999. While initially perceived as unnecessary due to the low cost of gasoline, worldwide increases in the price of petroleum caused many automakers to release hybrids in the late 2000s; they are now perceived as a core segment of the automotive market of the future.[3][4][5]

Mild hybrids are generally internal combustion engines equipped with an electric machine (one motor/generator in a parallel hybrid configuration) allowing the engine to be turned off whenever the car is coasting, braking, or stopped, yet restart quickly. Mild hybrids may employ regenerative brake and some level of power assist to the internal combustion engine (ICE), but mild hybrids do not have an exclusive electric-only mode of propulsion.

3. Hybrid Vehicle Components

Components used in hybrid vehicles are given below:

• Motor-bike engine -

This hybrid vehicle has a motor-bike engine much like the one you will find on most low CC bikes. However, the engine on a hybrid vehicle will be smaller and lighter, and is more efficient than the engine in a normal car and conventional vehicle, because the engine runs at a relatively constant speed, and does not need to provide direct power for acceleration, which is the biggest reason for large engines. As small engine consumes less fuel and give less emission.



Figure 1: Motor-bike Engine

• Fuel tank

The fuel tank in a hybrid vehicle is used for storing fuel like gasoline etc. 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

Electric motor used in hybrid vehicle are usually dc series motor since it's versatile and ease with which a variety of speed-torque characteristics can be obtained, and wide range of speed control is also possible in this. That is why the electric motor on a hybrid vehicle is very complicated. Advanced electronics allow it to act as a motor as well as a

generator. For example, it drives vehicle by consuming power and it produce power with acceleration of engine.

• Batteries

The batteries in a hybrid vehicle 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. The batteries used in hybrid vehicle is Ni-Cd cells since its lighter than the lead acid cells and it is also mechanically strong and can stand very rough use.

• Transmission

The transmission on a hybrid vehicle performs the same basic function as the transmission on a conventional car. This project has built on the chain drive transmission system because it contains bike engine and one way gear with chain drive used for motor.[6]

4. Fabrication Process

1) Frame And Wheel Assembly

This hybrid vehicle has 3-Wheeler structure, one on the front side and two at rear and this vehicle is based on rear wheel drive system that is why the fabrication of frame is done accordingly.

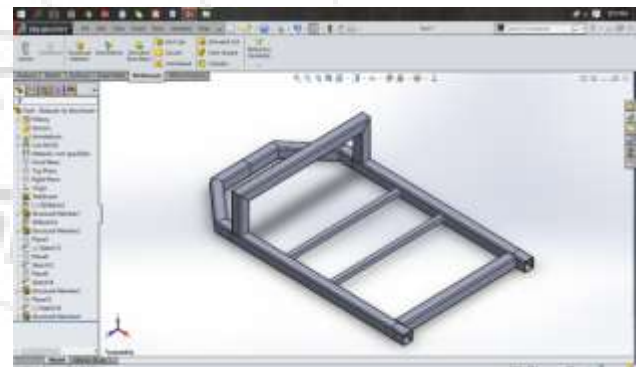


Figure 2: Frame Drawing of Vehicle



Figure 3: Front wheel and steering wheel installation



Figure 4: Rear wheel installation



Figure 7: mounting of dc motor and battery

2) Engine Selection and Mounting

As for making it less fuel consumption vehicle Engine selection is the major part to be focused and so finally we have selected 110 CC Bike engine. For mounting engine, we did some load analysis and selected a perfect place.



Figure 5: Side view after engine mounting

4) Power Transmission Installation

For Engine, we have used simple chain-sprocket Mechanism and For Motor, we have used one way chain-sprocket Mechanism. Both transmission installations took place on rear wheels to get effective power transmission.



Figure 8: Engine Power Transmission assembly



Figure 6: rear view after engine mounting



Figure 9: Motor Power Transmission Assembly

3) Installation of Motor and Battery

The Motor and Battery are the secondary power source of this vehicle so, according to load balancing and the power output given by motor we installed motor on the rear axel shaft near the power output of engine.



Figure 10: Engine and Motor power transmission Assembly

5) Body and Seat Installation

We have used simple wooden structure for giving it a shape just like a open car to make it more fancy.



Figure 11: Body before Fabrication



Figure 12: Fabricated Body

5. Result

Hybrid Efficiency

Besides a smaller, more efficient engine, today's hybrids use many other tricks to increase fuel efficiency. Some of those tricks will help any type of car get better mileage, and some only apply to a hybrid. To squeeze every last mile out of a gallon of gasoline, a hybrid car can:

Recover energy and store it in the battery -

Whenever you step on the brake pedal in your car, you are removing energy from the car. The faster a car is going, the more kinetic energy it has. The brakes of a car remove this energy and dissipate it in the form of heat. A hybrid car can capture some of this energy and store it in the battery to use later. It does this by using "regenerative braking." That is, instead of just using the brakes to stop the car, the electric motor that drives the hybrid can also slow the car. In this mode, the electric motor acts as a generator and charges the batteries while the car is slowing down.

Sometimes shut off the engine -

A hybrid car does not need to rely on the gasoline engine all of the time because it has an alternate power source -- the electric motor and batteries. So the hybrid car can sometimes turn off the gasoline engine, for example when the vehicle is stopped at a red light.

Use low-rolling resistance tires -

The tires on most cars are optimized to give a smooth ride, minimize noise, and provide good traction in a variety of weather conditions. But they are rarely optimized for efficiency. In fact, the tires cause a surprising amount of drag while you are driving. Hybrid cars use special tires that are both stiffer and inflated to a higher pressure than conventional tires. The result is that they cause about half the drag of regular tires.

6. Conclusion

Hybrid Vehicle is unquestionably an enhanced alternate of conventional cars due to its wise functionality of choosing secondary source of power according to situation which makes this vehicle fuel efficient, cost proficient and better substitute of current automobile in terms of limited resource consumption.

7. Future Scope

Future of every automobile industry is based on hybrid technology and this version of cars is definitely good for future but hybridization of two-wheeler is even better, consequently by combining technology of hybrid car and bike give more overall efficiency in every terms (cost & fuel). Since advanced technology of hybrid cars are not that much pocket friendly for middle class people. Taking this thing in mind, we made this vehicle very cheaper than hybrid car so everybody can manage to pay for it and will also give some credit to make the environment eco-friendly.

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