DESIGN ANALYSIS AND FABRICATION OF DUAL POWERED VEHICLE AND SELF CHARGING WITH HELP OF ALTERNATOR

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ABSTRACT
Present era, fuel resources availability is under depletion state, and the future automobiles are focusing on the electrical and hybrid mode of transportation. In general, the electrical vehicles are provided with hub motor and they are powered by batteries using plug-in charging mode, whereas in case of hybrid mode of transportation Internal combustion-Engine and electric motor were coupled together in series or parallel to bring a dual power mode in automotive. In our project work, we are introducing an alternator which is operated by IC engine and it charges the battery. The vehicle runs in IC engine power, output power of the engine is transmitted to alternator and then to the rear wheel via sprockets placed in the shaft of alternator. The alternator is installed with two different sprockets which were coupled with the IC engine output shaft and other coupled with input of the rear wheel. Set of series batteries are connected to alternator, which are being charged while vehicle running by engine power. When the petrol is under low level, then we may drive the vehicle by electric power through hub motor. The charging and discharging of the batteries are done through the controllers and they were responsible for the smooth running of the vehicle.

Keywords: hybrid vehicle, engine, alternator, hub motor, controller.

INTRODUCTION
A ‘gasoline-electric hybrid vehicle’ is an automobile which relies not only on gasoline but also on electric power source. In HEV, the battery alone provides power for low-speed driving conditions. During long highways or hill climbing, the gasoline engine drives the vehicle solely. Hybrid electric vehicles comprise of an electric motor, inverter, battery as electric drive and an internal combustion engine with transmission connected as gasoline based drive. It is to achieve better fuel economy and reduce toxic emissions. It has great advantages over the previously used gasoline engine that is driven solely from gasoline. This hybrid combination makes the vehicle dynamic in nature and provides
The works deals with fabrication and testing of a battery electric vehicle with self charging system. An attempt has made to fabricate a self charging battery electric vehicle which utilizes the energy of alternator, 4 batteries in series yields to 48V usage

1.1 TECHNOLOGY USED
The technologies we are introducing in our project are two types as namely:

1. Hybrid vehicle
2. Alternator

HYBRID VEHICLE
A hybrid uses to or more distinct types of power, such as IC engine to drive an electric generator that powers electric motors. A hybrid electric two wheeler 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. It has great advantages over the previously used gasoline engine that drives the power from gasoline only. It also is a major source of air pollution.

ALTERNATOR

There are two concentric wound coils of wire within the alternator: a stator coil (the outside coil which does not rotate) and a rotor coil (the inside coil, attached to the alternator’s pulley, which does rotate). The rotor is also referred to as the alternator’s “field. An electromagnet is created when current flows through the field coil. The strength of the magnet is directly proportional to the amount of current flowing through the field. As the rotor moves clockwise, the resultant magnetic field sweeps clockwise through the outer coil of wire, and electricity is generated in the stator coil. Since the magnetic field sweeps back and forth through the stator coil, an alternating current is produced. The alternating current has a frequency equal to the frequency with which the alternator’s pulley is rotating.

2 OBJECTIVES

The objective is to design and fabricate a two wheeler hybrid electric vehicle powered by both battery and gasoline. The combination of both the power makes the vehicle dynamic in nature. It provides its owner with advantages in fuel economy and environmental impact over conventional automobiles. Hybrid electric vehicles combine an electric motor, battery and power system with an internal combustion engine to achieve better fuel economy and reduce toxic emissions. In HEV, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. In accelerating, long highways, or hill climbing the electric motor provides additional power to assist the engine. This allows a smaller, more efficient engine to be used. Besides it also utilizes the concept of regenerative braking for optimized utilization of energy. Eco friendly mode of commutation can be obtained with desirable functions for various day to day activities hence obtaining a less emission vehicle. Increased driving range without refuelling or recharging compared with electric vehicles and perhaps even compared with internal-combustion vehicles.

Limitations in range have been a problem for traditional electric vehicles. The components being selected to develop this vehicle are cheaply available in market so that service, maintenance and replacement if any damages is easy for the customers. The defined work is to develop a self charging battery electric vehicle. The necessary amount of research papers and expert concern guided the way opt for the most optimistic method in selection of components, fabrication and testing of the vehicle under suitable conditions.

3 SELECTION OF MATERIAL

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
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<tbody>
<tr>
<td>Motor</td>
<td>750W 48V 20Ah</td>
</tr>
<tr>
<td>Battery</td>
<td>12V 7Ah (no load) and 12V 20 Ah (load)</td>
</tr>
<tr>
<td>Alternator</td>
<td>12V TO 14V</td>
</tr>
<tr>
<td>Controller</td>
<td>supply voltage 48V DC</td>
</tr>
<tr>
<td>Electric throttle</td>
<td>1</td>
</tr>
</tbody>
</table>
stationary magnetic field is used. In principle, any AC electrical generator can be called an alternator, but usually the term refers to small rotating machines driven by automotive and other internal combustion engines. An alternator [permanent magnet for its magnetic field is called a magneto. Alternators in power stations driven by steam turbines are called turbo-alternators. Large 50 or 60 Hz phase alternators in power plants generate most of the world's electric power, which is distributed by electric power grids.

Rate voltage: DC48V
- Rate power: 500W
- Rate current: 30A
- Under-voltage protection: DC41.5V+-0.5V
- Current limited: 30A±0.5A
- Efficiency: ≥83%
- Consumption: <1.5W

BATTERY

An electric battery is a device consisting of two or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell contains a positive terminal or cathode and a negative terminal or anode. Electrolytes allow ions to move between the electrodes and terminals, which allows current to flow out of the battery to perform work. Hybrid Electric Vehicle uses battery as one of its power source for vehicle motion during at low power conditions. Batteries are devices that consist of electrochemical cells and provide electrical energy converted from stored chemical energy. Generally batteries are of two types: primary batteries that are disposable and secondary batteries that are rechargeable. Secondary batteries are preferred for vehicles as they can be rechargeable. There are six major rechargeable batteries available today. They are as follows: lead-acid (Placid), nickel-cadmium (NiCad), nickel-metal hydride (NiMH), lithium-ion (Li-ion), lithium polymer (Lipoly), and zinc-air.

FIG 3 12V 4 SERIES BATTERY
- BATTERY: sealed lead acid, 48V, 20ah
- VOLTAGE: 48V

BLDC HUB MOTOR

In-wheel electric drive motors represent an effective method of providing propulsion to vehicles which
otherwise were not designed to have driven wheels.
The motor is a transducer. Input electric power and out comes mechanical power usually. Brushless DC electric motor also known as electronically commutated motors are synchronous motor that are powered by a DC electric source via an integrated inverter switching power supply, which produces an AC electric signal to drive the motor. The rotor part of a brushless motor is often a permanent magnet synchronous motor, but can also be a switched reluctance motor, or induction motor. Brushed DC motors develop a maximum torque when stationary, linearly decreasing as velocity increases. Some limitations of brushed motors can be overcome by brushless motors; they include higher efficiency and a lower susceptibility to mechanical wear. These benefits come at the cost of potentially less rugged, more complex, and more expensive control electronics.

FIG 5 ELECTRIC THROTTLE
- Green = Throttle
- Yellow = Ground
- Red = 5V

WORKING
On starting the motorbike, it is driven by the engine and alternator is connected with the crankshaft, with the help of Sprocket and chain. Internal combustion engine is being connected to alternator. In alternator, a shaft is being extended where two chain sprockets are placed. Both the chain sprockets in shaft of alternator are connected to sprocket of gear box, sprocket of the rear wheel respectively. Initially vehicle runs in engine power, Output power of the engine is transmitted to alternator and then to the rear wheel via sprockets placed in the shaft of alternator. Set of series batteries are connected to alternator, which are being charged while vehicle runs by engine power through the output voltage of the alternator. When the petrol is used off, gear of the vehicle needs to be neutralized, further vehicle runs using charge stored in batteries, since vehicle’s rear wheel is hub motor. Controller kit is used to transmit the power from the batteries to hub motor of the vehicle.

CONCLUSION
The concept emphasizes on a clean aspect of economizing the energy output using Hub motors mounted on rear wheels. Hybrid systems incorporating a scope of engine safety in terms of durability is undoubtedly a better option to be adopted in high performance and high speed class of vehicles. Mathematically its appealing fact that for the same amount of fuel and a mass of 75 kg (avg. human adult driver) can increase the engine mileage up to 70 km/l without much fuel consumption by continuing to work on electrical power generated. This can be employed as a supporting unit as its functionality is limited by low angular velocity conditions. Being supporting system it's going to be also functional at a range which is uneconomic as per defined by motorbike manufacturers. And hence engine seizure at high speed is eliminated as the vehicle can continue to run on electrical power supply.
REFERENCE


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