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Smart Electric Hybrid Bike with Advanced Features

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ABSTRACT: The Paper starts from brief history about Hybrid Technology and also some brief introduction on it. Paper will also discuss the technologies used in the making of Hybrid Cars such as “Hybrid Solar Vehicle”, “Hybrid Electric Vehicle” and “Plug In hybrid electric vehicles”. Our Paper is based on the explanation of such technologies, their function, drawback of this technology, efficiency of Hybrid Bike, Case studies on the present commercial hybrid Bike such as Toyota Prius series, Astro lab etc. and the fuels and raw materials used in the Hybrid Bike. Paper concludes on the advantages and dis-advantages of Hybrid Bike and how this technology will take over the world in future and would become the alternative for Petrol and Diesel Bike.

Keywords: Technology, Electric vehicle, Hybrid Bike

I. INTRODUCTION

New fuels and alternative vehicles will be required to substantially cut our dependence on foreign oil and reduce our transportation sector carbon footprint. Electric vehicle is a road vehicle that involves with electric propulsion. Hybrid electric vehicle is a vehicle in which propulsion energy is available from two or more kinds of energy sources or converters and at least one of them can deliver electrical energy. The evolution of HEV has changed the scene of transportation system. Later on, Petrol and Diesel became the main source of fuel for these vehicles. This technology made Human Efforts very easy through commercializing in the market. As, the world went through 20th Century, there happened many advancements for making this technology efficient and cost-effective. Due, to which it became the commercial success and its use in the day-to-day period increased. People could reach thousands of kilometres/miles in hours with the help of this technology. An electric vehicle (EV) is one that uses an electric propulsion system rather than an internal combustion engine (ICE). The vehicle's entire power comes from an electric motor, which also serves as the vehicle's primary drive source. The key benefit is the great efficiency of power conversion via the electric motor propulsion system. A hybrid vehicle solves these problems by combining the advantages of both the systems and uses both the power sources at their efficient conditions. The objective of this project aims at better utilization of fuel energy and reduces dependence on non-renewable resources using latest technology. The implementation involves development of HEV that uses battery as well as gasoline power for propulsion of vehicle.

The project discloses a hybrid system consisting of an Electric and Internal Combustion (IC) based power drives. The front wheel is being propelled by battery and the rear wheel is powered by gasoline, i.e., it includes a single cylinder, air cooled internal combustion engine and a BLDC motor based electric power drive used for hybrid powering of the vehicle. The controller is designed to implement the switching between IC Engine and Electric motor depending on the power requirement and load conditions.

Electric vehicle is a road vehicle that involves with electric propulsion. Hybrid electric vehicle is a vehicle in which propulsion energy is available from two or more kinds of energy sources or converters and at least one of them can deliver electrical energy. The evolution of HEV has changed the scene of transportation system. In HEV, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. In accelerating, passing, or hill climbing where high power is required battery provides power to electric motor as an additional power to assist the engine. This allows a smaller, more efficient engine to be used. A throttle position sensor (TPS) is a sensor used to monitor the position of the throttle in an internal combustion engine. It consists of a hall sensor. When the accelerator throttle angle changes magnetic field is created and it creates voltage across position sensor terminal. Thus, for various angles, various voltages are obtained. were calculated for $V_{REF} = 5.0$ volts. HEV consists of a throttle position sensor, i.e., hall sensor. It gives voltage as output with respect to the angle displacement in the accelerator. The analog voltage generated is converted to digital through ADC and is given to microcontroller. If the speed corresponding to the angle deviation in accelerator is less than 30km/hr then the relay is switched on. If the speed directed by accelerator is greater than 40km/hr, then the engine is started by closing the circuit of starting motor through a relay. The starting motor circuit is activated for five hundred milliseconds such that the vehicle is started.

II. METHODOLOGY

In HEV, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. In accelerating, passing, or hill climbing where high power is required battery provides power to electric motor as an additional power to assist the engine. This allows a smaller, more efficient engine to be used. A throttle position sensor (TPS) is a sensor used to monitor the position of the throttle in an internal combustion engine. It consists of a hall sensor. When the accelerator throttle angle changes magnetic field is created and it creates voltage across position sensor terminal. Thus, for various angles, various voltages are obtained. Were calculated for $V_{REF} = 5.0$ volts. HEV consists of a throttle position sensor, i.e., hall sensor. It gives voltage as output with respect to the angle displacement in the accelerator. The analog voltage generated is converted to digital through ADC and is given to microcontroller. If the speed corresponding to the angle deviation in accelerator is less than 30km/hr then the relay is switched on. If the speed directed by accelerator is greater than 40km/hr, then the engine is started by closing the circuit of starting motor through a relay. The starting motor circuit is activated for five hundred milliseconds such that the vehicle is started. In HEV, the battery alone provides power for low-speed driving conditions where internal combustion engines are least efficient. In accelerating, passing, or hill climbing where high power is required battery provides power to electric motor as an additional power to assist the engine. This allows a smaller, more efficient engine to be used. A throttle position sensor (TPS) is a sensor used to monitor the position of the throttle in an internal combustion engine. It consists of a hall sensor. When the accelerator throttle angle changes magnetic field is created and it creates voltage across position sensor terminal. Thus, for various angles, various voltages are obtained. HEV consists of a throttle position sensor, i.e., hall sensor. It gives voltage as output with respect to the angle displacement in the accelerator. The analog voltage generated is converted to digital through ADC and is given to microcontroller. If the speed corresponding to the angle deviation in accelerator is less than 30km/hr then the relay is switched on. The relay switching completes the circuit of the battery, inverter and hub motor; and vehicle is motioned by electric power. If the speed directed by accelerator is greater than 30km/hr., then the engine is started by closing the circuit of starting motor through a relay. The starting motor circuit is activated for five hundred milliseconds such that the vehicle is started. Once the vehicle starts the valve of engine for gasoline intake opens by servo motor. The amount of opening is controlled by the PWM generated by the microcontroller as directed by the accelerator. Hybrids do indeed get superior gas mileage. They use less gasoline, and therefore emit less greenhouse gas. Thus, the problem of environmental pollution can be avoided to certain extent. Apart from that they use less gasoline in comparison to the other vehicles of same power that run only on gasoline. Thus, this reduces the extreme dependence on gasoline which is a non-renewable source of energy. This encourages the method of sustainable development that has been the topic of concern in the modern society. Moreover, HEVs mode of operation are maximum efficient to the conditions, i.e., at low speed and high traffic areas where gasoline engine is least efficient with a lot of energy wasted, HEV moves with power from battery. At up slopes where high power is required and battery is inefficient, gasoline power is used for vehicle motion. Thus, the advantages of HEV make it superior than any other vehicle of today. 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.

• BLOCK DIAGRAM:

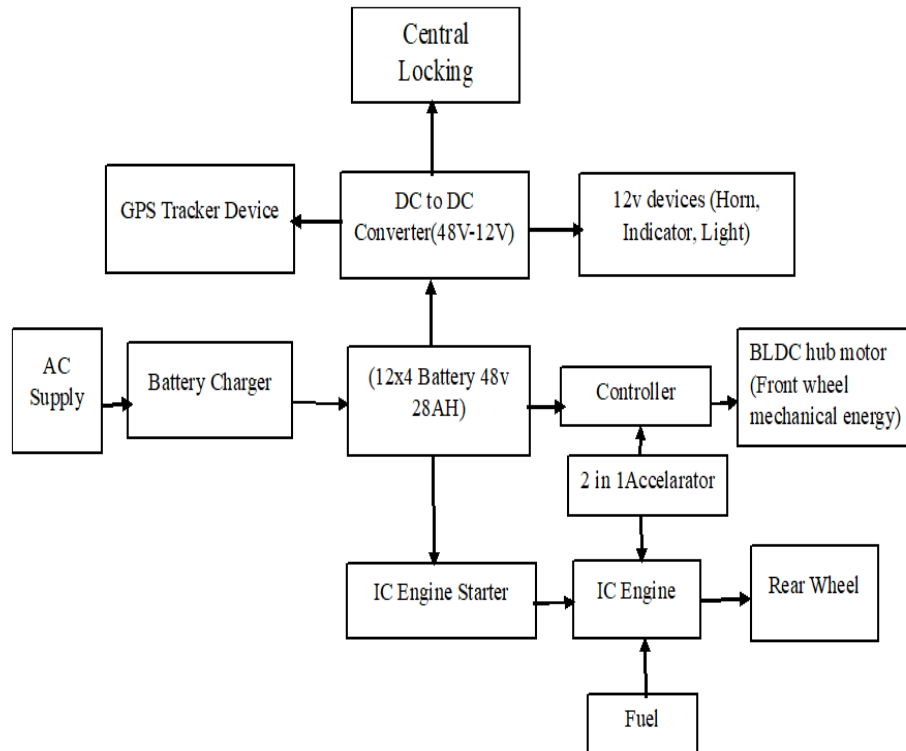
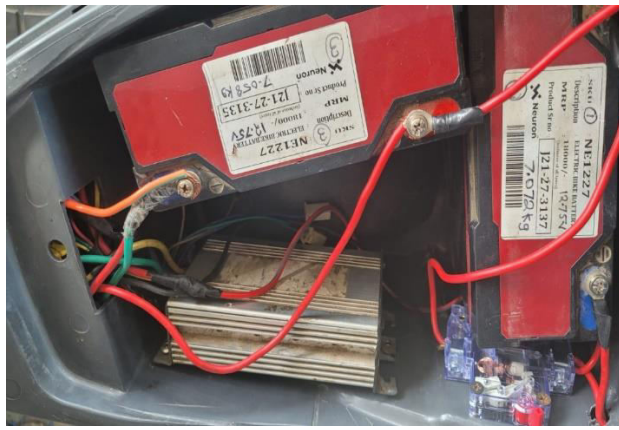


Fig 1: Block diagram

III. RESULTS





IV. CONCLUSION

The hybrid electric concept is characterized by numerous advantages over traditional internal-combustion powered vehicles. Reduced levels of pollutants, greater fuel efficiency, comfort, and convenience are all possible with a quality hybrid design. HEV is a vehicle that uses two sources of power- gasoline and battery. For low power application battery drive is used whereas for high power application where power requirement is very high gasoline engine is used. Gasoline drive is most efficient at high-speed drive. Thus, HEV's both mode of operation occurs at their maximum efficiency. But in gasoline engine low speed operation is not efficient. Its high-speed mode is only efficient. Therefore, it gives twice the mileage given by a normal vehicle. As this hybrid vehicle emits 50% less emission than normal vehicle it plays an important role for reducing pollution to certain extent without compromising with efficiency. Thus, it is most efficient in urban areas mainly in high traffic where gasoline engines are least efficient as the energy from gasoline is being wasted away and creates pollution.

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