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Design and Development of Hybrid Moped Using Electrical and Petrol Operating Arrangement

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Abstract: *Due to the rapid depletion of fossil resources, an alternative energy vehicle is now required. Electric vehicles are a potential technology in the realm of transportation in the future. Electric vehicles cannot compete with fossil fuel driven vehicles due to minor limitations, prompting the development of hybrid technology. Concentrated attempts are being made to create a hybrid system concept, in which one system is charged while the other delivers propulsion power to the vehicle. When the s is powered by an electric motor, it produces nearly no pollution. This project is concerned with the development of hybrid vehicles, as solely petrol or electric vehicles are insufficient. This hybrid technique can compensate for both types' drawbacks.*

Keywords: Hybrid E-bike, Hybrid Moped, Conversion kit, Hub motor, BLDC Motor, Electronic Speed controller, Lithium Battery, Battery Management System, etc.

I. INTRODUCTION

Around 93 percent of today's autos are powered by petroleum, which is expected to run out by 2050. Furthermore, current autos only use 25% of the energy released by petroleum, with the remainder being squandered into the atmosphere. Despite recent efforts to enhance vehicle fuel efficiency and limit hazardous emissions, emissions have consistently increased over the last two decades. An electric vehicle could be a huge breakthrough in the future preservation of gasoline and vehicle economy. Electric vehicles are pollution-free and efficient at moderate speeds, especially in congested locations. However, battery charging takes time. Furthermore, it is unable to supply the high power demanded by drives in high-speed conditions or on mountainous terrain. The gasoline engine is more efficient at greater speeds on highways, but it wastes a lot of energy in cities.

A hybrid car tackles these issues by combining the benefits of both systems and utilising both power sources at their peak efficiency. This project's goal is to make better use of fuel energy while reducing reliance on non-renewable resources. Petroleum is the primary source of power for vehicle propulsion in today's culture. The electric vehicle is inefficient in all power situations, i.e., it cannot provide power in high-speed situations. A hybrid approach of both vehicles is offered in the project, which takes advantage of both vehicles' efficiency. This technology is used in two-wheeled vehicles, which are the most popular among the general people. As a result, proper manufacturing and cost analysis can help the vehicle achieve considerable success.

II. LITERATURE SURVEY

General awareness about the current energy scenario and fossil fuel depletion has been previously discussed.4–8 Use of hybrid vehicles has been a major topic of research for various works done in the past.

Mr. A. Raskin, S. Shah [1] has analyzed HEVs combine various benefits of gasoline as well as electric motors. They can achieve objectives like fuel economy, higher power, or auxiliary power. Despite this, sales of these vehicles have remained low with about 900,000 units sold during the year 2007 due to their higher maintenance costs. Khan and Kar10 reviewed various steps being undertaken by the Canadian government to encourage sales of hybrid vehicles.

M. Anderman [2] developed a novel method for charging of hybrid vehicles. Fathabadi12 has proposed a novel charging system that can be coupled with photovoltaic (PV) or wind hybrid power source. Use of new hybrid module increased the cruising range of the vehicle by 19.6 km, efficiency and speed to 91.2% and 121 km/h, respectively, as compared to the normal operation (Table 2). Vehicle under consideration had a weight of 1880 kg Anderman explored the relationship between transmission and energy storage system of hybrid vehicles. Comparisons of conventional gasoline vehicle and hybrid vehicle proved that the cost of travel per-kilometer for the case of hybrid vehicles was lower as compared to those of gasoline vehicles.

P. Denholm and W. [3] presented a comprehensive review of electric vehicle modeling and control identifying major research gaps.

T Zeng et al.16 S. Logghe, B. Van Herbruggen, B. Van Zeebroeck [4] proposed a non-linear regression model of a fuel cell hybrid vehicle based on intelligent algorithms to predict the performance of a bus. Gasoline engines typically have an efficiency of 30% thus making electrically powered vehicles more feasible for use.

Clement K. [5] Van Reusel K., Driesen J investigated a commercial electric vehicle modified to convert it into a hydrogen-based hybrid.

Clement K., Haesen E., Driesen J [6] compared the cornering performance of an engine in driven vehicle and a HEV using the bicycle model and the Mimuro plot. Over steering was noted with an increase in the speed of vehicle increases.The influence of chassis, tire–road interface, and steering system non-linearity have been introduced.

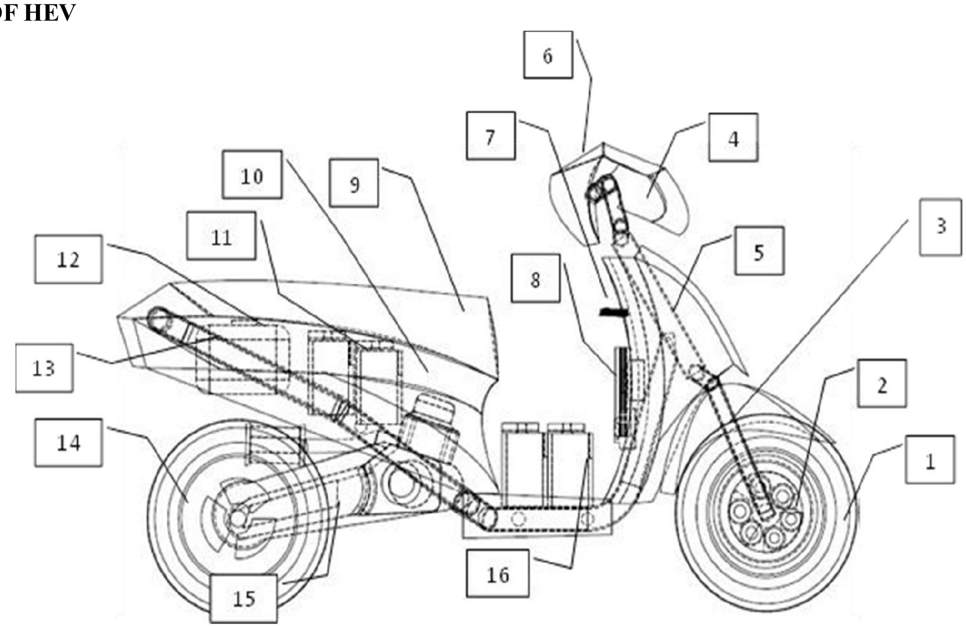
Kersting W. [7] discussed battery technologies and future options. The potential of the turbo-generator-based power train for hybrid vehicles has been described.

Haesen E., Driesen J. [8] described the identification, modeling, and simulation of the drive-train components in a hybrid IC-engine battery electric car.

J. Linderoth, A. Shapiro and S. Wright [9] analyzed the fuel consumption of an intelligent-hybrid vehicle. A “fuzzy controller” was used to plan a suitable controller for the designed hybrid locomotive.

III. IMPLEMENTATION

CAD OF HEV



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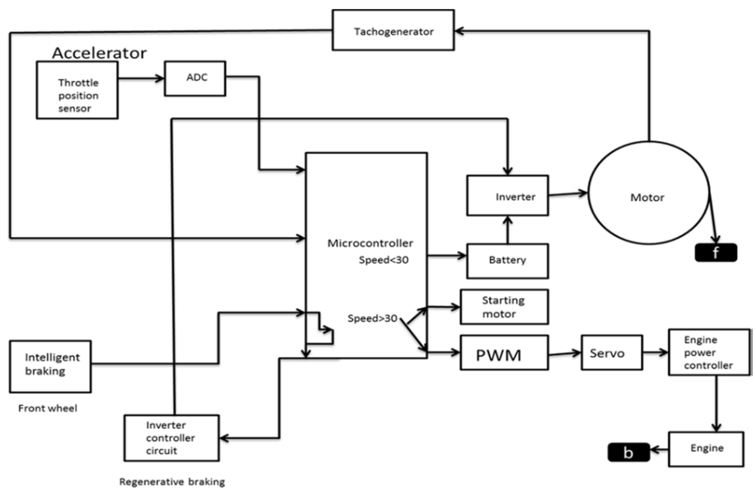
The car is front wheel drive at low speeds and automatically switches to rear wheel drive at high speeds. Component 1 in Figure 1 depicts the tyre's connection to the hub motor (2 of Fig 1). Because the torque produced is sufficient to operate the vehicle, no gear reduction is required. The motor's axel is connected to the suspension (3 of Fig 1). The suspension is linked to the handle, which in turn is linked to the main chassis. As a user help, accessories such as the headlamp (4 of Fig 1) and the display (6 of Fig 1) are included. A battery-powered microprocessor (7 of Fig 1) controls the transition from electric to internal combustion or vice versa.

IV. BLOCK DIAGRAM OF HEV



V. WORK OF HEV

For low-speed driving conditions, where internal combustion engines are least efficient, the battery alone provides power in HEVs. When high power is necessary for accelerating, passing, or hill climbing, the battery delivers additional power to the electric motor to help the engine. This enables the use of a smaller, more efficient engine. In an internal combustion engine, a throttle position sensor (TPS) is a sensor that monitors the throttle position. It is made up of a hall sensor. When the throttle angle of the accelerator changes, a magnetic field is formed, which produces voltage across the position sensor terminal. As a result, different voltages are obtained for different angles.

VI. CONCLUSION AND FUTURE SCOPE

A hybrid electric vehicle (HEV) is a vehicle that runs on both gasoline and electricity. Battery power is employed in low-power applications, while gasoline engines are used in high-power applications with high power requirements. The most efficient use of gasoline is at high speeds. As a result, both modes of operation for HEVs are at their most efficient. Low-speed operation, on the other hand, is inefficient in gasoline engines. The high-speed mode is solely useful. As a result, it provides twice the mileage of a standard vehicle. Because this hybrid car generates 50% less pollution than a standard vehicle, it serves a significant role in decreasing pollution while maintaining efficiency.

As a result, it is most effective in urban settings with heavy traffic and gasoline engines.

Future research will focus on discovering ways to charge batteries without needing energy. The goal is to make advantage of the energy that is lost in engine exhaust and cooling. According to the Sankey Diagram, only 25% of the fuel energy is transformed to meaningful work in gasoline engines, with the remainder being released into the atmosphere. Exhaust wastes about 40% of energy, and coolant wastes another 30%.

A stirling engine and an array of thermocouples can be utilised to transform this unused energy into mechanical energy. An exhaust pipe can be attached to one of the hot cylinders of a stirling engine to execute the stirling engine principle, while the cold cylinder is exposed to the atmosphere. The stirling engine is powered by the heat difference generated. The dynamo is connected to the stirling engine. The dynamo electric power produced by the stirling engine is utilised to charge the battery.

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