INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 5, Issue 2)
Available online at: www.ijariit.com

Review paper on design and development of hybrid two wheeler

Ravikumar R.
ravikumar.rstr1997@gmail.com
Acharya Institute of Technology, Bengaluru, Karnataka

Chethan M.
chethanm888@gmail.com
Acharya Institute of Technology, Bengaluru, Karnataka

Neeloy Debnath
neeloy.x16@gmail.com
Acharya Institute of Technology, Bengaluru, Karnataka

Ajay P. Kumar
ajay.beat.15@acharya.ac.in
Acharya Institute of Technology, Bengaluru, Karnataka

Prajwal L Sandyal
prajwalautomobile@gmail.com
Acharya Institute of Technology, Bengaluru, Karnataka

ABSTRACT

This work deals with the design and fabrication of hybrid two-wheeler system. In recent days availability of fuel is depleting day by day and also pollution is increasing globally with an increased number of vehicles. This leads to the evolution of various alternative fuels and concepts, in that HEV system (hybrid electric vehicle) is one of the effective systems. This paper involves the fabrication of two-wheeler which is driven by both fuel and electric energy with the help of engine and Electric motor. The electric motor is the hub motor which drives the front wheel which is driven by the battery and the engine drives the rear wheel. The goal of this paper is to implement the most efficient and less polluting vehicle. In our project, the hybrid vehicle model combines the internal combustion engine of a conventional vehicle with a battery and electric motor of an electric vehicle.

Keywords— *Hybrid vehicle, Fabrication, Two wheel hybrid vehicle*

1. INTRODUCTION

A hybrid vehicle uses two or more distinct types of power such as an internal combustion engine and electric motor. The basic principle with hybrid vehicles is that the different motors work better at different speeds; the electric motor is more efficient at producing torque and the combustion engine is better at maintaining high speed.

As per N.Boopalan et.al [1] his research says that when the vehicle is run by electric hub motor through the battery, the consumption of power is reduced, when high torque is required it can be changed to IC engine mode. Thus he concluded that this technology can be implemented on a two-wheeler.

As per Balasubramani N et.al [2], his paper concluded that for low power application battery drive is used whereas for high power application where power requirement is very high gasoline engine is used. Hence the mileage obtained will be twice than the normal vehicle.

As per Sharada Prasad et.al[3], their paper concluded that hybrid electric vehicle is utilized for obtaining the propulsion of the vehicle from the rest, as the speed is increased, the electric motor propulsion I combined with the ICE propulsion for a total movement of the vehicle.

As per Adinarayana G et.al [4] this paper says that the technology of hybrid petro electric bikes is an emerging field nowadays and the total turn one on these vehicles very profitable for the future and is an eco-friendly bike. The objective of this project points at way better utilization of fuel energy and decrease dependence on non-renewable assets utilizing most recent innovation. The execution includes improvement of HEV that uses the battery as well as gasoline control for the drive of the vehicle. It also has a vital future scope in the field of the automobile as it has various benefits

As per Mr.Abhijeet khandagale et.al [5] he says that the initial phase of driving does not need high power output. So the use of electric part at the start and before and after idling times is the optimum time to save fuel.

Shubham Jalamkar et.al [6] had research that the objective is to design and fabricate a two-wheeler hybrid electric vehicle powered by both battery and gasoline. The combination of both powers makes the vehicle dynamic in nature. In this, they studied 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.

As per A. Hemnath et.al [7] he compared both the driving modes and said that the electric drive mode is much cost effective than conventional drive mode. He concluded that by dual operation of both drives the vehicle can run 80kms.

As per Harish N et.al [8] he compared the power train efficiency of the range-extended electric vehicle with different driving cycles and said that mileage could be 130kms from a full battery and 1liter petrol.

The study was performed by Sharada Prasad N et.al [9] The study shown the combined effort of ICE and Electric motor in propelling the vehicle, the ICE will be active in the initial pickup and electric motor acts as supportive propulsion deriver. They studied on speed condition and recording methods. The measurement of speed is divided into two groups:
(a) Using the equipment provided in the vehicle like a speedometer.
(b) Usage of some additional equipment like a GPS system.

Also, they classify traffic conditions as:
(a) Congested urban conditions: An average speed of 8kmph to 10kmph with low to high idle time.
(b) Urban conditions: An average speed of 10kmph to 25kmph with moderate to low idle time.
(c) Extra-urban conditions: An average speed of 40kmph with low idle time.
(d) Highways: An average speed more than 40kmph with very low idle time.

As per Dr Nataraju S N et.al [10], his project was mainly to fabricate a scooter which runs with renewable as well as non-renewable i.e, solar energy and gasoline. The main advantage was that it can be directly charged by solar panel instead of using electric power and saves energy and reduces pollution.

As per Ruthvik P. Sankar et.al [11], battery-run vehicles are shallow on the performance side and are prone to malfunction. Through this project, we wish to design a system which runs both on engine and motor negating their individual limitations and maximizing their performance. This project is basically a fusion of two systems where the battery drives the vehicle at low speeds and passes the drive control to the petrol engine in case of reaching a set speed limit. The battery again takes over when the speed falls, which limits the usage of fuel at low speeds and hence increases the mileage.

As per Toshali Mohanty et .al [12], the objective is to design and fabricate a two-wheeler hybrid electric vehicle powered by both battery and gasoline. The combination of both powers 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.

As per Caiying Shen et.al [13], Compared to the conventional vehicles, HEV is multiple energy sources, then, how to split the required power among energy sources is called EM. Vehicle system controller performs powertrain control by using EM strategies according to command signals received from driver command interpreter and parameters information feedback from the electronic controller. The vehicle system controller can be divided into three function blocks
(a) Required power of vehicle interpreter.
(b) Energy management strategies.
(c) Torque interpreter.

As per Chinmay Sawanth et.al [14], the electric drive is not only silently but also low heat dissipation compared to petrol powered two-wheeler. The electric can't carry a heavy load or travel a long distance, at such a times IC is used as a driving source. Since the hybrid works on the dual mode of fuel supply it can cover a greater distance than regular gasoline or electric drive vehicle. Hybrid can also be used as purely gasoline vehicle by detaching batteries or as pure electric by turning off the engine.

As per V N Super et.al [15], automakers have introduced technologies that enable internal combustion engines (ICEs) to turn off automatically when vehicles are stopped. These stop-start vehicles are also known as micro hybrids, idle stop vehicles, and a variety of names branded by automakers. These vehicles can offer significant reductions in fuel consumption and CO2 emissions, although the actual saving depends heavily on the drive cycle. Stop-start vehicles require more robust batteries and starter systems that are found in internal combustion engine vehicles and are priced at a small premium over ICEs but considerably less than hybrid vehicles.

2. MATERIALS AND METHODS

Following are the materials included in our project:

2.1 Hub Motor

Hub motors are an interesting development which could offer benefits such as compactness, noiseless operation and high efficiency for electric vehicles. These motors have stators fixed at the axle, with a permanent magnet rotor embedded in the wheel.

2.2 Battery

The battery is like a fuel tank for an electric system and requires refilling by means of charging. The lead-acid battery is the power source of the electric drive. While most of the electric vehicles are choosing lead acid battery a variety of other alternatives battery can also be used. Sealed lead acid batteries have good energy density and power density ratio.

2.3 Controller

The controller varies the speed and torque of the motor. The controller connects the power source –fuel cell or battery to the actual motor. It controls speed and direction and optimizes energy conversion. While batteries produce fairly constant voltages which decreases as they are used up, the voltage output by battery varies as a function of power. It has extended fault direction and protection.

2.4 Methods

Methods of our project are:

(a) The front wheel of the bike is retrofitted by a wheel hub motor.
(b) Batteries are connected in series and are further connected to the hub motor through the controller.
(c) The connections from the IC engine are also made through the controller.
(d) A circuit will be designed to switch the vehicle from the battery source to fuel at a particular speed automatically.
(e) A manual switch will also be provided to run the vehicle either in battery source or fuel.

2.5 Expected outcome

(a) Combine the benefits of a gasoline engine and electric motor and can be expected to obtain different objectives such as improved fuel economy.
(b) The transmission of power using a wheel hub motor will be effective and reliable.
(c) Combined power train system should be useful in more stop and go traffic situation.
(d) With the use of this power train system, the overall fuel consumption is reduced and the fuel economy is improved.
(e) The cost of HEV is little more than conventional vehicle but are more efficient and the exhaust emissions are less.

3. CONCLUSION

The Hybrid Vehicle (HEV) uses both IC engines and electric motor to drive the vehicle. For low-speed applications, electric powertrain holds good and also pollution free. For the vehicle to run at high speeds IC engine powertrain suits well. Thus by this fuel economy increases and more mileage is obtained. The hybrid vehicle seems to overcome the drawback of both gasoline and electric vehicle thus being a promising mode of transport in the future.

4. REFERENCES

[1] N. Boopalan, Marlon Jones Louis, A.K. Nachimuthu: “Design and Fabrication of hybrid two wheeler”.
[2] Balasubramani N, Hari Prasath S, Jagadeesh Kumar A, Karna Prakash S, Karun prasath D: “Fabrication and performance analysis of hybrid two wheeler”.
[3] Sharadha Prasad N, Dr. K R Nataraj: “Design and Development of hybrid two wheeler with solar charging methodology”.
[4] G. Adinarayana, Ch. Ashok kumar, M. Ramakrishna: “Fabrication of hybrid petro electric vehicle”.
[5] Mr. Abhijeet Khandagale, Mr. Shrikant Sangludkar “Hybrid Two-Wheelers for Indian Roads.
[6] Shubham Jalamkar, Ashish Kawale, Prashant Bhujade, Nikhil Sahare and Aamir Sayed, “Design and Fabrication of Hybrid Two Wheeler”.
[7] A. Hemnath, E. Britto Sebastiraj, “Design and Fabrication of Dual Mode Power Drive System in Motorcycle”.
[8] Harish N, Amar Thakur, Alwin George, Mahmadali Babu Sab Nadel, “Hybrid Two Wheeler”.
[9] Sharada Prasad N and K R Nataraj, “Design and Development of Hybrid Electric Two-Wheeler Suitable for Indian Road Conditions”.
[10] Dr. Nataraju S N Prem Singh, Raghavendra Prasad C, Somashekar G, Manoj N, “Fabrication and Development of Hybrid Vehicle (scooter).
[11] Ruthvik P. Sankar, Sagar N, Sarthak J, Shubham P. Toraskar, Yashvanth Kumar,” Design and Development of Smart Hybrid Two Wheeler”.
[12] Toshali Mohanty” Design of a Hybrid Electric Vehicle”.
[13] Caiying Shen, Peng Shan, and Tao Gao” A Comprehensive Overview of Hybrid Electric Vehicles”.
[14] Chinmay Sawant, Rushabh Shah, Ashutosh Waghmare, Sagar Aher , Balaji Maddewad” Fabrication and Performance Analysis of Two Wheeler Hybrid Vehicle”.
[15] V. N. Supe, V. P. Waghmare, N. B. Chopade. “Fuel Efficient Two Wheelers Using Micro-Hybrid Technology& Smart Embedded System”.

