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HYBRID ELECTRIC VEHICLE

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ABSTRACT: Electric vehicles are the best solution for green transportation due to their high efficiency and zero greenhouse gas emissions. In this project we used BLDC(Brushless type direct current) due to it efficiency and high power deliverable capability it is used to drive the wheel at certain speed. Brushless DC motor overcomes many problems of the brushed DC motor and has been widely applied in various fields.In this paper we combined both the functionalities of electric system and engine combustion system to drive the one vehicle. that why we used the term 'hybrid'.A 42V,1000W BLDC Hub Motor is selected to drive the vehicle. Charge from various power sockets and generally include removable battery that allows them to be recharged inside and plugged in or run on batteries. Lithium ion battery (46V 30AH) is used and it function may function according to expectation, being a cheaper and environmentally friendly alternative as compared with other two wheeler.

I.INTRODUCTION

In recent years, vehicle emission is a major cause for global warming. The harmful gases produced from the vehicles create problems to our future society. Also the cost for petroleum fuels and natural gases are increasing rapidly. The requirement of vehicles which efficiently uses the electricity must be necessary in coming world. The popularity of electric vehicles (EV) rise rapidly with the savings in fuel costs compared to internal combustion engine vehicles. Considering the forces that affect the running of a vehicle in real time. The major forces which affect the tractive force are gradient force, force due to acceleration, frictional force of tyers and aero dynamic drag force. A hybrid can achieve the cruising range and performance advantages of conventional vehicles with low-noise, low-exhaust emissions and energy independence benefits of electric vehicles. Accordingly, the hybrid concept, where the alternative power unit is used as a second sources of energy, is gaining acceptance and is overcoming some of the problems of pure electric vehicles. In this paper we have two operating modes that are one is by electric system and another one by Internal combustion engine system.

II.MECHANICAL OVERVIEW OF PROJECT

This Hybrid Electric vehicle mainly has two operating modes that are electrical operating mode and Internal combustion engine mode[1].Lithium ion battery used in this project in the range of (48V 30 AH) is connected to the controller of Electrical operating system. battery is connected to the controller via MCB and ON/OFF switch for controlling the operation of battery.Battery is directly connected to the display which shows the present charging condition of the battery. Electronic display displays the charge of the battery in percentage (%) And speed of the motor in Kilometer per hour (KMPH). When working on the Electric system BLDC motor in the range (42V,1000 Watts). Engine is also connected to the BLDC motor. When scooter is operating on IC, engine will give power to the rear wheel by consuming fuel (petrol) and a permanent magnet brushless motor cum generator is integrated to the front wheel. This motor will freely rotate with the wheel while the scooter is running on IC engine.[14]

III PROPOSED SYSTEM

The main goal of proposed system working in two operation such as gasoline and battery operated on vehicle. A two-mode hybrid system enables high performance and fuel economy over a range of conditions by allowing the vehicle to function optimally in two separate modes: low speed/light load and high speed/heavy load. Two-mode hybrid buses achieve up to 50% better fuel economy than conventional vehicles.[2]

IV EXPLANATION OF PROPOSED SYSTEM

This Hybrid Electric vehicle mainly has two operating modes that are one is Electrical operating mode and another one is Internal combustion engine mode (ICM). Lithium-ion battery used in this project in the range of (48V 30 AH) is connected to the controller of Electrical operating system. Battery is connected to the controller via MCB and ON/OFF switch for controlling the operation of battery. Battery is directly connected to the display which shows the present charging condition of the battery.[12] Electronic display displays the charge of the battery in percentage (%) And speed of the motor in Kilo meter per hour (KMPH). When working on the Electric system BLDC motor in the range (42V,1000 Watts). Engine is also connected to the BLDC motor [13].

When the scooter is running on IC, a motor-cum-generator with no permanent magnetic brush is integrated into the rear wheel to power the engine fuel (petrol). This motor rotates freely with the wheel when the scooter is running on an IC engine. Figure 1 shows the block diagram of proposed system. If the batteries are fully charged then power goes to the BLDC motor cum generator which will now work as a motor and give drive to the front wheel while operated on electric system. If the batteries are not fully charged, then the system will run as it is on IC engine. In Electrical system IC combustion engine system will totally shut down. the hybrid electric vehicle will only operate in electrical system. when throttle is applied power from the lithium-ion battery is drawn and it is used to run the BLDC motor.[11]

V BLOCK DIAGRAM OF PROPOSED SYSTEM

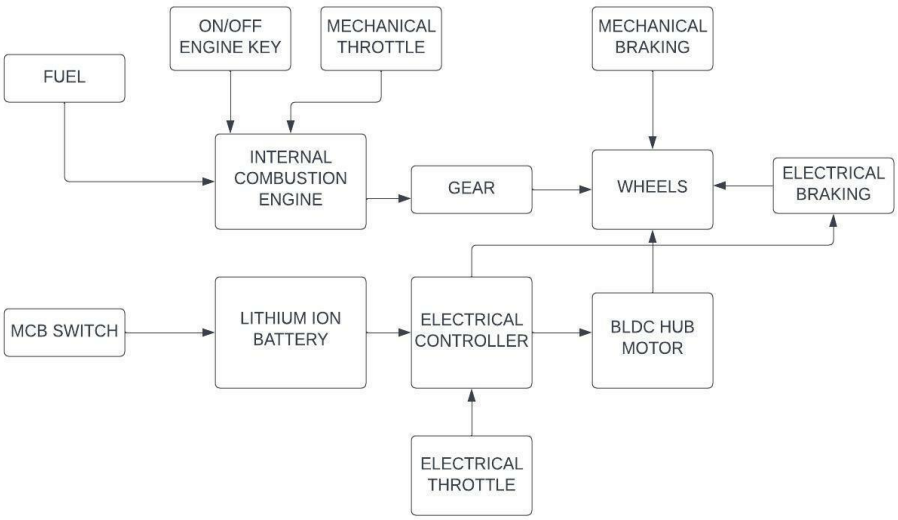

Figure 1 Block Diagram of Proposed system

VI WORKING OF HYBRID ELECTRIC VEHICLE

The components of electric vehicle are already discussed detail. So here we will discuss only the working of our fast-charging electric vehicle. The working principle of proposed method is divided into two methods as follows,[8]

1. Front wheel drive (Hub motor)

2. Rear wheel drive (existing)

FRONT WHEEL DRIVE:

The motor controller, Hub motor, throttle speed controller get starts when all wires are connected to each other. This hub motor needs 48v of current through battery . The 2-way toggle switch turned into ON,

the hub motor is energized, it drives the front wheel by accelerating the throttle. It consists of a throttle position sensor, i.e, hall sensor. It supplies voltage as a function of the angular displacement of the accelerator. The generated analog voltage is converted to digital by the ADC and fed to the microcontroller. If the speed corresponding to the angle deviation in accelerator. Now battery will gets discharged slightly The level of battery is shown in LCD display in three conditions. Three number of locators is mentioned in bar type[9].

• If there is a single bar, it indicates that the battery is going to down.

• If there are two number of bars, it indicates that the battery is an average condition.

48V and 30Ah battery is used in proposed method. It can be fully charged in 2 hours and discharged in 4 hours (approx.). And also, if it is in front drive that also indicated in RED led (in Monitor). The hub motor also working as generator so, the battery is recharged in rear wheel drive.[7]

REAR WHEEL DRIVE:

The Internal Combustion engine is working as usual commercial vehicle. When turns the switch in OFF, the IC engines going to drive the vehicle by own. Now accelerate the right-hand side throttle, its intake the fuel and controlled by the PWM. IC engine drive is going to be used in more 35kmph. That condition battery will be recharged through hub motor without any delay (self-charging). This self-charging is indicated as GREEN led (in monitor).

We can also add various power source to the battery so that we can charge the battery with multiple power source that we can make this hybrid electric vehicle more efficient than before. The power source for battery that we can add are we can use solar power source for recharging battery purpose. And we can also add wind turbine at the front of the hybrid electric vehicle by rotating that turbine with the help of the wind when the vehicle is in travel also can recharge the battery. We can also add the dynamo to wheel which can also deliver the power to the battery[10].Figure 2 shows the hardware final model of hybrid EV of proposed system.

In future we can use or replace the battery which is already present in the Hybrid electric vehicle with more powerful battery which can deliver more power to the hub motor with that milage of the Hybrid electric vehicle can be increased.[6]

VII MODEL

Figure 2 Proposed system of Hybrid electric vehicle

VII CONCLUSION

HEV is a vehicle that uses two power sources - petrol and battery. The battery drive is used for low power consumption, while the petrol engine uses high power for high power consumption. The petrol drive is very efficient in high speed operation. Therefore, both modes of action of HEV occur at their maximum efficiency. But low speed operation in petrol engine will not be efficient. Its high-speed mode is only efficient. Therefore, it gives twice as much mileage as 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. Therefore, in urban areas it is more efficient, mainly in high traffic congestion where petrol engines are less efficient because energy from petrol is wasted and pollution is generated.

This system has presented an overview of HEV with focus on the configurations, main issues, especially the control of HEV, and it elaborates the EM approaches. The EM problem has been the subject of heated research until now, and is an important technology for HEV.

The global optimization approach may be universally optimized, but it requires a significant amount of computational time and does not implement real-time, so a global optimization approach such as DP generally serves as a criterion for evaluating other EM strategies. Instantaneous control methods only optimize at instantaneous time. So, the real-time application become possible.[5]

VIII FUTURE SCOPE

Future work will find ways to automatically charge the battery without using electricity. The idea is to use the energy lost in the exhaust and cooling of the engines. According to Sankey Diagram for gasoline engines only 25% of fuel energy is converted to useful work and rest is rejected into the atmosphere. Approximately 40% of energy is wasted in exhaust and 30% in refrigerant. A Stirling engine and a series of thermocouples that convert heat into mechanical energy can be used to convert this unused energy. In future we can also add various power source to the battery so that we can charge the battery with multiple power source that we can make this hybrid electric vehicle more efficient than before.

The power source for battery that we can add are we can use solar power source for recharging battery purpose. And we can also add wind turbine at the front of the hybrid electric vehicle by rotating that turbine with the help of the wind when the vehicle is in travel also can recharge the battery. We can also add the dynamo to wheel which can also deliver the power to the battery.

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