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TWO DRIVE MODES FOR THE VEHICLE

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Abstract— Looking at the current fuel price hike, private transport is progressively getting to be unviable for the normal man. Fuel consumption of bikes increases when you are driving on a slope and in substantial rush hour traffic where you have to switch the gear over and over again, also driving the bike in the lower gear. In the event that you change over to battery mode in these street conditions, this issue can be survived. The driver will have the decision of using either battery-run front wheel drive or motor run back tire drive. When running on a non-ordinary fuel (power for this situation) we advantage our current circumstance through less contamination and zero commotion.

To accomplish this, we utilized an experimentation technique to make a bar connect that would support the heap of the center point engine mounted on the front wheel. To control the speed of the center engine, we fit the regulator simply over the front light gathering. We likewise gave a switch in the boot space to turn on the electric drive mode additionally mounted the batteries just beneath the stool. To speed up the vehicle we fitted the gas pedal, which is associated with the regulator,on the left side of the bar handle. We made some demo runs of the vehicle, calculated the data and proved that two drive modes for the vehicle are more efficient and environmentally friendly than a normal gasoline powered vehicle.

Index Terms— Brushless DC motor, Electric Hub motor, Two Drive Mode, Hybrid Two-wheeler, Motor assis, Motor Controller, Non-conventional fuel.

I. INTRODUCTION

Around 89% of today's automobiles run on petroleum-based product, which are estimated to be depleted by 2050. Moreover, current automobiles utilize only 25% of the energy released from petroleum and rest is wasted into the atmosphere. Despite recent efforts to improve fuel efficiency and reduce toxic emissions in the gasoline-powered vehicles, emissions have continued to increase steadily in the past two decades. For preservation of gasoline for future and increasing the efficiency of vehicle an electric vehicle can be a major breakthrough. An electric vehicle is sans contamination and is productive at low speed conditions chiefly in high rush hour gridlock regions. Yet, battery charging is tedious. Besides, it can't give high force needed by drives during rapid conditions or in inclines of bumpy regions. Fuel motor demonstrates its effectiveness at higher velocities in expressways and waste a great deal of energy in metropolitan zones. A cross breed vehicle tackles these issues by joining the upsides of both the frameworks and utilizations both the force sources at their productive conditions. The goal of this examination focuses on better usage of fuel energy and lessens reliance on non-inexhaustible assets utilizing most recent innovation. Consequently, we have created two drive modes for the bike that utilizes battery just as gas power for the impetus of vehicle.

We have taken into consideration the goal of the International Council on Clean Transportation (ICCT) to dramatically

improve the environmental performance and efficiency of personal, public and goods transportation in order to protect and improve public health, the environment, and quality of life.

1.1 HISTORY

The 1915 Dual Power made by the Woods Motor Vehicle electric car maker had a four-cylinder internal combustion engine and an electric motor. Below 15 mph (25 km/h) the electric motor alone drove the vehicle and above this speed the "main" engine cut in to take the car up to its 35 mph (55 km/h) top speed. About 600 were made up to 1918.
There have also been air engine hybrids where a small petrol engine powered a compressor. Several types of air engines also increased the range between fill-ups with up to 60% by absorbing ambient heat from its surroundings.
In 1959 the development of the first transistor-based electric car—the Henney Kilowatt—heralded the development of the electronic speed control that paved the way for modern hybrid electric cars. The Henney Kilowatt was the first modern production electric vehicle and was developed by a cooperative effort between National Union Electric Company, Henney Coachworks, Renault, and the Eureka Williams Company. Although sales of the Kilowatt were dismal, the development of the Kilowatt served was a historical "who's who" of electric propulsion technology.

for a differential. Toyota also plans to add hybrid drive trains to every model it sells in the coming decade.
For 2007 Lexus offers a hybrid version of their GS sport sedan dubbed the GS450h with "well in excess of 300hp". The 2007 Camry Hybrid has been announced and is slated to launch in late spring as a 2007 model. It will be built in Kentucky, USA. Also, Nissan announced the release of the Altima hybrid (technology supplied by Toyota) around 2007.

1.2 CURRENT STATUS

A huge majority of the worldwide Electric Two-Wheeler (ETW) market — 95.8% — is concentrated in China. The ETW market in Japan, Europe, and more recently, India, is small but growing. The market is 1.4% in Japan, 1.5% in Europe, 0.3% in India. The market is only 0.8% in the United States and 0.2% in Southeast Asia.
After China, the following biggest ETW market is Japan, with yearly deals of 270,000 bicycles/yr in 2006 and 13% normal yearly development since 2000. Pedelecs are the predominant kind of ETW. Most pedelec ETWs use Ni-MH or Li-particle batteries. Battery limit goes from 0.2 to 0.6 kWh, engine sizes range from 150 to 250 W, and costs range from $700 to $2,000. In Europe, the market was assessed at 190,000 bicycles/yr in 2006. Electric bicycles in Europe are likewise fundamentally pedelec style. Deals in the Netherlands are the best due to its broad bike framework and profound established trekking society. Germany and Belgium are the following biggest business sectors for pedelecs.
India's electric bicycle market is little, yet gauges for development are idealistic. In other non-industrial nations all through Southeast Asia, similar to Thailand, Vietnam, and Indonesia, where bikes are the predominant type of transportation, ETWs have not acquired a critical piece of the pie. This pattern might be credited to the way that valve-managed lead-corrosive (VRLA) battery execution (i.e., reach and lifetime) debases rapidly in territories where temperatures are extremely high (or low) consistently. Gas fueled motorbikes are the predominant mode in the bigger urban areas of thesecountries.

II. WORKING OF TWO DRIVE MODES FOR THEVEHICLE

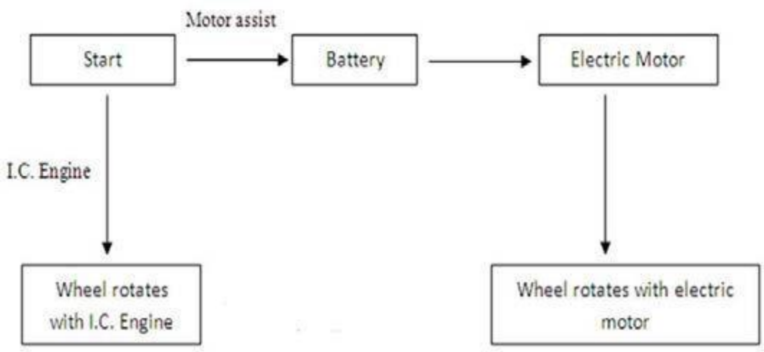

Fig. 1. Line diagram of the Hybrid Two-Wheeler

In this vehicle, 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, controller, battery as electric drive and an internal combustion engine with transmission connected as gasoline- based drive.

The hub motor is a conventional DC motor. The rotor is outside the stator with the permanent magnets mounted on inside. The stator is mounted and fixed onto the axle and the hub will be made to rotate by alternating currents supplied through batteries. Hub motor generates high torque at low speed.

The motor controller is an important component of the system. It is essential to control the amount of power supplied and to drive the Brushless DC hub motor. The controller converts the DC voltage from battery to an alternating voltage with variable amplitude and frequency that drive the hub motor at different speeds.

The maximum speed of a vehicle is 30 kmph. It is required to vary the speed depending upon the road conditions&traffic.Therefore,anacceleratororathrottleisnecessary.Throttleallowsustodrivet hemotorfrom zero speed to full speed. The throttle is fitted on left side of the handle bar and is connected tocontroller.

III. FABRICATION

We fabricated the vehicle which consist of assembly of components i.e. hub motor, battery, motor controller and accelerator.

3.1 HubMotor

For this research we used the brushless DC motor rather than the brushed DC motor, because brushless DC motors are 85-90% efficient, whereas brushed DC motors are 75-80% efficient. Selected specifications for the hub motor -
Rated power of the hub motor – 750W, Maximum RPM – 150

Fig. 2. Side view of the hub motor fitted on the front wheel of the vehicle

Ordinary electric motors use a mechanical device called a commutator and two contacts calledcarbon DC motors have half a dozen or more separate coils and they replace the commutator and brushes with an electronic circuit. The circuit switches the power on and off in the coil in turn creating forcesineachonethatmakethemotorspin.Sincethe brushesofthebrushedDCmotorspressagainst the axle of a normal motor, they introduce friction; slow it down, and waste energy. That's why brushless motor are often more efficient, especially at low speed. Getting rid of the brushes also saves themoney.
Tofitthehubmotoronthefrontwheel, on the lathe machine to match dimensions of the hub motor as shown in the fig.2.

3.2 Battery

Compared with ordinary lead-acid cells, sealed batteries offer several advantages. The battery can be mounted in any position, since the valves only operate on over pressure faults. Since the battery system is designed to be recombinant and eliminate the emission of gases on overcharge; room ventilation requirements are reduced and no acid fume is emitted during normal operation. The volume of free electrolyte that could be released on damage to the case or venting is very small. There is no need (nor possibility) to check the level of electrolyte or to top up water lost due to electrolysis,reducinginspectionandmaintenancecomparedtoOrdinarybatteries,sealedbatteriesaremoresensitiveto high temperature environments and more vulnerable to thermal run-away during abusive chargingcondition.
Following are the specifications of the batteries we used to achieve second drive mode for the vehicle:
Battery manufacturer – iPower Nominal voltage – 12V Nominal capacity – 24Ah Dimensions - 150x100x80mm

3.3 Motor Controller

The motor controller is an important component of the system. It is essential to control the amount of power supplied and to drive the brushless DC hub motor. The controller converts the DC voltage from battery to an alternating voltage with variable amplitude and frequency that drive the hub motor at different speeds

Fig. 3. Motor controller

To drive and control the brushless DC motor, the use of a motor controller is implemented. The motor controller is an essential device for any motor driven device. The motor controller is analogous to the human brain, processing information and feeding it back to the end user. Of course, the applications of a motor controller vary based on the task that it will be performing. One of the simplest applications is a basic switch to supply power to the motor, thus making the motor run. As one utilizes more features in the motor, the complexity of the motor controller increases. To drive the brushless DC motor, the motor controller sends rectangular/trapezoidal Voltage stokes that are coupled with the position of the rotor. The inputs to the controller include the speed and current signals that are supplied by the throttle. The DC power supply feeds power to the motor controller, which then distributes the voltage and current necessary to drive the brushless DC motor. The Hall Effect sensors provide the feedback needed for the motor to know the position of the rotor and to tell it when to supply the voltage stoke to the different phases of the brushless DC motor.
We fitted this controller on the front side of the vehicle just above the headlight assembly as shown in the fig. 4.

3.4 Accelerator

As we used the brushless DC Motor, it has separate speed control kit which is used to control the speed of the motor. We assembled the accelator on the left side of the handle so that dirver can easily vary the speed of the motor. The purpose of a motor speed controller is to take a signal representing the demanded speed, and to drive a motor at that speed. The controller may or may not actually measure the speed of the motor. If it does, it is called a Feedback Speed Controller or Closed Loop Speed Controller, if not it is called an Open Loop Speed Controller. Feedback speed control is better, but more complicated, and may not be required.

3.5 Summary

The components which we used or the vehicle are listed above. The front wheel is being propelled by the hub motor which is powered by the batteries connected in series and the rear wheel is powered by gasoline, i.e., the vehicle includes a single cylinder, air cooled internal combustion engine and a brushless DC motor based on electric power drive, used for hybrid powering of the vehicle. Also, we provided the control switch inside the boot space to switch on the power supply to the hub motor which is fitted in the front wheel.

IV. SELECTED VEHICLE

As in our research, the bike takes the total load of batteries, hub motor and rider's weight. Also, it is required to provide arrangement for installing battery on the bike. By considering all the above conditions we selected Honda Dio (100cc) so that it can carry load as mentioned above and also provision of the battery arrangement is possible. The load carrying capacity is 245 kg (including rider's weight). The weight of Honda Dio (100cc) bike is 105 kg. In other types of motorcycle, the frame construction is rigid and compact so there is unnecessary increase in weight and also sufficient place is not available for mounting of batteries, so Honda motorcycle is taken to complete above requirement. Also, difficulty arises in the mounting of motor in the front wheel due to improper dimensions of spokes in various motorcycles. This motor mounting is quite simple in Honda Dio (100cc) motorcycle.

V. CONCLUSIONS

The development of the two drive mode vehicle is succefully completed that uses two different sources of power - gasoline and electric. For low power application battery drive is used whereas for high power application where power requirement is very high gasoline engine is used. Therfore, the scope of vehicle is in excess of an ordinary fuel controlled vehicle. As this crossover vehicle emanates 0% outflow when driven on the electric mode, it assumes a significant part for decreasing contamination to specific degree without trading off with productivity. It is generally effective in metropolitan regions mostly in high rush hour gridlock where fuel motors are least proficient as the energy from gas is being died and makes contamination. In this manner two drive modes for the vehicle keeps up the correct harmony between fuel utilization and contamination control.

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Collected data

Table 1 experimental attributes

Attributes	Gasoline powered vehicle	Electric scooter	Hybrid vehicle
Fuel/Electricity cost (in Rs/Km)	2.2	0.25	0.9-0.11
Maintenance cost(Rs/15000Km)	4,500	6,800	7,200
Top Speed (Km/hr)	80	45	40 - on the electric mode 68 - on the gasoline power mode
Range (full tank/fully charged) (in Km)	175-190	70-80	230-240
Acceleration (0-30 Km/hr in XX sec)	04	06	07 - on the electric mode 05 - on the gasoline power mode