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IMPROVE EFFICIENCY FOR REGENERATIVE BRAKING SYSTEM

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Abstract— ***To improve driving ability of electric vehicle. Regenerative braking system (RBS) are an effective method of recovering the energy released and at the same time reducing the exhaust and brake emissions of vehicle . this method is based on the principle of converting the kinetic energy created by mechanical energy of the motor into electrical energy and the converted electrical energy is stored in battery for later use. These system provide economic benefits via fuel saving . This use also contribute to a clean environment and renewable energy source.***

Keywords —Regenerative brake, Energy, Vehicle, Emission ,Fuel Saving ,Clean air, Power saving

I. INTRODUCTION

Since the last two decades the bar and policy makers each over the world are deeply concerned about the critical need for protection of the terrain, ecology and humanity at large, there has been a steep rise in the accumulation of hothouse feasts particularly co2, which effect global changes in rainfall. Motor vehicle contribute about 14 of co2 from all besides, pollution due to both petrol and diesel machine driven vehicles caused by the emigration of co2, no un burnt hydrocarbons, particulate and oxides ethyl, lead is injury to health and terrain. Regulations on exhaust emigration from vehicle machines have been made precipitously further and further paycheck towards the time 2000 and further. Vehicle manufactures have been hence obliged to meet these norms by designing cleaner and energy efficiently machines and through provision for treatment of exhaust feasts satisfy the specified limits. So, to satisfy and overcome these two problems videlicet.

1. Pollution
2. Effectiveness

Also, we go for a electric vehicle the name of ELECTRIC TWO-WHEELER. One of the primary reasons for the preface of Electric vehicle into the request is the over hothouse gas emigration and their donation to global warming. National Electric Mobility Mission Plan (NEMMP) 2020. Its end to achieve the public energy security by promoting Electric vehicles in country. To achieve this there's a target to achieve 6-7 million deals of mongrel and electric vehicle in time 2020. And therefore, we can save2.2-2.5 million ton of liquid energy which will drop1.3-1.5 million-ton tons of carbon dioxide emigration. Electric vehicles are charged by batteries that are contained with the vehicle and generally give an acceptable charge for the propulsion of the vehicle through megacity business. The batteries are mounted within the vehicle and are used to propel the motorcycle as an volition to using an internal combustion The effectiveness of an electric vehicle is far lesser than all other forms of propulsion presently in use. Whenever there's employment of electricity, the vehicles using it tend to produces zero emigration at the tailpipe. Also, EVs offer great performance and are far from being slow. An electric vehicle operates else from a vehicle with an IC machine.

II. WORKING PRINCIPLE OF REGENERATIVE BRAKING SYSTEM

A regenerative Braking System is a braking system That generates electrical energy during braking action and that generated energy is used to run the vehicle by means of charging the battery and run the Motor.
It works on the" Law **of Conservation of Energy**".
The law of conservation of Energy states that: - Energy can neither be created nor be destroyed, it can only be converted from one form of energy to another form.

In Regenerative Braking System: - **When Vehicle is Running:** - Electrical Energy (Battery) is Converts into Kinetic Energy (Wheel Rotation) By Motor.

When Brake Apply: - Kinetic Energy (Wheel Rotation) is Converts into Electrical Energy (Battery Charging) by Motor (Works as Generator in Opposite Direction).
1) When Vehicle is starts, Controller supplies the Electrical Energy from Battery to the Motor.
2) Therefore, Motor starts Rotating, means it Converting the Electrical Energy into the Mechanical Energy.
3) Due to Motor Rotating, Vehicle wheels also Starts Rotating with Motor.
4) When Driver applies the Brake, Controller Disconnects the Electrical Energy supply to the Motor.
5) Now, Wheels have motion. Due to this Kinetic Energy of Wheels, Motor also Rotating with wheels.
6) Therefore, Motor works as Generator and produces the Electrical Energy.
7) Controller Receives This Electrical Energy from Generator & Supplies to the Motor. Hence Battery Changing Starts.
8) When Motor Rotates due to kinetic Energy of Wheels, Motor produces Back Electromotive Force which helps is Stop wheel rotation.

III: EXPERIMENTAL SETUP

FIG1.MODEL OF EFFECTIVE ENERGY RECOVERY FOR E-VEHICLE

IV. WORKING PRINCIPLE OF E-VEHICLE MODEL

Here, we are using the BLDC motor, which is running with the help of battery power. Battery is placed in the goods space. The motor is fixed inside the wheel and it is controlled through the controller. Other components required are like battery pack, power controller and pcb.

Firstly, battery of a vehicle is charged through charger, after which battery will provide power to pcb and micro-controller. Micro-controller checks the battery voltage and if sufficiently charged it power to controller which will provide sufficient amount of power to BLDC motor, power controller increases the efficiency by reducing unnecessary supply of power. Afterword motor runs the wheel through transmission drive. Regenerative braking is a braking method that provides charge to the battery by converting the mechanical energy of the motor and kinetic energy into electrical energy. In regenerative braking mode the vehicle slows down on an incline it doesn't needs power and acceleration. So at low throttle and good speed or while slowing down the micro-controller triggers the relay through the driver IC and the motor runs in generation mode. The motor generate emf at the terminals which is AC. It is converted into DC with rectifying circuit.

In this project we are using a brushless HUB motor (36v). The controller used for driving this motor operates on (36 v as well as 48 v). PCB requires 12 v supply for its operation. We are using three batteries in a series of 12 V 7.5A for supply this motor. The PCB is connected to a single battery. The LED screen displays battery voltage and acceleration percent. The microcontroller is a program such that when the acceleration throttle is given more than 30 %, it relays pickup and the motor runs in motoring mode but as the acceleration drops below 30 %, It sends a command to switch off the relay and the motor runs in generating mode. The LED displays the voltage being used while the motor runs in motoring mode and as the throttle drops below 30 % it displays the voltage being generated by the motor in generating mode. The generated voltage is stored in a separate battery pack which can be later used to supply the motor by simply switching between the main battery and battery pack. As we know the motor converts electrical energy into mechanical output so when the acceleration drops below 30% the supply to the motor is cut-off and the motor runs freely for some time because of the inertia stored in it. This mechanical output acts as an input and generates a three phase AC supply which we are rectifying and converting into DC before storing into a battery pack.

V. CALCULATION OF MODEL: -

- Radius of wheel is 0.125
- Maximum Rpm when connected to main battery supply = 750 Rpm
- Maximum Rpm when operated by battery pack = 300 Rpm

Therefore,

Speed

- When Rpm is 750 -= 35 km/hr.
- When Rpm is 300 = 15 km/hr.

The average time for which wheel runs on main battery is 30 minutes and speed is 35 km/hr.

Distance = speed * time

= 35*30

= 17.5 km

The motor can run for 17.5 Km when supplied from Main Battery.

The average time of wheel when operated by Battery pack is 15minutes at speed of 15 km/hr.

Distance = speed * time

= 15*15

= 3.75 km

The motor can run for 3.75 Km when supplied from Battery pack.

Therefore, from the above calculation we can say that the mileage of this demo vehicle will be increased by approximately 4 Km per full charge of the battery pack.

VI. TABLE

Parameters	Electric Vehicle without RBS	Electric Vehicle with RBS
Acceleration	100	100
Running time	30mint	45mint
Distance	17km	21km
Speed	35km/hr	21km/hr
Efficiency	80%	85%

VII. RESULT

This project has successfully illustrated that the energy saving technique stated above can be used to increase the efficiency of E-vehicles. In the demo model it has saved about 5% energy and it can save more energy when implemented in commercial vehicles as the inertia in the moving vehicle is more.

VIII. CONCLUSION

This paper shows demo model of an electric bike and also lists criteria for an effective selection of the main components of the electric bike such as BLDC motor selection, battery selection, controller selection, material selection, brakes. Additional protection features for the controller are also listed as well as miscellaneous mechanical component selections to design an electric bike model. There is a combination of positive and negative effect of that factor on perception. Here most of the respondents are consider the cost and the mileage while purchasing a new bike, so there is ample potential to electric bike in two-wheeler sectors. But their battery is one of the factors which decide the performance of bike. At times, if vehicle in heavy city traffic and there is no chance for moving, more energy is wasted due to variation of acceleration. If the vehicle is run by electric motor through battery with this technique, the consumption of power is reduced. Also, when acceleration is not required and speed is more due to slope or while braking this technique can save energy generated by motor and save it in different battery for later use which will significantly improve the range of E-bike.

IX. FUTURE SCOPE

- All the automobiles manufacturers are working on electric vehicle.
- Heavy vehicle like trucks will be used hybrid system in future. Efficiency of electrical vehicle will be increasing future.
- Safety feature will be added in new generation E-vehicle vehicle.
- Power of E vehicle need to increase in future.
- Price of E-vehicle will reduce due to increasing production rate of electric vehicle.

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