

Power Generation by Regenerative Braking Systems in Electrical Vehicles

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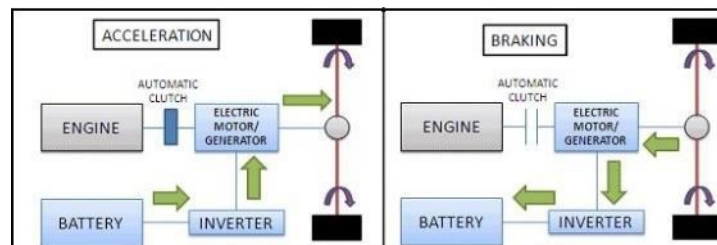
Abstract

Presently what the globe wants could be a methodology or a technology that saves energy from obtaining wasted. Energy conservation is that the hour of want. just in case of cars, energy conservation will be done by exploitation regenerative braking systems. When driving associate automobile, an excellent quantity of mechanical energy is wasted once brakes area unit applied, that then makes the beginning up fairly energy overwhelming. the most aim of this project was to develop a product that stores the energy that is often lost throughout braking, and reuses it. the employment of regenerative braking system in cars provides US the means that to balance the mechanical energy of the vehicle to some extent that is lost throughout the method of braking. The authors of the paper have mentioned and conferred 2 methods of victimization the K.E. that usually gets wasted by converting it into either energy or into current. Flywheel is employed for changing the K.E. to mechanical energy. Also, motor is employed to convert K.E. into electrical energy.

Keywords: Regenerative, Braking, Hybrid vehicles, Kinetic energy recovery system (K.E.R.S.), Flywheel, Motor, Hydraulic Power.

1. INTRODUCTION

Nowadays electrical vehicles become common as we all know it is inexperienced vehicle manufacturing zero emission to the air that is general reason behind depletion of layer. There are not any virulent gases releases from vehicle to dirty the atmosphere. In recent years the electrical vehicle population starts increasing in line with demand within the market. Besides, government is additional serious for the assembly of electrical Vehicles. All the humanities are attempting to avoid wasting Mother Nature & natural resources like crude & gases within the earth. In twentieth century, transport technology like management technology and integrative technology are developing aggressively. Somehow, the limitation of driving mileage still becomes Associate in Nursing obstacle for the event of electrical vehicles.



This technology had largely replaced the standard braking system within the vehicles as a result of the standard braking system always utilizes mechanical friction methodology to dissipate kinetic energy as energy so as to attain the impact of stopping.

Studies show that in urban driving, concerning one third to 1 half of the energy needed for operation of a vehicle is consumed throughout braking. Base on the energy perspective, the kinetic energy could be a surplus energy once the electrical motor is in

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the braking state since it dissipated the energy as heat and causes a loss of the general energy. This wasted energy really may be reborn to a helpful energy particularly for the hybrid and car. Therefore, regenerative braking had been enforced within the automotive braking system to recapture this wasted energy. additionally, the total energy saves relies on the driving condition, usually it is simpler in town driving instead of road whereas little braking happens.

2. LITERATURE REVIEW

(Yimin Gao and Mehrdad Ehsani 2001) The desirable braking system of a land vehicle is that it can stop the vehicle or reduce the vehicle speed as quickly as possible, maintain the vehicle direction stable and recover kinetic energy of the vehicle as much as possible. In this paper, an electronically controlled braking system for EV and HEV has been proposed, The results show that significant amount of energy can be recovered and braking performance of the vehicle is perfect. (SR Cikanek, KE Bailey - Proceedings of the 2002 American) This paper discusses a regenerative braking system (RBS) for a parallel hybrid electric vehicle (PHEV) that performs regenerative energy recovery based on vehicle attributes, thereby providing improved performance, efficiency and reliability at minimal additional cost. A detailed description of the regenerative braking algorithm is presented along with simulation results from a dynamic model of the PHEV exhibiting the regenerative braking performance.(X Nian, F Peng, H Zhang - IEEE Transactions on Industrial ..., 2014) Regenerative braking can improve energy usage efficiency and can prolong the driving distance of electric vehicles (EVs). A creative regenerative braking system (RBS) is presented in this paper. The RBS is adapted to brushless dc (BLDC) motor, and it emphasizes on the distribution of the braking force as well as BLDC motor control. In this paper, BLDC motor control utilizes the traditional proportional-integral-derivative (PID) control, and the distribution of braking force adopts fuzzy logic control.

3. OBJECTIVE

- Use in electrical vehicles for generates the electricity and storage in some unit.
- World's leading automakers like Ferrari, Renault, BMW, McLaren, Tesla ar developing hybrid and conjointly complete electrical cars and are attempting to feature this Regenerative braking systems (RBS) to them.
- The potency of IC engine vehicles is 20-25%.By victimization electrical vehicles the potency will increase by five hundredth. (i.e., 70-75%). victimization RBS it contributes to the development of the potency of electrical vehicles by providing braking feature and conjointly saving most of the energy at a similar time, that gets wasted. thus by this method the potency will be enhanced close to by V-J Day (i.e., 85-90%).

4. REGENERATIVE BRAKING EFFICIENCY

The energy potency of a traditional automobile is merely concerning twenty%, with the remaining eighty% of its energy being born-again to heat through friction. The miraculous issue concerning regenerative braking is that it should be able to capture the maximum amount as half that wasted energy and place it back to figure. may this might} scale back fuel consumption by ten to twenty five % Hydraulic regenerative braking systems could give even a lot of spectacular gains, probably reducing fuel use by twenty five to forty five% . during a century that will see the top of the Brobdingnagian fuel reserves that have provided North American country with energy for automotive and different technologies for several years, and within which fears concerning carbon emissions square measure returning to a peak, this other potency is changing into more and more necessary.

5. CONVERSION OF KINETIC ENERGY TO ELECTRICAL ENERGY USING MOTOR

The most common kind of regenerative brake involves victimization associate electrical motor as associate electrical generator. The operational of the regenerative braking system depends upon the rule of associate electrical motor, that's that the required component of the system. motor gets activated once some current is competent it. But, when some external force is applied to activate the motor (during the braking), then it behaves as a generator and generates electricity. this suggests that whenever motor runs in one direction, the voltage gets regenerate into mechanical energy, that's then accustomed accelerate the vehicle and whenever the motor runs in different means, it performs functions of a generator, that then converts energy into current, that creates it possible to utilize the movement force of the shaft to point out the electrical motors, that ends in produce voltage for storage at intervals the battery and at an equivalent time reducing the speed of the automotive with the regenerative resistance of the electrical motors. This electricity is then used for recharging the battery.

6. EXPECTED OUTCOMES

- It ought to store energy whereas braking that is its primary objective

- It ought to come back the keep energy whenever needed simply
- It ought to be compact and simple to put in
- It ought to give adequate stopping/braking force to the vehicle
- once utilized in conjunction with typical braking systems, it ought to simply switch as per demand half-dozen. Its style ought to be versatile so it will cater to the wants of a good form of vehicles.

7. CONCLUSION

Regenerative braking is associate degree energy recovery mechanism that slows a vehicle or object by changing its mechanical energy into a kind which might be either used straight off or keep till needed.

Once the driving force hits the brakes, energy that's normally lost as heat is instead reborn into electricity and stored during a battery. The regenerative braking system employed in the vehicles satisfies the purpose of saving a locality of the energy lost throughout braking. Also it will be operated at warmth vary and square measure efficient as compared to standard braking system.

The results from a number of the check conducted show that around 30% of the energy delivered will be recovered by the system. The results say that the force driven by the vehicles is measured. electric power generated by motor, generator and battery is extremely helpful and thence it ought to employed in electrical vehicles. The regulator absorbs energy once braking via a clutch system swiftness the automotive down and rushing up the wheel.

8. FUTURE SCOPE

Regenerative braking systems required detailed analysis and process improvement inputs to develop a modern and improved system that increases the amount of energy saved and helps the vehicle to stop quicker. As time elapses, designers and engineers can engineer excellent regenerative braking systems, thus these systems can replace traditional regenerative braking system as we know them today. All vehicles in motion will get benefit from these systems by recapturing energy which may have been lost through the traditional braking method.

References

1. Bildstein M., Mann K., Richter B. (2014) Regenerative braking system.
2. Reif K. (eds) Fundamentals of Automotive and Engine Technology
3. Bosch Professional Automotive Information. Springer Vieweg, Wiesbaden. https://doi.org/10.1007/978-3-658-03972-1_22
4. Mohammad Mostafa Ghafouryan, Sadegh Ataei, Fateme Tavakoli Dastjerd, "A novel method for the design of regenerative brakesystem in an urban automotive," Journal of the Brazilian Society of Mechanical Sciences and Engineering, 2014.