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POWER PRODUCTION IN ELECTRICLE VEHICLE USING SELF GENERATION AND REGENERATION

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Abstract : *In recent years most countries are trying to reduce the use of fossil fuel as a source of energy. Hence green energy industry is getting more and more attentions. The invention of Electric vehicle is a miracle as it produces zero emission to the air. Hence there is no toxic gases releases from the car. Due this reason the Electric vehicle is also known as green vehicle. Electric vehicle is nowadays drawing more attention due its fuel economy, cost effective, low maintenance,.etc. As it is well known one of the drawback of the electric vehicles is the driving range. The driving range can be increased with the help of self-generation and regeneration operation. Regenerative braking system replaces the traditional braking system in cars which produces more heat during braking. This system ensures high capability of energy storage in braking conditions and under normal operation.*

Keywords:

Electric vehicle(EV),Ultracapacitor,

Hybrid energy storage system,

self generaton,Regeneration.

INTRODUCTION

With the increasing technologies Electric vehicles and hybrid electric vehicles are more concerned today due to its efficient operation.In this project the power can be generated during running condition and braking condition. When the car is switched on the motor takes current from the battery. The motor then converts electrical energy into mechanical energy. The mechanical energy moves the vehicle forward .When the car starts moving then generation takes place. The generator attached to the back wheels starts generation. This process is called as self generation.In this project the power can also be generated with the help of regenerative braking system. The RBS system converts the mechanical energy into electrical energy during braking operation. In automobiles whenever the brakes are applied the vehicle comes to a halt and kinetic energy gets wasted due to friction in the form of kinetic energy. Nowadays regenerative braking system are used in automobiles to recover the kinetic energy of the vehicle to some extent that is lost during braking process. The energy management can be well improved through self generation and regeneration. Hence the generated energy can be stored back in the battery and the stored energy can be used further. In this model the generated energy can be stored with the help of advanced technology.

PRINCIPLE OF OPERATION

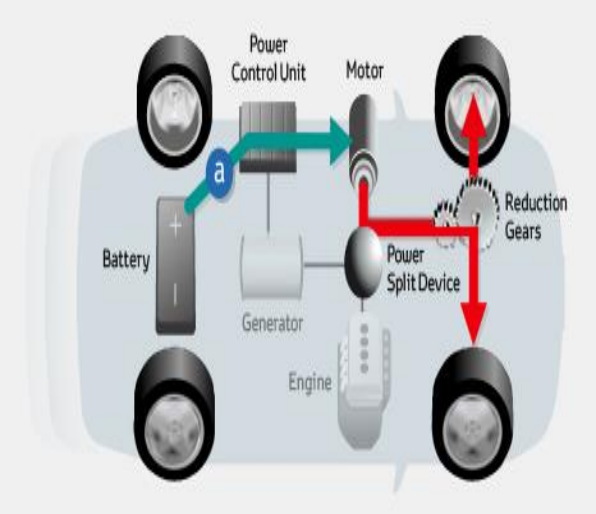


Fig-1:Normal operation

SELF GENERATION

The electric vehicle is driven by the battery. On switching the car the motor takes current from the battery. The motor converts the electrical energy into mechanical rotation and hence the vehicle moves forward. When the car starts running then generation takes place.The synchronous generator attached to the wheels starts generation.Here synchronous generator has been used because it can operate at low power.When the driving speed of the car increases then generation also increases.Hence the generation depends upon the driving condition.The output of the generator is Alternating type.Hence it can be converted into DC with the help of rectifier circuit.

The rectifier circuit converts this Alternating current into pulsating DC .The pulsating DC component is passed through the filter circuit which removes harmonics .Then the DC is stored in the ultracapacitor.Hence the power can be generated without any external forces and this process is called self generation.

REGENERATION

The brake is a device that decelerates the moving object or prevents an object from accelerating.

Brakes uses friction to convert kinetic energy into heat.As the brake pads rub against the wheels excessive heat energy is generated.This heat energy dissipates into the air wasting upto 30% of the generated power. Regenerative braking technology capture the energy created by braking process back into the system in the form of charging the battery for further use.

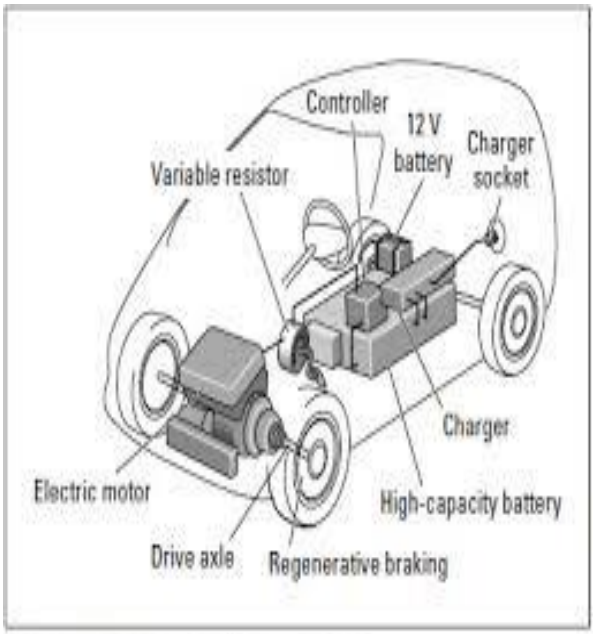


Fig 2.Regeneration in Ev

The energy generated during braking depends on the driving system. When the driver steps on thebrake pedal of an electric or hybrid vehicle, the brakes put the vehicle's electric motor into reverse mode, causing it to run backwards, inorder to slow the car's wheels. When the wheel runs backwards,then the motor acts as an electric generator, producing electricity which is then stored back into the vehicle's batteries.Many modern hybrid and electric

vehicles use this technique to extend the range of the battery pack.In regenerative braking system the controller plays a vital role because it controls the overall process of the motor.The main purpose of the controller is to monitor the speed of the wheel, calculate the torque ,and the generated electricity to be fed back to the batteries.Under braking condition the controller directs the current generated directly into the batteries or capacitors.

STORAGE:

The energy can be generated using self generation and regeneration principle and both the methods does not produce any pollution to the system .Using these systems the driving range of the vehicle can be improved.The energy storage can also be done with the help of Hybrid Energy Storage system.This method can improve the battery life of the system. It is also possible to boost the overall efficiency if the system is properly sized and controlled.Future work related to this paper will focus on analyzing the system under high voltage conditions.

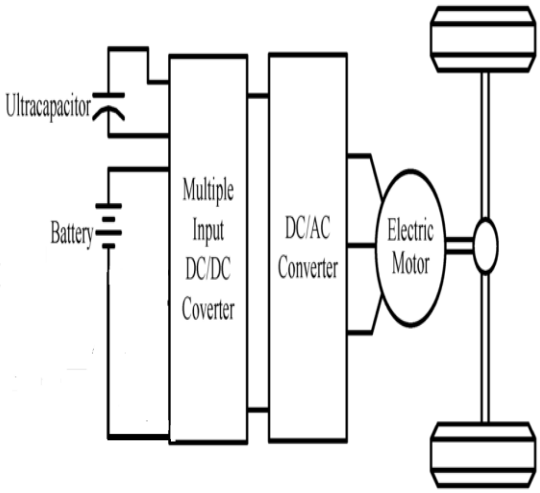
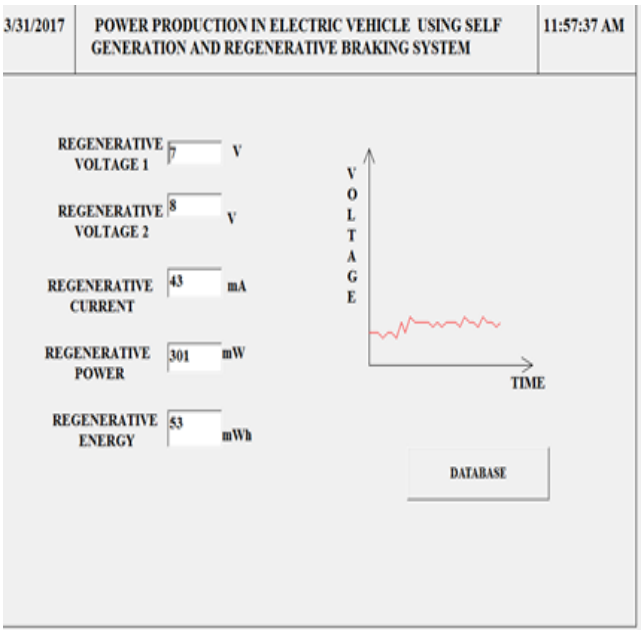


Fig-3:HBSS

According to our scheme when we charge many batteries in final that all to be connected together, which is not at all possible because of difference in voltage levels. To avoid this problem, we need to have a DC-DC converter whose output is designed for 24 Volts, where the Input designs should be according to the battery source. All the DC-DC converter output, should be connected together, sum of the output will have good enough current with constant voltage (SMPS concepts) (switched mode power) system.

The sum output should be connected to PWM chopper based inverter to invert to A.C. the A.C output should be designed according to the bus voltage of the electricity board.This system may provide constant and consistent output to the electricity board grid, irrespective of the climatical condition. During cloudy atmosphere also, we may receive energy. So this is the real enhancement which is needed for globalization of electrical output and may contribute the power to the power sector which needs energy.

Simulation results of both the regenerated power is as given below:



CONCLUSION

The energy can be generated using self generation and regeneration principle and both the methods does not produce any pollution to the system .Using these systems the driving range of the vehicle can be improved. The energy storage can also be done with the help of Hybrid Energy Storage system. This method can improve the battery life of the system. It is also possible to boost the overall efficiency if the system is properly sized and controlled.Future work related to this paper will focus on analyzing the system under high voltage conditions.

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