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Auto-Charging E-Vehicle with its battery Management.

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Abstract - *"Energy Can Neither Be Created nor Destroyed" as per the thermodynamics law. Trying to obtained the maximum energy from secondary power sources (solar) is a challenging task. In conventional electric vehicles there is batteries are used which charges through electricity on wall and also used for the car operation.*

This results in low range and need to search for charging station. The charging time for charged the batteries is too longer. In some electric vehicle they add solar to charge batteries while vehicle is moving, it causes inefficient charging and heating of batteries. Thus, switching circuit model is been developed. The common problems with e-vehicles, one of which is charging time. i.e., the charging hours of an e-vehicle is 6–8 hours approx., and in this time, they should carry a specific distance. Our project is based on this we are giving the basics concept as to create a type of vehicle that can be auto-charging with unlimited distance.

Due to this, the charging hours should be decreases or eliminated. In this, we want to make a controller that may control the charging and discharging of the batteries at the same time by switching method. The switching may hard or soft switching. The supply of batteries for charging should be provided by the gear coupling of the generator / Alternator on the vehicle shaft. By developing this type of E-vehicle we can controlled the global pollution as well as energy demands for charging station.

Key Words: *Auto-Charging EVs, New Concept of EVs, Unlimited distance, Energy Efficient, E-Vehicle New Idea.*

1.INTRODUCTION

In the project we are working on the solution for the E-vehicle, the problem has noticed is that the charging time of electric cars or vehicles is much longer, and they should carry a specific distance in that specific time. The solution for this is that, with our knowledge, we decided to make the E-vehicle, auto-charging, and due to this, it should carry an unlimited distance. While working on this project, to be consider the different ratings of motors according to the vehicle and the batteries that could sustain the load of the motor. The concept of our project is that, we are using a generator, and the generator should be AC or DC. We coupled the generator to the vehicle wheel shaft by a gear mechanism, understanding that due to this coupling, it shouldn't affect the speed and efficiency of the vehicle.

In the battery part, the batteries are divided into two sections, i.e., A and B. One of these batteries is the main battery, and the other is an auxiliary battery. The motor load should be carried by the main battery, and the charging should be done on the auxiliary battery. After full discharge of the main battery, the motor load is shared by the auxiliary battery, and at this time the main battery is switched to in charging condition by using controller.

The Switching can be of two methods hard switching and soft switching. The soft switching is done by using the advance level programming controller and other is hard switching. We are using hard switching, it is done by rack-pinion mechanism and controlling their movement by any microcontrollers.

1.1 Methodology

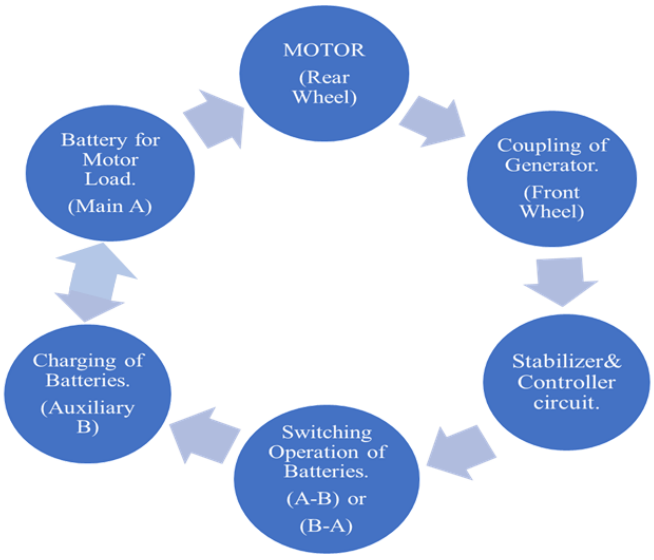

Chart -1: Steps /Cycle of project.

2. WORKING

The project is based on the Electric Vehicle, we had just modified the working of our conventional EVs (BEVs) and implements our idea in it. Due to this we find a new E-vehicle which doesn't required charging on the charging station, so charging time is reduces or eliminated & due to this the distance covered by the vehicle should be unlimited /it should be increased the current EVs.

We implemented this idea in to the small working prototype. The working is in a way that first by considering the Two Battery (Main & Auxiliary). The Main Battery supply power to Vehicle. The auxiliary is in the charging or full charged condition. The controller supervising the condition of both batteries when the Main battery come to its threshold state (i.e., 20% charged) then the controller switching action took place and the auxiliary battery will now be a Main battery and the Main battery will Auxiliary battery i.e., Auxiliary battery = Main Battery & Main battery = Auxiliary battery.

To charge the components in vehicle and auxiliary battery the power is generated by the alternator which is coupled on the shaft of the vehicle. Due to this, the vehicle not require to charge on the charging stations and so the charging hours of vehicle is or reduces completely /eliminated and vehicle should cover more or unlimited distances.
We have made prototype of this while considering all the factors and specifications according to our projects. The specification, calculation and observation should change according to the project. The controller we are using in Arduino UNO board, for industrial applications the controller should be changed.

While designing the E-vehicle if we should consider the losses as low as possible the vehicle should maximum efficiency. The switching should be two types is hard and soft switching. We are using hard switching in the project. We had done all the possible method to eliminate the maximum losses and provide accurate result from the project.

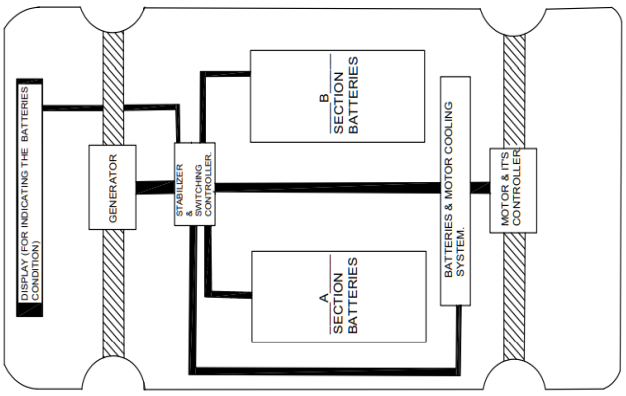

Fig -1: Virtual Construction of project

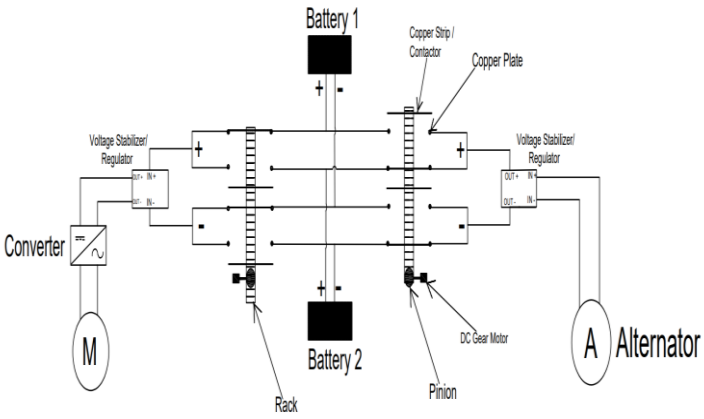

Fig -2: Connection diagram of project (Actual)

The above Fig -1 & Fig -2 Sows the Constructional diagram. The Fig -1 shows the virtual construction idea of project i.e., where the project idea should be implemented in actual vehicle. The Fig -2 shows basic implementation idea and the connection diagram actually we used in the project accordingly.

2.1 Observation

Table -1: Result / observation of project.

Sr. no.	Battery Voltage before Switching.		Switching/ Rack Rotation		State of battery After Switching.	
0.	Battery 1	Battery 2	Switch 1	Switch 2	Battery 1	Battery 2
1.	12 v	12v	Initial Condition (Down)	Initial condition (Up)	Discharging	Charging or Full Charged.
2.	6 v	12v	Up-ward	Down-ward	Charging	Discharging
3.	> 6v	< 12v	Up-ward (Stop)	Down-Ward (Stop)	Charging or charged full	Discharging
4.	12v	6v	Down-ward	Up-ward	Discharging	Charging
5.	<12v	>6v	Down-ward (Stop)	Up-ward (Stop)	Discharging	Charging or charged full

In the above observation table, it shows the data while performing and testing of the project. The table shows the data in a form of truth table i.e., by the battery condition the switching action is took place. As shown in above Table -1.

2.2 View of project

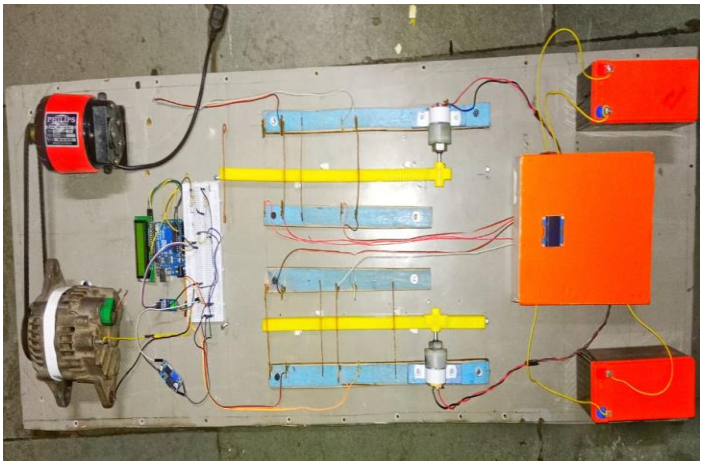

Fig -3: Actual View

In the above fig the Alternator is shown which is coupled to the electric motor. Here the Electric motor act as a front shaft of the vehicle. As the concept, the Alternator is coupled to the front shaft of the EVs and the Driving Motor is on Rear wheel. When the vehicle is running the alternator start to generation and the generated voltage should we utilized to batteries and other components as per required. And the hard switching in the above fig -3, done by rack & pinion mechanism. The two Arduino board is used one of them is for generation side parameter measurement (alternator) and other is for switching control.

For Voltage Divider: Vout = Vin * R2 / R1+R2. By this formula we can calculate the source voltage/ battery voltages.

2.3 Scope of project/ objectives

1. Providing a New Concept of vehicles to the society.
2. Presenting a new concept of E-Vehicles for Manufacturing.
3. Try to overcome the Charging hours of E-Vehicles.
4. Try to overcome the Limited Distance for Travels.
5. Make a Pure Electric Vehicles which is Efficient with less cost.

2.4 Advantages

1. No/less Charging at charging station.
2. Unlimited distance.
3. Reduce uses of charging station.
4. Low maintenance & running cost.
5. No fuel, no emissions & other as current EVs.

3. CONCLUSIONS

In conclusion, it is evident that global warming is a real phenomenon, and it is happening right now. There are several factors that contribute to this issue, and the impacts can be seen both socially and environmentally. If we do not take the necessary precautions and act now, the situation is only going to worsen in the future. One should be well-aware of the consequences and ensure that they are not doing anything to contribute to it.

For the solution of global warming the EVs are widely manufacturing but not sale as the government is expected. Due to some the limitations of EVs the seal of the E-Vehicle is less as compared to conventional petrol and diesel vehicles. By overcoming this limitation, the sale of the EVs should be increased or should be better in the future.

Some off the problem are overcoming by help of our projects. We made a prototype which should give the basic idea to manufacture a E-vehicles which should overcome the problems of charging of EVs, finding the charging station and a limited distance of travelling.

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