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ELECTRIC VEHICLE CONTINUOUS CHARGING BY CONSTANT POWER LOAD STABILIZATION TECHNIQUE

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Abstract

Power, these days a very essential thing, because power is utilized by almost all the sources. The requirement of power is increasing year after year. To meet the demand of power various technologies has been used nowadays to overcome the scarcity of power. Few technologies are solar charger, Ac to DC Charger etc. Though these techniques are efficient there are some drawbacks. They never give power at all time. It is not having the capability to give constant power supply always. A novel technique for constant power supply is discussed in this paper. In this paper a supply to electric vehicle is given by three batteries. So if one battery fails, the power is taken from the other battery. Meantime the battery which gets drained has get charged. Here boost converter and buck converters are used to step up and step down the input voltage as per the requirement. By using three batteries the electric vehicle is charged all time and it works effectively. The entire work is done with three batteries, buck, boost converters and results are validated by simulation.

Keywords: Constant load supply; dc to dc charger; hybrid vehicles.

I. Introduction

Nowadays the electrical equipments are used everywhere. Since this is an era of electrical technology, electrical and electronics products play a vital role in all fields. These equipments are very cheap and useful. But only a few technologies are reliable. Electrical equipments are used in the day to day life for making the work easier and faster. It can also save the time, manpower, and efforts of human being. Nowadays the electric power becomes the major criteria for the functioning of all the electrical equipments. There are various power sources are used solar, wind energy, AC to DC charger etc. All these equipments will deliver the power for certain time. They can't deliver the power continuously for the equipments which it is utilizing. The wind power produces sound when it is delivering the

power to the equipments. The solar power affects the ecosystem since it covers the larger area. Due to climatic condition and weather the amount of power generation varies. If it is a rainy day, the solar panel or solar charger never gets enough energy to generate the power. So it makes the obstacle for power generation. In order to overcome the above stated drawbacks a constant power generation or constant power producing equipment is needed. In this paper a technique for constant power supply is used for charging electric vehicles.

The sole purpose of this system is to give a constant load supply to the motor, where all the systems used previously are capable of only producing supply for a short period of time .This system allows the user to use the electrical vehicle for far more time than the previous systems.

The existing types are the solar charging technique and the ac to dc type charging .The drawback of the solar was that it cannot be used during night times or monsoon seasons .The drawback of the ac charging was that to take the battery out to charge it.

This method uses two sub batteries to compensate the main battery, and while running the vehicle, so that is the advantage of this paper. The development of Power electronics converters also preserve energy by making it possible to transport electricity in excess of extended distances with minimal loss by transforming alternating current (AC) into high-voltage direct current (HVDC) and vice-versa.

II. Existing Methodologies

A. Solar charging

Solar panels that collect energy from the sun's light have been around for many years at this point. Solar battery chargers enable to make electrical energy even if you are in the ocean. With the chargers, you can always be ensured of electrical energy even when there is a blackout. The solar panels can‘t be damaged by ultraviolet rays or water. They are hardy and can’t be damaged by the impact of rain drops. In fact, some people even install solar power in their houses as a way to remove themselves from the power grid.

Solar panels on cars haven't always been that practical, it’s because of how highly expensive the technology is. Some carmakers, however, including Toyota and Audi, are introducing solar panels onto their hybrid models, but they cannot be used during the monsoon seasons or cannot be used during the night times too.

Solar charging had another drawback which was that it took a lot of time for charging which was another major disadvantage for the solar charger, this had the ac to dc charging technique more effective and efficient than of this solar charging technique.

B. Ac to dc charging

The ac to dc charger used to be the upmost technique like 5 years ago, as it was the only available technology that was thought of or invented of at those times. The drawback with the ac to dc charger is that the battery must be taken out of the vehicle every single time to charge the vehicle which is problem when the vehicle is on the move , so when a vehicle runs out of charge while on the go, it cannot be charged all of sudden in a nowhere position, so hence that was one of the drawbacks of the ac to dc type of charging.

Ac to dc charging is a failure because, for charging the battery, the battery has to be taken out of the vehicle and this is a major disadvantage as the vehicle is on the move, you cannot simply keep taking the huge battery out of the vehicle at all instances to charge the battery.

This technique was considered better than that of the solar charging technique as solar wasn't much useful during the monsoon seasons or even during the night times, and this ac to dc charging technique didn't have any particular drawback regarding the season or anything but as time passed by the drawback of taking the battery out to charge the battery was becoming hectic as we cannot take them on the move, but this charging technique had its perks too, as this type of charging was more quick in the process than any other technique.

It didn't take as much as time that the solar charger took. So that was most advantageous factor that it was the fastest mode of charging. Whereas the solar charging took a lot of time.

III. Constant Power Load Stabilization

The Proposed system of DC to DC converter is a system working with the help of Boost Converter and Buck Converter. In the Proposed system, we have used one main battery and two sub batteries to operate the bidirectional DC to DC Converter. The two batteries are connected in input side of the boost converter and one battery is connected to the Boost converter output side. The Proposed system needs to check the power levels of that of the Boost converter input side two batteries. If the two batteries power are full, the microcontroller will give off the priority to anyone battery to distribute the input power to the Boost converter. Suppose a battery power is full and power battery is charged by the Buck converter and the charge full another one battery power is low means the low battery is distribute the input power to the boost converter. The Boost Converter is stepped up the input voltage and the boost converter output is given to that of the Boost converter output side to the battery, vehicle and the Buck Converter input. The Buck converter is stepped down the input voltage and this converter output is directly connected to the Low power battery for charging purpose.

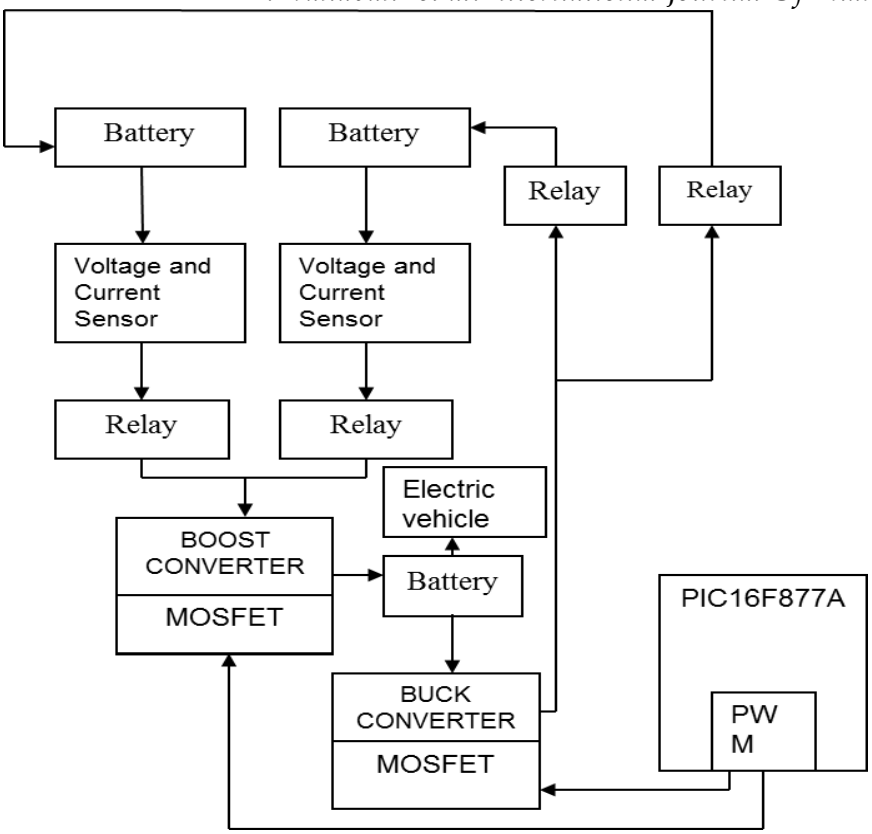

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Fig1. Block diagram of constant power load stabilization.

The working of the constant power load stabilization is explained below. The DC to DC converter is Boost Converter and Buck Converter. In this system, three batteries are used to operate the bidirectional DC to DC Converter. Two of the batteries are connected in input side of the boost converter and another one battery is connected in Boost converter output side. the system needs to check for the power levels of the Boost converter input side two batteries. If the two sub batteries power are full, the microcontroller will give the priority to anyone battery to distribute that of the input power to the Boost converter. Suppose the battery power is full and another one battery power is low means the low powered battery is charged by that of the Buck converter and the charge full battery is distribute the input power to the boost converter. Then the Boost Converter is being stepped up the input voltage and the boost converter output is given to the Boost converter output side of the battery, vehicle and the Buck Converter input. The Buck converter is stepped down by that of the input voltage and this converter output is directly connected to the Low power battery for charging purpose.

IV. Result and Discussion

The constant power stabilization kit is shown in fig 2. In that the response of buck converter and boost converter is taken. The buck converter reduces the input voltage by 12v. The boost converter increases the input voltage by 24 v, as shown the fig 3 and fig 4.

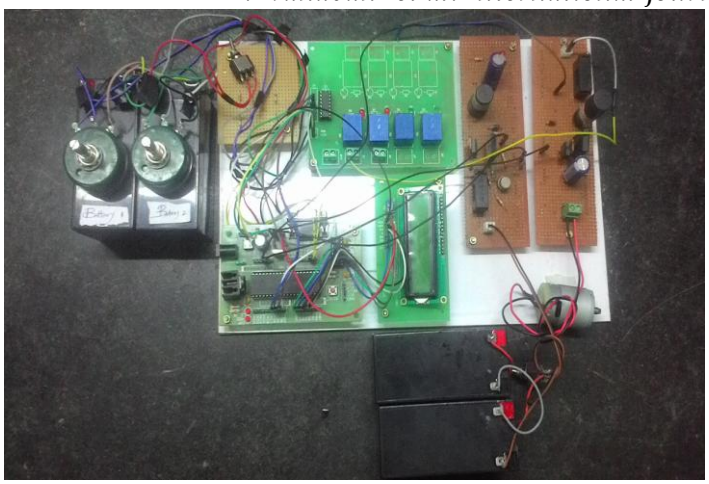

Fig2. Kit of constant power load vehicle.

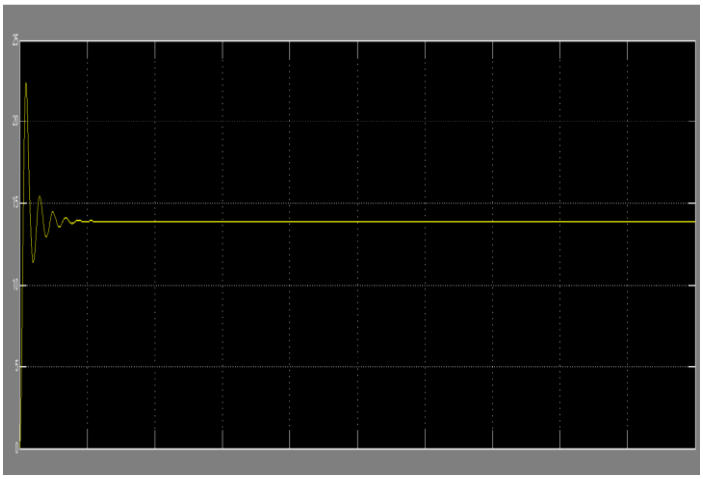

Fig3.output response of buck converter.

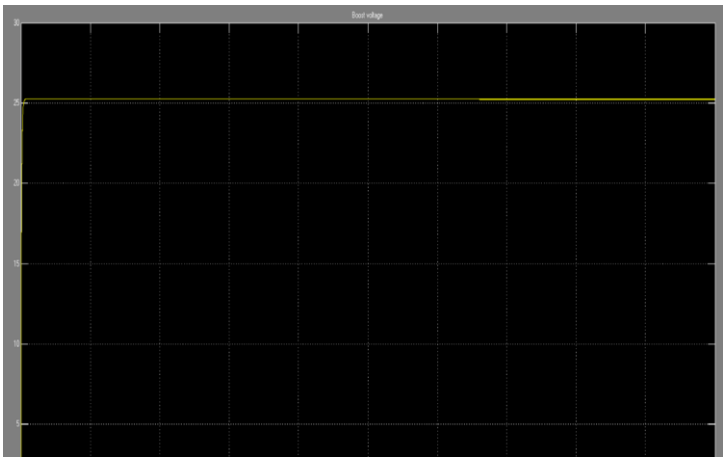

Fig4. Output response of boost converter.

Conclusion

The necessity of power is increasing day by day. Nowadays various sources has been used to meet the power requirements like solar energy, wind energy, tidal power etc. But the constant power generation is still a question mark. Since a constant power stabilization is used in this paper to give continuous supply to electric vehicle without any interruption. Because of three batteries a constant supply is given to the electric vehicle. In future this technique can also used in continuous power requiring devices.

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