

Solar Power Assisted Smart Battery Charging and Balancing Using Arduino

Shweta S. Deshmukh¹, Prajakta R. Waghmare², Sonali A. Dilwale³, Shubhangi S. Jawale⁴

^{1,2,3,4} Pune University, Bachelor of Electrical Engineering, D.V.V.P.C.O.E., Vilad Ghat, Ahmednagar, India

Abstract: The main aim of this paper is to charge our battery smartly by using electric supply as well as solar energy for electric vehicle. In this paper is to charge our battery smartly and also discharger it properly without any damage to our battery and charging circuit. For proper charging we are using balancing method and for charging of this battery we are using three different mode each mode has its own benefits.

Keywords: Arduino, LDR, Current sensor, Battery.

1. Introduction

As we know that now a days the main problem is fuel day it is getting costly. So it is necessary to use natural sources such as wind energy, solar energy in our project we are using solar energy. The second problem which we are facing is storing electricity. Generally the electricity is stored in battery but the battery get damaged due to various effects such as overcharging overheating and unbalancing condition. So in our project we are reducing this problem also we are using passive balancing method to reduce the degradation of battery life. The life of a rechargeable battery can be extended through the use of an intelligent charging system. The charging system must incorporate the proper charging method for the appropriate battery type (according to the battery chemistry) and overcharge protection to prevent battery damage. One of the prime functions of this system is to provide the necessary monitoring and control to protect the cells from situations outside of normal operating conditions.

As we know that nowadays automation is taking place everywhere so we are designing such a project which will bring automation in our battery balancing and battery charging system. There are different methods of battery balancing such as Active method and passive methods. Out of which we are using Passive method of charging in our project. We are using passive method because we are using only two batteries in our project. If number of batteries are more then we can use Active method and this method is more costly than passive method. In this project we are using three modes of charging. In this project we are using two methods of charging one is directly from our main A.C supply and second is by using natural source of energy which is solar energy. We are using natural source of energy.

2. System Development

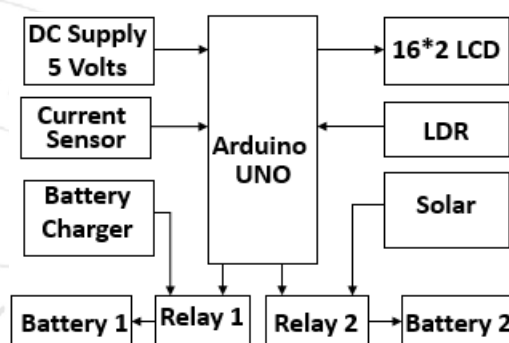


Figure 1: Block diagram of system

Following components are used:-

- ARDUINO UNO
- SOLAR PANEL
- BATTERY
- CURRENT SEENSOR
- 16*2 LCD DISPLAY
- LDR
- RELAY
- BATTERY CHARGER

As shown in the block diagram of our project it consist of various part, the main aim of this project is to balance the battery used in our vehicle and also maintain its charging. As we know that there are different methods used in balancing of battery such as active method and passive method. In our project we are using passive method because we have selected lithium battery in our project. This is how we can balance the battery which will protect our battery from overcharging and overheating. The next thing which we are doing in our project is we are also maintaining the battery balancing. In this there are three different stages. First if the vehicle is in running condition or parked then we are using solar energy for charging our battery. For this we are using solar panel, relay and LDR. The main purpose of LDR is to detect the intensity of light available if the light available is sufficient for charring then our relay 2 will be turned on by the arduino and the battery will get charged. Second if the vehicle is parked and we have source of charging i.e. 230v is available then we can plug the charger and charge the

battery. In this unit we are using current sensor, charger and relay. The main purpose of this current sensor is to check the supply available and if it is sufficient for charging then arduino will turn on the relay1 and the battery will be charged. Third if both the things are available then our project will use natural source of electricity i.e. solar panel.

3. Working Flow of System

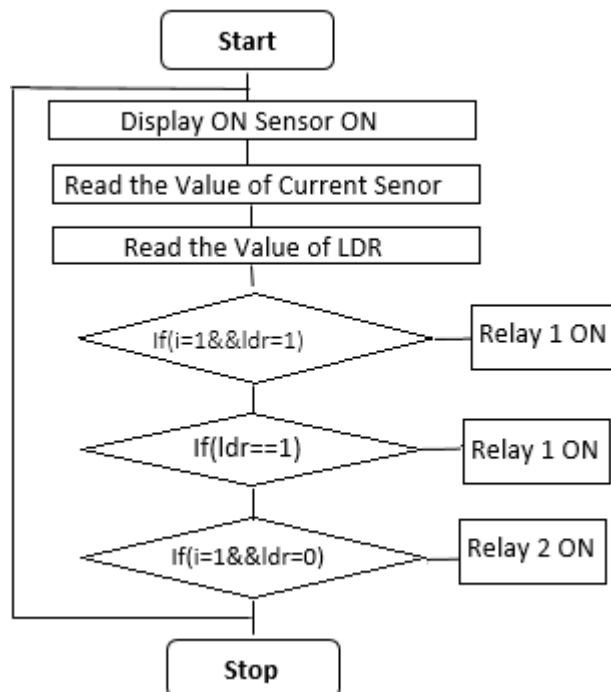


Figure 2: Flowchart of System

4. Conclusion

In this project we use more and more renewable energy source i.e. solar energy and minimize the use of fuel. We are balancing the battery smartly by using arduino. It can extend the life of battery.

References

- [1] Wai Chung Lee, David Drury, Phil Mellor, "Comparison Of Passive Cell Balancing And Active Cell Balancing For Automotive Batteries" University of Bristol, Merchant Ventures Building, Woodland Road, Bristol, BS8 1UB, UK IEEE 2011.
- [2] Jian Cao, Nigel Schofield And Ali Emadi, "Battery Balancing Methods: A Comprehensive Review" IEEE Vehicle Power and Propulsion Conference (VPPC), September 3-5, 2008 Harbin, China.
- [3] G.R. Chandra Mauli, P. Bauar, M. Zeman, "System Design For a Solar Power Electric Vehicle Charging Station For Workplaces" 0306-2619 January 2016 ELSEVIER Ltd.
- [4] Chen Duan, Member, IEEE, Caisheng Wang, Senior Member, IEEE, Zongzheng Li, Jianfei Chen, Member, IEEE Shidao Wang, Adrian Snyder and Chenguang Jiang "A Solar Power Assisted Battery Balancing System for Electric Vehicles" accepted February 27, 2018.

Author Profile

Shweta S. Deshmukh born in Osmanabad, Maharashtra, India in 1996, pursuing B.E. in Electrical Engineering from Savitribai Phule Pune University, India.

Prajakta R. Waghmare born in Nashik, Maharashtra, India in 1998, pursuing B.E. in Electrical Engineering from Savitribai Phule Pune University, India.

Sonali A. Dilwale born in Aurangabad, Maharashtra, India in 1997, pursuing B.E. in Electrical Engineering from Savitribai Phule Pune University, India.

Shubhangi S. Jawale born in Ahmednagar, Maharashtra, India in 1998, pursuing B.E. in Electrical Engineering from Savitribai Phule Pune University, India.