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# Design and Implementation of Solar Powered Mobile Phone Charging Station for Public Places

**[1]Sharmistha Rathod, [2]Prof. Dr. AA Apte**

[1]Student, M.E., Power Electronics and Drives, AISSMS College of Engineering, Pune, Maharashtra, India
[2]Professor, M.E., Power Electronics and Drives, AISSMS College of Engineering, Pune, Maharashtra, India

***Abstract* - Solar Energy is a smooth and RE Strength help and is on its way to high stage infiltration inside the worldwide strength bushel. Notwithstanding, there are a few requesting circumstances connected with Solar Energy, similar to discontinuity, limited dispatch limit and non-storability. Non-storability in an independent PV gadget can be moderated by utilizing consolidating strength carport devices like battery to store the electric strength created with the guide of sun powered charger while the sun based is sparkling and to supply energy when the sun isn't sparkling. Batteries are, thusly, one of the fundamental viewpoint in the independent PV framework. Furthermore, routinely the most fragile connection in PV frameworks since it influences the upkeep cost and dependability of the framework. This undertaking incorporates sun oriented based battery charging station, microcontroller based thoroughly, sun controlled battery charging gadget. The primary point of this task is to charge our battery keenly by involving electric stock as well as sunlight based energy for electric vehicle. In this task is to charge our battery shrewdly and furthermore discharger it appropriately with practically no harms to our battery and charging circuit. For appropriate charging we are utilizing adjusting strategy and for charging of this battery we are utilizing three distinct modes every mode has its own advantages.**

***Keywords:*** Battery, Charge controller, At-Mega 328, Solar PV Panel.

## I. INTRODUCTION

As we realize that now a days the main problem is fuel step by step it is getting exorbitant. So it is important to utilize regular sources, for example, wind energy, sunlight based energy in our task we are utilizing sun powered energy. The existence of a battery-powered battery can be reached out using a smart charging framework. The charging framework should consolidate the legitimate charging strategy for the proper battery type (as indicated by the battery science). One of the great elements of this framework is to give the essential observing and control to safeguard the cells from circumstances beyond ordinary working circumstances. As we realize that these days robotization is occurring all over the place so we are planning such an undertaking which will get mechanization our battery adjusting and battery charging framework. In this task we are utilizing two strategies for charging one is straightforwardly from our fundamental A.C supply and second is by utilizing regular wellspring of energy which is sun based energy. We are utilizing regular wellspring of energy. The main purpose of this project "Solar Based Charging Station using IOT" is to get the most energy out of the solar panel by changing the angle of rotation in response to the strength of light falling on it. With this process we can get a lot of energy from the solar panel from different sides of the slope[1]. Depending on the availability of sunlight, the solar panel tilt angle is determined. An electric car charging station is a place where a line is drawn on every electric car for a charge. These charging channels are sent to the standard separation range to make the public domain easily accessible. Just like ordinary cars like gasoline engines get fuel at a gas station, the charging stations are a place to charge electric cars. As it plays a necessary role in charging electric batteries, it is necessary to monitor its performance within and within the Internet of Things [2]. With the existing system of scarcity lacking capability, it becomes difficult to build an E-car charging station from a remote end. And in the present system the energy produced by the solar panel is made only by one angle of inclination [3]. This startup system will only generate limited power and power that can be started at various tilt angles not used. Even more so even at a solar charging station the amount of energy produced on that sunny day and in the afternoon will be higher compared to the energy produced in the morning or evening [4]. This is mainly due to the lack of sunlight falling on the solar panel. Here there is a problem or if there is sunlight, it falls into the wrong axis and therefore the electrical energy from the solar panel is small. The proposed system uses the ARDUINO UNO microcontroller as its operating principle. It features a powerful Atmega328 8-bit microcontroller unit for its processing purposes [5]. In the proposed work the power of the photovoltaic panel is emitted on different sides of the slope which is why the energy released in this way remains higher than the traditional power generation with the solar panel on the fixed side.

 

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## II. METHODOLOGY

Electric vehicles require power for charging the batteries. This includes the augmentation of functional expenses consequently supplanting this framework with sun oriented energy would invalidate the high functional expenses. So to change over the ordinary electric vehicles into half breed electric vehicles, a few sunlight based chargers and a specific charge regulator is vital. Sunlight powered chargers help in catching and changing over the sun based energy into electrical energy while the charge regulator manages and chooses the hotspot for charging. A particular mix of electric vehicles with photovoltaic frameworks was accounted for which are mostly utilized for home to work or home to schooling transports worked from a lattice associated photovoltaic framework.

## III. WORKING

Solar charging for electrical vehicles is a basic and viable application of using solar energy to achieve sustainable energy development. The solar charging is based on the utilization of solar PV panels for converting solar energy to DC voltage. The DC voltage can be stored in the battery bank by a charge controller. An inverter is employed to convert the DC voltage from the battery bank to 110 volt AC at 60 Hz frequency that is identical to the power from the electric outlet. This paper will address the fundamental concepts of designing and developing solar PV systems for charging electrical vehicles. Solar and power from grid will charge the battery. Battery voltage and current will be displayed on LCD display.LCD display will display the number of connected batteries i.e. only one battery will connected. If battery removed from voltage and current the number of batteries connected will show zero. After switch on project name will be shown on LCD Display. We will use SMPS as grid, main power source to charge battery.

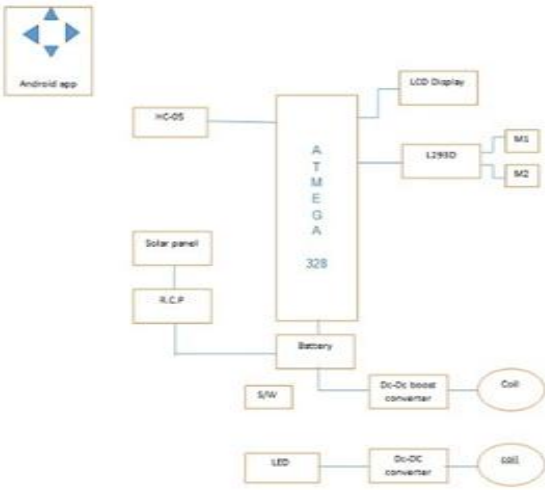


**Figure 1: Block diagram**

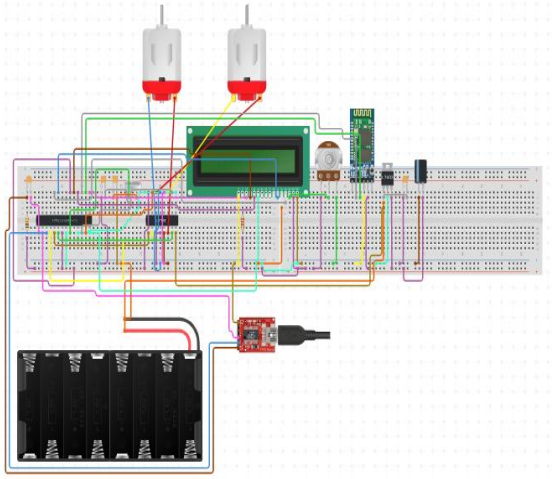

**Figure 2: Circuit Diagram 1**

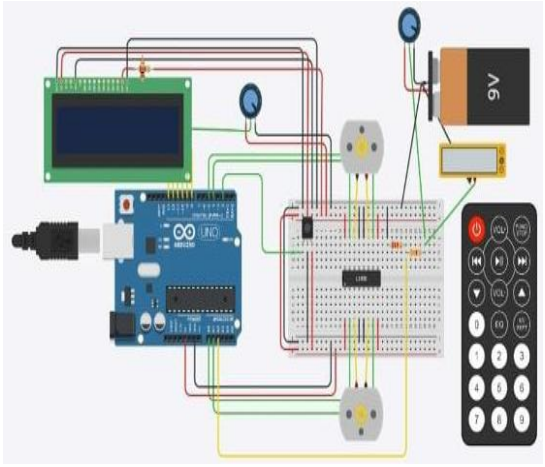


**Figure 3: Circuit Diagram 2**

### Voltage Regulator Circuit

Two regulator circuits are used in the system. One circuit provides 4V output and the other voltage regulator circuit gives 5V as output. The voltage regulation circuits are developed using IC LM 317. Fig. 5 depicts the voltage regulator circuit using IC LM 317.

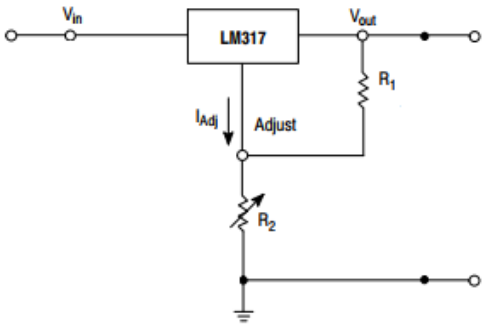


**Figure 4: Voltage Regulator Circuit for LM 317**

LM 317 IC has three pins named Vin, Vout and Adjust. Vin is the input pin and Vout is the output pin where the

 

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output of the circuit is obtained. R1 and R2 are the voltage divider resistance which determines the output for the regulator circuit.

The resistance value for R1 can be assumed to be any value according to the availability. The value of the resistance R2 can be theoretically calculated using the equation.

$$R_2 = R_1 * \left[\left(\frac{V_{out}}{1.25}\right) - 1\right] \quad (1)$$

Selection of $R_1$ and $R_2$ for 4V regulator circuit:

$R_1 = 180\Omega$

$$R_2 = 180 * \left[\left(\frac{4}{1.25}\right) - 1\right] \quad (2)$$

Therefore, $R_2 = 396\Omega$

Selection of $R_1$ and $R_2$ for 5V regulator circuit:

$R_1 = 180\Omega$

$$R_2 = 180 * \left[\left(\frac{5}{1.25}\right) - 1\right] \quad (3)$$

Therefore, $R_2 = 540\Omega$

1K potentiometer is used for R2 in both regulator circuits.

### Regulator Circuit Simulation

The designed regulator circuits are simulated in Proteus and outputs are validated. The Fig. 6 and Fig. 7 show the simulation circuits of 5V and 4V regulator circuits respectively. The circuits are simulated with 12V input and the desired outputs are obtained.

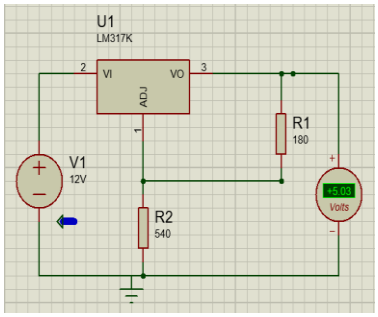


**Figure 5: Regulator Circuit for 5V output**

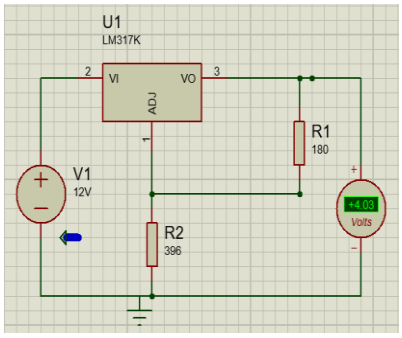


**Figure 6: Regulator Circuit for 4V output**

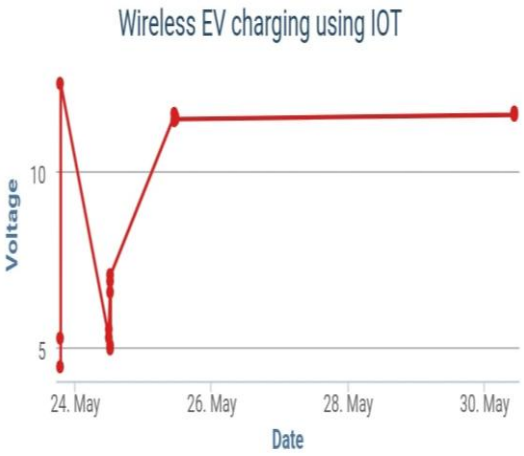


**Figure 7: Result**

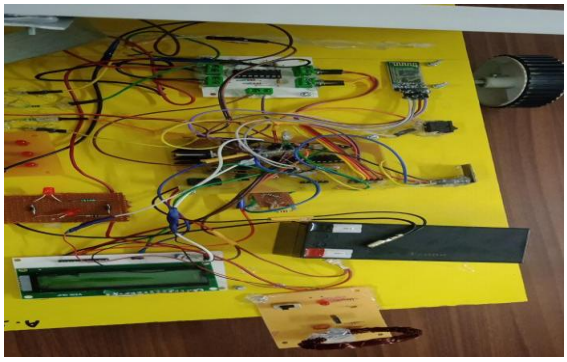

**Figure 8: System Implementation**

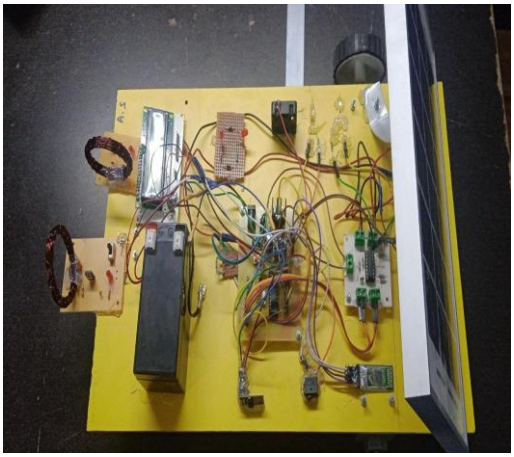

**Figure 9: Hardware Implementation**

## IV. RESULTS AND CONCLUSION

The improvement of the Solar Charging framework for batteries project involved different disciplines like electrical, hardware, and mechanical designing advancements. This venture endeavored to give a system to the sun based controlled battery charging station. The proposed sunlight based charging framework will be one of the drives taken to accomplish Green grounds. The monetary examination of the

 

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proposed framework uncovers that the restitution time of the venture is 3.5 years. It is obviously clear that the proposed sun powered based battery charging framework is superior to the current electrical charging framework both with regards to activity and affordable viewpoints. Specialists work on this venture find out about the plan and working of Solar PV frameworks for a few valuable applications like electrical vehicle framework. The design, development and implementation of a solar powered mobile phone charging unit for public places is presented and discussed. The solar powered mobile charging system with battery and charging adapter for different phones can be mounted in any places like bus stops, parks, junctions etc for public use. Thus the user can charge the mobile phone by directly plugging it in the system. The hardware of the proposed system is implemented and tested.

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## AUTHOR’S BIOGRAPHY

**Sharmistha Rathod**, Student, M.E., Power Electronics and Drives, AISSMS College of Engineering, Pune, Maharashtra, India.

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