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Multi-Mobile Charger with Small LED based on Solar Panel

Arti S. Bhongade[1], Shubhangi R. Mohije[2], Vaishnavi D. Varma[3], M. J. Nemade[4]
[1,2,3]*Student, Department of Electrical Engineering, DES'S COET, Dhamangaon Rly, India*
[4]*Professor, Department of Electrical Engineering, DES'S COET, Dhamangaon Rly, India*

***Abstract*: To charge a mobile phone from the DC-DC converter built, a regulator would need to be used to supply a constant voltage to the phone itself. To supplying 5V to the mobile Phone would be sufficient. The output of the built buck converter should be between 5V and 10 V. These voltages would be low enough to be input to most 5V regulators. It was decided to use a simple 5V linear regulator to perform the task. The sun vitality is independent and boundless while other sources like petroleum, natural gas and coal are demonstrating their end. To raise the proficiency of sun based vitality framework, solar panel based multi mobile charger and street lamp system can be executed. Nowadays, mobiles are the key things for each individual and for that purpose. Investigations will also have to be made into how the overall system would change if these larger solar panels were implemented. The small scale test system will also be able to display information visually to the user of the system regarding the systems overall capacity to charge at any given time and will also include power management functions**

***Keywords*: Solar Panel, Mobile Charger, renewable energy, solar energy.**

1. Introduction

Solar energy is an inexhaustible resource. The sun produces vast amounts of renewable solar energy that can be collected and converted into heat and electricity. Texas, due to its large size and abundant sunshine, has the largest solar energy resources among the states. Several other states, however, lead the nation in terms of using solar energy, mostly due to state policies and incentives that encourage the installation of solar energy systems. California is the nation's largest solar energy market by far, and has effective state initiatives promoting the industry. Other states with notable markets for solar energy include New Jersey, Arizona, Colorado and New York. Even so, in 2006 solar energy accounted for just 0.01 percent of all U.S. electricity, mainly because of its higher costs compared to other power options. Solar energy plays an even smaller role in the Texas electricity market. Still, Texas has the sunshine, manufacturing base and research institutions needed to become a leader in the development of solar energy. The energy extracted from solar radiation by solar cells is vital to expanding our source of energy. Alternative sources of energy are being sought out constantly and solar energy has already been a primary source as solar cells have been in existence for many years. By figuring out how to maximize the efficiency of solar cells, engineers can build better cells and models for usage in homes and businesses. The purpose of this lab is to gain a better understanding of the relationship between solar cell voltage output and the angle of incidence with the Sun's rays. Since the Sun is never stagnant, an understanding of this relationship will help in designing practical positioning of solar cells. Engineers and solar cell manufacturers have already determined that solar cells are most efficient when placed exactly perpendicular to the Sun's rays. In today's environment conscious world, a lot of interest is being taken in alternate forms of energy.

Solar power is a renewable source of energy, which has become increasingly popular in modern days. Today 80% of the energy we use comes from fossil fuels and about 1% comes from solar energy. It is estimated that the world's oil reserves will last for 30 to 40 years, whereas solar energy is forever. Solar energy has two big advantages over fossil fuels. The first is in the fact that it is renewable, it is never going to run out. The second is its effect on the environment. Burning of fossil fuels introduces many harmful pollutants into the atmosphere and contributes to global warming and acid rain. Solar cell directly converts solar energy into electricity. The solar cells that are connected together make up the solar panel. This can last up-to several decades without replacement. However, there is a drawback of solar power, energy can be produced only in the presence of sunlight. To overcome this, the solar panels are coupled with the rechargeable batteries, which can store excess power generated and provide energy in the absence of sunlight.

Solar energy has advantages over other renewable energy sources including wind and water power, solar power is generated using solar panels, which do not require any major mechanical parts, such as wind turbines. These mechanical parts can breakdown and cause maintenance issues and can also be quite noisy. Both of these issues are virtually non-existent with solar panels. This project aims at harvesting solar energy and storing it in a rechargeable battery. Using this battery various low-voltage device can be charged. Also, the charge in the battery is displayed on an LCD through a micro-controller. The energy extracted from solar radiation by solar cells is vital to expanding our source of energy. Alternative sources of energy are being sought out constantly and solar energy has already been a primary source as solar cells have been in

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2. Overview

A. Solar panel

Solar panels are flat and rectangular in shape, made from multiple interconnected solar module. This photovoltaic cells are composes from silicon material. When sunrays incident on solar cells, the photons carries by sunlight knock electrons of the silicon wafer. A solar cell consists of two layers-positive and negative that has been allow to flow of electricity. When many photovoltaic cells are connected together, solar panel is formed. Each photovoltaic cell produces some electricity and therefore many modules in the panel are combining to make an electric current and voltage output. In this framework, polycrystalline solar panel is used. Polycrystalline cell have many crystal structure. They can be built into rectangular or square shaped panels for packing with least spacing between them, which would result in power rating per unit area that are similar or higher than the mono-crystalline solar panel.

Solar panels or more technically photovoltaic (PV) panels are a solar home electric system’s enabling component. There can be various types of solar panel but mainly there are only three types of solar panel i.e. mono-crystalline polycrystalline and amorphous thin film type solar panel. Mono-crystalline cells are being sliced out from ingot of pure crystalline. They are black in color and they can absorb maximum sunlight falling on the surface if set at correct angle. The efficiency of mono-crystalline cell is around 19-20%. Polycrystalline cells are being made of pure silicon cut offs. Unlike mono-crystalline their cells are not perfectly aligned in one direction and thus interconnection losses may occur which reduces its efficiency to 13-15%. Amorphous thin film efficiency is around 6-10%. The Panels are made of wafers or cells of semiconductor material that use sunlight (photons) and the photovoltaic effect to generate direct current (DC) electricity. The different cell technologies are used to represent different energy conversion efficiencies and manufacturing techniques which are used in trying to reduce the cost of photovoltaic generated electricity. The photovoltaic technology is constantly involving day by day in the direction of better conversion efficiency and lower cost. Each solar cell can generate a predetermined voltage and current under certain manufacturing and physical constraints. A solar panel is a series and parallel combinations of identical cells to generate the desired power output (current and voltage). Panels are assigned a power rating in watts which depends on the maximum power they can produce under ideal sun and temperature conditions. By knowing the rated power output we can determine how many panels are required to meet the electrical load demands. Multiple panels combined together are called solar arrays. There is a directly proportionality between solar panel cost and output power. The solar panel is approximately 50% of the total initial equipment cost of a SHS. The working of solar panels are shown in Fig. 1 below.

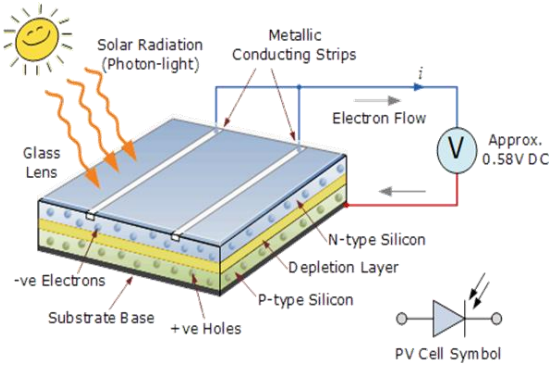

Fig. 1. Working of Solar Panel

B. Solar rechargeable battery

Solar battery refers to rechargeable batteries which are designed especially for use in PV systems. They are especially used for off grid systems for storing of energy which is produced by the panels. The battery type used in this system is lead-acid battery. It is used for its low price per unit stored energy, low maintenance, the low self-discharge and for good efficiency of about 80%. A charge controller is an essential part of all power system that charge batteries, whether the power source is solar, wind, fuel, or grid. Its purpose is to keep the batteries properly fed and safe for the long time. A charge controller blocks the reverse current which is flowing during the night time and prevents the battery. Solar charge controllers are doing main two functions in solar panel system, it mainly controlling the charging of batteries. It prevents the battery from overcharging and deep discharging according to the energy storage available in battery. Solar charge controllers are specified by both ampere and voltage range.

3. Circuit description

A. System description

Photovoltaic panels are used for converting the sunlight into electricity. When sunlight incident on the panel, sufficient number of photons from sunlight get absorbed by the PV panel. Then photon excites some loose electrons in the panel. In this way the positive and negative regions are created from which electricity is obtained. The energy generated by PV panel is used for charging the battery which is connected in the system. Sometimes the output from the panel is high and sometimes it is very low. If batteries are fully charged, then the supply from panels should be cut-off and if batteries are not charged at the rated level, supply to load should be cut-off. For these

problems, charge controller is used to control the charging of battery and prevent it from over charging and deep discharging. The purpose of this document is to present a classification method for solar power prediction systems We wish to be able to use this method as a research and innovation tool, useful for selecting the optimal system during the stage of technological development of the new systems and during the stage of development of the opportunity and feasibility studies, and of the business plans on the development of new production capacities of solar energy. A Design of single axis sun tracking systems, main objective for this project is to develop the sun tracking solar system model which is a device that follow the movement of the Sun regardless of motor speed. Besides that, it is to improve the overall electricity generation using single axis sun tracking system and also to provide the design for residential use. LDR or light dependent resistor has been chosen as the sensor because LDR is commonly used in sun tracking system. This is because LDR is sensitive to the light. The resistance of LDR will decreases with increasing incident light intensity. For the controller, PIC18F877A had been chosen. This PIC programming will give the pulse to the driver to move the motor. For the driver, bidirectional DC motor control using relay has been used. The motor controller had been chosen because it can control the motor to rotate clockwise and counter-clockwise easily. DC geared motor also been chosen because it has a hold torque up to 24 kg.cm and low rpm. Last but not least, LM7805 issued to convert the input voltage from the source to 5V output because integrated circuit only need 5V to operate. Fig. 2, shows single axis sun tracking system solar tracking systems for solar concentrator field of heliostats innovation, performance and adaptation to small scale applications. The choice of this system is based on several scientific studies and is focused on solar tracking with two-axis.

Different mathematical models and simulations have been developed and used to determine,

- The position of the sun relative to a geographic position of an observer.
- The angular position of the heliostats.

The set of equations modelling the geometry of shadows and the blocking effect between the heliostats. This allows to the geometry optimization of the field in order to obtain the best compromise between productivity heliostats and the land occupied by them, which aim to minimize the cost of energy.

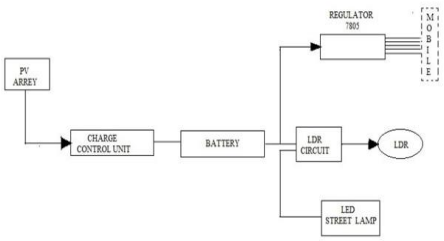

Fig. 2. Block diagram of proposed system

4. Conclusion

From this seminar it is conclude that this whole system based on solar energy is effectively used for charging of mobile phones having low cost. This system can be used at any public place, tourist place and also in un-electrified areas. This system can be more useful in rural areas which are suffered because of electricity problems. The voltage output of a solar panel is approximately linear. I conclude from this, it generate maximum solar cell electricity. It is recommended performing solar cell electricity at a location closer to the equator. I run into a problem with reflected light at oblique angle. The only problem is the unregulated voltage due to the variation in intensity of light. Voltage regulator is used to solve this problem by regulating the output voltage. The charge so obtained is stored in the battery and is given to the respective loads. The used of solar power system for generation of electricity now a days it is widely used. The solar light is most favored source of energy. This seminar based on lighting emitting diodes (LED) as a lighting source, solar energy as a primary source and batteries as secondary source.

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