Portable Accommodation For Beach Cleaning Robot With Solar Charging

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Abstract- *In this paper we present, the design of a portable charging station. The solar charging station is designed, so that not only for fully charging the Robot but it can make the environment a safer place. This technique of charging works on the principle of electricity generation through solar power. Whereas this generated energy is stored in the storage banks. Also, a buck converter is used to maintain the supply to charge the battery. They provide accommodation for the robot for charging purposes at standstill conditions and a garbage pit for dumping the garbage. By using the buck booster converter, we can keep the voltage constant which is helping in the distribution of the electricity during any environmental condition. MPPT is used to track the maximum power from the solar panel. It will reduce the voltage and current ripple*

Keywords- Charging Station, Buck-Boost converter, Battery, MPPT, Solar Energy

I. INTRODUCTION

The idea of this project is to build a "solar charging station" that will provide free electricity that is generated from the solar photovoltaic (PV) system for charging the electric robot. The solar charging station utilized solar PV modules to convert solar energy to DC voltage. The DC energy can be store in a battery bank by a charge controller. A solar power charging station is designed so that the device can be charged outdoor and in environmentally friendly ways. MPPT is used to track the maximum power from the solar. The objective of this project for this project will not only be to generate power from solar energy, but to also the maximum output of it and implement the robot to system technology to improve the efficiency of the solar panel. The operation of the charging station is managed in such a way that the power is supplied by the photovoltaic panel and the robot system will be also attempted.

Principle of Solar Energy: The Photovoltaic EffectPhotovoltaic (PV) effect is the conversion of sunlight energy into electricity. In a PV system, the PV cells exercise this effect. Semi-conducting materials in the PV cell are doped to form a P-N structure as an internal electric field. The p-type (positive) silicon tends to give up electrons and acquire holes while the n-type (negative) silicon accepts electrons. When sunlight hits the cell, the photons in light excite some of the electrons in the semiconductors to become electron-hole (negative-positive) pairs. Since there is an internal electric field, these pairs are induced to separate. Consequently, the electrons move to the negative electrode while the holes move to the positive electrode. A conducting wire connects the negative electrode, the load, and the positive electrode in series to form a circuit. As a result, an electric current is generated to supply the external load. This is how the PV effect works in a solar cell.

II. BLOCK DIAGRAM

Fig.1) Block Diagram Solar Charging Station
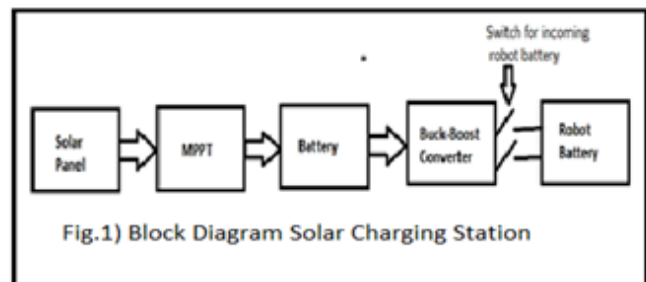
[1] Solar Panel: -The solar panel produces electricity when there is sunlight by converting it into DC. Photovoltaic (PV) or solar cells are the building blocks of solar panels.The rated output of the panel is determined by the voltage and current that the solar panel can produce. Generally, solar panels produce electricity at either 12- or 24-volts output terminal of the solar panel are connected to the input terminal of MPPT.

[2] MPPT:-Maximum power point tracking (MPPT) or sometimes just power point tracking (MPPT) is a technique used in photovoltaic (PV) solar systems to maximize power extraction under all conditions. And their terminal is connected to the battery.

[3] Battery:- Batteries are used to store the electric charge coming from solar panels to provide power to the load. For this project we are using 12V, 20AH capacity is used.

[4] Buck-Boost Converter:-The buck-boost converter is a type that has an output voltage magnitude that is either greater than or less than the input voltage magnitude. It is

a switched-mode power supply with a similar circuit topology to the boost converter and the buck converter.
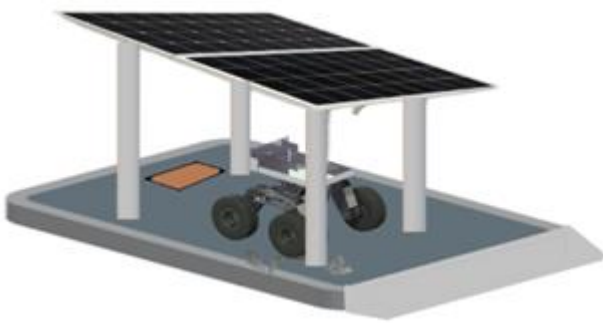
III. METHODOLOGY

Fig.2) Model of Portable Solar Charging Station

Fig.2 shows the basic diagram of our project. In that, the first part is about, the battery of the robot getting charged from the battery backup of the charging station. And the charging stations getting charged from the solar panels on our model. There is a smart mechanism installed in our partner project which links the project. If the battery of the robot comes at 40 % it sends a signal to the charging station. This is done by the transmitter in the robot and to the receiver in the charging station. Then after the feedback from the station, the robot approaches the charging station. The moment of the robot in the charging station is checked by the buzzer at the entrance point. Then after the on-boarding, the garbage is dumped in the dumping pits. And then the charging process starts. Now in the garbage collection, the garbage is segregated in two forms namely, wet garbage and dry garbage. When the climatic changes happen and the raining starts, there is a provision in our model for the safety and complete shielding of the robot. Just in case if the robot works at night and the battery of the robot needs charging, we would either charge it with the supply from the battery of the charging station. After the work, the robot comes back to the charging station as it is the pit area for the bikes. Industrial Electronics (ISCAIE),2015.

IV. CONCLUSION

This portable device which can clean up all premises mostly beaches with solar panel as charging station which is cost-effective and eco-friendly.

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