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Portable Accommodation for Beach Cleaning Robot with Solar Charging

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***Abstract*:** When the available power for an autonomous mobile robot falls below a specified level, the robot must abandon its current work and proceed to a charging station to replenish its battery. The location of charging stations has a considerable impact on the efficiency of an autonomous mobile robot. In this project, we look at how to put charging stations for mobile robots in a regulated environment. This project involves the creation of a portable charging station. It will be used to keep beach cleaning robots charged. For charging the robots, we use both traditional and wireless charging techniques.

Keywords- Autonomous Robotic Embedded, MPPT, Solar Charge Controller, Wireless Charging, Vehicle

I. INTRODUCTION

Movable robots are now utilized in a variety of industries, including home security, industrial monitoring, hospitals, and a variety of others. The fundamental reason for this progress is that the cost of manufacturing and constructing robots has decreased significantly. In many ways, the robots that are conceived and manufactured minimize the human load. The home surveillance robot is one of the most popular. Mobile robots are widely employed in industrial robotization, home robotization, hospitals, space exploration, and the military, among other applications. Due to the world's growing population, garbage disposal has become a big issue. Plastics, in particular, pose a significant environmental problem since they take longer to degrade than other degradable materials. Plastics dumped on the coastlines of beaches increase the volume of plastic rubbish when compared to urban areas. This pollutes the soil and is bad to both the environment and us. The fertility of the sand on the coast is decreasing as a result of this, resulting in soil and land pollution. This has an impact on the environment and produces a slew of issues. While preservatives in the atmosphere may cause harm to living beings and pollute the environment (air, water, and soil), resulting in dangerous consequences. Every year, almost eight million tonnes of plastic trash is dumped on beaches and washed into the sea. Despite this, plastics, plastic bottles, and beads continue to pollute the environment, with countless pieces washing up on the shore. Some beaches didn't appear to be as as filthy as others. Plastic is widely utilized around the world due to its versatility, light weight, flexibility, moisture resistance, strength-to-weight ratio, and low cost. A beach cleaner robot powered by an automobile will be useful for cleaning beaches and other locations. The biggest problem with such robots, however, is their charging. As a result, we intend to design a portable solar charging

station for such robots, which will be able to charge them using solar electricity harvested during the day and used by the robot to clean the beach at night.

II. BLOCK DIAGRAM

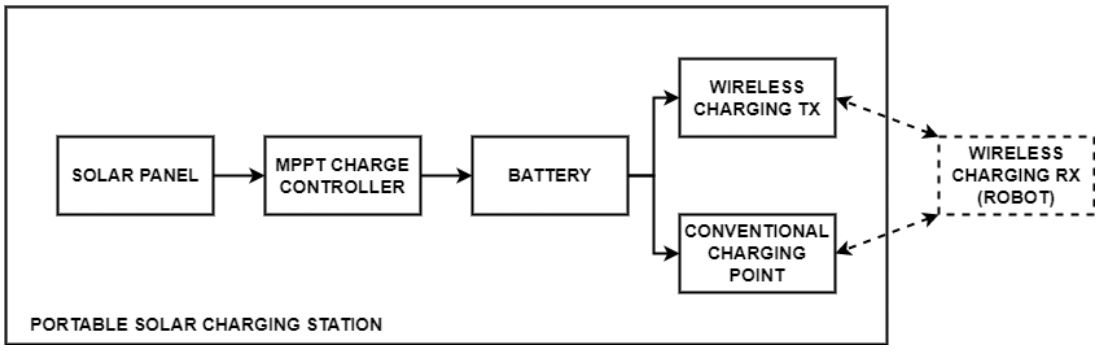

Fig. 1: Portable Solar Charging Station

2.1 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.

2.2 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.

2.3 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.

2.4 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

3.1 WORKING:

The basic diagram of our project is shown in Figure 3.1. The first part of that is about the robot's battery being charged from the charging station's battery backup. And the charging stations on our model are powered by solar panels. Our partner project has a clever mechanism in place that connects the two projects. When the robot's battery reaches 40%, it sends a signal to the charging station. This is done by the robot's transmitter and the charging station's receiver. The robot then approaches the charging station after receiving feedback from the station. The buzzer at the entrance point checks the robot's status in the charging station. The waste is then thrown in dumping pits upon on-boarding. The charging procedure will then begin. Garbage is now separated into two types, wet rubbish and dry garbage, during garbage collection. Our solution includes a provision for the robot's safety and total shielding when climatic changes occur and rain begins. If the robot operates at night and its battery has to be recharged, we can either use the charging station's battery or the supply from the robot's battery. The robot returns to the charging station, which also serves as a pit area for the bikes, after completing its tasks. ISCAIE (International Society for the Control of Advanced Instrumentation and Electronics), 2015.

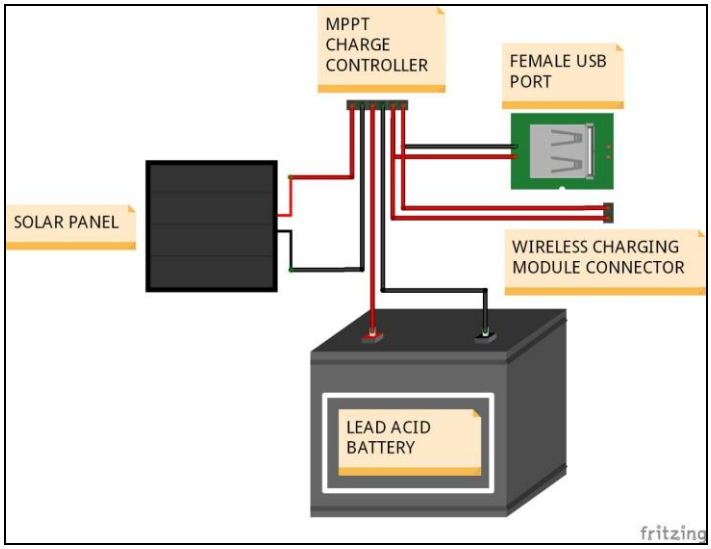

Fig. 2: Circuit Designing of Solar Charging Station

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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