International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 11 Issue: 03 | Mar 2024 www.irjet.net p-ISSN: 2395-0072

HYBRID CHARGING STATION

Mr. Aditya Babaji Dange[1], Mr. Kannesh Sharad Sawant[2], Mr. Karishma Prakash Rawool [3], Mr. Mayuresh Umesh Ludabe [4], Mr. Ganesh Vijay Akerkar [5] , Mrs T R Shenai [6]

[1-5]Student, Yashwantrao Bhonsale Institute of Technology, Sawantwadi, Maharastra,India
[6]Faculty, Yashwantrao Bhonsale Institute of Technology, Sawantwadi, Maharastra, india,

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Abstract - The Hybrid Charging Station is a cutting-edge solution designed specifically for laptops and mobile phones that provides a single power source for a variety of electronic devices. With its integrated USB ports and Qi wireless charging pads, the station is compatible with a wide range of devices and supports many charging standards. The application of intelligent charge management optimizes power distribution, guards against overcharging, and boosts overall effectiveness. By using sophisticated sensors to detect the presence of devices automatically, the station emphasizes user convenience and streamlines the charging process. Its environmentally friendly design uses sustainable materials and energy-saving elements to create a more environmentally friendly space. The Hybrid Charging Station solves the drawbacks of device-specific charging stations and encourages resource efficiency by combining the infrastructure for charging. Because of its adaptability, the station can be used in a variety of settings, such as homes, workplaces, and public areas. Because of its versatility and scalability, it is at the forefront of offering modern users a complete charging solution. Reducing electronic waste is one of the station's primary contributions to sustainable technology practices. All things considered, the Hybrid Charging Station is a practical, environmentally responsible, and effective answer to the changing demands of consumers of electronic devices.

Key Words: HYBRID, USB PORTS, QI WIRELESS, STATION ENERGY, EFFICIENCY.

1.INTRODUCTION

This concept presents a state-of-the-art hybrid charging station intended to offer sustainable and environmentally friendly power options for computers and mobile phones. In order to guarantee continuous charging capabilities, the system makes use of both solar and wind energy sources, regardless of changing climatic circumstances. Photovoltaic panels are used at the charging station to collect solar energy during the day. These panels are arranged in a way that maximizes their absorption of sunlight, generating the most energy possible all day long. To fully utilize the potential of solar and wind resources, a vertical-axis wind turbine is also added into the system to generate wind energy. The charging station has clever energy management and storage features to improve effectiveness and user-friendliness. High-capacity batteries are used to store excess energy produced during peak conditions, guaranteeing a steady power supply even during times of low sunshine or wind activity. With its ability to support numerous devices at once, the station provides consumers with an easy-to-use and convenient charging solution.

2.OBJECTIVES

- To create a green charging station.
- To install charging stations that are convenient and effective in public areas.
- To offer long-term solutions to people's billing issues.

3.BLOCK DIAGRAM

Solar panels are used by hybrid charging stations, and they are positioned in a sunny area. Sunlight is captured by these panels and transformed into electricity. A device known as a charge controller processes the power produced by the solar panels. This controller manages the voltage and current as well as the flow of electricity to prevent overcharging the batteries. Batteries are used to store electricity. By storing energy produced during the day for use when the sun isn't shining, these batteries function as a power bank. You connect a tiny gadget to the solar charging station in order to charge it, such as a smartphone or small appliance. Using the charging station, your little device is charged using the electricity that has been stored in the batteries. It functions similarly to plugging a device into an electrical outlet except that solar energy is used. By employing this configuration, you may lessen your need on conventional power sources by charging your tiny devices with clean, renewable energy from the sun. To put it simply, solar charging stations use sunshine to charge batteries. You can then use the energy that is stored to charge other tiny devices. This is a practical and environmentally friendly way to power your electronics.

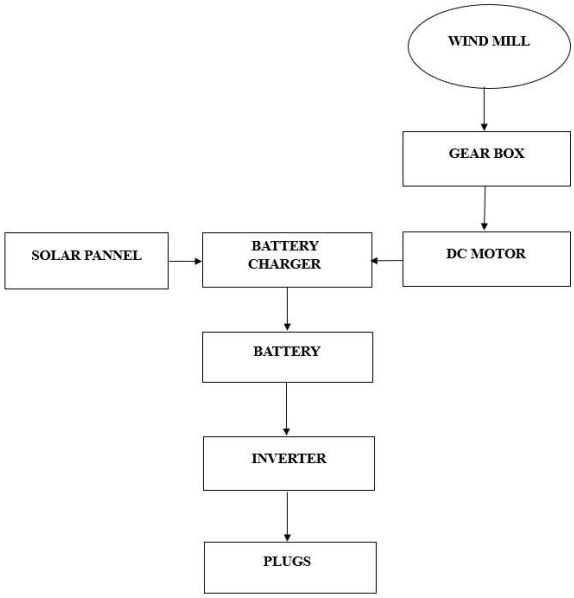

Fig.1 *block diagram*

4.COMPONENTS

4.1SOLAR PANNEL

Sunlight Panel Solar energy is converted into electrical energy using a solar cell. Another name for it is a photovoltaic cell. A junction diode with a thick layer of ntype semiconductor and a very thin layer of p-type semiconductor makes up a photovoltaic cell. Next, a few electrodes should be applied to the p-type semiconductor layer's top. Photons of light can readily pass through the extremely thin p-type layer and enter the p-n junction when light arrives. The photons' light energy provides the connection with enough energy to form many electron-hole pairs. The junction's state of thermal equilibrium is broken by the incident light. The n-type side of the junction may get free electrons from the depletion zone. Likewise, the p-type side of the junction may be where the holes in the depletion occur. Once on the n-type and p-type sides, respectively, the recently generated free electrons and holes arrive. Due to the junction's potential barrier, they are unable to cross it. The p-n junction will function like a little battery cell when the concentration of electrons increases on one side. When the load is linked, a voltage known as photovoltaic is built up along with a tiny current flow. A module is the quantity of solar cells connected in parallel or series (solar panel). An array is the number of modules connected in parallel or series.

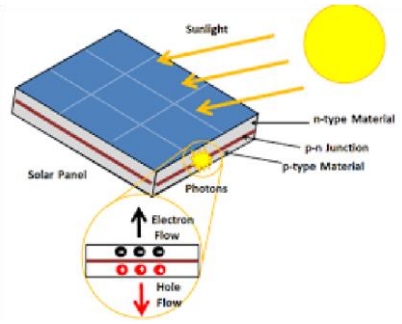

Fig.2 *solar panel*

4.2Wind Turbine

One renewable energy source is wind. The kinetic energy of the wind is transformed into electrical energy using a wind turbine. The generator, which is attached to the blade shafts, transforms mechanical energy into electrical energy. There are two types of wind turbines: horizontal axis wind turbines and vertical axis wind turbines, which are based on the direction in which the blades rotate. The wind's speed determines the wind turbine's output. The turbine's output varies in power. The electric energy needed to supply the load with continuous power is stored in a rechargeable battery. Figure 3 depicts the model of a wind turbine.

Fig.3*wind turbine*

4.3Battery

Electricity generated by solar and wind energy sources is stored in batteries. The size of the solar panel and wind turbine employed determines the battery's capacity. Battery leakage is minimal and maintenance is minimal. The quantity of batteries connected in parallel or series to alter a battery's capacity based on the hybrid system's output.

Fig.4 *batter*

4.4Inverter

The electric energy contained in batteries is transformed from dc to ac via an inverter. Since the power is provided by a DC source, this device is unable to produce any form of power. Certain circumstances, such as low DC voltage, prevent us from using low DC voltage in any of our household appliances. This means that each time we use the power generator, we can use an inverter.

4.5Charge Controller

The primary function of a charge controller is to regulate the source's activity or inactivity. It simultaneously provides electricity for loading and charges the battery. Additionally, it should take power from the battery and deliver it to the load when the power is not producing.

Fig.5*charge controller*

4.6AC-DC Convertor

The dc electricity is changed into ac power using this ac-dc converter. We obtain dc power from this prototype, and since the load needs an ac supply, an ac-dc convertor is needed to convert it. There is no power generated by this converter. There is just one source of power—a DC one.

Fig.6*inverter*

4.7Actual Image:

Fig.7*actual image*

5. CONCLUSIONS

Smart device hybrid charging stations resemble superchargers for our electronics. They provide us with a variety of options for charging our tablets, phones, and other electronic devices. These incredibly adaptable charging stations are compatible with nearly any location, including parking lots, public spaces, and college campuses. The future of sustainable and convenient smart device charging in public spaces is hybrid charging stations. These charging stations provide a variety of charging options to meet the demands of those on the go, including professionals, students, travelers, and more. Smart device hybrid charging stations resemble superchargers for our electronics. They provide us with a variety of options for charging our tablets, phones, and other electronic devices.

6. FUTURE SCOPE

With this system, we may include an anti-theft mechanism to keep thieves from stealing or destroying it. Using impact sensors, it detects immediately if it is being moved by an unauthorized person or if someone is attempting to destroy it. We can give it an AI feature .We could add a charging station to it.

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