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"DESIGN OF PORTABLE SOLAR POWER BANK"

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Abstract: The Solar Mobile Charger harnesses solar energyfor on-the-go device charging. In response to the increasing demand for sustainable charging solutions in of portable electronic devices, this research paper presents an in-depth exploration of the Solar Mobile Charger integrated with a Power Bank Module. With a focus on environmental sustainability, efficiency, and versatility, this project introduces a comprehensive approach to harnessing renewable solar energy for on-the-go device charging. The Solar Mobile Charger employs photo voltaic technology, serving as the primary energy source, while a 7805 voltage regulator enhances system efficiency by optimizing solar energy conversion. Coupled with a Power Bank Module, this integrated solution not only promotes sustainability but also reduces dependence on nonrenewable energy sources, liberating users from traditional power outlets and enabling charging anywhere. The Solar Mobile Charger with 7805 voltage regulators and Power Bank Module emerge as a viable and sustainable solution, symbolizing the potential of renewable energy in addressing modern-day power consumption challenges.

Keywords- Solar Energy, Energy Crisis, Renewable Energy,Solar Charger, Solar power bank mobile charger.

I. INTRODUCTION

In today's digitally connected world, the reliance on mobile devices has become really common, emphasizing the critical need for dependable and portable charging solutions.With smart phones, tablets, and other electronics integral to daily life, ensuring uninterrupted power availability, particularly in remote places, is not possible. In response, solarmobile chargers have emerged as a promising solution, usingrenewable solar energy to offer sustainable and versatile charging capabilities. This research paper delivers into the design, development,and integration of a solar mobile charger featuring an ST 6855module, aimed at harnessing solar power for portable devicecharging. The proposed charger provides a practical and Eco-conscious solution to the pressing demand for mobile devicecharging in various settings, including outdoor environments,emergencies, and off-grid locations. The incorporation of the ST 6855 module augments the efficiency and reliability of the solar mobile charger by furnishing advanced charging regulation and battery optimization functionalists. Through meticulous design andexecution, this research endeavors to tackle pivotal challengesin solar mobile charger technology, such as maximizing solarenergy utilization, optimizing charging efficiency, and ensuring compatibility with diverse mobile devices

This research holds significance in its contribution to global initiatives promoting renewable energy adoption and environmental sustainability in electronic device usage. By tapping into solar power for mobile device charging, this project aligns with efforts aimed at reducing carbon footprintsand transitioning towards greener energy sources .

Furthermore, the practical implementation of a solar mobile charger featuring an ST 6855 module offers valuable insights into the feasibility and effectiveness of integrating sophisticated charging technologies into portable charging .

II. RELATED WORK

[01] Presents a work titled "Perception Of Usage Of Solar Chargers In Mobile Phones". This research paper explores the perception of using solar chargers in mobile phones, aiming to reduce reliance on traditional power adapters and promote environmental sustainability. Findings indicate widespread awareness and acceptance of solar power devices among respondents, with a majority recognizing their benefits. Suggestions include government initiatives and market strategies to enhance solar charger adoption. Overall, the study underscores the potential of solar chargers as eco-friendly alternatives in the mobile phone charging landscape.

[02] The work titled "Solar Powered Mobile Power Bank System" proposes a solar-powered portable power bank for mobile phones, emphasizing its utility during disasters. The system integrates solar panels to convert sunlight into electrical energy, stored in a battery for subsequent use. A micro controller monitors battery charge levels, ensuring

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efficient energy management. Technical feasibility considerations include battery capacity and solar panel efficiency. The physical prototype involves solar panels, batteries, and charging circuits, facilitating mobile phone charging. Improvements focus on safety features and battery indicators. Solar power banks offer environmentally friendly, cost-effective, and reliable energy solutions, mitigating environmental hazards and reducing utility bills while ensuring continuous connectivity.

[03] The work titled "Design and Development of Portable Mobile Solar Charger" presents a solar mobile charger as an eco-friendly solution for charging portable electronic devices, particularly in outdoor or off-grid environments. It comprises four main components: a solar panel, battery, charge controller, and USB port. The solar panel converts sunlight into electricity, stored in the battery for a steady power supply to the device. The charge controller regulates power flow, preventing overcharging and voltage spikes. The USB port offers universal compatibility. Literature review highlights the technology, effectiveness, and societal impact of portable solar mobile chargers, emphasizing their potential in providing sustainable energy access, especially in developing regions. The conclusion underscores the environmental benefits and future potential of solar mobile chargers, promoting sustainability and energy independence. Key references address control issues, boost-buck converters, Z-source inverters, parallel power processing topology, solar electricity engineering, power electronics, and renewable energy incentives.

[04] The work titled "Solar Mobile Phone Charging System" evaluates existing solar mobile chargers with the aim of addressing the significant issue of electricity crisis. The author recognizes the widespread problem of electricity shortages, particularly in regions with unreliable power infrastructure or during natural disasters. By assessing already available solar mobile chargers, the author seeks to understand their effectiveness, efficiency, and suitability in providing a sustainable solution for charging mobile devices. This evaluation likely involves examining factors such as charging speed, reliability, portability, and cost-effectiveness of various solar chargers. Through this work, the author aims to contribute to the advancement of solar charging technology and its application in mitigating electricity crises, ultimately offering a reliable and eco-friendly solution for mobile device users.

[05] The work titled "Design and Construction of a Portable Solar Mobile Charger" presents a solution to the electricity crisis in Nigeria by developing a portable solar charger for mobile phones. The device converts solar energy into electrical energy to charge mobile phone batteries, addressing challenges such as power outages and pollution from generators. Through simulation and construction, the device demonstrates efficiency, portability, and environmental friendliness, offering a sustainable alternative to traditional charging methods.

III. METHODOLOGY

The solar mobile charger works by converting sunlight into electrical energy using the solar panel. The 9V solar panel captures sunlight and generates a varying voltage output, which is then regulated by the 7805 voltage regulator to ensure a stable 5V output suitable for charging devices like mobile phones. The regulated voltage charges the lithium-ion battery through the power bank module, which also includes circuitry for protection and efficient charging. The lithium-ion battery stores the energy for later use, and the USB port allows you to connect your mobile device for charging using the stored energy from the battery.

IV. OBJECTIVES

1. To create a portable and sustainable charging solution that harnesses human-generated kinetic energy to power mobile devices, ensuring accessibility to a reliable power source in off-grid or emergency situations. To design an eco-friendly, portable charging solution that utilizes solar energy to provide a reliable and sustainable power source for mobile devices, enabling convenient charging in outdoor settings or areas with limited access to electricity.

2. To develop and implement an efficient, salable, and cost-effective renewable energy solution, aiming to reduce carbon footprint, mitigate reliance on fossil fuels, and contribute positively to environmental sustainability while meeting the energy demands of communities or industries.

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IV. BLOCK DIAGRAM AND DESCRIPTION

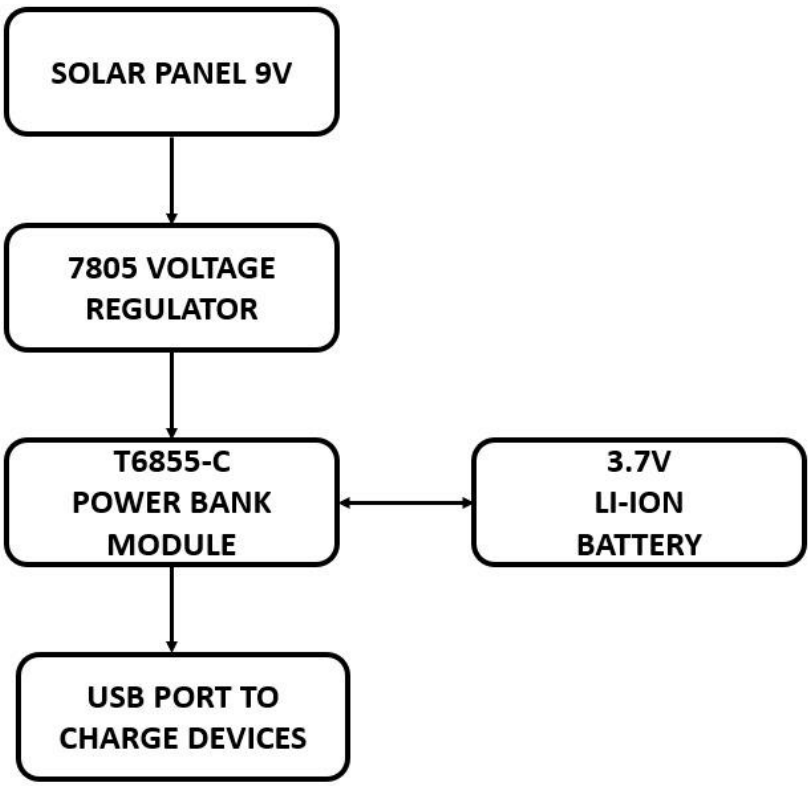

Fig 1: Block Diagram

V. RESULTS

The solar mobile charger, employing a 9V solar panel, 7805 voltage regulator, power bank module, lithium-ion battery, and USB port, delivers several notable outcomes. Firstly, its portability enables users to charge their devices conveniently while on the move, catering to outdoor activities, travel, or emergencies. Harnessing solar energy, it stands as a sustainable solution, minimizing dependence on traditional electricity sources and reducing environmental impact. The versatility of the USB port ensures compatibility with a wide array of mobile devices, from smart phones to tablets, enhancing its utility. Moreover, its off-grid charging capability makes it indispensable in remote areas or during power outages, providing a reliable power source when conventional electricity is unavailable.

By utilizing solar power, it contributes to cost savings over time, offering an alternative to grid electricity. Furthermore, its reliance on a lithium-ion battery ensures longevity and efficiency, aligning with sustainability goals. In essence, the solar mobile charger represents a practical, eco-friendly, and cost-effective solution for charging mobile devices anytime, anywhere.

VI. CONCLUSION

The solar mobile charger, integrating a 9V solar panel, 7805 voltage regulator, power bank module, lithium-ion battery, and USB port, emerges as a versatile and sustainable solution for charging mobile devices. Its portability, renewable energy source, and off-grid capabilities make it indispensable for outdoor activities, travel, and emergencies. By harnessing solar power and utilizing advanced battery technology, it not only offers convenience but also contributes to environmental conservation and cost savings. In essence, the solar mobile charger exemplifies the fusion of modern technology with Eco-conscious design, providing a reliable and efficient charging solution for users worldwide.

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