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Solar Mobile Charger

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ABSTRACT –

In most countries, mobile phones have become an essential tool for communication. Nowadays, the number of mobile phones exceeds the number of users due to advancements in technology, convenience, and affordability. However, one limitation is that mobile phones have a relatively short battery life, making it inconvenient for long-distance travel. To address this issue, we have developed a solar mobile charger that harnesses solar energy to provide sufficient electricity for charging mobile phones. The primary objective of using a solar mobile charger is to utilize a renewable energy source, enabling us to generate electricity at no cost. This innovation offers a practical solution for individuals who frequently travel long distances with their mobile phones. The charging process utilizes inductive coupling, which transfers power between the transmitter and receiver. With the abundance and accessibility of solar energy, our proposed device presents the optimal solution for outdoor mobile phone charging. It is portable and does not require an electric supply, as it solely relies on solar energy from the solar panel. This innovation particularly benefits trekkers, farmers, travelers, and individuals engaged in personal or industrial activities.

Keywords - Solar Energy, Photovoltaic cell, Voltage regulator, Charger.

INTRODUCTION

Solar cell phone chargers utilize solar panels to recharge cell phone batteries. They offer a convenient solution for charging phones in situations where there is no access to electricity, such as when mains power or a vehicle battery is unavailable. Unlike traditional electrical cell phone chargers, solar chargers do not rely on consuming mains electricity. Some models can also function as regular chargers by plugging into an electrical outlet. Certain chargers feature an internal rechargeable battery that is powered by sunlight and then used to charge the phone, while others directly charge the phone. Public solar chargers for mobile phones are also available, which can be permanently installed in public areas like streets, parks, and squares. An example of such a charger is the Strawberry Tree public solar charger. In 2010, a cell phone model with a built-in solar charger was introduced. Various types of solar cell phone chargers are commercially accessible, including folding models like Goal Zero and Endless Sun Solar, as well as designs that unfold like petals such as Solio. Some chargers come in the form of straps, with solar cells on the outer surface and a rechargeable battery inside. The effectiveness and practicality of phone solar chargers are limited by solar cell technology. The charging times for phones vary based on factors like solar panel size and efficiency, as well as the battery capacity of models with built-in batteries, which can further prolong the charging process. The fold-out design of some chargers provides a larger solar panel for higher charge current, while also being compact when not in use. Solar chargers can also be used to recharge other devices with similar requirements to mobile phones, such as Bluetooth headsets and music players. It is important to note that solar chargers that directly charge a phone, without an internal battery, can potentially harm the phone if the output
is not properly controlled, such as supplying excessive voltage in bright sunlight. In situations with less intense light, although there may be electrical output, it could be insufficient to support charging.

A solar mobile charger is a device that utilizes solar energy to charge portable electronic devices like smartphones, tablets, and laptops. It offers an environmentally friendly and sustainable solution for charging devices while on the move, particularly in outdoor and off-grid settings where access to power outlets is limited or unavailable. The construction of a solar mobile charger typically comprises four essential components: a solar panel, a battery, a charge controller, and a USB port for device connectivity. The solar panel serves as the core of the system, converting sunlight into electricity through the photovoltaic effect. The generated electricity is then stored in the battery, which acts as a buffer and ensures a consistent power supply to the device. The charge controller plays a vital role in regulating the power flow between the solar panel, battery, and device. It prevents battery overcharging, which can lead to damage or reduced lifespan, and safeguards the device against voltage spikes or surges. With its USB port, the solar mobile charger offers a universal interface for connecting to various devices, making it compatible with a wide range of brands and devices.

LITERATURE SURVEY

Dr. A. S. Telang, Bhavana Zatale, Supriya Marodkar, Ishwari Wankhade, SrushtiAtram, Navin Vanjari (2024) [1] In this project, a battery charging system powered by solar energy and utilizing Arduino technology has been created and implemented. The system consists of a solar panel for collecting energy, an Arduino microcontroller for regulating battery charging, and a battery for storing energy. The solar panel converts sunlight into DC electrical energy, which is then transferred to the battery through a charging circuit. The setup procedure for this system is straightforward: the solar panel is connected to an input pin on the Arduino microcontroller, which controls the battery charging process through a charging circuit connected to an output pin.

Vinay Sapkal, Mrunmayee Naik, Meet Nahar, Yash Nagrale, Kripa Naik, Sakshi Naik, Mital (2023) [4], Explained how Solar-powered mobile chargers are becoming a viable option, utilizing the sun's plentiful energy to charge electronic devices. This study delves into the progress and exploration of solar-powered mobile chargers, covering charger design, efficiency enhancement methods, and practical implementation factors. Furthermore, it discusses the advantages, obstacles, and future possibilities of solar charging technology.

Prof. Veena S, Vijay DG (2022) [6], This paper explores the utilization of solar energy for energy harvesting, specifically for the purpose of charging batteries. By harnessing solar power, it becomes possible to charge mobile batteries in remote locations where access to electricity is limited. Furthermore, efforts are made to reduce the cost of this circuitry, making it affordable for the general public to purchase and reaps benefit.

Olly Roy Chowdhury, Arif Kaiser, Sarna Majumder, Md. Forhad Hossain (2021) [8], Mobile devices and other smart gadgets are constantly in operation, regardless of location, which inevitably leads to battery drain. Charging these devices requires both time and a suitable location. However, unexpected battery depletion can cause significant inconvenience for individuals who are in a hurry to attend meetings, make requests, go to school, visit government offices, catch trains, or use machines at stations, among other things. It would be highly beneficial if we could provide these individuals with instant opportunities for smart device charging through renewable energy harvesting, allowing them to recharge their devices whenever needed, even while on the move. Numerous studies have been conducted thus far to address this challenge of providing portable charging solutions for smart device.

Salim Mud (2020) [10], The objective of this project is to develop a portable solar charger that can be conveniently used while on the move. A portable solar charger for mobile phones is essentially an electronic device that harnesses solar energy and converts it into electrical current to charge the batteries of mobile phones. This charger utilizes power electronics technology to convert, control, and condition the flow of electrical energy from the source to the load, based on the load's specific requirements. To achieve the desired constant voltage, an external adjustable voltage regulator is employed.

METHODOLOGY

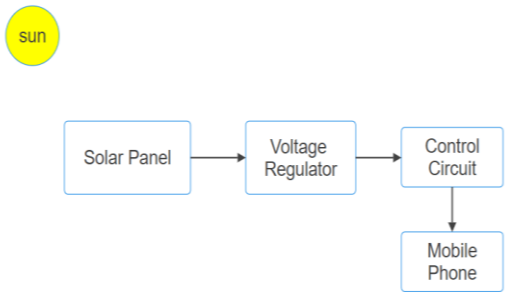

Fig 1: Block Diagram

The system harnesses the power of the sun, which consists of hydrogen and helium, and releases a significant amount of heat.

- Solar Panel: Solar panels capture sunlight to generate electricity or heat. A photovoltaic module is a compact assembly of typically 6x10 photovoltaic solar cells.
- Voltage Regulator: Its purpose is to automatically maintain a constant voltage level. A voltage regulator can be a simple feed-forward design or incorporate negative feedback. It may utilize an electromechanical mechanism or electronic components. Depending on its design, it can regulate one or more AC or DC voltages.
- Control Circuit: It includes components such as a register, capacitor, switch, or output jack.
- A mobile phone is used in this context for charging purposes.

WORKING MECHANISM

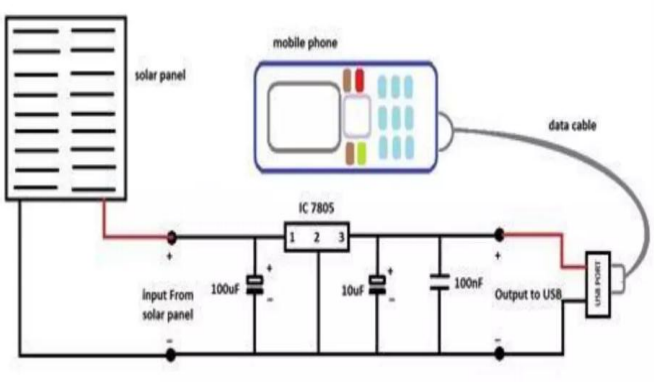

Fig 2: Circuit Diagram

- The diagram illustrates the circuit and overview of the solar mobile charger. It includes a main input source, such as AC input from a solar panel.
- Both C1 and C2 capacitors are utilized to eliminate ripples and serve as filter capacitors, effectively removing AC components.
- The circuit primarily incorporates ICs regulators to ensure a precise voltage level, which is then supplied to the device.
- A regulator is employed in conjunction with a capacitor connected in parallel to both the input and output terminals of the IC regulator.
- Capacitors are employed to monitor significant changes in the input and output filters.
- Bypass capacitors are utilized to detect minor spikes in the input and output levels.
- Bypass capacitors are typically of small values and are used to directly divert short-duration pulses into the Earth.

SPECIFICATION OF SOLAR MOBILE CHARGER

- The solar panel utilizes high efficiency mono crystalline silicon.
- Solar panel: 5.5V/1000Ma
- Output Voltage: 5.5V
- Output Current: 300-550mA
- Charging time for a typical mobile phone using the charger is approximately 60 minutes.

ADVANTAGES

- Cost Effective: Compared to the other mobile chargers, the solar chargers are cost effective as it absorbs power from the sun. It does not require electric power.
- Versatile: It is also known to be versatile as it can be used for all types of mobile phones.
- Emergency Purposes: Another benefit is that it hardly requires any electrical outlet. It can therefore be used during emergencies and outdoor purposes.
- Compact Design: Solar mobile phone chargers are compact in size and easy to carry around.
- Renewable energy source.

APPLICATIONS

- It is convenient for charging phones while on the go without relying on electricity.
- Compact designs created to charge various mobile phones, smartphones, iPods, or other portable audio devices.
- By utilizing an overvoltage protection circuit, we can safeguard our battery from excessive charging.
- Solar chargers available for public use, installed permanently in public areas like parks, plazas, and streets, accessible to everyone at no cost.
- A power source that is low maintenance, emission-free, and environmentally friendly

RESULT

Solar chargers for mobile devices utilize solar power to recharge gadgets like smartphones and tablets. They offer a practical and eco-friendly solution for keeping devices charged, particularly in outdoor or off-grid settings. Different companies provide solar chargers with varying characteristics such as portability, effectiveness, and battery capacity. Well-known brands in this market segment are Anker, RAVPower, Goal Zero, and BioLite. Furthermore, technological progress has resulted in the creation of more efficient and cost-effective solar chargers in the past few years.

CONCLUSION

In conclusion, the solar mobile charger represents a pivotal advancement in portable power technology, offering a sustainable and convenient solution for charging mobile devices. Through harnessing the renewable energy of the sun, these chargers reduce our reliance on traditional electricity sources, contributing to environmental conservation and sustainability efforts. Their portability, compatibility, and versatility make them invaluable accessories for individuals on the go, whether hiking in remote areas, traveling to off-grid locations, or simply seeking an eco-friendly charging option. As technology continues to evolve, solar chargers are becoming increasingly efficient, durable, and affordable, further enhancing their accessibility and appeal. By embracing solar mobile chargers, we not only empower ourselves with reliable off-grid power solutions but also play a part in reducing carbon emissions and mitigating climate change. Incorporating solar charging technology into our daily lives represents a significant step towards a cleaner, greener future for generations to come.

FUTURE SCOPE

The solar mobile charger is primarily designed for recharging mobile batteries. However, with some adjustments, it can also be utilized to charge batteries in various other portable devices such as laptops, walkie-talkies, iPods, digital cameras, and more. Solar power is only accessible during daylight hours and when the sun is shining. To address this limitation, solar panels can be paired with a backup battery to store excess power generated

during the day for use when sunlight is not available. The large size of the solar panel can make the device cumbersome and less portable, so it is essential to design the solar panel to cover the entire device in order to effectively reduce the overall size of the device.

REFERENCES :

[1] DR. A. S. Telang, Bhavana Zatale, Supriya Marodkar, Ishwari Wankhande, SrushtiAtram Navin Vanjari "Solar Mobile Charger" Journal of Emerging Technologies and Innovative Research (JETIR), Volume 11, Issue 4, April 2024.

[2] K Phanikanth, K Kiran Kumar, K Ananth Sai, K Abhinav Vighnesh, Kuntimaddi Viney "Solar Powered Mobile Charging" Researchgate DOI:10.13140/RG.2.2.27562.02246, April 2024.

[3] Prof. S.K. Raut, Prajwal R. Thakare, Atharava Thakare, Aniket Tumsare, Ketan Alone, Yash Bhoyar, Prajwal Meshram "Design and Development of Portable Mobile Solar Charger" International Research Journal of Modernization in Engineering Technology and Science , Volume 5, Issue 5, May 2023

[4] Vinay Sapkal, Mrunmayee Naik, Meet Nahar, Yash Nagrale, Kripa Naik, Sakshi Naik, Mital Nakawal "The Design and Development of Solar Mobile Chargers as a Commercial Product" International Journal of Innovative Research in Technology, Volume 10, Issue 6, November 2023

[5] Suraj Labade, Rohit Mane, Aditya Modak, Anil Sadgire, Tanaya Harde, Prof. Dr. Pankaj Gaigole "Phone Charger Using Sun Tracking Solar Panel" International Journal for Research in Applied Science & Engineering Technology , Volume 11, Issue 4, April 2023

[6] Prof. Veena S, Vijay DG "Solar Mobile Charger" International Research Journal of Modernization in Engineering Technology and Science, Volume 4, Issue 7, July 2022

[7] Prathamesh Mane, Anshu Sharma, Kunal Trivdi, Kaustubh Patil, Harsha Sanap "Solar Battery Charger" International Research Journal of Engineering and Technology, Volume 9, Issue 4, Aprile 2022

[8] Sarna Majumder, Md. Forhad Hossain, Olly Roy Chowdhury, Arif Kaiser, Sarna Majumder, "Solar Powered Mobile Charger Unit – A Review" International Journal of Engineering Research and Technology, volume 10, Issue 9, September 2021

[9] Wiktor Hudy, Oleh Matviikiv, Krzyszto Pytel, Stainslaw Gumula, Michal Koziol, Krystian Bilski "Experimental Solar-Based Rechargeable Battery charger" IEEE, 2021.

[10] Salim Mudi "Design and Construction of a Portable Solar Mobile Charger",World Academic Journal of Engineering Science, Volume 7, Issue 1, March 2020