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WINDOW MOUNTED SOLAR CHARGER

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Abstract:

This innovative window-mounted solar charger harnesses solar energy to charge electronic devices, reducing reliance on non-renewable energy sources. The device consists of a compact, transparent solar panel integrated into a window-mounted frame, allowing for seamless installation on existing windows. Advanced power management and energy storage capabilities ensure efficient energy harvesting and storage. This sustainable solution offers a convenient, eco-friendly alternative for charging devices, ideal for homes, offices, and public spaces. By leveraging untapped solar energy, this window-mounted solar charger promotes renewable energy adoption, reducing carbon footprints and supporting a greener future.

Keywords: *Window-mounted, Solar energy, Photovoltaic technology, Portable solar power, Charging efficiency, Energy conversion.*

Introduction:

This research explores the feasibility and efficiency of a solar-mounted window charger that uses solar energy to charge devices like smartphones, tablets, and laptops. Designed to be lightweight, portable, and easy to install, it provides an eco-friendly charging solution, particularly in areas without power outlets or for outdoor use, with the goal of charging devices within 4-5 hours.

Review of the Literature:

Solar Power Mobile Charger Using Buck Converter Authors: Adarsha Rana, Sujan Gian, Manish Kumar- This study demonstrates the solar-powered charging of high-voltage nickel-metal hydride (NiMH) batteries used in hybrid vehicles by boosting low-voltage solar output to over 300 V using DC–DC converters. The research also develops a protocol for charging these batteries efficiently and highlights the potential of solar energy in battery-electric vehicles, marking a significant step towards sustainable, renewable energy solutions for transportation.

Design and Construction of a Portable Solar Mobile Charger - Salim Mudi - This portable solar mobile charger efficiently converts solar energy into electrical current using power electronics, featuring an adjustable voltage regulator and lithium-ion battery backup. With an output of 5V and 800mA, it fully charges a phone in 4-5 hours, offering a lightweight, pollution-free solution for on-the-go charging.

Objectives of the study:

1. To give suggest the alternate source of using solar energy
2. To Investigate feasibility and efficiency of Solar Energy Converter

Scope of the study:

This study aims to investigate the feasibility and efficiency of window-mounted solar chargers, analyzing their technical, economic, and environmental aspects. The research will explore the technical requirements and design optimization of these chargers, as well as their environmental impact and performance analysis. Additionally, the study will

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assess the economic benefits and cost-effectiveness of window-mounted solar chargers, comparing them to traditional solar panels and alternative energy sources.

Limitations of the study:

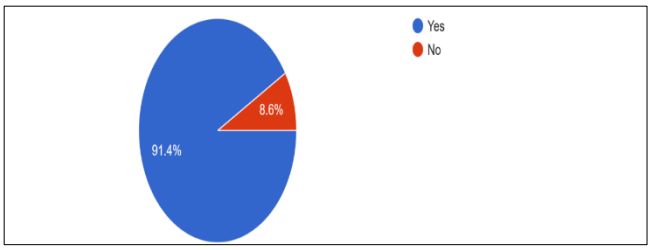
- Window-mounted solar chargers have limited power output, intermittent energy supply, and efficiency losses due to dependence on sunlight, temperature fluctuations, and durability concerns.
- They also have higher upfront costs, limited scalability, and maintenance and replacement costs, which can affect user acceptance and regulatory frameworks.

Research Methodology:

This study employs an experimental research design, using a prototype window-mounted solar charger to collect data on its performance and efficiency. Data analysis involves quantitative and qualitative methods, including simulation software and statistical tools.

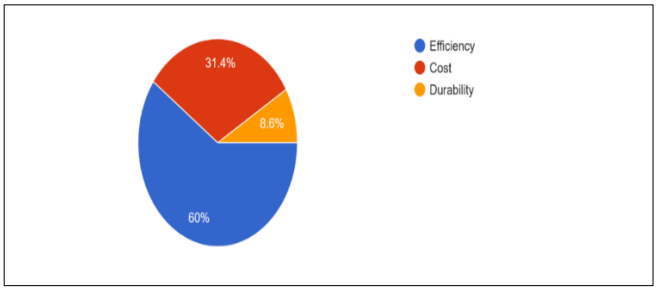
Data Analysis and Findings:

1. **Are you aware of solar energy solutions for homes/offices?**



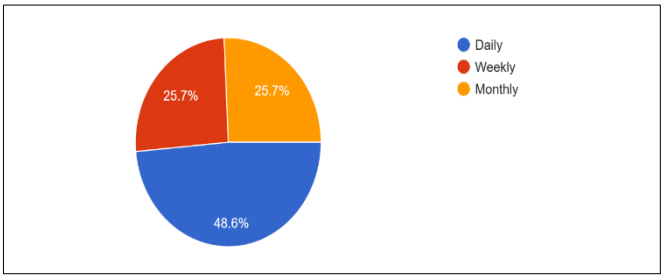
From the chart it shows that 91.4% are familiar with the window mounted solar charger.

2. **What is the most important factor for a Window mounted solar charger?**



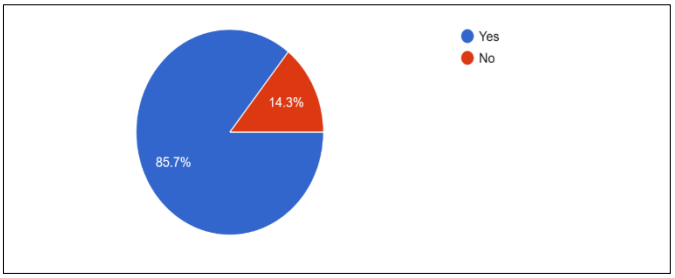
This Chart shows that 60% believe that Efficiency is the most important factor for window mounted solar charger

3. **How often would you expect to clean a window mounted solar charger?**



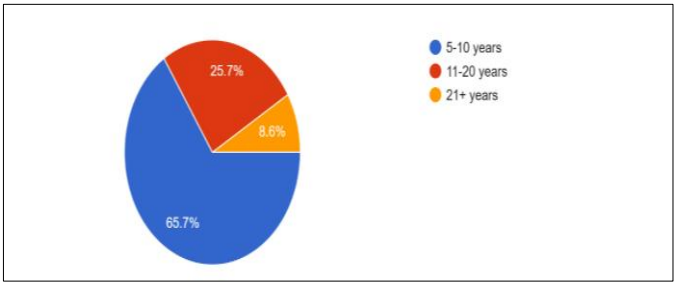
This chart shows that 48.65% would clean the window mounted solar charger daily.

4. **Do you think window mounted solar charger can significantly reduce carbon footprint?**



This chart shows that think that 85.7% window-mounted solar charger can significantly reduce the carbon footprint

5. **What is the expected lifespan of a window mounted solar charger?**



This chart shows that 65.7% people would like to have lifespan of a window-mounted solar charger of 5-10 years.

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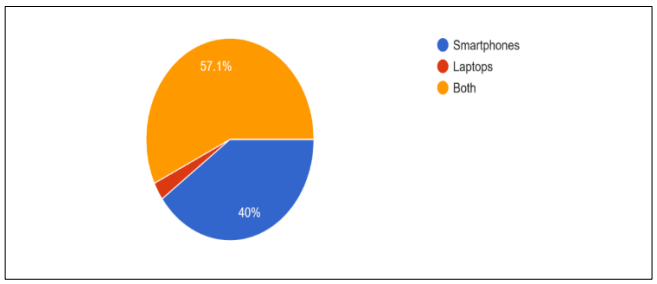
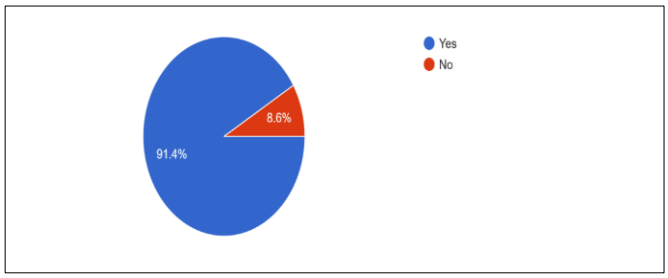
6.What is devices would you charge with a window mounted solar charger?



This chart shows that 57.1 % would to like to charger both smartphones and laptops with window-mounted solar charger

7. Do you expect a window mounted solar charger to reduces energy bill?



This chart shows that 91.4% people would like window-mounted solar charger to reduce their bills.

Challenges:

- Limited power output due to smaller panel size and variable sunlight exposure.
- Intermittent sunlight, temperature fluctuations, and air pollution can affect charger performance and lifespan.
- Window-mounted solar chargers can be more expensive than traditional charging methods.
- Exposure to outdoor environmental conditions can affect durability, and regular maintenance can add to overall costs.

Conclusion:

The findings of this research contribute to the development of advance sustainable and renewable energy solutions, offering a alternative to traditional energy sources. The findings of this research contribute significantly to the development of advanced, sustainable, and renewable energy solutions. By exploring innovative approaches and technologies, this study provides a vital stepping stone towards reducing our reliance on traditional energy sources. The outcomes of this research have the potential to inform the design and implementation of more efficient, cost-effective, and environmentally friendly energy systems.

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