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Solar Power Enabled Smart Car

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***Abstract:** An overview of introducing renewable energy sources in the fast-paced world for various uses In today's fast-paced world, the use of cars and other automobile vehicles is compulsory for public and goods transport. This has made the safety of cars, the car drivers, and car owners a major concern in traffic jams on cities and roads. Especially on nights when near and dear ones are waiting for you at home, To ensure the safety of cars with actual location tracking, one can be at peace of mind with the deployment of this innovative design.*
***Keywords:** PV Solar Panel, Wi-Fi, CCTV Camera, Charge Controller, Inverter, Battery*

I. INTRIDUCTION

This is an effort towards materializing the non-traditional energy source for different miscellaneous benefits in day-to-day life. In order to align with and utilize the voluminous solar energy available in nature, we have to make up our minds and prepare ourselves for its daily use.

In order to achieve that this is very introductory and primary but honest and vital effort to save the traditional energy sources and to give a better alternative for the appliances especially those are used on vehicles. In cities specially in metro's like Mumbai, Delhi, Chennai , and other tier to cities like Pune , Aurangabad , Jaipur we can see thousands of private vehicles roaming around with increasing traffic snarls, there is need to utilize working time and for utilizing the working hours in modern digital era. There is huge need of pollution free and clean energy. A professional like advocates, doctors and IT engineers constantly need their equipment's charged. Specially, when they are working away from their workplaces.

With the increasing number of vehicles, the risk of safety is also increasing. Specially, when woman has to drive alone and in night hours with the help of this , continuous, constant and real time traceable location facility can be availed using dedicated internet service and remote(footage) cctv facility. So that in case of any possible mishap, proper help and assistance can be provided. To run this safety measures continuously there is need to supply continuous but free energy.

This project is aimed at facilitating small but essential services like internet, laptop, and other appliances charging, ensuring the safety of our near and dear while they are onboard renewable energy sources.

Cars and other vehicles need inside cleanliness, and in order to achieve it, various models of vacuum cleaners are available, and they need more than 10 to 12 hours of continuous charging. This can be achieved using solar energy, and the cost of car cleaning can be hugely reduced.

II. LITERATURE SURVEY

The components that have been invented, like solar panels, are essentially building blocks of this design-oriented and design-enabled architecture so that it manifests the very basic concept of the electrical domain, i.e., generation of electricity through solar panels, transmission of electricity, and distribution of it over the loads. Which itself is a small manifestation of an electricity unit on a mobile platform.

On an acute survey and market search, we found such an idea is never implemented that uses solar energy for an altogether different design to make the car's safety reliable, continuous, affordable, and accessible through Wi-Fi, especially in the low-cost segment of the automobile market.

Ref [1]:- The purpose of this study is to present a solar powered battery charger that utilises a photovoltaic (PV) panel to convert solar power into electricity, while a DC/DC converter controls the output power of the PV panel and the charging current for the battery. The study employs an optimal control algorithm in the software to obtain the maximum available power from the sun. The proposed technique can be applied to various light electrical vehicles, such as golf carts, scooters, and airport utility vehicles, as well as other renewable power stations that use batteries for energy storage. To evaluate the performance of the system, the study presents simulation and experimental results, which are then compared. This research fills a gap in the literature by proposing a novel solution for charging batteries using solar power, which has various practical applications in the field of renewable energy.

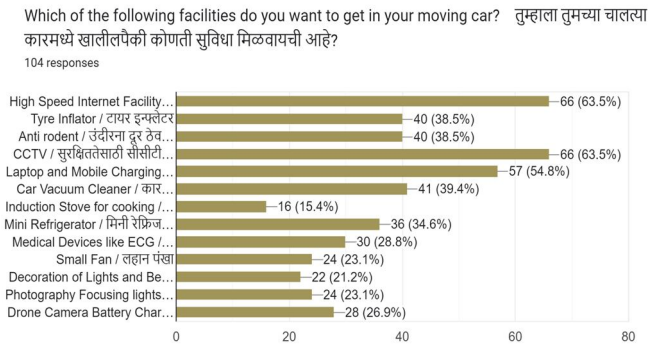
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The study provides valuable insights into the design and implementation of solar-powered battery chargers, which can contribute to the development of more sustainable and efficient energy systems.

Ref [2]:-Hybrid electric vehicles are becoming increasingly popular due to the growing interest in green transportation and the use of renewable energy sources, such as solar power. Solar panels are a free and widely available source of energy that can be used to power hybrid vehicles. Previous studies have shown that solar tracking systems can significantly increase the amount of solar energy collected compared to fixed horizontal photovoltaic panels. However, there is a difference between solar tracking systems designed for fixed plants and those designed for mobile applications. This paper presents a prototype of a solar tracking system for vehicles and an energetic analysis of the system. The paper describes the geometric optimization of the system and presents an energy evaluation that includes the computation of solar gain, mechanical energy required to move the roof, and energy losses. The analysis is performed using MATLAB® software and the SimMechanics tool. This research contributes to the development of more efficient and sustainable hybrid electric vehicles, which can have significant implications for the future of transportation.

Ref [3]:-Professor Bilal Ahmad of Kashmir has developed a unique solar car that has caught the attention of major Indian car manufacturers. The car has been designed to be ecofriendly with zero pollution and is affordable, making it a car of the future. Bilal's solar car is equipped with monocrystalline solar panels, which generate maximum energy for the vehicle to work smoothly. Additionally, it has 'Gullwings,' which open upward and have solar panels fitted to them. Bilal has spent thousands of hours working on the car and is now further working on improving its speed and mileage. The Chairman of Mahindra Car Company, Anand Mahindra, has shown his support for Bilal and offered to explore and develop the car further. The car has garnered significant attention for its innovative design and eco-friendly features.

Prerelease and market response and feedback:

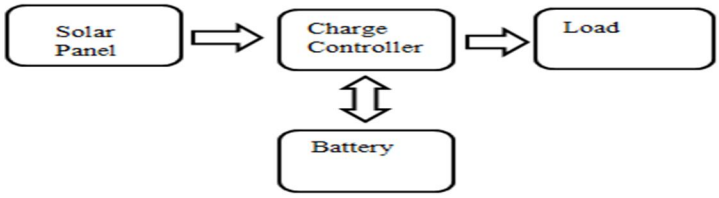


Through Google Forms, this project has received feedback and responses from various individuals, including farmers, employees, business owners, and others. They have provided suggestions regarding facilities they would like to have in their vehicles, such as farmers' equipment, business-related amenities, and more. Along with these suggestions, they have also received information about the types of vehicles available, the facilities they offer, and the estimated expenses for such modifications, among other questions. The feedback has been overwhelmingly positive.

According to the pie chart above, a significant priority for car safety is the inclusion of CCTV and internet connectivity. Approximately 63.5% of respondents have shown interest in this feature. Additionally, 38.5% of participants have expressed the need for a tyre inflator and anti-rodent measures.

III. PROPOSED SYSTEM

A. Block Diagram



(Solar system installation)

B. Solar Panel / PV Cells

The sun is the source of heat and light. Photovoltaic systems are classified into two major types: off-grid (standalone) systems and inter-tied systems. Photovoltaic are solar cells that convert sunlight into DC electricity. The solar panel can be used to generate and supply electricity for different applications. In this project, solar energy is used to make existing fuel-based cars smart. For better efficiency, monocrystalline panels are used in this project



C. Battery

It is the only way you can actually store the energy. so that you could use it during the time when there is no sunlight to collect. Without storing the energy, you would be able to produce and use solar energy only when there is sunlight, not when it's dark or cloudy.



D. Charge Controller

For off-grid solar systems, a solar charge controller is an electronic device that manages the power going into the battery bank from the solar array. A solar charge controller is used to keep the battery from overcharging by regulating the voltage and current coming from the solar panel to the battery.



E. Load

As per customer requirements, the wattage calculation and the ratings of the battery and solar capacity can be changed accordingly. For this project, we have considered CCTV, internet connectivity as part of the safety measures, and charging provisions for mobile phones and laptops.











In this project:
Calculation:
Total Load:

1) CCTV- 5.4 W
2) WIFI Router- 12 W
3) Other-10W

Equipment	Watt/hrs.	Hours of Usage	Total
CCTV	5.4	24	135
Wi-Fi Router	12	24	288
Other	10	4	40
Total Consumption			463 watt

For 12 Volt solar system,
The battery used has a capacity of 32 AH and is from the Livfast Company. Solar panels with a capacity of 100 watts have been utilized. We have also obtained a solar charge controller and a solar inverter.

IV. ADVANTAGES

1) Safety of the vehicle and vehicle driver
2) Strong anti-theft deployment
3) Safety of a Single woman Specially at nights
4) 3 pin laptop charging specially on long drives with no hault.
5) Use of nontraditional and renewable energy with zero cost after installation
6) High Speed Internet connection
7) The same battery storage can be used at home in emergency

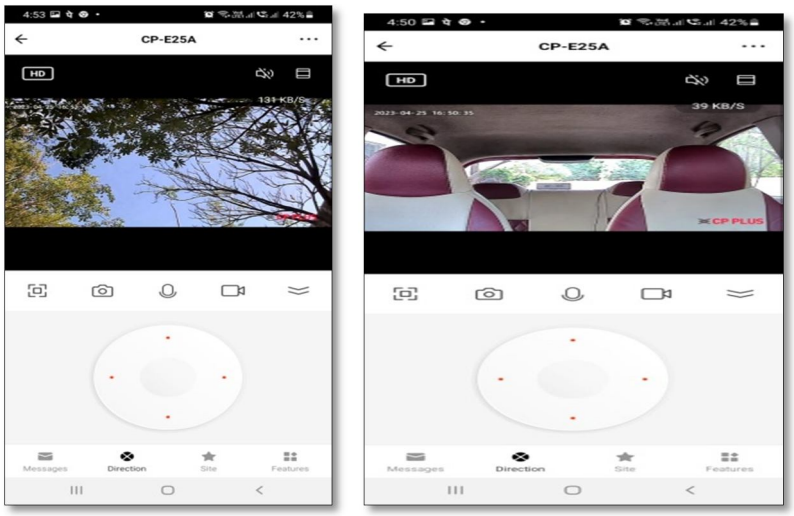
V. DISADVANTAGES

1) There can be compromises with the available space in the car.

VI. RESULT AND CONCLUSION











Since this design has been made and is well equipped with the current trends of smart devices using broadband networks, and having checked its effectiveness for safety and anti-theft purposes with three-pin laptop charging, we can say this is an innovative design using renewable and non-traditional energy to make the car more safe. To give car owners real peace of mind, irrespective of the place where their car is parked.

Even after towing the car, the owner can reach the actual location of the traffic office.

In the case of a woman driver, especially at night, family members can be at peace as they can access the actual location rather than a virtual location.

VII. FUTURE SCOPE

1) More smart devices can be deployed with AI and Machine Learning

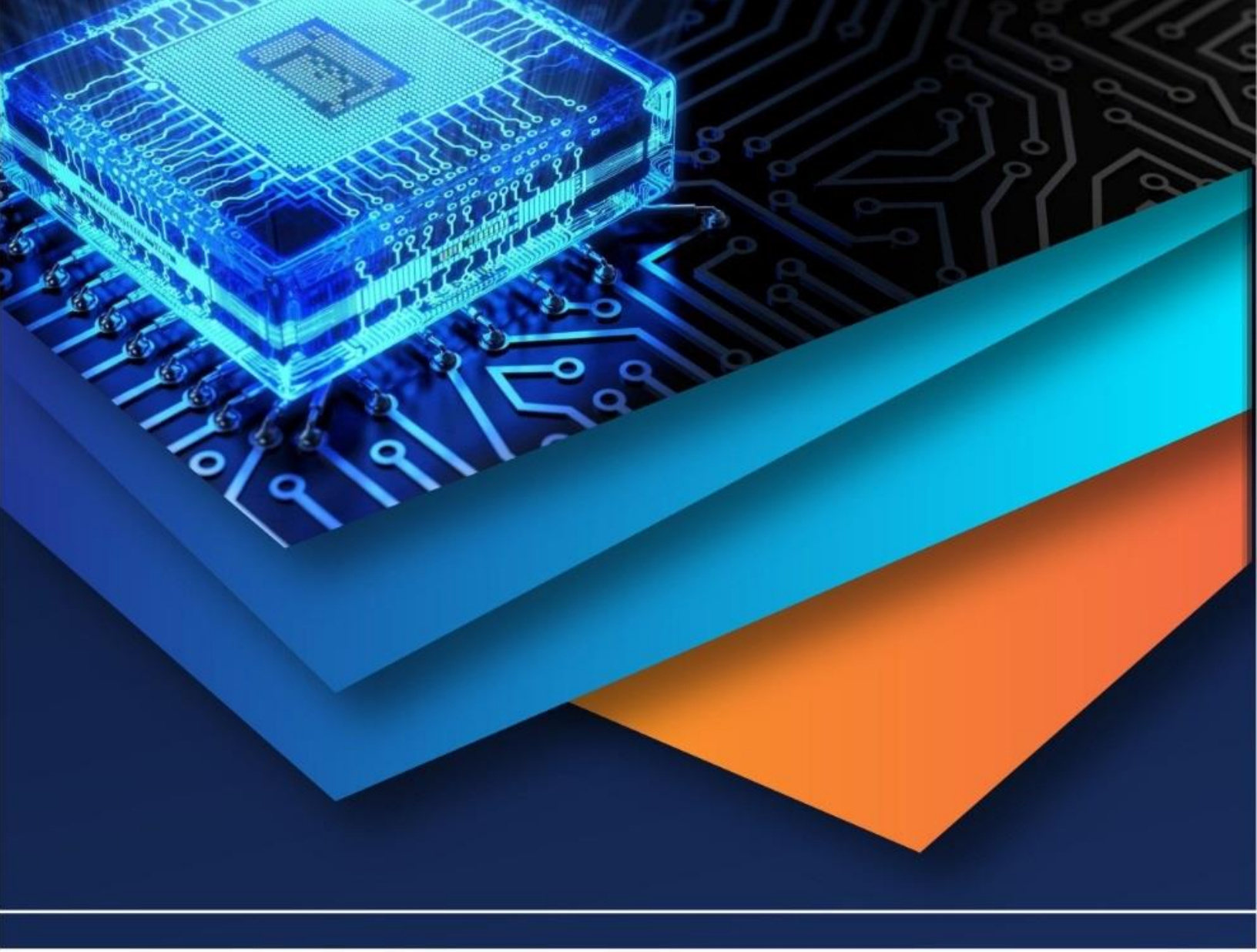
2) To check the theft of cars in metro cities government t can suggest the installation for insurance purpose.

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