K. E. Society's

Rajarambapu Institute of Technology, Rajaramnagar

Evs Project

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Solar car

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Problem Statement

The primary problem addressed by the solar car project is the reliance on fossil fuels for transportation, which contributes significantly to environmental pollution and resource depletion. Conventional vehicles emit large amounts of greenhouse gases, accelerating climate change and impacting air quality. Additionally, the finite nature of fossil fuels raises concerns about long-term energy sustainability.

Why There Is Need Of Solar Car ??

Solar cars are needed to reduce dependence on fossil fuels, combat climate change, and promote sustainable transportation. Powered by renewable solar energy, they produce zero emissions, helping to reduce air pollution and carbon footprints. As fuel prices rise and environmental concerns grow, solar cars offer an eco-friendly and cost-effective alternative.

By harnessing sunlight, they provide a clean, abundant energy source, decreasing reliance on non-renewable resources. Solar cars also support innovation in green technologies, paving the way for a sustainable future in the automotive industry while addressing the growing demand for energy-efficient, low-impact transportation solutions.

Literature Review :

Bhatti, Salam, Aziz, Yee, and Ashique's work explores the integration of photovoltaic (PV) systems for electric vehicle (EV) charging, emphasizing solar energy's role in creating sustainable transportation solutions. They discuss the potential of PV-based charging to reduce dependence on grid electricity, lower carbon emissions, and offer energy independence for EV owners. The study highlights technical challenges, such as intermittency in solar power and energy storage limitations, suggesting hybrid systems with battery storage or grid support as potential solutions. Their findings underline the importance of advancements in PV technology and energy management to enhance the feasibility and efficiency of solar-powered EV charging**.[1]**

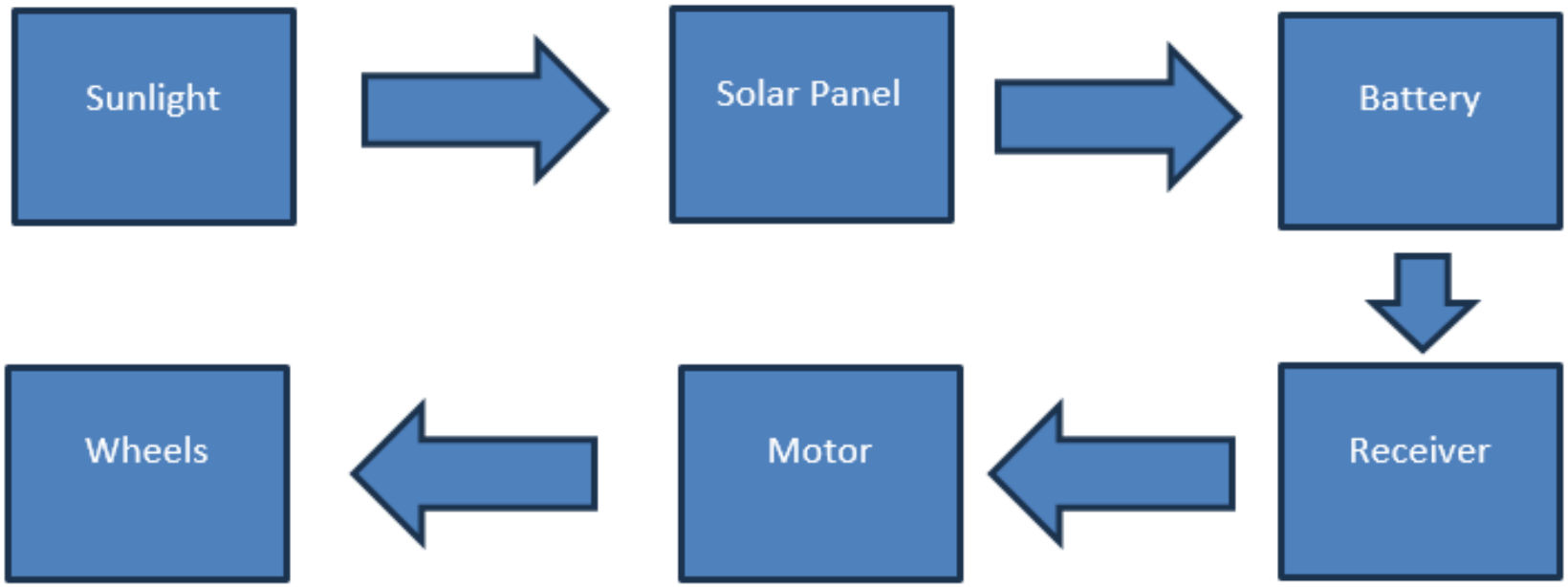
Literature Review :

Green et al. (2010) provide a comprehensive analysis of solar cell efficiency advancements, highlighting significant progress in photovoltaic technology. The study tracks the evolution of efficiency records for various solar cell materials, such as crystalline silicon, thin films, and multi-junction cells. The authors emphasize the impact of material innovations and fabrication techniques on boosting efficiency levels, which is crucial for improving solar power viability. This work serves as a key reference for understanding efficiency trends and technological breakthroughs, setting a benchmark for future research focused on optimizing solar energy systems and enhancing their potential for practical applications in sustainable transportation**.[2]**

Methodology :

The methodology for the solar car project involves a systematic approach that includes several key phases aimed at effectively integrating solar technology into vehicle design and performance. Initially, a comprehensive literature review will be conducted to gather insights into existing solar car technologies, focusing on advancements in photovoltaic panels, battery systems, and energy management techniques. This research will inform the design phase, where computer-aided design (CAD) software will be utilized to create detailed vehicle designs, incorporating lightweight materials such as carbon composites for optimal energy efficiency while ensuring safety and aerodynamic performance.

Block Diagram :



Block Diagram Explanation:

1. Sunlight :

Sunlight is the primary energy source for the solar car. It consists of photons that carry solar energy, which is captured by the solar panel. This renewable energy source is essential for powering the car without relying on fossil fuels, making it environmentally friendly and sustainable for long-term use.

2. Solar Panel :

The solar panel converts sunlight into electrical energy using photovoltaic cells. The panel generates direct current (DC) electricity, which can either be used immediately or stored in the battery for later use. Its efficiency determines how much energy is captured from sunlight and thus affects the car's overall performance.

Block Diagram Explanation:

3. Battery :

The battery stores electrical energy produced by the solar panel for use when sunlight is unavailable or insufficient. It acts as a buffer, ensuring continuous power supply to the motor. Typically, lithium-ion batteries are preferred for their energy density and rechargeability, providing a steady energy reserve for the motor controller**.**

4. Motor Controller :

The motor controller manages the flow of electricity from the battery to the motor. It regulates the voltage and current supplied to the motor based on the driver's input, controlling the speed and torque. By efficiently delivering power, the motor controller ensures smooth acceleration and energy conservation.

Block Diagram Explanation:

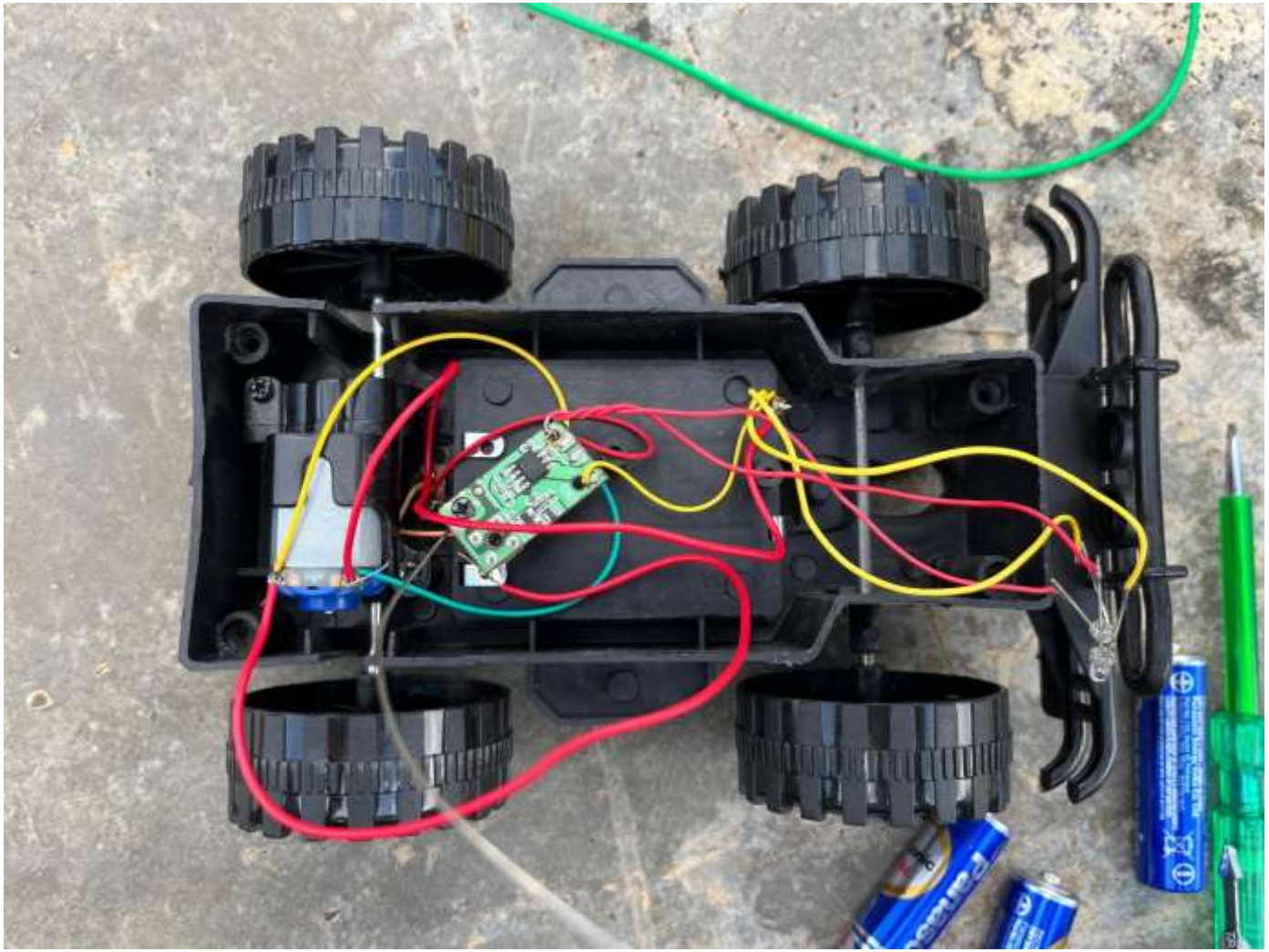
5. Motor :

The motor converts electrical energy from the battery into mechanical energy, which drives the wheels. As an electric motor, it operates quietly and efficiently, using direct current. The motor’s performance, including speed and torque, is controlled by the motor controller, enabling the vehicle to move forward or backward.

6. Wheels :

The wheels receive mechanical energy (rotational force) from the motor and convert it into movement. The motor's torque is transmitted to the wheels, which allows the car to move along the road. The wheels play a critical role in translating the motor's energy into actual vehicle motion, enabling acceleration and direction changes.

Internal Circuit :



Design Objectives :

1. To design and integrate photovoltaic panels to maximize sunlight conversion into electricity for optimal vehicle performance.

2. To investigate and implement advanced battery technologies to ensure reliable energy storage, allowing the vehicle to operate effectively during low sunlight conditions or at night.

3. To utilize lightweight and durable materials to reduce energy consumption while maintaining safety and structural integrity, enhancing overall vehicle efficiency.

Design Objectives :

4. To conduct thorough testing to assess the solar car's speed, range, and energy consumption, identifying areas for improvement and ensuring practical viability for everyday use.

5. To raise awareness about the benefits of solar-powered transportation and its potential role in reducing dependence on fossil fuels and mitigating environmental impact.

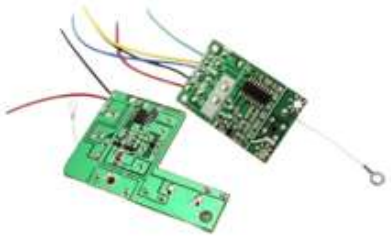
Hardware Requirements:

Solar panel

Car

RC controller

RC receiver



Project Outcome:

The project aims to produce a functional solar car prototype, contribute to research papers, and participate in national events such as hackathons or engineering challenges. The ultimate outcome will include a detailed analysis of the solar car's performance and its potential impact on sustainable transportation.

References :

[1] Electric vehicles charging using photovoltaic-Abdul Rauf Bhatti , Zainal Salam , Mohd Junaidi Bin Abdul Aziz, Kong Pui Yee, Ratil H. Ashique

[2] Green, M. A., Emery, K., Hishikawa, Y., Warta, W., & Zou, J. (2010). "Solar Cell Efficiency Tables (Version 35)." *Progress in Photovoltaics: Research and Applications*, 18(1), 1-12.

Thank You!