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Design of a Solar Powered Tricycle

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ABSTRACT

In order to identify an environmentally sustainable mode of transportation, this project report details the design of a solar-powered motor tricycle. The car offers a renewable energy-powered substitute for traditional fossil fuel-powered automobiles thanks to its 400W solar panel array, lithium-ion battery, and high-efficiency electric motor. The design technique includes a thorough analysis and component selection based on performance, cost, and efficiency. The tricycle's battery life, weight carrying capacity, and solar charging efficiency were all found to be good after testing under a variety of circumstances. Structural reinforcements were incorporated into essential safety features to ensure the user's and the vehicle's longevity. Results showed that the tricycle is a workable urban transportation option that lowers.

INTRODUCTION

In the realm of solar-powered vehicles, it has become even more clear that eco-friendly and efficient transportation options are becoming more popular. The use of solar-power for mobility is actively working to reduce emissions with clean energy sources and even without those that are renewable. That's why the design of this solar tricycle will be the most important part in clean energy transportation development for city and countryside alike. Photovoltaic (PV) panels, placed on the outside to harness the sun's energy and in-turn they get the solar automobiles to be charged. Electric motors, which are responsible for cars operating are moved by the energy that is generated, which does not emit any pollutants, lessens the operational cost in comparison to the conventional fossil-powered tricycles. These are must-have electric vehicles.

DESIGN PROCESS

System analysis, component selection, electrical and mechanical integration, and other phases comprised the organised design process for the solar-powered tricycle. Thus, weight reduction, efficiency, and smooth operation with low maintenance have all been taken into account in this design. Here is a description of the steps that were done for this process.

COMPONENT SELECTION

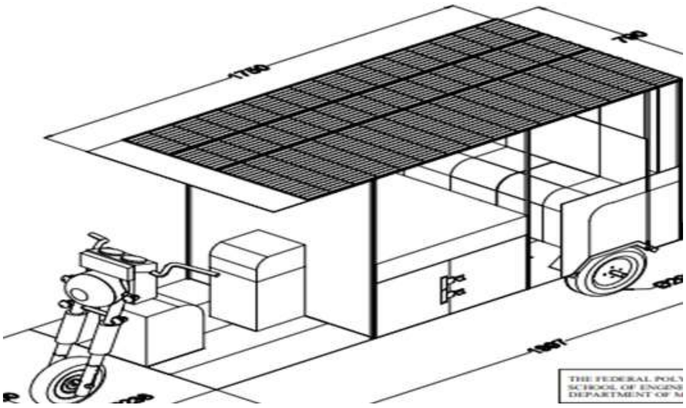
The selection of the type of parts to be used as the next step in the design. These parts have been selected on the basis of effectiveness, strength, and cost-effectiveness with respect to requirements the tricycle need. To be specific, main components of the design would be e-motors, charge controller, solar panel, batteries, and inverter. The electric motor; one of the most important components in the design of tricycles. A good electric motor required will ensure that the motor has a lot of torque and speed while being energy efficient. A brushless DC motor was selected for this purpose. This is because they are low maintenance and offer excellent efficiency performance (Yang & Liu, 2019). Li et al. (2020) stated that brushless dc motors have very high power density and provide simple points for controlling speed and torque.

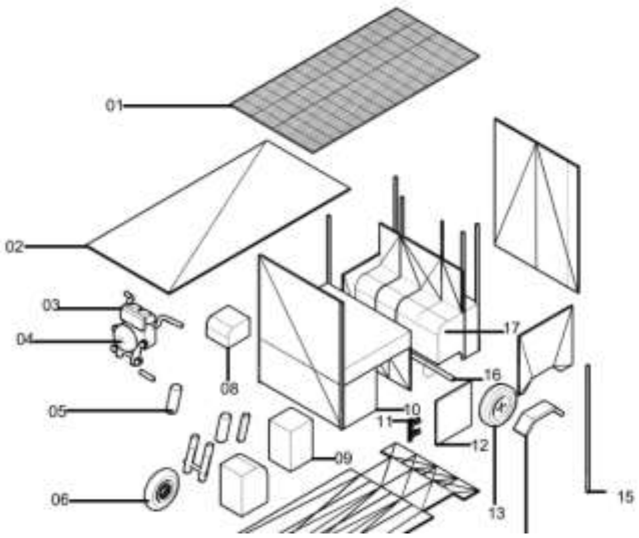
MECHANICAL DESIGN

The solar-powered tricycle is thusly designed mechanically for a robust yet lightweight frame to house the motor, battery, and solar panel assembly. To minimize the energy consumption, the trike should be strong enough even to accommodate man and electrical components without being very heavy. Since high-strength steel and aluminium are the materials of the frame, they were chosen to present an excellent combination of strength-to-weight ratio. Ashby and Johnson (2020) state that having materials with exceptional strength-to-weight ratio is the key to making renewable energy vehicles as efficient as possible. The tricycle's body was striven to be aerodynamically considered, as streamlined forms will reduce the opposition to air while moving, Wickens et al. (2021).

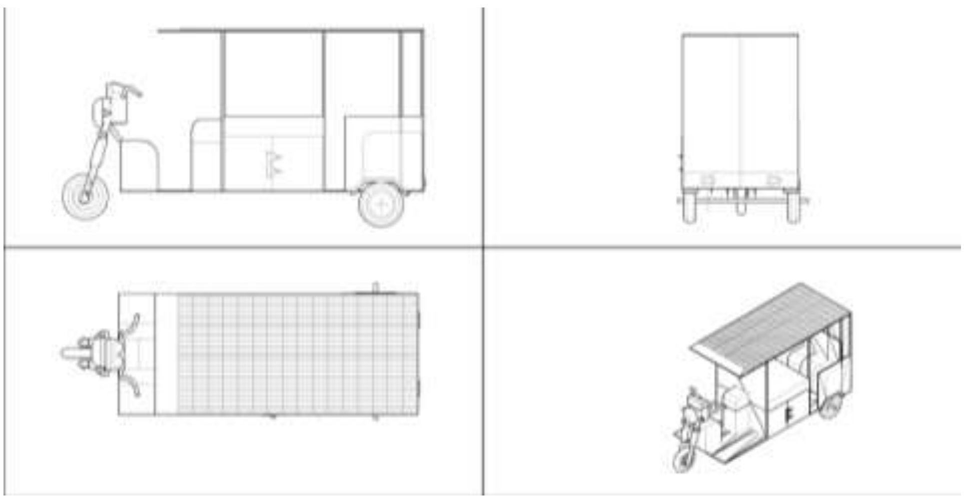
PERFORMANCE TESTING

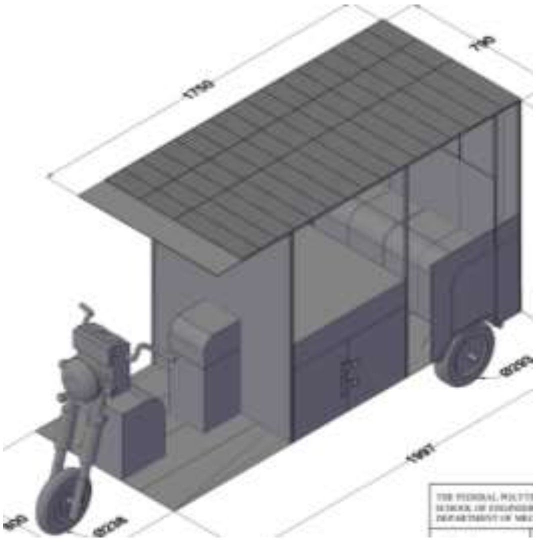
There were tests performed in the several kinds of environments to ascertain the overall performance of the power of the solar tricycle. Their major performance indicators constitute power output, battery servicing hours, solar panel charging efficiency, and mechanical resistance.





17	REAR DOOR
16	REAR SHAFT
15	CHASIS (SQUARE PIPE)
14	REAR WHEEL COVER
13	REAR WHEEL
12	CARGO DOOR
11	CARGO LOCKER
10	CARGO AREA
09	TOOLS BOX
08	FRONT SEAT
07	BOTTOM CHASIS SHEET
06	FRONT WHEEL
05	FRONT TELESCOPIC SUSPENSION
04	HEAD LAMP
03	DASHBOARD
02	ROOF
01	SOLAR PANEL
S/N	DESCRIPTION





CONCLUSION

The gas-powered tricycle to the solar-powered conversion had been a major goal of the project to create an electric, a cost-effective, and green means of transportation that uses renewable energy. It also encouraged the adoption of sustainable-measure in solving transportation issues, especially in urban areas. This project, more precisely, was about coming up with an environmentally sustainable solution by replacing traditional fossil fuel-powered transit systems with solar-powered tricycles followed by a two-wheeler. In doing so proffer a way to lower carbon emissions and improve the transportation system to be eco-friendlier.

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