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Pre-Enhancing the Fuel Saving and Emissions Reduction of Light-Duty by a New Design Worked by Solar Energy

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ABSTRACT

A solar car can be characterised as a "green vehicle" because it uses renewable energy sources and emits no carbon dioxide. Numerous sun race competitions held all around the world have fueled the development of solar vehicles by various research teams. These occasions have evolved into a venue for academic institutions and corporate businesses to demonstrate their most recent innovations and discoveries in using solar energy to power their automobiles. The expense of developing solar cars has been seen to rise dramatically over time, with the majority of teams focusing solely on winning the competition rather than building useful, everyday-useable vehicles.

KEYWORDS: *BATTERY, SOLAR PANEL, SWITCH, CHASSI*

1. INTRODUCTION

The increasing use fossil fuel in different transport sectors leads to significant concerns in the worldwide due to the environment pollution and global warming. Solar energy is a good way to reduce the penalty of fuel consumption, reduce energy requirement and keep clean environment [[1], [2], [3]]. Therefore, many studies have been focused on the reduce engine load and energy of fuel consumption which linked with provide comfortable services in vehicles such as air conditioning (a/c) [4]. In modern vehicles, energy management is a crucial issue which can be noticed in the case of diesel vehicles. Future designs must take into account how the a/c system affects the overall energy consumption of the vehicle. In earlier research, mathematical models were introduced in the literature to study various options for thermodynamics [5], energy management and savings [6], or good cabin cooling performances [7], and to achieve greater efficiency [8], optimal control [9], as well as engine [10] engagement. Compressors, heat exchangers, evaporators, and condensers, among other crucial components, have been investigated and optimised by Mendoza-Miranda et al. [12] and Huang at al [11]. It is well known that the conventional a/c system, which consists of a compressor (powered by the engine) actuated by an electronic clutch, placed an additional stress on the car's engine. The primary influence on the temperatures for condensation and

evaporation is air conditioning (a/c) (depend on cooling power). The control system for vehicle energy management interacts with the air conditioning system, engine, environment, and fuel consumption improvement. When employing the mechanical compressor, it is claimed that the fuel consumption for subcompact to mid-size cars rose by up to 12%-17% [13]. Earlier research by Barone et al. [14] and Farzaneh et al. [15] produced a number of techniques for controlling the air conditioning system and lowering the energy consumption of a vehicle. The cost of various forms of air conditioning (a/c), heating, and ventilation is rising globally by 6.2% each year, as demonstrated in To effectively handle latent loads in a hot, humid environment, the a/c system's energy management is crucial. Different functions (heating, lighting, and air conditioning) in vehicles can now be powered by solar and biomass in recent years. Due to rising demand for air cooling, which also helped to increase environmental pollution, the usage of energy sources in automobiles rose during the past few decades [17,18]. As a result, the writers began looking into alternate energy sources while considering their costs [[19], [20], [21]].Various alternative energy sources can be used in a particular location to meet energy needs, and renewable energy that is already accessible can also be used to meet those needs. Due to the rising demand for air conditioning in hot and humid conditions, energy use has significantly increased [22,23]. The peak demand for air cooling can occur with periods of maximum insolation, hence solar energy is seen to be a viable application [24]. Due to the city of Chengdu's increased exposure to light and solar radiation throughout the year, solar energy has a significant potential for application in air conditioning. A/C system effects were found to be the cause of the fuel consumption and vehicle energy in conventional internal combustion engine (ICE) automobiles. According to reports, numerous control systems have been devised to use small weight vehicles and reduce engine fuel consumption [25,26]. Experimental investigations conducted in the past in Europe demonstrated that utilising a standard air conditioning system to cool and heat a cabin increases fuel consumption by 7 billion litres annually, or 3.2% of global fuel use [27]. Global warming will increase as a result of the annual rise in carbon monoxide (CO), carbon dioxide (CO2), and hydrocarbon emissions from burning fuels in developing nations [28,29]. Conventional cooling systems must use renewable energy sources, which lowers emissions of carbon dioxide (CO2) and chlorofluorocarbons [30,31].The goal of this study is to develop an intelligent solar-powered air conditioning system that will deliver a comfortable interior temperature and air quality while consuming less fuel and emitting fewer emissions. Examine how well the solar air conditioning system performs to cool and heat the car's cabin in hot and cold conditions. Examine how two automobiles' solar and conventional air conditioning systems affect BSFC (braking specific fuel consumption) and hazardous pollutants (CO, NOX and THCs).

2. LITERATURE REVIEW

Mark P. Baldwin Timothy J. Dunkerton has been confirmed Observations and modeling studies support the hypothesis that solar cycle/ozone interactions create temperature andwind anomalies in the tropical upper stratosphere near 1 hPa. During extended winter (October–April), interactionswith planetary-scale Rossby waves draw low-latitude stratospheric wind anomalies poleward and downward throughthe stratosphere. Solar influence on surface climate would likely involve interactions with stratospheric Rossby wavesand the coupling of the lower stratospheric circulation to the circulation near Earth's surface. Here we provide anoverview of stratosphere–troposphere dynamical coupling. We discuss dynamical mechanisms that might communicatestratospheric circulation anomalies downward to the troposphere and surface.

Andrew P. Schurer, Simon F. B. Tett & Gabriele C. Hegerl would provedNo evidence can be found in the observations of the global temperature for a dangerous warming derivedfrom human actions.The computer simulations of climate, which estimate a warming of roughly 1 C over the last 100 years, have overestimated the warming that has actually occurred by a factor of three or more. The same computersimulations projecting for the next 100 years (the time frame cited for the equivalent of a doubling of carbondioxide) must be corrected for these

overestimates of past warming. When corrected, the forecasted warmingfor the next 100 years is a few tenths C. That warming, spread over a century, will be negligible compared tothe natural fluctuations in climate.

Furthermore, delaying the onset of drastic emission reductions by as much as 25 years results in a penalty ofonly 0.2 C in added temperature by 210013, according to the current computer forecasts which are known beexaggerating the warming. Investing in and waiting for better climate science would be appropriate, considering that the IPCC-forecasted warming has dropped by nearly a factor of two just in the last six years.

In addition, that assumption of the equivalence of input of solar and anthropogenic forcing ignores a key issue: Does the response of the climate system differ significantly for different forcings? If the answer to this question is affirmative, it should be possible to identify specific causes of climate change. As will be seen, the consequences of different kinds of forcings, including solar variability, are still difficult to disentangle.

3.DESIGN:

3.1. WHEELS:

These four components make up the mechanical part of the solar car. Front wheel steering is used as it tends to be more stable and safe. The suspension used isophisticated enough to allow the user a stable ride and to protect the car and panels from sudden shocks and blows. A drum braking system as in conventional cars is used to provide the safety features of the car while travelling. The rolling resistance of the wheels affects how far the solar car can go on the amount of energy it has available. Thinner but strong wheels are preferred because they have lower rolling resistance than thicker wheels.

3.2 CHASSIS:

In general, the chassis is thought of as a framework to support the vehicle's body, engine, and other components. The chassis offers stability and support to the whole vehicle. A typical chassis features many transverse cross elements that bridge the channels and a pair of longitudinally expanding channels. The transverse components have a smaller cross section to make room for a storage compartment that extends longitudinally.

The chassis must be built around the driver's cockpit and include all of the necessary race vehicle components. A crucial component of the design, the safety of the chassis should be taken into account at every stage. The basic chassis types typically include backbone, ladder, spaceframe, and monocoque.

3.3BATTERY

The solar panels will collect energy from the sun and convert it into usable electrical energy, which in turn will be stored in the lead acid battery to be supplied to the motor when necessary.

The battery range is 24V 190Ah and the quantity is 2*12V

3.4SOLAR PANNEL

Solar panels are crucial because they are the only component of a solar car that collects energy from the sun, which is how solar cars are powered.., they can be mounted and fitted easily on the top of the car or on the bonnet nature.Range of solar panel is 140Wp(Watt Peak)

3.5MOTOR

High torque DC motor 1Hp=746W

A DC motor is any of a class of rotary electrical motors that converts direct current (DC) electrical energy into mechanical energy. The most common types rely on the forces produced by induced magnetic fields due to flowing current in the coil. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

3.6 MATERIALS

Components used	Range	Quantity
Solar panel	140Wp(Watt Peak)	1
Batteries (heavy Inverter batteries)	24V 190Ah	2*12V
Connecting Cables	Motor connection:-25Sq.mm high voltage cables. Solar module to charge controller unit:-1Sq.mm Charge controller to battery unit:-2Sq.mm	2 meters 1 meter 1 meter
Motor	High torque DC motor 1Hp=746W	1

4.EXPERIMENTAL SETUP

The car's body is made of iorn. Because the chassis is both light and sturdy, moving the vehicle requires less power from the motor. The art of engineering involves striking the ideal balance between strength and weight.

The solar car's body is constructed using metals that are longitudinally welded to it. The four corners of the chassis are fitted with wheels. The motor is attached to the wheels and mounted behind the back of the chassis. On top of the chassis is where the solar panel is situated. To move the solar automobile, the solar panel is next connected through a switch to the rechargeable battery.

5.RESULT

It is imperative to move to a new source of energy, namely solar power, which would be a cheap, efficient, inexhaustible, and of course environmentally benign alternative to meet the rising fuel demands and the catastrophic environmental pollution caused by driving carbon-based automobiles.

Electric vehicles fueled by solar energy are safe since they lack hot exhaust systems or flammable fuel. They produce no emissions and are also odourless, smokeless, and silent. They are easier to maintain, have fewer or no moving components, and can be efficiently charged almost anywhere. It goes without saying that it is incredibly cost-effective.

We believe that it won't be long before the majority of people in the globe move to driving this contemporary vehicle, thereby bringing about a positive change in their lives and the environment, because solar cars can readily absorb future technologies. Future advancements will undoubtedly make solar cars the preferred means of transportation over automobiles with internal combustion engines because this is just the beginning of a new technology.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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