The Winning Solar Car Design

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Science, Education, and Technology Division

a successful solar car team must have a good car good drivers good weather information good strategy and a well trained support team based on the author s experiences designing and building five solar cars over a ten year period this book focuses on the most imporant aspects of designing a competitive solar car including developing a racing strategy efficient solar car driving project management and designing the specific subsystems of the car chapters cover design methodology aerodynamics of solar cars composite materials car balance and spring rates and more

this exciting primer on solar racing literally starts from the ground up describing how the interactions of a vehicle with its environment circumscribe its ultimate success from aerodynamics to resistance and propulsion by demonstrating how to mathematically model these underlying physical phenomena the author helps solar racing competitors carefully select key characteristics of the vehicle such as weight and shape to produce optimal speed energy conversion and demand are given particular attention followed by chapters devoted to examining solar racers design manufacture and testing using a structured problem solving process to keep projects on track and on schedule a chapter devoted to energy management strategies provides invaluable tips on maximizing average speed during a race complex issues such as ventilation system analysis and performance simulation are covered in dedicated appendices the financial aspect of project design is not neglected as both fund raising and cost estimation are given in depth consideration

this report shows the design and analysis of body parts for racing solar cars because this play an important role in the motor industry today and solar car also powered by sun energy solar this is obtained from solar panels on the surface of the vehicle photovoltaic pv cells convert the sun s energy directly into electric energy this is project use the materials type as carbon fiber overall this project involves many processes starting from the design concept in this project design is very long time and this part most important in solar car industry secondly start

the analyzing the parts of the body because the body plays a role in absorbing solar energy as possible as well the car body design aerodynamic

designing with photovoltaics cover a broad range of topics related to the design of products buildings and vehicles with integrated photovoltaic pv technologies including storage aspect it enables the reader to easily design new products buildings and vehicles through use of innovative pv products diverse categories of product integrated pvs are discussed including applications of solar power for mobility and building integrated systems along with design and manufacturing related information about solar cells illustrating design cases of various pv powered products special attention is paid to end users and environmental aspects of pv applications aimed at senior undergraduates graduates and professionals in electrical engineering architecture design physics mechanical engineering and those specifically studying photovoltaics it covers the different product integrated photovoltaics pipv with a focus on design and manufacturing presents comprehensive overview of all aspects of designing with photovoltaics includes product integrated pv building integrated pv and solar powered mobility concepts contains real design cases showing how to design with photovoltaics discusses context of environmental issues and user aspects

this book examines the history of creative applications of photovoltaic pv solar power including sound art wearable technology public art industrial design digital media building integrated design and many others the growth in artists and designers incorporating solar power into their work reflects broader social economic and political events as the cost of pv cells has come down they have become more accessible and have found their way into a growing range of design applications and artistic practices as climate change continues to transform our environment and becomes a greater public concern the importance of integrating sustainable energy technologies into our culture grows as well the book will be of interest to scholars working in art history design history design studies environmental studies environmental humanities and sustainable energy design

the solar car power system consists of three main subsystems which are the solar

array battery management and lastly battery pack it is arguably the most essential system of a solar car since it generates power for the car thus vastly influences the functionality of the car itself this project was carried out to design a solar car power system that is feasible cost effective and in compliance with the rules and regulations of the 2011 world solar challenge wsc the main objective of this project was to design an electrical layout of a solar car power system with components that are properly selected as well as carrying out analysis to determine the practicality and compatibilty of the design the design of the power system was divided into four levels which were the selection of subsystems mian components design of the subsystems the conditioning of the power system and finally the design of the overall power system itself these steps involved drawing of design design calculations and analysis of compatibilty within the power system the drawings involved in the design of the system were done via solidworks 2010 and smartdraw 2010 softwares the finalized design delivered a power system that could generate a maximum power of 837 6w through its solar array designed by tabbed monocrystalline solar cells the power generated would be stored in a battery pack which consists of five vrla batteries with a combined power capacity of 6 4kwh a buck type maximum power point tracker configures the input from the solar array to the battery pack motor controller of the actuation system would configure the power system to continuously supply 1kw to the motor it is calculated that in ideal conditions the power system can continously power the motor for at least 11 99 hours which is already sufficient for a day of solar racing the results and discussion concluded that the design of the solar car power system is feasible to be implemented and is considerably cost effective within the financial prowess of the university through proper justifications the design is also proven to be compatible within the system itself for further improvements in the future this project should be conducted with a greater budget so that rather than coming up with a conceptual design a fabrication or at least a better form of design simulation can be done besides that with greater budget better components that are more costly are then affordable

position yourself at the forefront of the transportation revolution with this guide to mastering computational intelligence that serves as the essential linchpin for

the safe sustainable and hyper connected internet of vehicular things the rapid adoption of the internet of things has transformed the way we interact with our environment ushering in an era of unprecedented connectivity and data sharing one of the most dynamic and influential manifestations of this technological revolution is the internet of vehicular things a paradigm that connects the digital and physical worlds through the integration of intelligent vehicles smart infrastructure and advanced communication networks in this fast evolving landscape computational intelligence emerges as the linchpin that enables iovt to realize its full potential this book addresses the fascinating intersection of vehicle technology and computational intelligence it explores the transformative power of algorithms machine learning artificial intelligence and data analytics shaping the future of transportation as vehicles become smarter safer and more efficient the opportunities for innovation and optimization are limitless the iovt ecosystem encompasses a wide range of applications from autonomous vehicles and traffic management systems to driver assistance technologies and predictive maintenance by harnessing the collective intelligence of vehicles and infrastructures iovt promises to revolutionize not only our daily commute but the broader transportation landscape paving the way for sustainable efficient and safe mobility solutions this book is a comprehensive guide for researchers engineers practitioners and policymakers looking to navigate the complex terrain of iovt using computational intelligence it provides a multidisciplinary perspective and draws on recent advances in computer science data science electrical engineering and transportation science to facilitate a deep understanding of the key concepts challenges and opportunities associated with iovt and computational intelligence

this report presents on the design of upper body structure for solar car solar car uses solar energy from the sun to convert it into electrical energy in order to move the solar car in order to move the solar car smoothly the shape of solar car s body must be more aerodynamics to get low drag and reduce the friction at the same time the objective of this report is to propose several design of solar car s body and analyze the models for drag coefficient and justify the most aerodynamics model the report describes the aerodynamics concept use in common cars

computational fluid dynamics cfd analysis to calculate the drag coefficient and identify material and dimension of solar car the dimension for the project is guided by world solar challenge regulations 2009 technical specifications fibreglass kevlar and carbon fiber materials were studied in this report which is commonly used in nowadays solar car the models of solar car were designed by using the computer aided drawing software which is solid work the cfd analysis was then performed using cosmosfloworks each model of solar car was analyzed using different mesh and speed of the air flow finally the drag force of each model is obtained and used in the calculation to find coefficient of drag for each model from the result it is observed that frontal area and shape of the solar car s body are the most important parameter to be considered in order to design an aerodynamics car besides designing the aerodynamics shape of solar car the choice of material for body can also affect the performance of the vehicle because different material will contribute the weight of the vehicle as the vehicle is lighter it will improve the vehicle power to weight ratio thus improve the performance of the vehicle

a solar car is a specialized type of car designed for race and powered by sun energy solar this is obtained from solar panels on the surface of the vehicle photovoltaic pv cells convert the sun s energy directly into electric energy solar vehicles are not sold as practical day to day transportation devices at present but are primarily demonstration vehicles and engineering exercises it have limited seating usually one sometimes two people it have very little cargo capacity and only be driven during the day chassis is one of the important parts and every car passenger has it this structure was the biggest component in the car and car shape dependent on it it has a considerable affected to the performance of the car the primary challenge in developing an effective solar car chassis is to maximize the strength but minimize the weight there are various types of chassis each with its own advantages and disadvantages every extra pound requires more energy to move down the road this means that chassis must strive to minimize weight and a key area is the chassis however safety is a primary concern and the chassis must meet stringent strength and safety requirements as the conclusion this project had achieves its entire objective successfully this project was done around twelve week included almost all steps of the report such as

literature review design analysis process and others

selected peer reviewed papers from the 2013 international symposium on vehicle mechanical and electrical engineering isvmee 2013 december 21 22 2013 taiwan china

handbook of power electronics in autonomous and electric vehicles provides advanced knowledge on autonomous systems electric propulsion in electric vehicles radars and sensors for autonomous systems and relevant aspects of energy storage and battery charging the work is designed to provide clear technical presentation with a focus on commercial viability it supports any and all aspects of a project requiring specialist design analysis installation commissioning and maintenance services with this book in hand engineers will be able to execute design analysis and evaluation of assigned projects using sound engineering principles and commercial requirements policies and product and program requirements presents core power systems and engineering applications relevant to autonomous and electric vehicles in characteristic depth and technical presentation offers practical support and guidance with detailed examples and applications for laboratory vehicular test plans and automotive field experimentation includes modern technical coverage of emergent fields including sensors and radars battery charging and monitoring and vehicle cybersecurity

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