Dr. MAHALINGAM MCET
COLLEGE OF ENGINEERING AND TECHNOLOGY
Enlightening Technical Minds

Dr. MAHALINGAM
COLLEGE OF ENGINEERING AND TECHNOLOGY

Affiliated to Anna University, Chennai. Approved by AICTE. Accredited by NBA and NAAC with Grade A++
Udumalai Road, Pollachi - 642 003.

DEPARTMENT OF AUTOMOBILE ENGINEERING

SCUDERIA AVES

MAGAZINE 2022-2023

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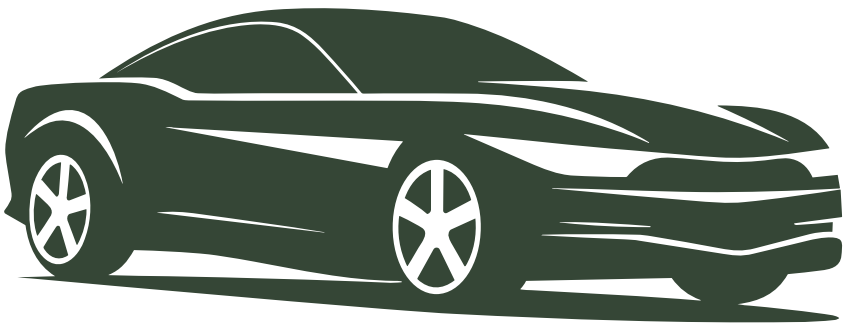

INSTITUTE'S VISION AND MISSON

VISION

- We develop a globally competitive workforce and entrepreneurs.

MISSON

- Dr. Mahalingam College of Engineering and Technology, Pollachi
- endeavors to impart high quality, competency based technical education in Engineering and Technology to the younger generation with the required
- skills and abilities to face the challenging needs of the industry around the globe. This institution is also striving hard to attain a unique status in the international level by means of infrastructure, state-of-the-art computer facilities and techniques.

DEPARTMENT'S VISION AND MISSON

VISION

- To offer cutting-edge technology in the broad area of automobile engineering and develop globally competitive engineers.

MISSON

- To develop automobile engineering graduates for a successful career in automotive industry around the globe through effective teaching-learning and training.
- To develop the capability of graduates for creating innovative products/ systems to enhance the quality of life.
- To inculcate in them the ability to solve societal problems through engineering and professional skills.

PEOS, POS & PSOS

Programme Educational Outcomes (PEOS)

- **PEO 1. Technical Expertise:** Actively apply technical and professional skills in engineering practices to face industrial challenges around the globe.
- **PEO 2.** Higher studies and Research : Own their professional and personal development by continuous learning to create new knowledge.
- **PEO 3. Ethical Knowledge:** Conduct themselves in a responsible, professional and ethical manner supporting sustainable economic development, which enhances the quality of life.

Programme Outcomes (POs)

- **PO 1. Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO 2. Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **PO 3. Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- **PO 4. Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **PO 5. Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- **PO 6. The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- **PO 7. Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **PO 8. Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

Programme Outcomes (POs)

- **PO 9. Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO 10. Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- **PO 11. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- **PO 12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes (PSOs)

- **PSO 1.** Analyze the systems behaviour and optimize for the results using modelling, simulation and experiments.
- **PSO 2.** Design automotive components with due considerations of environment and sustainability.

THE IMPACT OF GREEN SUPPLY CHAIN MANAGEMENT PRACTICES IN THE AUTOMOTIVE INDUSTRY

The paper delves into the realm of green supply chain management (GSCM) practices and their influence on corporate performance within the automotive sector. It scrutinizes the nexus between GSCM strategies and key facets of corporate performance, with a focus on eco-design, corporate social responsibility (CSR) promotion, and corporate social value (CSV) promotion. The study underscores the pivotal role of internal organizational activities associated with GSCM in shaping operational performance and enhancing corporate value within the industry.

Eco-design emerges as a critical driver in augmenting environmental performance for local automotive entities. This encompasses streamlining raw material, accessory, and product design processes, as well as optimizing logistics efficiency and curbing waste gas emissions. The research findings accentuate the positive impact of eco-design endeavors on bolstering environmental sustainability in the automotive landscape.

Moreover, the study elucidates the significance of CSR and CSV promotion in fostering collaboration with consumers and suppliers. CSR initiatives such as deploying corporate social responsibility frameworks and designating individuals to oversee CSR efforts contribute to operational performance and bolster production efficiency. On the other hand, CSV promotion focuses on catalyzing positive economic performance by leveraging strategies like integrating new technologies for enhanced energy efficiency and refining distribution routes to elevate logistics efficiency.

The paper sheds light on the dual-edged nature of GSCM practices, elucidating that while they can yield positive economic outcomes like market share expansion and enhanced customer acquisition, they may also lead to challenges such as increased procurement and training costs. In conclusion, the study advocates for the propagation of GSCM implementation and its alignment with organizational development plans, underscoring the imperative for automotive players to espouse proactive green practices for fostering operational efficiency, environmental sustainability, and economic prosperity.

REFERENCES

[1]. The impact of internal and external green supply chain management activities on performance improvement: evidence from the automobile industry by Xintao Li , Diyi Liu , Zaisheng Zhang, Tongshun Cheng, Li Liu , Jie Yuan, Volume 8, Issue 11, November 2022, e11486.

By
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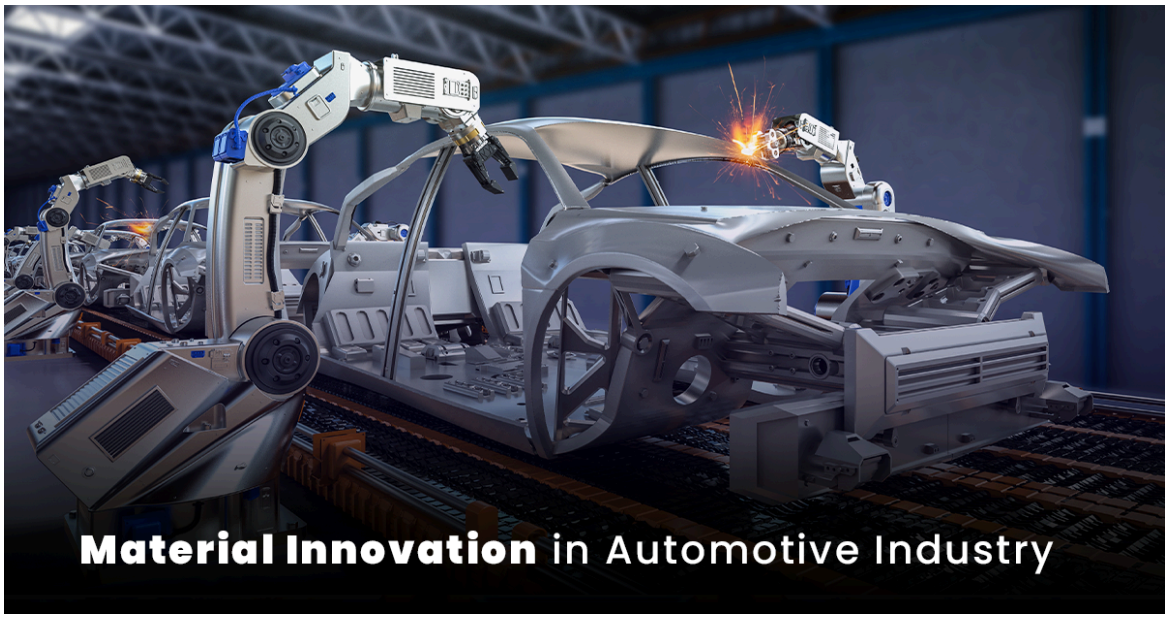
Automobile engineering

INNOVATIVE LIGHTWEIGHT MATERIALS AND ADVANCED MANUFACTURING PROCESSES IN THE AUTOMOTIVE INDUSTRY

The paper provides a comprehensive overview of the use of advanced lightweight materials in the automotive industry to enhance fuel efficiency, reduce emissions, and improve performance. It explores the utilization of materials such as light alloys, high-strength steels, composites, and advanced materials in electric vehicles, discussing their advantages, drawbacks, and potential applications. The importance of developing advanced materials and improving manufacturing processes to create safer, more capable, and environmentally-friendly vehicles is emphasized. Challenges such as cost constraints and the need for cost-effective machining technologies are addressed, with a focus on the high cost of titanium alloys and potential solutions through additive manufacturing technologies for producing titanium components. The paper highlights the significance of material selection for weight reduction and performance enhancement in modern vehicles, as well as the potential applications of advanced materials like metamaterials in future automotive design.



The text delves into various aspects of materials and manufacturing processes in the automotive industry, including mechanical characterization of aluminum alloys, joinability of thermoplastic polymers with aluminum sheets, recent developments in aluminum and magnesium applications, corrosion resistance of alloys, metal recycling for end-of-life vehicles, design for recycling evaluation, and global aluminum flow. Research on titanium alloys, magnesium applications in lightweight powertrains, natural fibers and bio-inspired materials, and advanced materials like metamaterials for impact mitigation and sound insulation in vehicles are also discussed.

REFERENCES

[1].Advanced lightweight materials for Automobiles: A review Wen Zhang , Jun Xu.

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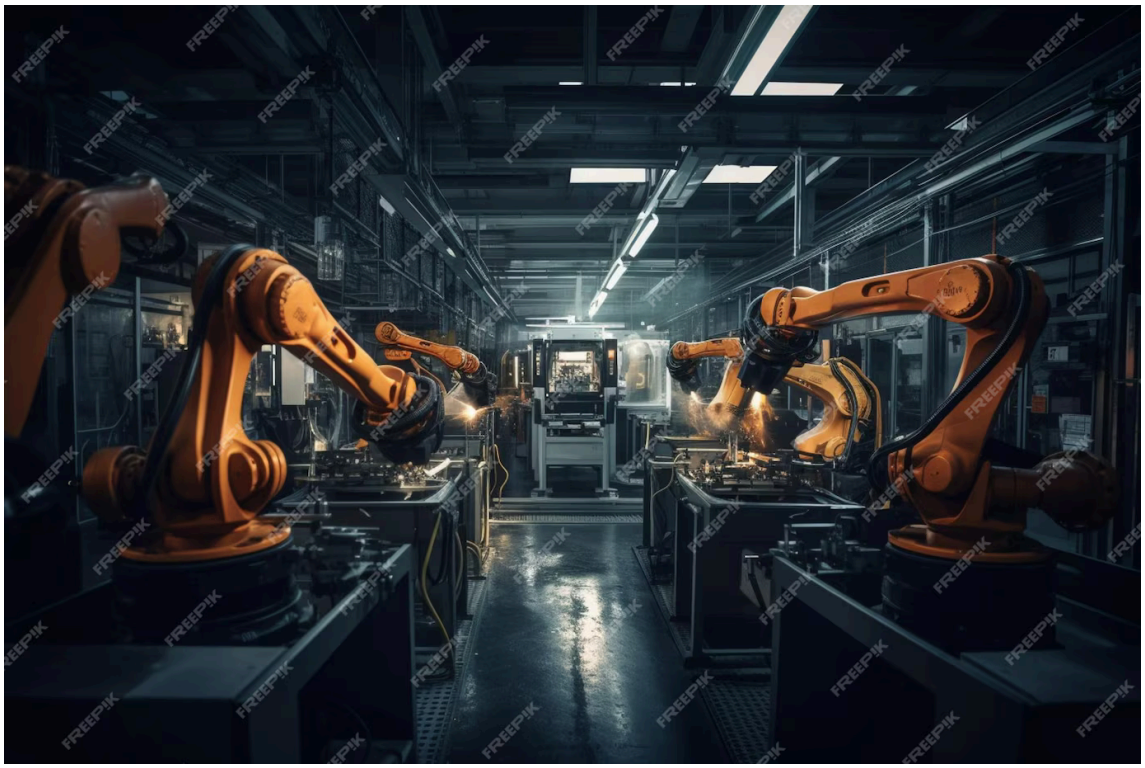
EFFICIENT ENERGY OPTIMIZATION IN ROBOTIC ASSEMBLY LINES: THE MEMORY-BASED CUCKOO SEARCH ALGORITHM APPROACH

The paper discusses the implementation of the Memory-Based Cuckoo Search Algorithm (MBCSA) to address the Robotic Mixed-Model Assembly Line Balancing Problem (RMiMALBP). This problem involves minimizing energy consumption in robotic assembly lines by optimizing task assignments to robots and workstations. The MBCSA incorporates memory to effectively balance diversification and intensification in the search space, enabling it to efficiently explore and find optimal solutions for complex problems. Comparative analysis with Genetic Algorithms and Memory Less CSA demonstrates the superior performance of MBCSA in minimizing energy consumption for larger problems. The algorithm's utilization of a repair mechanism ensures solution feasibility by replacing abandoned solutions with newly generated ones that have better objective values. These new solutions are evaluated based on energy consumption models to determine their effectiveness in optimizing the assembly line balancing.



The experimental results Showcase the promising performance of MBCSA in obtaining good solutions for various instances of the RMiMALBP. By integrating memory and intelligent search mechanisms, the algorithm proves to be a valuable tool in addressing the challenging issue of energy-efficient assembly line balancing in mixed-model production environments. The study highlights the significance of memory-based metaheuristics in optimizing manufacturing systems and contributes to the field of artificial intelligence and optimization.

Overall, the Memory-Based Cuckoo Search Algorithm emerges as an efficient and effective approach for minimizing energy consumption in robotic assembly lines. Its ability to balance diversification and intensification, along with its utilization of memory and repair mechanisms, makes it a valuable tool for solving complex optimization problems in manufacturing systems.

Reference:

[1] Solving the energy-efficient Robotic Mixed-Model Assembly Line balancingproblem using a Memory-Based Cuckoo Search Algorithm

By
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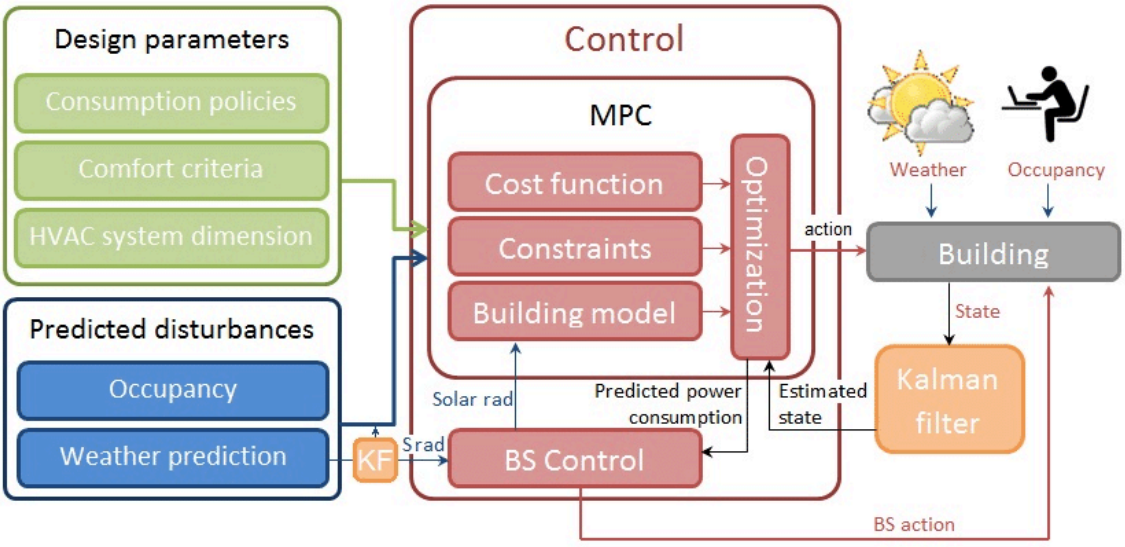
EFFICIENT WAREHOUSE PATH PLANNING USING MODEL PREDICTIVE CONTROL: AVOIDING DEADLOCKS AND OPTIMIZING OPERATIONS

This study addresses the need for automation in warehouse transportation by presenting a path planning method based on Model Predictive Control (MPC) to enhance the efficiency of operations using automated transport robots. Traditional global path planning algorithms, like Dijkstra, are typically combined with MPC to prevent local optimal solutions that can result in robot immobility. However, such approaches rely on detailed map information of the warehouse. To overcome this limitation, the study proposes an MPC-based path planning method that avoids deadlocks without the need for global paths by augmenting the objective function. The method aims to optimize warehouse efficiency for multiple robots by introducing a penalty function based on robot speed to prevent deadlocks and tuning weight matrices to prevent detours. Through numerical simulations, the study demonstrates the effectiveness of the proposed method in generating paths for robots to reach their goals without encountering deadlocks or detours. Future research directions may include enhancing algorithm speed for larger warehouses and addressing deadlock avoidance for dynamic obstacles. Overall, the study provides a novel approach to path planning for warehouse robots, showcasing the potential of MPC in optimizing warehouse operations while avoiding the limitations of traditional global path planning algorithms.



Reference:

[1]A Proposal of Path Planning for Robots in Warehouses by Model Predictive Control without Using Global Paths IFAC Papers Online 55-37 (2022) 573–578

By
DELBIN V D
21BAU323
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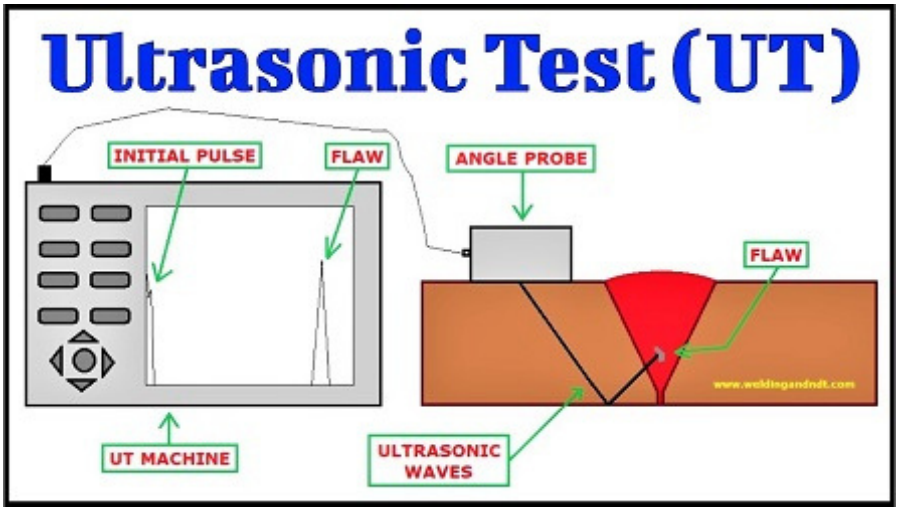
PROJECTS BY STUDENTS

ULTRASONIC TEST

Due to their favorable properties such as high strength-to-weight ratio and excellent corrosion resistance, Aluminium and its alloys are widely used in various industries. Joining aluminium components is crucial in fabrication, and different welding techniques have been developed to achieve strong and reliable weld joints. This abstract presents a comparative analysis of four major welding methods: Friction Stir Welding (FSW), Gas Tungsten Arc Welding (GTAW) Welding, Gas Metal Arc Welding (GMAW), ad Ultrasonic Testing, focusing on their application and effectiveness in aluminium welding. The application of Ultrasonic Testing (UT) for evaluating the quality of weld joints in aluminium is examined. UT is a non-destructive testing method that uses high-frequency sound wavesto detect internal defects and assess the structural integrity of welds. It offers advantages such as real-time inspection, portability, and the ability to detect subsurface flaws, making it a valuable tool for quality control in aluminium welding. This comparative analysis aims to provide an understanding of the strengths, limitations, and application areas of Friction Stir Welding. GTAW, GMAW, and Ultrasonic Testing in aluminium welding.



By
MATHESH S (727621BAU012)
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DESIGN AND SIMULATION OF DUAL AXIS STEERING SYSTEM IN PASSENGER VEHICLE

This project aims to develop a simulation model for the Dual Axis Steering (DAS) system in the BMW M3 competition model using MATLAB Simulink. The DAS system is a novel technology that has been used in Formula One racing to improve the handling and stability of the vehicle at high speeds. By simulating the DAS system in the BMW M3 competition model, we can gain insights into its potential benefits and limitations in a real-world scenario. The simulation model consists of two main blocks: a BMW M3 vehicle block and a DAS system block. The BMW M3 vehicle block is based on a MATLAB code that defines the vehicle dynamics, while the DAS system block is based on a MATLAB code that simulates the DAS system. The two blocks are connected using input and output blocks, including a constant block for the longitudinal velocity and a signal builder block for the lateral velocity, yaw rate, desired steering angle, and previous steering angle inputs to the DAS system block.

The simulation model can be used to analyze the performance of the DAS system in the BMW M3 competition model under different driving conditions and input signals. The model can also be used to explore different control strategies for the DAS system, such as feedback control and model predictive control. These strategies can be used to optimize the performance of the DAS system under different driving conditions and input signals. The simulation model can be a valuable tool for researchers and engineers working on the development and optimization of the DAS system for us in production vehicles. The insights gained from the simulation model can be used to inform the design and development of future DAS systems and to improve the safety, and performance of production vehicles.

By
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THERMAL MANAGEMENT OF LITHIUM-ION BATTERY PACK WITH PHASE-CHANGE MATERIAL

The use of phase change material (PCM) for thermal energy storage is gaining traction as it improves the efficiency of thermal systems. To improve the performance of energy storage systems, dispersing nanocomposite particles in PCMs can improve their low thermal conductivity. The research article addresses the effect of Silicon dioxide nano particles on its thermal conductivity of the octadecanoic acid for thermal storage applications. Four different PCM samples were prepared such as 100 octadecanoic acid, 99.5 octadecanoic acid + 0.5wt %SiO2, 99 octadecanoic acid + 1wt % SiO2 and 98.5 octadecanoic acid + 1.5 wt% SiOz. Different experimental techniques were made on the prepared PCMs to assess its physical and thermal properties using Differential Scanning Calorimetry (DSC), Thermo Gravimetric Analysis (TGA) and Thermal Conductivity. The results revealed that the increase in mass concentration of the nano particles with octadecanoic acid increases the thermal conductivity of samples and provide better thermal conductivity enhancement of octadecanoic acid of 6.89%, 27.5% and 55.3% improvement for 0.5wt %, 1wt % and 1.5wt% of SiO2 nano particles. The outcomes of the research are revealed that thermal properties of octadecanoic acid were significantly increased with the increment of small wt.% of SiO2 nano particles

The thermal conductivity temperature increases in octadecanoic acid are as follows: paraffin +SiO2 0.01%-6.89% W/mK, paraffin +SiO2 0.1%-27.5% W/mK, and paraffin +SiO2 0.25% 55.3%W/mK. Battery pack are temperature are measured for both charging and discharging condition without octadecanoic acid and with octadecanoic acid module it is observed that during charging and discharging the temperature of the octadecanoic acid cooled battery temperature is 63°C and 5.5° C lesser than without octadecanoic acid, octadecanoic acid based cooling system maintains the battery pack temperature below 40°.

By
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NUMERICAL INESTIGATION OF BATTERY THERMAL MANAGEMENT

Battery heat management is critical to energy storage system performance, safety, and lifetime. This research includes a numerical inquiry aimed at thoroughly understanding battery thermal behavior and optimizing thermal management solutions. Ansys simulations are used in the inquiry to analyze heat transmission and temperature distribution within a battery pack.

The study begins with the creation of a sophisticated numerical model that reflects the battery pack's complex thermal behavior. Parameters such as cell geometry, material qualities, and operating conditions are all included in the model. CFD models are run to evaluate the effectiveness of various cooling techniques, such as phase-change materials and fins, in maintaining appropriate temperatures.

The simulations evaluate the impact of various factors on battery temperature management. Cell spacing. cooling flow rate, cooling medium qualities, and external environmental variables are examples of these factors. The numerical studies provide insights into the thermal behavior of batteries under various conditions, allowing for the identification of possible hotspots and locations in need of greater cooling.

Simulation results are used to optimize battery heat management solutions. This includes determining appropriate cooling parameters, including flow rates and configurations, to improve heat dissipation and reduce temperature gradients within the battery pack. Furthermore, the study assesses the impact of temperature management on battery performance, cycle life, and safety, providing important information for the design and operation of battery systems.

Overall, this numerical analysis advances battery thermal management techniques by giving a thorough understanding of battery thermal behavior and directing the development of appropriate cooling systems. The findings can be used by energy storage researchers, engineers, and manufacturers to improve battery heat management and promote efficient and safe operation.

By
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IOT BASED SAFETY SYSTEM FOR SAE - BAJA ATV

This paper proposes an IoT-based safety system for SAE BAJA All-Terrain Vehicles (ATVs) to improve the safety of riders. The system consists of intelligent safety enhancement systemwhich is integrated with the vehicle to collect data on its location, SOS alert, speed, acceleration, and other important parameters. The collected data is then transmitted to a cloud-based server via wireless communication protocols such as Wi-Fi or cellular network. In this project, we have built an IoT based accident detection with the help of Nodemcu ESP8266 Wi-Fi module and a vibration signal which detect the accidents and send an emergency warning message. The system constitutes of single- board embedded system thathas Nodemcu ESP8266 connected to loT. Nodemcu ESP8266 is an open-source based firmware and development board specially targeted for IoT based applications. The proposedsystem also includes a remote monitoring and control feature, allowing the rider's friends, family members, or emergency services to track the location and status of the ATV in case of an emergency. Moreover, the system can also be used to monitor the vehicle's maintenance status and provide proactive maintenance recommendations to ensure its optimal performance and longevity. The experimental results demonstrate that the proposed system is effective in enhancing the safety consideration of ATV riders through Blynk-IoT platformand can significantly reduce the risk of accidents through crash alert system. The system canalso be easily integrated with other IoT devices and platforms, making it highly scalable and adaptable to different types of vehicles and environments.

By
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AUTOMOBILE NEWS

HYUNDAI VERNA REVIEW

The all-new Hyundai Verna is now the most powerful in its segments thanks to its 1.5-litre turbo-petrol engine. Read more in our first drive of the sedan in the April issue of Autocar India.

LAMBORGHINI REVUELTO FIRST LOOK

Internal combustion engines, unfortunately, are on their way out. However, with the Lamborghini Revuelto hybridising the fabled V12, there's hope. Our first look brings all the details.

By
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MG EV FOR THE CITY

MG Motors is mulling a two-door EV for India that will be priced around Rs 10 lakh. Expected to be revealed at the Auto Expo 2023, MG hopes this will be adopted by millennials as a city runabout.

KIA EV6

We drove the Kia's new electric crossover, the EV6, at the Buddh International Circuit and came back impressed.

MERCEDES-BENZ C-CLASS

the footsteps of the S-Class is not easy, but the new C-Class is ambitious. We find out if it can improve upon the standards set by its predecessors.

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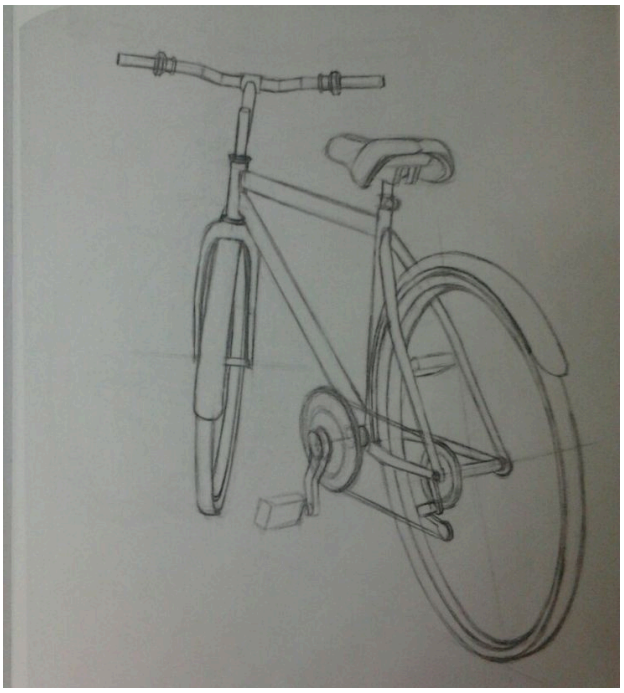

A Pencil Sketch of Bi-cycle

By
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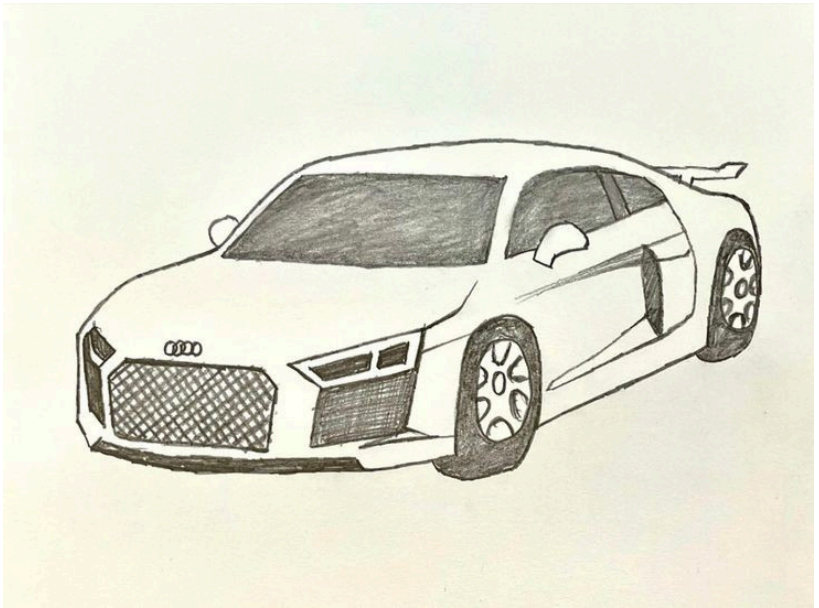

A Pencil Sketch of Audi car

By
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INSIDE THE OLA FUTUREFACTORY

Ola's ambitious mega factory in Tamil Nadu to find out how futuristic it actually

SUZUKI V-STROM SX

We have ridden the Suzuki V-Strom SX, which gets more ground clearance, comfort and off-road capability, and is based on the Gixxer's platform.





DUCATI HYPERMOTARD 950

The Ducati Hypermotard 950 is a confusing bit of kit. It looks like a dirt bike, but everything else reeks of sportiness. We find out what it is all about.

FORMULA E GEN 3 RACE CAR

With the whole world going electric, it is natural that motorsports won't be left far behind. We analyse the gains the latest Formula E cars have made over the previous generations.

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DEPARTMENT OF AUTOMOBILE ENGINEERING

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