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DEPARTMENT OF MECHANICAL ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)



Prof. T. V. Arjunan

HOD, DEPARTMENT OF MECHANICAL ENGINEERING

FROM THE HOD'S DESK

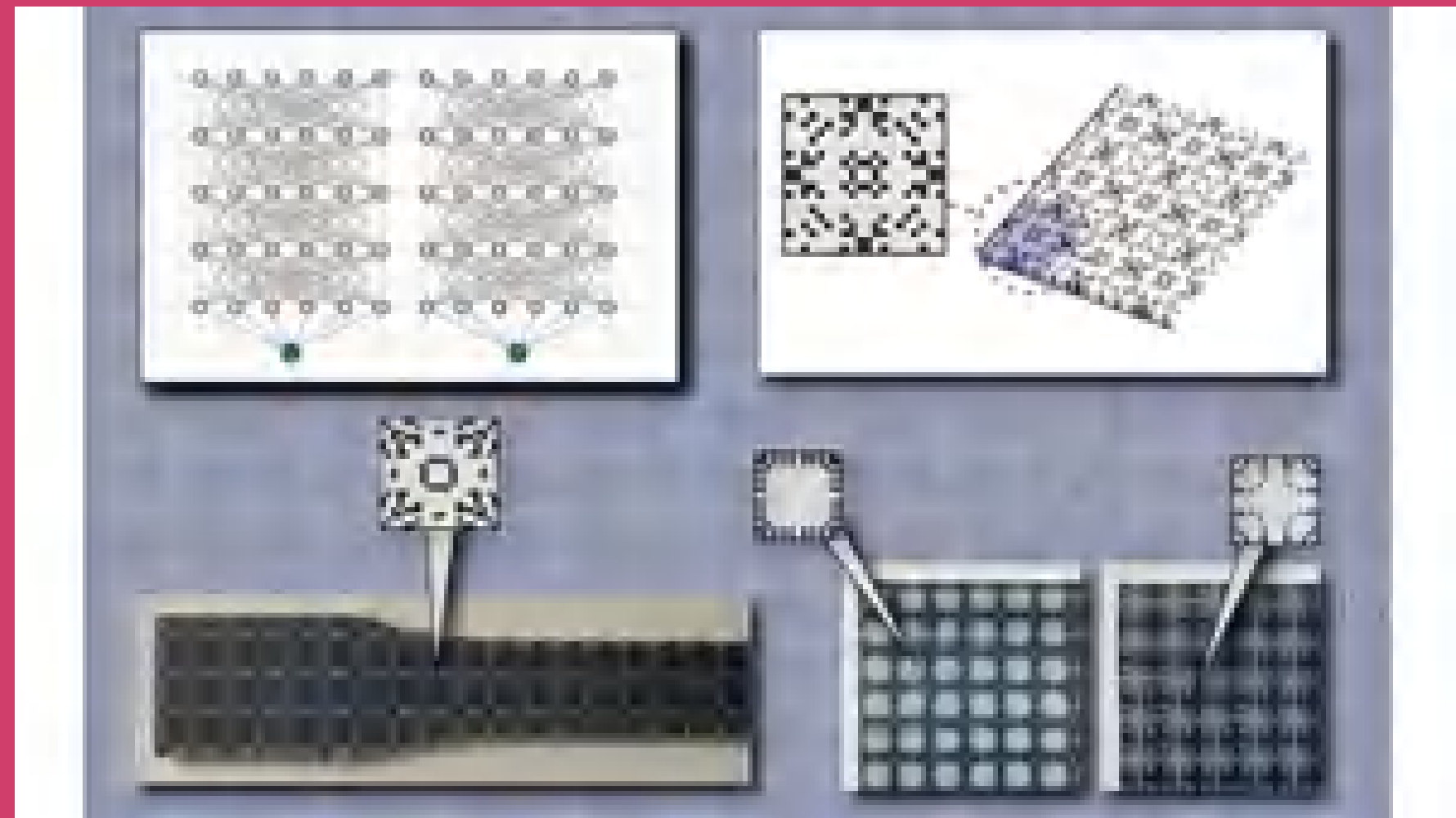
Welcome to the department of mechanical Engineering, Guru Ghasidas Vishwavidyalaya. The department works with the objective of addressing critical challenges faced by the industry, society and academia. Perhaps even more important is our unceasing commitment to our students, helping them to learn, grow, develop, and achieve their goals in their pursuit to excel in their professional career.

Mechanical Engineering is a professional Core engineering discipline that deals with the design, production and maintenance of any product of any industry. The pride of every student and staff would be in his/her department and college. Our department has a team of highly qualified and experienced faculty, good infrastructure and lab facilities. We are striving hard continuously to improve upon the quality of education and to maintain its position of leadership in engineering and technology. We always work with the motto "Nothing can be achieved without genuine effort." The core values of the department help the students to develop their overall personality and make them worthy to compete and work at global level. Our faculty are continuously attending various training programs, publishing research papers, books and filing patents. Many are pursuing research. Our department has been conducting seminar / conferences to keep the faculty and students abreast with the latest developments in the field of technical education. We are happy to share that many students are pursuing higher studies in leading universities in India and abroad. I am certain that our students will prove to be an invaluable asset to an organization.

This newsletter is one of the such effort which will let the students to know about different activities, so that they can heartly involve themselves in various programs of the department.

My warm wishes to the entire team for their excellent work.

An AI system developed at the Massachusetts Institute of Technology (MIT) has discovered tough and durable new materials that could be used in diverse engineering applications.



MIT researchers developed an AI system merging experiments, simulations, and neural networks to discover robust microstructured composites. Lead researcher Beichen Li highlighted the system's adaptability across various fields. Neural networks

served as surrogate models, expediting material design. The process began with crafting and testing 3D printed samples, followed by simulations predicting material characteristics. A key achievement was binding different materials at a microscopic scale, balancing strength and flexibility. The Neural Network Accelerated Multi-Objective Optimization (NMO) algorithm navigated the design landscape, unveiling configurations with optimal mechanical attributes. The workflow iteratively refined predictions, aligning closer with reality. Challenges included maintaining consistency in 3D printing and integrating diverse components efficiently. The team aims to automate the entire process, envisioning fully automated labs. Li emphasized the goal of maximizing efficiency while minimizing human supervision.

Source:INSTITUTION OF MECHANICAL ENGINEERS

Engineered bacteria turn plastic waste into silk

Researchers at Rensselaer Polytechnic Institute have developed a strain of *Pseudomonas aeruginosa* bacteria capable of transforming polyethylene, a common plastic pollutant, into biodegradable silk protein. This "bio-inspired spider silk" resembles natural spider silk in strength, lightweight nature, and biodegradability. Polyethylene, notorious for its slow degradation and widespread environmental pollution, poses a significant challenge, but the engineered bacteria offer a solution by upcycling the waste material. After predi-

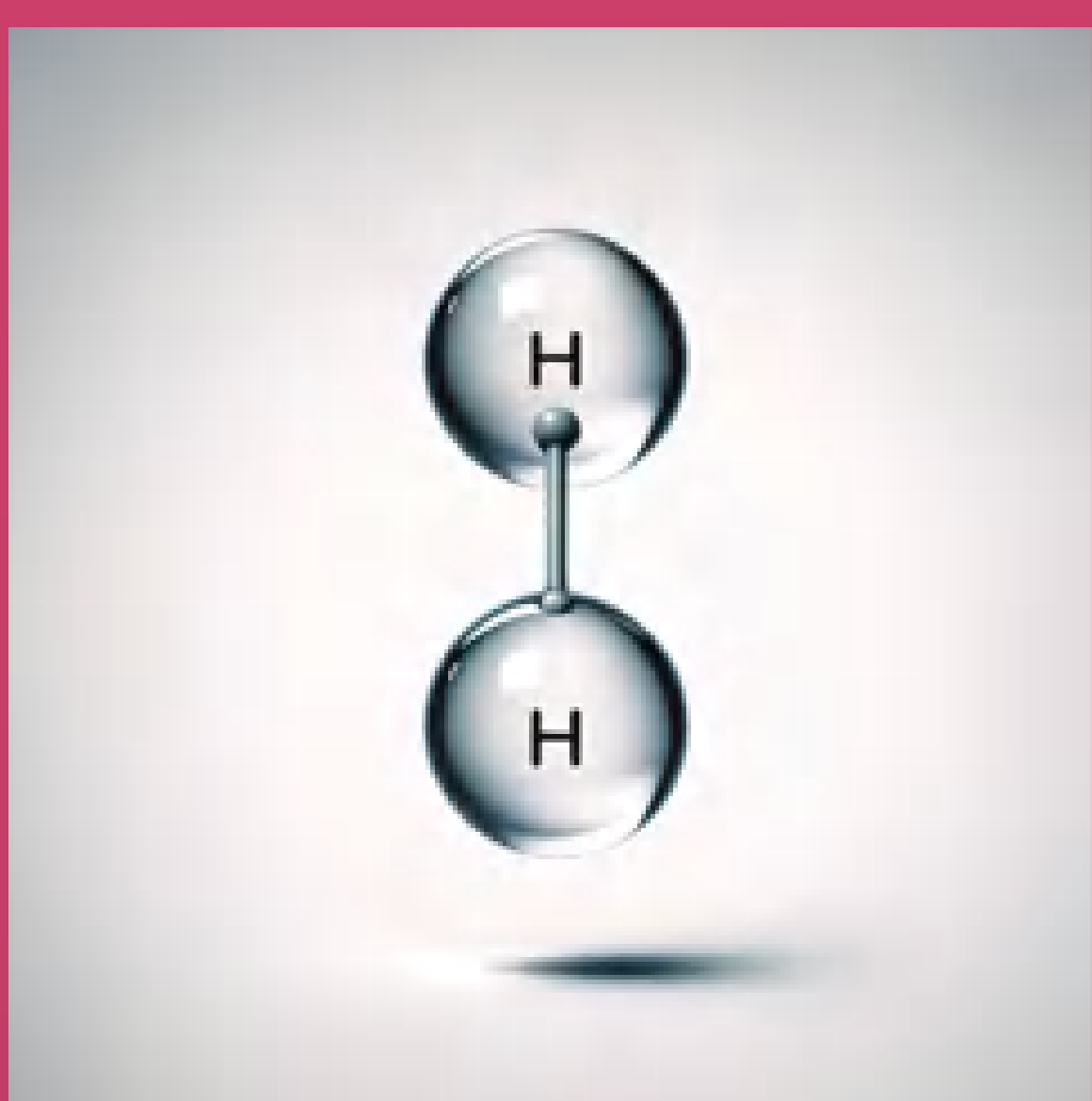


gesting the plastic, the bacteria convert its carbon atoms into silk protein, which can then be purified and processed. The process, which does not involve toxic chemicals and is energy-efficient, presents a sustainable alternative to conventional plastic production methods. Despite the promising results, further optimization is needed to enhance production efficiency before scaled-up manufacturing of upcycled spider silk products becomes feasible. Lead researcher Helen Zha highlighted the potential of harnessing nature's capabilities to address plastic pollution effectively. Future research will focus on refining the bacteria and process to facilitate large-scale production, as outlined by researcher Mattheos Koffas.

Source:INSTITUTION OF MECHANICAL ENGINEERS

The Historical Journey of Hydrogen

The journey of hydrogen as a pivotal element in human understanding and industrial application traces back to the early 16th century when Paracelsus observed the release of a flammable gas during the dissolution of iron in sulfuric acid. However, it wasn't until 1766 that Henry Cavendish identified hydrogen as a distinct element through meticulous experimentation involving acid-metal reactions. Cavendish's foundational work laid the groundwork for comprehending hydrogen's unique properties and its potential applications. Hydrogen's early utilisation manifested notably in the pioneering work of the Montgolfier brothers in the late 18th century, who utilized hydrogen in ballooning, marking its transition from scientific curiosity to practical utility in transportation. The element's lightness and flammability sparked further exploration, leading to its integration into various fields.



Fuel cells, developed in the mid-20th century, revolutionized energy production by efficiently converting hydrogen's chemical energy into electricity. This innovation positioned hydrogen as a prominent contender in the clean energy sector, powering vehicles and providing electricity in remote areas, thereby reducing reliance on fossil fuels.

Moreover, hydrogen's significance extends to industrial processes, particularly in ammonia manufacturing for fertilizers and refining processes for cleaner fuels. Its unique chemical properties render it indispensable in various applications, from reducing metal ores to hydrogenation of fats and oils in the food industry.

However, the Hindenburg disaster in 1937 served as a grim reminder of hydrogen's potential hazards. The catastrophic explosion of the German passenger airship highlighted the element's extreme flammability, leading to a shift towards safer alternatives like helium in airship technology. Hydrogen's flammability, wide ignition range, invisible flames, rapid

flame spread, and high energy content contribute to its classification as a dangerous substance, necessitating stringent safety measures, particularly in industrial settings. The concept of ATEX zones plays a crucial role in managing the risks associated with hydrogen and other flammable substances, ensuring personnel safety and facility integrity.



Furthermore, hydrogen's interaction with metals, notably hydrogen embrittlement, poses challenges in various applications, necessitating ongoing research to develop materials resistant to embrittlement and enhance safety and durability.

Despite its challenges, hydrogen holds immense promise as a clean and sustainable energy source, particularly in the transition towards decarbonization. "Green hydrogen," produced from renewable sources, offers a pathway to reduce carbon emissions, especially in hard-to-electrify sectors like heavy industry and long-haul transportation.

However, significant challenges remain, including the cost of green hydrogen production, logistical hurdles in storage and transportation, and the need for substantial infrastructure development and policy support. Overcoming these challenges requires concerted efforts in research, innovation, and investment from both public and private sectors.

Patent And Publication

➤ Academic Years-2023-2024 (Patent Published):

S.No.	Authors	Patent Types and detail	Patent Description
1.	Sivasubramanian Palanisamy, Dr.Sivakumar Karthikeyan Mrs. Shweta Singh, Dr. P. Ranjith, Dr. Yagya Dutta Dwivedi, Dr. P. Suresh Kumar, M. Sudhakar	(Ref. Application No. 202321030936 A Published on: 17/11/2023	A novel natural fiber composites with enhanced thermal conductivity

➤ Academic Years-2023-2024 (Patent Granted):

S.No	Authors	Patent Types	Patent Description
1.	Dr. M. Veeramanikandan, Dr. D. Sathish, R. Immanual, Dr. R. Thirunavukkarasu, T. Karthickmunisamy and .Dr. T. V.Arjunan	Granted (Reg./Design no.382813-001) Filing dated on 03/04/2023 and Granted on 06/07/2023	Glazed Bed Bi Fluid photovoltaic thermal
2.	IIT (Dhanbad), Ram Krishna, Niranjan Kumar, Pankaj Kumar Gupta and Ajit Kumar	Granted (Registration/ Design No: 366215-001) dated on 16 June'22 and Granted on 26-07-2023	Four-lobed swirl inducing pipe
3.	Dr. T. V. Arjunan, Mr. A. Veera Kumar, Mr. R. Venkatramanan and Dr. D. Seenivasan	Granted (Ref. No: 202121001111) Filed on 11 th Jan'21 and Granted no: 502027 Granted on 23-01-2024	Evacuated solar tube embedded with pierced twisted tape system for heating air
4.	Dr. T. V. Arjunan, Dr. S. Vijayan, Dr. M.M. Matheswaran and Dr. S.P. Anbuudayasankar	Granted (Ref. No: 202041049838) Filed on 16th Nov'20 and Patent Granted no: 515641 Granted on 27/02/2024	Device for heating air using solar evacuated tube
5.	Prof T.V. Arjunan, M.r. A. Veera Kumar, Mr. R. Venkatramanan and Dr. D. Seenivasan	Granted (Ref. No: 202021054885) Filed on 17th Dec'20 and Patent Granted no: 523592 Granted on 12/03/2024	Evacuated tube solar air heater with jet impingement system

Name of the faculty	Title of Journal Paper	Name of the Journal	Year Issue Volume	Impact Factors
Anoop Kumar Sahu	Wang, J., Prabhu, M. , AbatihunAlehegn S , 3 and Sahu, A.K (2023) Environmental Supply Chain Performance Mapping of an Enterprise by Exploring a Novel Vague-Intellectual Approach	Discrete Dynamics in Nature and Society, Hindawi,	Vol. 2023, pp. 1-20	SCIE-IF 2.3
Anbuudayasankar, S.P.	Arjun Krishna, Mithun Suresh, Rohith Sankar P, Mohit V Shah, Anbuudayasankar SP, M.S. Narassima& M. Thenarasu (2023): An analysis of the factors influencing sustainable online food delivery, Journal of Foodservice Business Research	Journal of Foodservice Business Research, Taylor and Francis	-	SSCI, SCIE-IF 4.8
Anbuudayasankar, S.P.	Narassima, M.S., Aashrith, V., Aldo Ronald, C., Anbuudayasankar, S.P. and Thenarasu, M. (2023), "Implementation of lean principles in the yarn manufacturing industry: a system dynamics approach", Benchmarking: An International Journal, Emerald Publication House.	Benchmarking: An International Journal, Emerald Publication House.	doi.org/10.1108/BIJ-05-2023-0324	ESCI+ SCOPUS
Anbuudayasankar, S.P.	Balkumar, K., Gedam, V.V., Himateja, M., Anbuudayasankar, S.P., Narassima, M.S., Ganesh, K., Dwarakanath, M. and Pazhani, S. (2023), "Prevalence and future trend in green supply chain management (GSCM): a systematic literature review", Benchmarking: An International Journal, Emerald Publication House.	Benchmarking: An International Journal, Emerald Publication House.	https://doi.org/10.1108/BIJ-06-2022-0363	ESCI+ SCOPUS
Prof. T.V., Arjunan	Shriwas, S.K, T. V. Arjunan, Manikandan, R. &Mishra, Arpa (2023). Mechanical behaviour of polymer matrix composite reinforced with titanium carbide and cow dung ash ,AIP Conf. Proc. 2492, 040018, https://doi.org/10.1063/5.0114801	AIP Conf. Proc. 2492	pp. 040018	Web of Science+ SCOPUS
Prof. T.V., Arjunan	Arpa Mishra, T. V. Arjunan, R. Manikandam and Sanjeev Shriwas (2023) Study of mechanical behaviour of boron carbide and cow dung ash reinforced polymer matrix composite, AIP Conference Proceeding, Proc. 2492, 040026, https://doi.org/10.1063/5.0114798	AIP Conference Proceeding . Proc. 2492, 040026,	https://doi.org/10.1063/5.0114798	Web of Science+ SCOPUS
Prof. T.V., Arjunan	Thirumoorthy A, Arulraj M, Arjunan T.V., Rajeshkumar G, Kumaravelan R, Venkatesh L. (2023) Investigation of mechanical and wear properties of Al6061/Si3N4/MgO hybrid composite fabricated by stir casting method.Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering;237(3):702-709. doi:10.1177/09544089221105934	Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering.	Vol. 237, No. (3), pp. 702-709. doi:10.1177/09544089221105934	SCI-2.4
Singh, S., & Das, B.	Influence of reduced graphene oxide flakes addition on the electromagnetic wave absorption performance of silicon carbide-	JOM	Vol. 76, pp. 486-495	SCI-2.8

Dr. Pankaj Kumar Gupta	Sharma, N.K., Dewangan, S. K. & Gupta, P.K. (2023) Numerical simulation of three-dimensional circular free turbulent jet flow using different reynolds average navier-stokes turbulence models, <i>Computational Thermal Sciences: An International Journal, Vol. 15, No. 3, 2023, pp. 79-97.</i>	Computational Thermal Sciences: An International Journal,	Vol. 15, No. 3, 2023, pp. 79-97.	SCI-1.5
Dr. Pankaj Kumar Gupta	Krishna, R., Kumar, N., Gupta, P.K. (2023) Numerical study of wall erosion using energy approach for the flow of dense slurry in 90o horizontal pipe bend, Powder Technology, Vol. 426, pp. 118623.	Powder Technology	Vol. 426, pp. 118623.	SCI-7.2

Academic Year-2023-2024				
S. No.	Departmental author/authors	Journal titles vol. and references	Name of the Journals in which publications are made as GGV faculty	Impact Factors
1.	Jasinta Poonam Ekka	Maurya, O.P , Ekka, P.J., Kumar, D., Dewangan, D., Singh, A (2023), Experimental and numerical methods for the performance analysis of a tubular three-pass solar air heater	Energy Volume 283, 15 November 2023, 128640	SCI-IF 9.0
2.	Jasinta Poonam Ekka,	Ekka, P.J and Dewangan, D. (2023) A comprehensive review on recent developments, applications and future aspects of heat pipe-assisted solar collectors	Journal of Thermal Analysis and Calorimetry, 148 11173–11201	SCI-IF 4.8

3.	Anoop Kumar Sahu	Wang, J., Prabhu, M. , AbatihunAlehegn S , 3 and Sahu, A.K (2023) Environmental Supply Chain Performance Mapping of an Enterprise by Exploring a Novel Vague-Intellectual Approach Juan Wang,1 M. Prabhu , 2 AbatihunAlehegnSewagegn , 3 and Anoop Kumar Sahu 4	Discrete Dynamics in Nature and Society, Hindawi, Vol. 2023, pp. 1-20	SCIE-IF 2.3	
4.	Anbuudayasankar , S.P.	Arjun Krishna, Mithun Suresh, Rohith Sankar P, Mohit V Shah, Anbuudayasankar SP, M.S. Narassima& M. Thenarasu (2023): An analysis of the factors influencing sustainable online food delivery, Journal of Foodservice Business Research	Journal of Foodservice Business Research, Taylor and Francis	SSCI, IF 4.8	SCIE-
5.	Anbuudayasankar , S.P.	Narassima, M.S., Aashrith, V., Aldo Ronald, C., Anbuudayasankar, S.P. and Thenarasu, M. (2023), "Implementation of lean principles in the yarn manufacturing industry: a system dynamics approach", Benchmarking: An International Journal, Emerald Publication House.	doi.org/10.1108/BIJ-05-2023-0324	ESCI+	SCOPUS
6.	Anbuudayasankar , S.P.	Narassima, M.S., Gedam, V., Gunasekaran, A., Anbuudayasankar, S.P. and Dwarakanath, M. (2023), "A novel coexistent resilience index to evaluate the supply chain resilience of industries using fuzzy logic", Supply Chain Management, Emerald Publication House.	https://doi.org/10.1108/SCM-05-2023-0218	ESCI+	SCOPUS
7.	Anbuudayasankar , S.P.	Balkumar, K., Gedam, V.V., Himateja, M., Anbuudayasankar, S.P., Narassima, M.S., Ganesh, K., Dwarakanath, M. and Pazhani, S. (2023), "Prevalence and future trend in green supply chain management (GSCM): a systematic literature review", Benchmarking: An International Journal, Emerald Publication House.	https://doi.org/10.1108/BIJ-06-2022-0363	ESCI+	SCOPUS
8.	Prof. T.V., Arjuman	Shriwas, S.K, T. V. Arjuman, Manikandan, R. &Mishra, Arpa (2023). Mechanical behaviour of polymer matrix composite reinforced with titanium carbide and cow dung ash , AIP Conf. Proc. 2492, 040018, https://doi.org/10.1063/5.0114801	AIP Conf. Proc. 2492, 040018,	Web of Science+	SCOPUS
9.	Prof. T.V., Arjuman	Arpa Mishra, T. V. Arjuman, R. Manikandam and Sanjeev Shriwas (2023) Study of mechanical behaviour of boron carbide and cow dung ash reinforced polymer matrix composite, <i>AIP Conference Proceeding</i> . <i>Proc.</i> 2492, 040026, https://doi.org/10.1063/5.0114798	<i>AIP Conference Proceeding</i> . <i>Proc.</i> 2492, 040026, https://doi.org/10.1063/5.0114798	Web of Science+	SCOPUS
10.	Prof. T.V., Arjuman	Thirumoorthy A, Arulraj M, Arjuman T.V., Rajeshkumar G, Kumaravelan R, Venkatesh L. (2023) Investigation of mechanical and wear properties of Al6061/Si3N4/MgO hybrid composite fabricated by stir casting method. Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering;237(3):702-709. doi:10.1177/09544089221105934	Proceedings of the Institution of Mechanical Engineers, Part E: Journal of Process Mechanical Engineering;237(3):702-709. doi:10.1177/09544089221105934	SCI-2.4	

SAE GGV INAUGURATION



Summary

On the 24th of July, 2023 Society of Automotive Engineers club of GGV was inaugurated, the event was organized by the mechanical department of GGV featuring SAE Collegiate club of NIT Raipur who held a workshop and informative session about SAE and its operations. The event aimed to educate and inform the students of GGV about SAE and the opportunities it brings and the experience and learning that the club brings.

Total of 45 people attended the workshop from 1st year to 4th year of mechanical department.

The event kicked off with a warm welcome of all the attendees and the members from SAE NIT Raipur, followed by a motivational speech from DR. T.V Arjunan, the head of mechanical department. Followed by Mr. Bhushan Singh Gautam, Assistant professor of mechanical engineering department, delivered a speech highlighting the importance of the opportunity the club brings to the students.

Then the members of SAE NIT Raipur introduced the SAE club and SAEINDIA with very detailed presentation explaining the different as-



pects of the club, its working, the competition that the club participates in and the technical aspects on how to work in the club and how to build a car. The event ended with a question answer session which was highly interactive with both the hosts and audience actively participating.



Report- Workshop on Engines by SAE



On the 3rd of November, the Society of Automotive Engineering Collegiate Club of Gurughasidas Vishwavidyalaya (SAE-GGV) organized an Automotive Workshop and Info- Session featuring Team Celeritas. This event aimed to educate college-level attendees about the basic workings of cars. First-year students from the Mechanical Department of the year 2023 were invited, and around 53 people participated.

The event kicked off with a warm welcome to all attendees, followed by an encouraging speech from Dr. T.V Arjunan, the Head of the Mechanical Department. Subsequently, Mr. Bhushan Singh Gautam, Assistant Professor of Mechanical Engineering and Faculty In- Charge of SAE-GGV, delivered a motivational speech, highlighting the importance of the SAE- GGV Club to first-year students.



The next segment introduced the SAE-GGV Core Team, allowing each member to introduce themselves and connect with the audience. The technical aspect of the event began with a brief overview of the basics of aerodynamics in race cars, followed by a lecture on car chassis. A short question-and-answer session provided an opportunity for students to actively participate. A subsequent lecture on engines was followed by a hands-on session focused on the practical functioning of a bike engine. The bike engine was borrowed from the Mechanical Engineering Workshop with permission. During the practical session, attendees were guided through the engine's workings step by step, under the supervision of a core SAE-GGV member. After the informative practical session, the event moved into another question-and-answer session where the audience freely asked questions about automotive engines, with the SAE team providing answers. The event was highly interactive, with both the audience and hosts actively contributing. Following the practical session, the event delved into lectures on additional automotive parts such as brakes, suspensions, and the transmission system of a car, marking the conclusion of the technical session. Subsequently, details about the club were

shared with the audience, covering its importance, the opportunities it offers, the registration process, and the club's goals.



This was succeeded by a Question-and-Answer session where some students shared their experiences on stage, and many expressed enthusiasms about joining the club, posing questions that were answered by club members. The event concluded with a brief speech by the hosts, bringing the proceedings to an end.

The Hosting Team for the Event consisted of the following members:

1. Vipul Banjare (Mechanical Engineering Department)
2. Shreyansh Shukla (Chemical Engineering Department)
3. Tarun Ohdar (Mechanical Engineering Department)
4. Vipin Singh Markam (Mechanical Engineering Department)
5. Shelly Vishwakarma (Mechanical Engineering Department)
6. Manav Bharadwaj (Mechanical Engineering Department)
7. Sandeep Sahay (Mechanical Engineering Department)

MECHANICAL ENGINEERING NEWSLETTER

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