



17 - 19 November 2023

**LORD CHARLES HOTEL, SOMERSET WEST,
CAPE TOWN, SOUTH AFRICA.**



3rd International Conference on APPLIED RESEARCH AND ENGINEERING

**Cape Peninsula University of
Technology, Cape Town, South Africa.**

Organized By

The Department of Mechanical
and Mechatronic Engineering.

In Partnership with

The Institute of Aeronautical
Engineering Dundigal, Hyderabad, India.



3rd International Conference on Applied Research and Engineering (ICARAE 2023)
In Partnership with the Institute of Aeronautical Engineering Dundigal, Hyderabad, Telangana, India.



Welcoming Dinner – 16th November 2023

Time: 19:00 PM

Lord Charles Hotel, Garden Terrace, Sommerset West, Cape Town, Western Cape, South Africa.

18:00 PM to 20:00 PM

Dinner with all the delegates (Networking).

17th November 2023

Inaugural Ceremony – 17th November 2023

Time: 09:00 AM

Lord Charles Hotel, Somerset Suite 1, Somerset West, Cape Town, Western Cape, South Africa.

Microsoft Teams Meeting Hybrid Link: [ICARAE2023 LINK](#)

Program Director: Dr Tiyamike Ngonda

Minute-to-Minute Schedule

Opening Remarks..... <i>Dr. S. Mabuwa</i> <i>ICARAE Coordinator</i>	09:00 AM
Assistant Dean: Research, Technology, Innovation and Partnerships..... <i>Prof. V.G. Fester</i> <i>CPUT</i>	09:15 AM
Introducing Keynote Speakers..... <i>Prof. A. Raji</i> <i>Associate Professor, DEECE</i> <i>CPUT</i>	09:35 AM
Vote of Thanks..... <i>Mr. S. Ngabisa</i> <i>HOD - DMME</i> <i>CPUT</i>	09:45 AM
Group Photograph.....	09:55 AM

Coffee Break (10:00 – 10:15 AM)

Keynote Speaker Information

Keynote Speaker 1



Professor João Pedro Oliveira

Affiliation: Professor, Materials Science Department of FCT/NOVA, Portugal.

Research interests: welding and fusion-based additive manufacturing of advanced engineering materials, with a special scientific interest in less conventional engineering alloys such as shape memory and high entropy alloys.

Biography: Professor João Pedro Oliveira is currently an assistant professor at the Materials Science Department of FCT/NOVA, Portugal.

Prior to his current appointment at FCT/NOVA, he was a postdoctoral researcher at the Welding Engineering program of Ohio State University, United States. He did his PhD in laser welding of shape memory alloys at FCT/NOVA while being a visiting researcher at the Center of Advanced Materials Joining of the University of Waterloo, Canada. His research group is heavily invested in the use of high-energy synchrotron X-ray diffraction for fine probing of the material microstructure ex-situ or in-situ. He currently supervises 10 PhD students in the areas of welding and additive manufacturing. He is also an Associate Editor of Additive Manufacturing (Elsevier).

Keynote Speaker 2



Professor Ashish Kumar Srivastava

Affiliation: Associate Professor, Muzaffarpur Institute of Technology (MIT) Muzaffarpur, Department of Science, Technology and Technical Education, Government of Bihar, India

Research interests: 3D Printing (Metal and fibre), Friction Stir Additive Manufacturing (Through Robotic Milling, CNC Milling and Conventional VMC), Wire-Arc Additive Manufacturing (Through Robotic Welding), Friction Stir welding, Friction Stir Processing, Mechanical and Electromagnetic stir casting, Abrasive Waterjet cutting and turning, and Wire electric discharge cutting and turning.

Biography: Prof. Ashish Kumar Srivastava completed his Ph.D. at the Indian Institute of Technology (ISM) Dhanbad, Jharkhand, India, in February 2018.

He is currently working as an Associate Professor in the Department of Mechanical Engineering, MIT Muzaffarpur, Department of Science, Technology and Technical Education, Government of Bihar, India. He is a good learner, and listener and contributed a lot to society through his academics, administration and research work. As a researcher, he has published more than 120 research papers in various journals of repute, indexed in SCI/SCIE/SCOPUS. He has also presented more than 20 research papers at various international and national conferences in India and Abroad. Dr. Srivastava is among the Top 2% of scientists in the world listed by Stanford University USA and Elsevier B.V. in 2022 and 2023. He has successfully completed 2 research-funded projects under the collaborative research scheme of TEQIP-III. Presently received a grant of Rs 10.19 Lacs from the Council of Science and Technology, Uttar Pradesh (CST-UP). Recently he has published 9 Indian patents, which are likely to be granted in the upcoming years. Dr. Srivastava has also worked with the Institute of the Geonics of the CAS, Ostrava-Poruba, Czech Republic and Slovak Research and Development Agency (Slovak Republic) under contract No. APVV-207-12 to carry out his Ph.D. research work related to abrasive waterjet cutting and turning.

Keynote Speaker 3



3rd International Conference on Applied Research and Engineering (ICARAE 2023)

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Professor Ajay Kumar

Affiliation: Associate Professor in School of Engineering and Technology, JECRC University, Jaipur, Rajasthan, India.

Research interest: Incremental Sheet Forming, Artificial Intelligence, Sustainable Materials, Additive Manufacturing, Mechatronics, Smart Manufacturing, Industry 4.0, Waste Management, and Optimization Techniques.

Biography: He received his Ph.D. in the field of Advanced Manufacturing from Guru Jambheshwar University of Science & Technology, Hisar, India after B.Tech. (Hons.) in mechanical engineering and M.Tech. (Distinction) in manufacturing and automation.

He has over 60 publications in international journals of repute, including SCOPUS, Web of Science and SCI indexed database and refereed international conferences. He has organized various national and international events, including an international conference on Mechatronics and Artificial Intelligence (ICMAI-2021) as conference chair. He is currently organising an international conference on Artificial Intelligence, Advanced Materials, and Mechatronics Systems (AIAMMS-2023) as conference chair. He has more than 20 national and international patents to his credit. He has supervised more than 8 M.Tech, Ph.D scholars and numerous undergraduate projects/ thesis. He has a total of 15 years of experience in teaching and research. He is a Guest Editors and Review Editor of reputed journals, including Frontiers in Sustainability. He has contributed to many international conferences/ symposiums as a session chair, expert speaker, and member of the editorial board. He has won several proficiency awards during the course of his career, including merit awards, best teacher awards, and so on. He is an adviser of QCFC, Delhi Chapter student cell at JECRC University and has also authored many in-house course notes, lab manuals, monographs and invited chapters in books. He has organized a series of Faculty Development Programs, International Conferences, workshops, and seminars for researchers, PhD, UG and PG-level students. He is associated with many research, academic, and professional societies in various capacities.

Keynote Address Session 1

Host: Prof. Atanda Raji - Cape Peninsula University of Technology, South Africa.

10:30 AM to 11:15 AM

Professor João Pedro Oliveira

Professor, University of Coimbra, Portugal.

Topic: Development WAAM Variants for Improvement on Microstructure and Mechanical Response in Engineering Alloys.

Technical Session 1 (Reserved)

12:00 AM to 13:00 PM

Session Chair 1: Dr Ajaya Bharti, Motilal Nehru National Institute of Technology, India.

Session Chair 2: Fredrick Mwema, Northumbria University, Newcastle, UK.

11:15 - 11:30

11:30 - 11:45

Title: Mechanical and Tribological Performance of AlCrFeCuNi-(Vx) HEAs Synthesized via Arc Melting technique.

L.R. Kanyanea, Tshwane University of Technology, Pretoria, South Africa

Coffee Break (11:45 – 12:00 PM)

Technical Session 1 (Continuation)

12:00 – 12:15

Title: Comparative Flexural Analysis of Cantilever Beam at Various Loads Using Analytical, Computational and Experimental Techniques.

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	Ashenafi Abuye , Addis Ababa Science and Technology University, Addis Ababa, Ethiopia.
12:15 – 12:30	Title: Study the Wear Behaviour of Al7075/SiC Composite Utilizing the Grey-Based Taguchi Technique. Abhijit Bhowmik , Dream Institute of Technology, Kolkata, India.
12:30 – 12:45	Title: Mathematical Model of Unsteady MHD Couette Flow of Maxwell Viscoelastic Material and Heat Transfer with Ramped Wall Temperature. Victor M. Job , University of the West Indies, Mona Campus, Jamaica.
12:45 – 13:00	Title: Olefin dihydroxylation mediated by Os-Zn-Al hydrotalcite-like catalyst: The scope and reactivity using various co-oxidants. Philani Perfect Mpungose , Cape Peninsula University of Technology, Bellville, South Africa.

Lunch Break (13:00 – 14:00 PM)

Technical Session 2	
13:00 PM to 16:00 PM	
Session Chair 1: Dr. Amlana Panda Assistant - Professor, School of Mech. Eng., KIIT Deemed to be University, India.	
Session Chair 2: Dr. Qiang Jin, Shandong University, Jinan, China.	
14:00 – 14:15	Title: Preparing and studying of Au Nanocomposites Synthesized with different polymer matrix. Kahtan A. Mohammed , Jabir Ibn Hayyan Medical University, Najaf, Iraq.
14:15 – 14:30	Title: Development and Implementation of an Artificial Neural Network for the Simulation of Flood Phenomena in a Natural Area. Evangelos Keramaris , International Hellenic University, Thessaloniki, Greece.
14:30 – 14:45	Title: Electron Microscopy for Materials Characterization: Advances and Applications. Manoj Agrawal , GLA University, Mathura, UP, India.
14:45 – 15:00	Title: Emerging Applications of Advanced Materials Processing in Healthcare and Biotechnology. Shashank Srivastava , GLA University, Mathura, UP, India.
15:00 – 15:15	Title: Topological Optimization of Mining Vehicle Tyre. Peter Müller , University of South Africa, Gauteng, South Africa.
15:15 – 15:30	Title: Fabrication of Functionally Graded Materials through Severe Plastic Deformation of Powders: Process, Significance, and Future Development. Fredrick Mwema , Northumbria University, Newcastle, UK.
15:30 – 15:45	Title: Investigation of Aerodynamic Performance of NACA 4412 Wing with Surface Roughness. Yagya Dutta Dwivedi , Institute of Aeronautical Engineering, Hyderabad, India.
15:45 – 16:00	Title: Fabrication and Characterization of AlCrFeCuNi High Entropy Alloy doped with (Yx) via Arc Melting Technology for Engineering Application. P. Mpofu , Tshwane University of Technology, Pretoria, South Africa.
16:00 – 16:15	Title: Mechanical characteristics and crystallographic texture of AA5083 during Equal Channel Angular Pressing Technique. Nagendra Singh , GLA University, Mathura, India.



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16:15 – 16:30

End Of Day 1

18th November 2023

Keynote Address Session

[Keynote Address Link 2](#)

Host: Prof. Atanda Raji - Cape Peninsula University of Technology, Bellville, South Africa.

09:00 AM to 09:45 AM	Professor Ajay Kumar Associate Professor in School of Engineering and Technology, JECRC University, Jaipur, Rajasthan, India. Topic: Dieless Sheet-Forming Techniques.
10:00 AM to 10:45 PM	Professor Ashish Kumar Srivastava Associate Professor, Department of Mechanical Engineering Muzaffarpur Institute of Technology, India. Topic: Artificial Intelligence Application in Friction Stir Additive Manufacturing.

Coffee Break (10:45 – 11:00 AM)

Technical Session 3

11:00 AM to 13:00 PM

Session Chair 1: Dr. Kahtan Adnan Mohammed, Jabir Ibn Hayyan Medical University, Najaf, Iraq.

Session Chair 2: Prof. Modify Kaunda, Cape Peninsula University of Technology, Bellville, South Africa.

11:00 – 11:15	Title: Optimization of Wire-EDM Process Parameter for Machining of EN-24 Steel in Terms of Surface Integrity and Material Removal Rate. Ashish Goyal , Manipal University, Jaipur, India.
11:15 – 11:30	Title: Influence of Annealing Temperature on the Chemical Composition of Composite Al-Si Coating Deposited via Magnetron Sputtering on ZK60A. Ashish Kumar Singh , AS SMW Group, Riga, Latvia.
11:30 – 11:45	Title: Smart Materials for Sensing and Actuation: State-of-the-Art and Prospects. Toshit Jain , GLA University, Mathura, UP, India.
11:45 – 12:00	Title: In Situ Testing of Materials: Advancements and Opportunities. Manoj Agrawal , GLA University, Mathura, UP, India.
12:00 – 12:15	Title: Bioinspired Composites: Lessons from Nature for Materials Design and Performance. Pankaj Sonia , GLA University, Mathura, UP, India.
12:15 – 12:30	Title: Processing of Advanced Materials for Next-Generation Electronics and Photonics. Avadesh Sharma , GLA University, Mathura, UP, India.
12:30 – 12:45	Title: Machine Learning and Artificial Intelligence for Advanced Materials Processing: Opportunities and Challenges. Shashank Srivastava , GLA University, Mathura, UP, India.
12:45 – 13:00	Title: High-Speed Machining of Difficult-To-Machine Materials: Strategies and Tools. Kuldeep K Saxena , Lovely Professional University, Phagwara, India.

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Lunch Break (13:00 – 14:00 PM)

Technical Session 4	
14:00 AM to 16:30 PM	
Session Chair 1: Dr. Shubham Verma, Shandong University, Jinan, China.	
Session Chair 2: Dr Dhrubajit Sarma, Madanapalle Institute of Technology and Science, India.	
14:00 – 14:15	Title: The Impact of Polymer Matrix Type On the Optical Properties of Silver Nanocomposites. Kahtan A. Mohammed , Jabir Ibn Hayyan Medical University, Najaf, Iraq.
14:15 – 14:30	Title: Enhanced stability of a three-dimensional graphite nanosheets networks S. Simphiwe Nqabisa , Cape Peninsula University of Technology, Bellville, South Africa.
14:30 – 14:45	Title: Eco-Design of Products and Processes: Principles and Tools for Sustainable Manufacturing. Tejendra Singh Singhal , Malaviya National Institute of Technology, Jaipur, India.
14:45 – 15:00	Title: Self-Healing Materials: Mechanisms, Characterization, and Applications. Wasim Akram , Presidency University, Bangalore, Karnataka, India.
15:00 – 15:15	Title: Energy-Efficient Manufacturing: Opportunities and Challenges. M. P. Singh , Jaipur Engineering College and Research Centre, Jaipur, Rajasthan, India.
15:15 – 15:30	Title: Green Machining: Environmental and Economic Impacts of Cutting Fluid. Yogesh Dubey , JECRC University, Jaipur, Rajasthan, India.
15:30 – 15:45	Title: Computational Analysis of a Cruciform Tail Configuration on a Fixed Wing Unmanned Aerial Vehicles. Yagya Dutta Dwivedi , Institute of Aeronautical Engineering, Hyderabad, India.
15:45 – 16:00	Title: Rapid Solidification Techniques for Metal Processing: Microstructure and Properties. Ashish Srivastava , Presidency University, Bangalore, Karnataka, India.
16:00 – 16:15	Title: Advances in Dental Materials: Bioactive Glass and Ceramic Composites. Gaurav Pant , GLA University, Mathura, UP, India.
16:15 – 16:30	Title: Smart Materials in Biomedical Applications: Current Trends and Future Challenges. Vishwesh Mishra , GLA University, Mathura, UP, India.
End of Day 2	

19th November 2023

Technical Session 5

09:00 AM to 11:00 AM

Session Chair 1: Dr. Cebolizakha Leonard Ndlangamandla, University of Zululand, Mpangeni, South Africa.

Session Chair 2: Dr Avinash Ravi Rajah, Shandong University, Jinan, China.

09:00 – 09:15	Title: Exploring the Future of Advanced Materials Processing: Innovations and Challenges Ahead. Avadesh Sharma , GLA University, Mathura, UP, India.
09:15 – 09:30	Title: Micro-milling of Micro-structured Surfaces: Challenges and Opportunities. Bharat Singh , GLA University, Mathura, UP, India.

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09:30 – 09:45	Title: Biomimetic Materials for Regenerative Medicine: Design and Applications. Toshit Jain , GLA University, Mathura, UP, India.
09:45 – 10:00	Title: Hybrid Welding Techniques for Improved Joint Performance. Pankaj Sonia , GLA University, Mathura, UP, India.
10:00 – 10:15	Title: Advancements in Gas Tungsten Arc Welding for Aerospace Applications. Bharat Singh , GLA University, Mathura, UP, India
10:15 – 10:30	Title: Microwave-Assisted Synthesis of Triazine Covalent Organic Frameworks via Friedel-Crafts Reaction for Use in Treating Brackish Water Sabelo Bright Mthembu , University of KwaZulu-Natal, Durban, South Africa.
10:30 – 10:45	Title: The Utilisation of Rice Husk Ash Leachates for the Synthesis of Ecofriendly Geopolymers. ENOH, Maria Kaka Etete , Cross River University of Technology, Calabar, Nigeria.
10:45 – 11:00	Title: FEM Analysis on Thermo-mechanical behavior and experimental validation of Al₂₀Cr₂₀Fe₂₅Ni₂₅Mn₁₀ High Entropy Alloy during Spark Plasma Sintering. Lehlogonolo Rudolf Kanyane , Tshwane University of Technology, Pretoria, South Africa.

Coffee Break (11:00 – 11:15 AM)

Technical Session 6

11:15 AM to 13:00 PM

Session Chair 1: Victor M. Job, University of the West Indies, Mona Campus, Jamaica.

Session Chair 2: Dr. Puleng Biyela, University of Zululand, Mpangeni, South Africa.

11:15 – 11:30	Title: Optimization of bar soap extrusion process parameters through numerical modelling. F.M. Mwema , Northumbria University, Newcastle, United Kingdom.
11:30 – 11:45	Title: Certain Investigation on Feasibility of Developing Riser Less Ductile Iron Castings. Chandramohan Palanisamy , Sri Ramakrishna Engineering College, Coimbatore, India.
11:45 – 12:00	Title: Microstructural characteristics, hardness and tribological behavior of additive manufactured CM247LC nickel super alloy. Chandramohan Palanisamy , Sri Ramakrishna Engineering College, Coimbatore, India.
12:00 – 12:15	Title: Design of Thermal Energy Storage System. Mohamed Nawfal Z. , SASTRA Deemed to be University, India.
12:15 – 12:30	Title: Study on Seismic Performance of Reinforced Concrete High-Rise Building with Buckling Restrained Braces Dissipation Devices. Ravi Kant , Shoolini University, India
12:30 – 12:45	Title: Investigate the Effect of Process Parameters for Weld Bead During Arc Welding Process. Ashish Goyal , Manipal University, Jaipur, India.
12:45 – 13:00	Title: Semi-closed-form solutions of the van der Pol oscillator system. Modify A. E. Kaunda , Cape Peninsula University of Technology, Bellville, South Africa.
13:00 – 13:15	Title: Impact of stack length on performance of standing wave thermoacoustic refrigerator. Patrick Kaja Tshowa Cape Peninsula University of Technology, Bellville, South Africa.

End of Technical Sessions

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Valedictory Ceremony

Time: 14:15 PM

**Lord Charles Hotel, Somerset Suite 1, Sommerset West, Cape Town,
Western Cape, South Africa.**

Program Director: Dr Ncediwe Ndube - Tsolekile

Minute-to-Minute Schedule

Welcome Address..... <i>Dr. V. Msomi, ICARAE Coordinator.</i>	14:15 PM
Declaration of Best Research Papers <i>Dr. S. Sehgal Panjab University, Chandigarh, India.</i>	14:25 PM
Best Presentations Awards..... <i>Dr. Q. A. Mohammed, Jabir Ibn Hayyan Medical University, Najaf, Iraq.</i>	14:35 PM
Acknowledgement of Organizing Team..... <i>Dr. T. Ngonda, ICARAE Committee.</i>	14:45 PM
Vote of Thanks <i>Dr. N. Ndube – Tsolekile, ICARAE Committee.</i>	14:55 PM

Group Photo 15:00 PM

Coffee (15:10 - 15:25 PM)