Editorial

S.G. Ponnambalam*

School of Mechanical Engineering,
Vellore Institute of Technology,
Vellore-632014, India
Email: sgponnambalam@gmail.com
*Corresponding author

Kuppan Chetty Ramanathan

School of Mechanical Engineering,
SASTRA Deemed University,
Thanjavur – 613401, India
Email: kuppanchetty@mech.sastra.edu

Joshuva Arockia Dhanraj

School of Engineering,
Dayananda Sagar University,
Bengaluru – 562112, India
Email: joshuva1991@gmail.com

Mukund Janardhanan

Warwick Manufacturing Group,
University of Warwick,
Coventry – CV4 7AL, UK
Email: Mukund.Janardhanan@warwick.ac.uk

Biographical notes: S.G. Ponnambalam has a 42 years of experience (40 in academia and two in manufacturing as a Production Engineer), is a Senior Professor in Mechanical Engineering at VIT University, India. Previously, he was a Full Professor at Monash University Malaysia (2002–2017) and University Malaysia Pahang (2018–2020). His expertise includes robotic assembly, manufacturing, supply chain management, optimisation, and swarm robotics. He has published over 300 articles and edited key works, such as Industry 4.0 and Hyper-Customized Smart Manufacturing Supply Chains and Innovation Analytics: Tools for Competitive Advantage. He is a Fellow of IMechE (UK), Chartered Engineer, and IEEE Senior Member.

Kuppan Chetty Ramanathan is a Professor of Mechanical Engineering at SASTRA Deemed to be University, with over 20 years in mechatronics and robotics. He holds a PhD in Robotics and Controls from IIT Madras, an MTech in Sensor Systems from VIT, and a BTech in Instrumentation from Madurai Kamaraj University. His research spans cooperative robotics, assistive robotics, industrial automation, and climbing robots. With around 80 publications and numerous patents, he has completed funded projects worth INR 20 million from agencies such as The Royal Academy of Engineering (UK). He is an IEEE Senior Member, IET member, and IEI Chartered Engineer.

Joshuva Arockia Dhanraj is an Associate Professor of Computer Science and Engineering (AI and ML) at Dayananda Sagar University. Previously, he held positions in Mechatronics at Hindustan University and served as a postdoctoral researcher in Environmental Assessment at Prince of Songkla University, Thailand. He holds a BE in Electronics and Communication from Anna University, an MTech in Mechatronics from VIT, an MBA in HR from the University of Madras, and a PhD in Mechanical Engineering (Mechatronics) from VIT. With over 160 publications and numerous patents, his research focuses on AI, machine learning, robotics, and sustainable energy applications.

Mukund Janardhanan is the Head of Sustainable Engineering and Manufacturing at Warwick Manufacturing Group, University of Warwick. Previously, he served as the Director of Education in the School of Engineering at the University of Leicester. With around ten years of experience, – eight in academia and two in engineering consultancy – he holds a PhD in Manufacturing Optimisation from Monash University and was a Post-Doctoral Fellow at Aalborg University,

Copyright © 2024 Inderscience Enterprises Ltd.

Denmark. His research interests include Industry 4.0, manufacturing optimisation, and simulation. A Chartered Engineer and Fellow of the UK's Higher Education Academy, he has published over 60 research papers and contributed to high-impact projects and conferences.

1 Preface

The Fourth International Conference on Robotics, Automation, and Non-destructive Evaluation (RANE – 2023) was held on 5th and 7th August 2023 at Hindustan Institute of Technology and Science (HITS) (Deemed to be University), Chennai, India. This annual event is organised by the Centre for Automation and Robotics (ANRO) at HITS and is sponsored by the Royal Academy of Engineering UK. RANE 2023 attracted approximately 80 research articles focused on robotics, automation, and non-destructive evaluation. All submissions underwent blind review by at least three domain experts, resulting in the selection of 29 research papers for presentation, yielding an acceptance rate of 36%.

Among the 29 papers presented, 11 were recommended by the expert panel for potential publication in the RANE 2023 special issue titled 'Intelligent mechatronic systems and robotics in sustainable development' in the *International Journal of Advanced Mechatronic Systems*. These articles underwent further review by a minimum of two field experts. The synopsis of the articles accepted for publication are presented below.

- 'Electrostatic discharge test automation using Staubli TX2-90 robot presents' the development of an automated ESD testing system utilising the Staubli TX2-90 robot. The robotic system is designed to perform standardised ESD tests on electronic components to ensure their reliability and compliance with industry standards. The integration of precision sensors and control algorithms allows for accurate positioning and handling of components during testing. Experimental results demonstrate the effectiveness of the automated system in improving testing efficiency and accuracy while reducing the potential for human error in ESD assessments.
- 'Development of a low cost structured light 3D reconstruction system' outlines the design and implementation of an affordable system for 3D surface reconstruction using structured light techniques. The system comprises a standard digital camera and a pattern projector, facilitating cost-effective operation.
- 'Enhancing recycling efficiency: a SCARA robot and CNN model for waste segregation' – this study focuses on the design and development of an automated waste segregation system that integrates a SCARA robot with a convolutional neural network (CNN). The CNN model is trained to accurately classify waste items, enabling the SCARA robot to efficiently manipulate and sort various materials. The performance of the system is evaluated through experimental trials, demonstrating significant improvements in sorting speed and accuracy, ultimately contributing to more effective recycling processes.
- 'Smart in-pipe monitoring robot for crack detection' presents the design and development of a robotic system specifically engineered for navigating the interiors of pipelines to detect cracks. The robot is equipped with high-resolution imaging and ultrasonic sensors to assess the condition of the pipeline walls. Through real-time data acquisition, the system can identify and localise cracks effectively, enabling prompt maintenance actions. Experimental results demonstrate the robot's efficacy in enhancing pipeline monitoring and ensuring structural integrity.
- 'Demonstration and analysing the performance of image caption generator: efforts for visually impaired candidates for Smart Cities 5.0' presents the development and evaluation of an image captioning system aimed at assisting visually impaired individuals in navigating urban environments. The proposed generator utilises advanced computer vision algorithms to analyse images and produce descriptive captions that convey essential information about the surroundings. Through comprehensive testing and user feedback, the performance of the system is assessed in terms of accuracy, clarity, and usability. The results highlight the potential of the image caption generator to enhance accessibility and improve the quality of life for visually impaired individuals in smart cities.