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Editorial Corner

Engineering Innovation for Intelligent Systems, Sustainable Infrastructure and Applied Technologies

C. Prathapmohan Nair
International Consultant,
The United Nations (UN-CCD)
Professor of Practice – The IIIC
cpnair@iiic.ac.in | cpnair@gmail.com,

Asha Joseph
Professor, Federal Institute of Science And Technology
Angamaly, Kerala, India - 683577
ashameledath@fisat.ac.in

Rejeesh C.R.
Professor, Federal Institute of Science And Technology
Angamaly, Kerala, India - 683577
rejeeshcr@fisat.ac.in

Engineering research today is being reshaped by the rapid convergence of artificial intelligence, digital technologies and sustainable design. As disciplines increasingly overlap, there is a growing focus on solutions that are not just technically sound, but also practical, scalable and genuinely responsive to real-world needs — from resilient infrastructure and clean energy to smart mobility, healthcare and education.

The seven papers in this issue highlight this change. Though they span different domains, together they show how engineering innovation today is shaped by intelligent systems, digital tools, advanced materials and data-driven methods, all oriented towards efficiency, sustainability and a better quality of life.

The key theme running through this collection is the growing role of artificial intelligence, machine learning, computer vision and IoT in solving everyday engineering problems, with intelligent algorithms increasingly used to automate monitoring and support better decision-making. The paper on automated photovoltaic panel defect detection shows how deep learning, applied to UAV imagery, can improve the maintenance of renewable energy installations by accurately flagging defects.

The same spirit is observed in the pothole detection and traffic signal recognition framework, bringing AI closer to intelligent transportation and driver assistance systems. In another instance, predictive modelling of stress from physiological and lifestyle data extends machine learning into preventive healthcare, while an IoT-based continuous attendance system shows how embedded sensors, biometric authentication and cloud computing can quietly improve everyday efficiency on campus. Together, these studies confirm that AI is no longer a specialised pursuit — it has become a working tool across engineering disciplines, valued as much for practical implementation and user-centred design as for algorithmic accuracy.

A subsequent theme concerns sustainable infrastructure and digital construction. The study on ferrocement jacketing using PVA fibre and PVA powder offers a practical retrofitting technique to extend the service life of ageing reinforced concrete structures. The BIM-based clash detection study addresses the same lifecycle from another end, using digital coordination to reduce design conflicts and rework before construction even begins — different stages, but the same proactive spirit of building smarter and building to last.

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The issue also carries forward research in communication technology, through a planar sub-terahertz bandpass filter based on a cross-arrow slot frequency selective surface, whose relevance will only grow as secure communication, radar and next-generation wireless systems mature.

The defining feature of this issue is its methodological range: experimental work, computational simulation, BIM, deep learning, embedded systems and data analytics all feature, reflecting how meaningful engineering advances today draw as much from computation as from traditional practice. Equally notable is the emphasis on practical validation: prototypes, working models and demonstrated implementation, rather than theory alone, reinforcing engineering's link to real industrial need.

Taken as a whole, these papers speak to what defines engineering research today: interdisciplinarity, technological integration, sustainability and application-driven thinking. They demonstrate that the future of engineering lies not in isolated disciplinary advances, but in the convergence of intelligent systems, advanced materials, digital technologies and human-centred design. They also align closely with several UN Sustainable Development Goals — SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action) — a reminder of engineering's role in building resilient, sustainable solutions to global challenges.

Looking ahead, this line of research would benefit from larger-scale validation, longer field trials and closer collaboration between academia, industry and policy, alongside emerging tools such as digital twins. I hope these contributions spark further interdisciplinary work and inspire solutions that serve both scientific progress and a more sustainable future.