

PREFACE TO THE EDITION

The forthcoming issue of the **International Journal of Technical Research Studies (IJTRS)** presents a diverse collection of research contributions that reflect the expanding scope of contemporary technical innovation. The articles in this volume explore advancements across several key domains of modern engineering and applied technology, including artificial intelligence, cloud-native computing architectures, smart manufacturing, power electronics, and geospatial technologies for sustainable development. Collectively, these studies demonstrate how interdisciplinary technical research continues to drive solutions to complex industrial, computational, and environmental challenges.

A prominent theme in this issue is the integration of artificial intelligence into practical systems and applications. The study on *real-time emotion recognition using lightweight deep learning models* introduces an efficient architecture designed for deployment on resource-constrained edge devices. By combining optimized neural network structures with knowledge distillation techniques, the research demonstrates how advanced affective computing capabilities can be achieved with significantly reduced computational requirements. This work highlights the growing importance of efficient AI models capable of operating in embedded and edge computing environments.

The issue also addresses emerging architectures for scalable machine learning deployment. The article on *cloud-native AI workloads using microservice architectures* explores how modern containerized infrastructures can improve the efficiency and scalability of production-level machine learning systems. Through the use of Kubernetes-based orchestration and modular service design, the study illustrates how decomposing monolithic applications into specialized services can enhance throughput, reduce latency, and improve resource utilization in distributed computing environments.

Advances in smart manufacturing and industrial optimization are represented in the research on *machine-learning-based optimization of CNC machining parameters*. By employing regression models and multi-objective optimization techniques, the study demonstrates how data-driven methods can significantly improve machining performance, reduce tool wear, and enhance surface quality. This contribution illustrates the increasing role of machine learning in modern manufacturing processes and industrial decision-making.

In the domain of power electronics, the comparative analysis of *multi-level inverter topologies for high-power industrial drives* provides valuable insights into the design and performance characteristics of different inverter configurations. Through simulation-based evaluation of harmonic distortion, switching losses, and system efficiency, the study offers practical guidance for selecting optimal inverter topologies in high-power industrial applications.

Finally, the issue extends its focus to sustainable development and urban planning through the article on *GIS-based land-use planning for sustainable urban growth*. By combining remote sensing, multi-criteria decision analysis, and predictive modelling techniques, the study presents an integrated approach for managing urban expansion while preserving ecological and agricultural resources. This research underscores the importance of geospatial technologies in supporting informed decision-making for sustainable urban development.

Together, the contributions in this issue highlight the breadth of technical research addressing both emerging technological frontiers and practical engineering challenges. They demonstrate how advances in computing, manufacturing, energy systems, and geospatial analysis can collectively contribute to more efficient, intelligent, and sustainable technological systems.

The editorial board expresses its sincere appreciation to the authors and reviewers whose expertise and dedication have made this issue possible. We hope that the research presented in this volume will stimulate further innovation and collaboration within the global technical research community.

Dr. Krishna Prasad K
Chief Editor

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