

Editorial

This issue brings together six studies that embody the convergence of technology, engineering, and data-driven decision-making to solve pressing challenges in education, industry, energy, and commerce. Each contribution underscores the role of intelligent systems in shaping more responsive, efficient, and forward-looking environments—whether through targeted skill development, improved semiconductor behavior analysis, operational frameworks for AI integration, or optimized approaches to renewable energy and customer engagement. Together, these works reveal not only technical depth but also a consistent emphasis on actionable outcomes and system-level transformation.

One study focuses on the integration of generative artificial intelligence in higher education to address the gap in students' visual literacy skills. Using a robust quantitative framework, the research compares traditional instructional methods with AI-enhanced learning environments across four universities. The analysis anchored in post-test performance, observation, and student feedback reveals that a significant portion of learners struggle with translating visual information into meaningful outputs. By leveraging generative tools, the study demonstrates improved comprehension and design proficiency, offering a data-backed case for curriculum innovation. These findings highlight the need to integrate contemporary technologies into educational models to meet evolving cognitive demands in the digital era [1].

Another article examines the electrical behavior of AlGaIn/GaN high electron mobility transistors under high-frequency conditions. Specifically, it investigates current collapse recovery times and temperature-dependent transient responses. The experimental results expose a unique relationship between strain-induced defects and electron trapping behaviors influenced by the inverse piezoelectric effect. Observations of variable activation energy further illuminate the dynamics of charge transport and defect states, contributing to a deeper understanding of semiconductor reliability. These insights are vital for advancing GaN-based device performance, particularly in applications that require high efficiency and thermal stability [2].

A third contribution presents a sector-specific framework designed to assess the readiness of shipbuilding enterprises to adopt artificial intelligence. Based on a comparative analysis of leading shipbuilders and a review of more than 50 AI maturity models, the proposed structure introduces a four-tiered roadmap encompassing dimensions like organizational culture, resilience, customer integration, and production efficiency. This approach not only benchmarks technological adoption but links maturity levels with quantifiable outcomes such as production scalability and delivery performance. The model offers strategic recommendations for public-private coordination, skill development, and policy alignment, serving as a critical guide for accelerating digital transformation in a historically traditional sector [3].

In a separate investigation, researchers explore a new model for grid-interactive solar energy compensation by leveraging distributed energy resources in cooperative arrangements. Using cooperative game theory, the model replaces legacy net metering mechanisms with performance-based pricing strategies. These pricing schemes are aligned with energy arbitrage and peak load reduction objectives, allowing utility-led coordination of customer-owned resources like rooftop solar and battery systems. The framework introduces mechanisms such as a Grid Services Set and Grid Services Rider to formalize engagement, while an optimization algorithm manages real-time resource dispatch across operational and market contexts. This study contributes a structured, scalable alternative to grid management and renewable energy integration that supports flexibility, resilience, and equitable value sharing [4].

Another study delves into artificial intelligence applications for fault detection in photovoltaic systems, with an emphasis on explainability and active learning. While AI has been employed for

performance monitoring, this research highlights a critical underutilization of transparent methods that can aid adoption by engineers and stakeholders. Through bibliometric mapping and case analysis, the research identifies key contributors and methodologies, particularly those emerging from China's research institutions. The findings advocate for deeper integration of human expertise in labeling and model training, enabling systems that are not only technically sound but also intuitively interpretable. This shift is essential for enhancing long-term reliability and adoption in solar technology infrastructures [5].

Finally, an extensive machine learning-based analysis is conducted on customer response data from a retail marketing campaign. By employing models such as Random Forest, SVC, KNN, and logistic regression, the research dissects behavioral trends and campaign effectiveness. Pre-processing steps ensured data integrity, while exploratory data analysis revealed correlations between marketing efforts and consumer actions. The insights derived from model evaluation suggest that predictive analytics can uncover non-obvious patterns, informing decisions on campaign targeting and resource allocation. This work consolidates scattered approaches in previous literature, offering a cohesive methodology for retail stakeholders seeking to leverage AI for competitive advantage [6].

This collection of research illustrates how domain-specific innovations—guided by rigorous methodology and strategic foresight—can drive transformation across disciplines. Whether enhancing student skills, refining industrial processes, rethinking energy pricing, or decoding consumer behavior, the studies presented offer practical blueprints for intelligent, sustainable progress. As industries and institutions face rising complexity and digital demands, the value of targeted, explainable, and responsive solutions has never been clearer.

References:

- [1] A. Kristanto, U. Dewi, D. Fitria Murad, Y. iati, S. Dewiki, T. Sevi Nurmanita, "Utilization of Generative Artificial Intelligence to Improve Students' Visual Literacy Skills," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 1–8, 2025, doi:10.25046/aj100301.
- [2] J. Takeda, S. Sano, H. Taguchi, "Characteristics of crystal defects due to the inverse piezoelectric effect in aluminum gallium nitride / gallium nitride high electron mobility transistors," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 10–3, 2025, doi:10.25046/aj100302.
- [3] D. Salian, G. Sandeep Nadella, G. Elkhodari, R. Neouchi, S. Brown, E. Babulak, R. Sbeit, "The impact of digitalization on shipbuilding as measured by Artificial Intelligence (AI) maturity models: a systematic review," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 2025, doi:10.25046/aj100303.
- [4] F. Farhidi, Y. Baghzouz, M. Rusakov, "Cooperative Game Theory for Grid Service Pricing: A Utility-Centric Approach," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 21–28, 2025, doi:10.25046/aj100304.
- [5] F. Dieudonné Mengue, V. Rostand Nwokam, A.S. Tewa Kammogne, R. Yamapi, M. Ngossaha Justin, B. Tsakou Samuel, B. Kamsu Fogue, "Explainable AI and Active Learning for Photovoltaic System Fault Detection: A Bibliometric Study and Future Directions," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 29–44, 2025, doi:10.25046/aj100305.
- [6] khawla Alhasan, "Predictive Analytics in Marketing: Evaluating its Effectiveness in Driving Customer Engagement," *Advances in Science, Technology and Engineering Systems Journal*, 10(3), 45–51, 2025, doi:10.25046/aj100306.

Editor-in-chief

Prof. Hamid Mattiello