Editorial

Advances in Science, Technology and Engineering Journal (ASTESJ) continues to present multidisciplinary research addressing emerging challenges through innovative engineering methodologies and advanced computational techniques. The contributions featured in this issue span biomedical sensing, network optimization, and deep learning for long time-series data, reflecting the broad application of engineering research to healthcare, communication infrastructure, and data-driven prediction. Collectively, these studies demonstrate the importance of systematic evaluation, optimization, and intelligent computational approaches in developing efficient and reliable technological solutions.

Breast microwave sensing represents a promising low-cost alternative for breast cancer screening, particularly in settings where conventional diagnostic technologies may be difficult to access. A controlled experimental investigation examines the influence of antenna design on breast microwave sensing image quality by evaluating six different antennas, including horn, Vivaldi, and ultra-wideband flexible PCB configurations. Through consistent imaging conditions and reconstruction procedures, the study assesses spatial resolution, signal-to-noise ratio, signal-to-clutter ratio, intensity shift invariance, and contrast resolution. The findings demonstrate that antenna gain alone does not determine imaging performance, with antenna footprint and beam pattern also playing important roles. In particular, compact omnidirectional PCB antennas with moderate gain show potential for improving spatial resolution and contrast, highlighting important design considerations for portable and robust breast microwave sensing systems intended for low-resource and remote environments. [1]

The increasing complexity of Network Functions Virtualization introduces a challenging many-objective optimization problem in which quality of service, resource utilization, operational costs, and network performance must be considered simultaneously. A systematic investigation identifies 11 representative objective functions for VNF placement and evaluates R-VEA, NSGA-III, and MOEA/D across multiple network topologies and load conditions. Statistical analyses using Friedman and Wilcoxon tests, together with effect-size evaluation, demonstrate that R-VEA provides the most consistent overall performance, effectively balancing convergence and diversity across the Pareto front. Although MOEA/D demonstrates competitive behavior under specific high-traffic conditions, the overall findings establish R-VEA as a robust approach for the considered many-objective VNF placement problem, with potential benefits for quality of service as well as CAPEX and OPEX reduction. [2]

The increasing application of deep learning to medical and semiconductor time-series data presents significant challenges because such datasets can contain very high sampling frequencies and exceptionally long sequences. A data augmentation approach addresses this challenge by replacing the autoregressive component of TimeGAN with an IndRNN-based architecture for generating long time-series data. Experimental results indicate that the proposed modification maintains strong augmentation capabilities as sequence lengths increase and enables the generation of progressively longer sequences. Its practical application to stock prediction further demonstrates the usefulness of the generated data, particularly for long-sequence scenarios, providing evidence that the approach can support deep learning applications where the availability of sufficiently large long time-series datasets remains a major limitation. [3]

The three contributions presented in this issue demonstrate the breadth of engineering research in addressing practical challenges through systematic experimentation, optimization, and advanced computational methods. From improving the design of microwave sensing systems for

accessible healthcare to optimizing virtualized network infrastructures and addressing data scarcity in long-sequence deep learning applications, the studies provide valuable insights across distinct but increasingly interconnected technological domains. Together, these contributions reinforce the role of engineering innovation in developing efficient, reliable, and application-oriented solutions to contemporary scientific and technological challenges.

References:

[1] G. Fontaine, B. Loewen, S. Pistorius, “The Impact of Antenna Design on Breast Microwave Imaging,” Advances in Science, Technology and Engineering Systems Journal, **11**(3), 1–8, 2026, doi:10.25046/aj110301.

[2] C.J.B. Dominguez, F.A.B. Cantero, L.G.M. Rodríguez, D.P. Pinto-Roa, J.D.C. Sanabria, “Many-objective Placement Optimization in Virtual Network Functions,” Advances in Science, Technology and Engineering Systems Journal, **11**(3), 9–39, 2026, doi:10.25046/aj110302.

[3] L.-C. Lin, M.-C. Yu, C.-K. Chiang, “Enhancing Long Time-Series Data Augmentation with Generative Adversarial Networks,” Advances in Science, Technology and Engineering Systems Journal, **11**(3), 40–48, 2026, doi:10.25046/aj110303.

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