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Editorial

Inaugural Editorial of the Inspire Smart Systems First Issue Publication

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Smart systems are advanced technological frameworks that integrate sensing, computation, data analytics, and autonomous decision-making to operate effectively in complex and dynamic environments [1]. Using several technologies such as artificial intelligence (AI), cyber physical systems, and data-driven modeling, smart systems provide a unified approach for addressing pressing global challenges in a wide variety of domains [2]. A key attribute of smart systems is their ability to convert heterogeneous large-scale data into actionable intelligence that enhances operational efficiency, resilience, and sustainability across diverse application domains.

In the context of energy systems, smart technologies are frequently positioned as enablers of the transition toward renewable and low-carbon infrastructures [3]. For example, solar-based energy harvesting has benefited from intelligent monitoring, adaptive control, and predictive optimization techniques. However, managing intermittency, environmental variability, and system degradation over time is needed for sustainability. Current research studies suggest that real-time sensing combined with AI-driven analytics can enhance reliability and lifecycle performance, although questions remain regarding scalability and governance in large deployments [4]. The integration of advanced analytics into systems therefore reflects an ongoing shift from reactive operation toward proactive energy management.

A significant advancement in proactive smart system management is the application of digital twin (DT) technology. DTs are virtual representations of physical systems that synchronize in real time to support monitoring, predictive maintenance, and performance optimization. By combining sensor data, system models, and AI, DT-enabled smart systems improve operational efficiency and reduce lifecycle costs for renewable energy assets such as solar farms and grid components. DTs are increasingly considered a cornerstone of next-generation smart grid and energy infrastructures, providing enhanced situational awareness across distributed energy resources [5].

Beyond technical infrastructures, smart systems are reshaping socio-economic sectors such as healthcare financing. Data-driven analytics can uncover catastrophic health spending, income disparities, and out-of-pocket healthcare burdens. Data-driven assessment tools, including statistical models and visualization platforms, help policymakers identify inequities, estimate risk exposure, and design targeted interventions aimed at expanding coverage and financial protection for vulnerable populations [6-7].

Urban logistics represents another area where smart systems are frequently proposed as a solution to growing complexity. Recent research highlights the potential of AI, Internet of Things platforms, and real-time data integration to support predictive routing and adaptive fleet management [8]. At the same time, comparative studies

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show trade-offs between learning-based methods and traditional heuristics, suggesting that performance gains are often context-dependent rather than universal.

Success for smart systems depends on how secure these systems are against the cyberattacks. Ethical AI principles such as transparency, fairness, and accountability are also essential to ensure responsible automation and trustworthy detections in real-world systems [9]. This inaugural issue of Smart Systems journal presents some of the contributions in the different areas related to smart systems.

The first contribution focuses on energy harvesting within a miniature solar cage, examining how variations in light intensity influence voltage generation and residual energy under controlled illumination. By limiting background and indirect light sources, the study exposes pronounced reductions in internal illumination at lower thresholds, thereby contributing to discussions on minimum viable energy levels for sustainable harvesting and plant growth.

The second contribution develops a DT–based management framework for photovoltaic systems through the modeling and experimental validation of a 60 W monocrystalline solar panel. Employing the Single Diode Model with parameters identified via a hybrid Particle Swarm Optimization and Powell’s method, the resulting MATLAB/Simulink implementation demonstrates close alignment with observed I–V and P–V characteristics across varying irradiance conditions. These results suggest the model’s applicability for forecasting and fault detection, while also underscoring the importance of accurate parameter identification.

The third contribution investigates healthcare financing practices among informal sector households in Akwa Ibom, Nigeria, with particular attention to income, health expenditure, borrowing behavior, and insurance participation. The findings indicate persistent dependence on out-of-pocket payments and limited insurance uptake, reinforcing broader evidence on financial vulnerability and the need for more inclusive risk-pooling mechanisms.

The fourth contribution addresses the Vehicle Routing Problem in last-mile logistics by contrasting a reinforcement learning approach based on Proximal Policy Optimization with the Ant Colony Optimization heuristic. Results obtained from benchmark datasets indicate that PPO achieves comparable or improved routing performance with substantially faster inference in dynamic, large-scale scenarios, whereas ACO retains advantages primarily in static environments. This comparison highlights ongoing methodological trade-offs between adaptive learning and heuristic robustness.

The fifth contribution examines fake account detection as a contemporary cybersecurity challenge. Using non-content metadata and behavioral indicators, a Random Forest–based supervised learning model achieves high classification accuracy with low inference latency. The results support the viability of metadata-driven approaches for real-time deployment, while aligning with current discussions on responsible and ethically grounded AI-based security systems.

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List of Contributions:

1. Khan, M. A., Maricle, B., Franzel, Z. D., Gransden, G., & Vannette, M. (2026). Partial Energy Harvesting Study of Solar Energy in a Microworld by Artificial Illumination. *Inspire Smart Systems Journal, 1*(1), 1-8.
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