Editorial

In the dynamic fields of renewable energy, electrical safety, network simulation, and vehicular ad-hoc networks (VANETs), groundbreaking research is paving the way for technological advancements and practical applications. These editorial reviews four impactful papers that contribute to these diverse yet interconnected domains, highlighting their innovative approaches and significant findings.

The first paper focuses on the Taïba Ndiaye wind farm in Senegal, which plays a crucial role in balancing the national grid by offsetting electricity shortfalls with its 158.7 MW installed capacity. Given the intermittent nature of wind power, the study emphasizes the need for accurate forecasting methods to predict wind generation and optimize the transition between renewable and fossil energy sources. By employing machine learning models—specifically decision tree and random forest—the authors achieve high coefficients of determination (0.92 and 0.938, respectively), demonstrating the reliability of their forecasting approach using production data. These findings promise substantial improvements in resource management and energy planning, facilitating a smoother transition to renewable energy [1].

The second paper addresses the critical issue of electrical safety in household appliances, specifically focusing on bathing water heaters. Traditional heaters pose a significant risk of electrocution if the copper tube covering the heating element corrodes and allows water to contact live electricity. The study proposes an innovative solution using a microcontroller to control water flow into a glass container heated by a microwave oven. This method eliminates the risk of electrocution, as there is no direct electrical contact with the water. This research offers a safer alternative for heating bathing water, highlighting the importance of safety innovations in everyday appliances [2].

The third paper explores the educational applications of network simulation tools, essential for teaching computer networks and communication protocols. The study evaluates five prominent network simulators—Cisco Packet Tracer, Riverbed Modeler Academic Edition, GNS3, NS-3, and Mininet—assessing their functionality, user-friendliness, and suitability for educational purposes. By comparing their operational capabilities and effectiveness, the authors provide valuable insights into each simulator’s strengths and weaknesses. This comprehensive analysis helps educators choose the most appropriate tools for enhancing students' learning experiences in networking education [3].

This paper delves into the realm of Vehicular Ad-hoc Networks (VANETs), focusing on the development of realistic simulation tools to study vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) interactions. The authors introduce Simulator Bridger, which integrates IoTSim-OsmosisRES with the SUMO traffic simulator to create a realistic VANET environment. Their analysis reveals a near-perfect correlation between communication dataflows and vehicle battery consumption, highlighting the impact of increased communication activity on overall energy use. The study proposes future research directions, including traffic rerouting based on battery consumption optimization, offering a deeper understanding of energy management in VANETs and paving the way for more efficient vehicular networks [4].

In summary, these four papers collectively advance our understanding of renewable energy forecasting, electrical safety in household appliances, network simulation for educational purposes, and energy-efficient VANETs. The innovative solutions and practical applications presented in each study underscore the importance of continuous research and development in addressing contemporary challenges. As technology continues to evolve, interdisciplinary research remains crucial in driving progress and enhancing the safety, efficiency, and sustainability of our technological systems.

References:

[1] S. Diop, P. Silly Traore, M. Lamine Ndiaye, I. Zerbo, “Using Artificial Intelligence Models to Predict the Wind Power to be Fed into the Grid,” *Journal of Engineering Research and Sciences*, vol. 3, no. 6, pp. 1–9, 2024, doi:10.55708/js0306001.

[2] P. Karunakaran, M.S. Osman, B.H. Hossain, “Microwave and Microcontroller Technology to Achieve Warm Water Bathing,” *Journal of Engineering Research and Sciences*, vol. 3, no. 6, pp. 10–17, 2024, doi:10.55708/js0306002.

[3] N. V Oikonomou, D. V Oikonomou, “Educational Applications and Comparative Analysis of Network Simulators: Protocols, Types, and Performance Evaluation,” *Journal of Engineering Research and Sciences*, vol. 3, no. 6, pp. 18–32, 2024, doi:10.55708/js0306003.

[4] R. Almutairi, G. Bergami, G. Morgan, “SimulatorBridger: System for Monitoring Energy Efficiency of Electric Vehicles in Real-World Traffic Simulations,” *Journal of Engineering Research and Sciences*, vol. 3, no. 6, pp. 33–40, 2024, doi:10.55708/js0306004.

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