

Editorial

The continuing evolution of technology, from the historical development of computing systems to the implementation of modern intelligent solutions, reveals the multidisciplinary character of contemporary research. These papers collectively illustrate the critical intersections of security, transport, networking, and optimization in today's dynamic environments. Whether addressing road safety, data privacy, energy consumption, or network reliability, each study represents a unique contribution to the progression of engineering knowledge and its practical implications for society.

A detailed narrative on the evolution of computing technology is presented through the development of a dedicated exhibit at the University of Florence. Tracing the lineage from rudimentary calculating tools such as slide rules to the advent of personal computers, microprocessors, and electromechanical calculators, the study serves as a curated journey through the milestones of computer history. Unlike traditional museums, this exhibit is tailored for engineering students, offering them insight into the rapid pace and depth of technological advancement. The expanded material enriches the academic experience by contextualizing past innovations that form the foundation of present-day computing [1].

Secure and anonymous acknowledgment mechanisms in communication protocols are explored in a study that focuses on ad-hoc and Delay-Tolerant Networks (DTNs). Unlike conventional TCP acknowledgments, the proposed model uses cryptographically generated acks embedded within encrypted messages to ensure both message integrity and anonymity. These acks are distributed through peer-to-peer forwarding without revealing sender or receiver identities. An innovative feature includes the use of hashed message IDs, enabling nodes to manage cache memory efficiently by identifying delivered messages without compromising privacy. This system demonstrates how privacy-preserving communication can coexist with robust data delivery across intermittently connected networks [2].

Traffic classification under real-world conditions benefits from a fuzzy logic-based framework that interprets flow, occupancy, and speed data to determine road congestion levels. Applied to the freeway between Padua and Venice, the fuzzy approach is shown to outperform deterministic models in delivering more intuitive feedback to drivers. By embracing human-like reasoning and uncertainty, the system aligns with the way drivers perceive traffic, thus enhancing its practicality for real-time traffic management. The MATLAB implementation confirms the system's ability to improve classification accuracy and offers a new perspective for managing dynamic transport environments [3].

Ensuring sufficient pavement friction is vital for road safety, particularly in braking and turning scenarios. This study compares the performance of Calcined Bauxite an expensive but high-friction material with several cost-effective local alternatives such as Meramec River Aggregate, Flint Chat, and Steel Slag. Through laboratory tests, including dynamic friction, British Pendulum measurements, and aggregate imaging, the research identifies viable substitutes with comparable frictional properties. Key variables such as aggregate size and surface texture are linked to friction performance, offering a cost-efficient pathway for infrastructure development without compromising road safety [4].

The performance of interior gateway protocols (IGPs) in large-scale enterprise networks is critically analyzed through simulation using a tri-connected topology. The study evaluates protocols such as RIP, EIGRP, OSPF, and IS-IS across metrics like convergence time, delay, and jitter. Notably, EIGRP exhibits superior performance in delay and convergence, while IS-IS outpaces OSPF in convergence speed. This investigation enhances current understanding by offering a statistical computation framework for jitter analysis and optimizing protocol selection in complex network scenarios. The experimental setup, simulated in GNS3, provides a realistic foundation for future enterprise-scale deployments [5].

To address the persistent challenge of rear-end collisions due to unsafe following distances especially under adverse weather conditions—a novel Arduino-based intelligent driver-assistance system is developed. By integrating sensors for distance and rain detection, along with a computational algorithm for speed adjustment, the system dynamically adapts recommended speeds in real time. Trials conducted in various environments across Bahrain confirm the model's adaptability and effectiveness. This intelligent system not only enhances vehicular safety but also introduces an accessible, affordable solution for reducing accident rates on busy roads [6].

The pressing need for energy efficiency in wireless sensor networks (WSNs) is met by this bibliometric analysis focused on energy optimization algorithms (EOAs). Drawing data from the Web of Science and analyzing trends between 2019 and 2023, the study identifies key research themes and evaluates popular protocols such as PSO and LEACH. Using tools like VOSviewer, the analysis maps out collaborative networks, keyword occurrences, and co-citation patterns, shedding light on the depth and direction of research in this domain. The findings highlight promising avenues for improving WSN performance and call attention to underexplored optimization techniques for future exploration [7].

This collection reflects the dynamic and multifaceted nature of engineering research today. From preserving the legacy of early computing machines to engineering smart, safe, and efficient systems in the modern world, each study affirms the importance of bridging theoretical understanding with real-world applications. Together, they exemplify the enduring relevance of innovation, interdisciplinary thinking, and systemic resilience in shaping a technologically responsible future.

References:

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Editor-in-chief

Prof. Paul Andrew