

## Editorial

We are pleased to present this issue featuring 11 accepted research articles that showcase recent advances across a diverse range of topics in science and engineering.

The issue opens with Okeke and Eze's paper exploring the impact of self-regulated learning strategies on the academic performance of physics students in secondary schools in Nigeria [1]. Using a quasi-experimental design, they found that students taught with self-regulated learning methods had significantly higher test scores compared to those taught using conventional teaching methods. These results highlight the potential benefits of self-regulated learning approaches to improve physics education outcomes.

Shifting focus to the realm of online education, Lin and colleagues present a case study examining student perceptions and learning outcomes using the game-based learning platform Kahoot in an online crop production course [2]. Their findings indicated that Kahoot quizzes were effective for reinforcing both theoretical knowledge and visual plant species identification, while also being enjoyable for most students. This provides insight into effective online active learning tools.

In the computer science domain, Kadappan et al. introduce a novel framework of value trace problems to support the self-study of code reading and comprehension skills in C programming [3]. Through evaluations with university students across three countries, they found that these problems allowed efficient independent practice and helped students overcome challenges in understanding complex code snippets. Such resources have high utility for novice programmers.

Turning attention to space technology, Kiryushin outlines conceptual solutions for a sodium-potassium-cesium cooled nuclear fission reactor designed for providing power on the Martian surface [4]. Through modeling and simulations, the author proposes innovative cermet fuels along with a two-circuit energy conversion system using carbon dioxide. This work lays important groundwork for enabling long-term colonization of Mars.

Shifting focus to social issues in technology, Almaiah et al. provide a comprehensive review of the numerous ethical concerns arising from increased use of social media platforms [5]. Ranging from threats to privacy and questionable content to mental health effects and cybercrimes, the authors highlight major areas society must address to develop solutions and policies that reduce adverse impacts. This will continue to be a crucial area needing further research and discussion.

In applied materials science, Garcia-Valenzuela and colleagues report on the deposition and characterization of amorphous carbon nitride thin films onto copper substrates using a DC pulsed sputtering technique [6]. Through structural and morphology analyses, they demonstrate the ability to synthesize CN films with island-like structures, elucidating the growth mechanisms. Such coatings have potential uses in mechanical and electronic devices.

Moving to thermal-electric energy systems, Eleyinmi's article provides extensive theoretical analysis alongside MATLAB simulations of thermoelectric generators (TEGs) and coolers (TECs) [7]. Determining optimal operating points to maximize efficiency, the author highlights the nonlinear relationships between currents, cooling/heating powers and other factors. The models developed offer useful tools for designing efficient thermoelectric systems.

Targeting improved reliability of electrical grids, Abdelaziz and Valles propose a novel algorithm for precisely locating faults in high-voltage transmission lines [8]. By leveraging electromagnetic transient dynamics, their method overcomes limitations of impedance-based fault localization

approaches. Simulations demonstrate 98.9% accuracy in detecting distance to faults, enabling rapid repairs and service restoration.

In another modeling contribution, da Silva Junior et al. present an approach to estimating nonhomogeneous thermal conductivity along a metallic bar using Fourier's heat transfer equation [9]. By propagating uncertainty from measurement errors, they obtain upper and lower bounds on the estimated conductivity values. This demonstrates an effective data-driven strategy for inferring material thermal properties.

Rounding out the issue, Boukhatem et al. examine integrating particle swarm optimization techniques to enhance the performance of sliding mode controllers for maximum power point tracking in photovoltaic systems [10]. Compared to classical sliding mode control, the particle swarm optimization method achieved higher precision and faster convergence in simulations. Hybridization of bio-inspired metaheuristics with conventional control methods shows strong promise.

Gritti et al. present an improved publicly verifiable proof scheme for enforcing data replication and retrievability in cloud storage systems [11]. By integrating verifiable delay functions, their method enables any third-party auditor to efficiently validate that files and replicas are correctly stored by cloud providers. This work enhances security and accountability for remote data storage services.

Overall, the excellent array of papers compiled in this issue exemplify high-quality research contributing novel techniques, frameworks and solutions across STEM fields. We hope these studies will inspire and inform future work by the research community to push forward the boundaries of knowledge and technology innovation. We thank the authors for entrusting their manuscripts to our journal and the reviewers for their diligent evaluations ensuring the highest standards.

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**Editor-in-chief**

**Prof. Passerini Kazmersk**