Editorial

In the editorial for this issue, the focus is directed towards the overarching theme of interdisciplinary collaboration and its profound impact on shaping the landscape of contemporary research. The editorial team provides a thoughtful introduction, emphasizing the synergies that emerge when researchers from diverse fields converge to address complex challenges. It underscores the importance of fostering cross-disciplinary dialogue to propel innovation and broaden the horizons of knowledge. Throughout the editorial, the symbiotic relationship between various scientific domains is explored, highlighting the interconnectedness that characterizes the modern research ecosystem. This introductory piece sets the tone for the collection of 20 papers, each offering a unique perspective and contributing to the rich tapestry of interdisciplinary exploration showcased in this special issue.

In the realm of industrial collaboration, a recent study delves into the nuanced art of musical saw bowing. The research focuses on the bowing motion, a critical element often employed by skilled players. While previous efforts have concentrated on sound feedback systems using mallet strike techniques, this study takes a unique approach. It explores the control of pressure and speed between the bow and the musical saw, aiming to achieve skilful manipulation. The investigation not only considers the sound generated by self-excited vibration but also emphasizes its inherent purity, distinct from prior studies focused on suppression. Moreover, the study showcases the adept use of an industrial collaborative humanoid robot in skilfully manipulating a musical saw with a bow [1].

Deep learning takes centre stage in another article, exploring its application in monitoring complex technical systems. The study utilizes analytical and numerical methods to model and simulate multidimensional chaotic systems. Emphasizing the Visual Thinking methodology, the research integrates visual images and calculated parameters into the Input Layer of the Recurrent Neural Network of the Deep Learning algorithm. This strategic combination enhances the quality and efficiency of monitoring complex technical systems, showcasing the potential for advanced control and interpretation [2].

A case study delves into the electrification challenges faced by remote regions, focusing on Upper Blink Water in South Africa, approximately 20km away from the national grid. The study proposes a hybrid energy system integrating solar photovoltaic (PV), a diesel generator, and battery storage. Through the use of Homer software for technical evaluations and Reticmaster software for assessing distribution line voltage drops, the results demonstrate the feasibility of supplying electricity to the isolated community. The study provides valuable insights into electricity cost optimization and diesel fuel consumption for off-grid electrification [3].

Cybersecurity in power systems takes a front seat in an article proposing an improved model to analyze the impact of cyber-attacks. The ICAPS model addresses both frequency disturbances and voltage disruption during load changes, incorporating various controllers such as LFC, AGC, AGC-PID, AVR, and AVR-PID. Through MATLAB Simulink tool experiments, the model's validity is confirmed, revealing the consequences of cyber-attacks on frequency deviations, voltage disruptions, and system oscillations. This holistic approach stands as a significant contribution to addressing the simultaneous challenges posed by cyber threats in power systems [4].

Amidst energy crises and the evolving landscape due to the COVID-19 pandemic, a study assesses the impact of integrating solar PV systems into the grid. Using the Equal Area Criterion

(EAC) method for transient stability analysis, the research focuses on power quality and stability challenges. Through MATLAB/Simulink simulations, the critical clearing time (CCT) is calculated, highlighting the positive impact of solar PV integration on the national grid's transient characteristics. The study adds a critical perspective to the ongoing discourse on sustainable energy solutions and their integration into existing power infrastructures [5].

In the realm of healthcare, a cross-sectional study investigates the effect of a flexible knee orthosis (FKO) on lateral thrust in patients with knee osteoarthritis. Leveraging a wireless 3-axis accelerometer, the study analyzes lateral thrust during walking with varying orthosis wearing pressures. The findings suggest that increased wearing pressure reduces lateral thrust, pointing to the potential effectiveness of knee orthosis in inhibiting lateral thrust in patients with knee osteoarthritis. This research contributes valuable insights into non-invasive interventions for managing knee-related conditions [6].

The semiconductor industry comes into focus with an exploration of layout arrangements for CMOS oscillators. The study evaluates various layouts, highlighting the superiority of the serpentine style in minimizing output variation on silicon. Post-layout simulations and physical fabrication validate the effectiveness of the serpentine layout style over straight and staggered alternatives. This research addresses critical challenges in CMOS oscillator realization, promising improved performance and stability on silicon [7].

Stochastic processing times in agile manufacturing take centre stage in a study conducting sensitive analysis in holding and penalty costs for the stochastic sequencing problem. Through simulation algorithms, the study compares dispatch rules, revealing the robustness of the Shortest Processing Time (SPT) rule. This research offers insights into the relationship between holding-penalty cost proportions and the most effective dispatch rules for optimizing job scheduling in agile manufacturing environments [8].

The integration of solar PV-thermal power systems is explored in-depth in another article, which proposes a model for load frequency controllers and introduces various auxiliary controllers. The study assesses controller performance using different tuning strategies and incorporates an HVDC link for stability enhancement. By focusing on stabilizing frequency and tie-power deviations, the research provides a valuable contribution to the efficient control of interlinked solar PV-thermal power systems [9].

In the mining industry, a paper presents the calibration of Discrete Element Method (DEM) parameters for modelling phosphate ore clogging. The study introduces a model contact for defining particle-cluster and particle-tipper surface interactions. Calibration methods based on repose angle determination contribute to accurate simulation, offering insights into optimal parameters for modelling phosphate clogging phenomena. This research addresses challenges in various industries by providing a reliable model for understanding and mitigating ore clogging [10].

Recognizing the challenges of video transmission in Vehicular Ad-Hoc Networks (VANETs), a study proposes a self-adaptive routing algorithm (RSAR). Leveraging the mobility characteristics of vehicles, RSAR aims to create reliable routes based on link reliability and adaptability to changing network topology. The algorithm combines heuristic Q-Learning with a decentralized network, demonstrating its effectiveness through simulations in the NS-2 environment. This research contributes to the ongoing efforts to enhance real-time video transmission in dynamic vehicular networks [11].

The design of cascade control systems for photovoltaic (PV) powered microgrids takes centre stage in another article, focusing on DC grid-connected systems. The study evaluates three cascade schemes, including digital control, model-based predictive control (MBPC), and a hybrid approach [12].

Results indicate that the combined scheme, integrating classical control with MBPC, achieves optimal stabilization of microgrid voltage with fast response and minimal overvoltage. This research offers valuable insights into the design and control strategies for enhancing the stability of PV-powered microgrids [13].

Countering the challenges of people counting in crowded spaces, a study proposes a system for automatic counting of passengers in train stations. Utilizing overhead fisheye cameras and a multi-object tracker, the system analyzes passenger trajectories to compute total train occupancy. The proposed approach demonstrates robustness against occlusions and achieves a high accuracy of counting people getting on and off trains. This research contributes to the development of intelligent systems for public transportation management [14].

Analyzing Morocco's energy mix from 2010 to 2050, a study simulates the country's electricity production trajectory. The research critically evaluates strategic decisions made at the onset of Morocco's National Energy Strategy, emphasizing the potential need for reconsideration of technology choices. This study provides a valuable contribution to the understanding of long-term renewable energy development strategies in the absence of traditional energy resources, offering insights into sustainable energy planning [15].

Efforts to reduce computational efforts in sensor and actuator networks take a sophisticated turn with a focus on model order reduction. The study decentralizes a global multi-input-multi-output system in a sensor and actuator network, resulting in multiple decentralized local single-input-single-output systems. Model order reduction techniques, including Balanced Truncation and Krylov subspace methods, are employed to minimize computational loads on decentralized nodes while preserving system properties. This research stands as a promising approach for efficient state estimation in distributed systems [16].

In the domain of EEG analysis, a novel approach introduces a machine learning algorithm for detecting artifacts in Event-Related Potential (ERP) data during an oddball paradigm. Unsupervised learning algorithms, including DBScan, are applied to identify noisy epochs, ensuring the production of a cleaner ERP dataset. By minimizing the impact of non-EEG components, this research enhances the reliability of ERP studies, contributing to improved neuroscientific insights [17].

The application of blockchain technology in the retail and insurance sectors is scrutinized through an analysis of Suning and PingAn as pioneers in implementing blockchain solutions. Using the TOE framework, the study explores success factors and highlights the impact of blockchain on digital transformation. Emphasizing industry-specific features, the research provides insights into the competitiveness of Chinese blockchain providers on the global stage, shedding light on the evolving landscape of retail and insurance with blockchain integration [18].

Text mining techniques take centre stage in a comprehensive review focusing on knowledge discovery from e-news articles. The study explores association rule extraction using two prominent algorithms, Apriori and FP-Growth. Assessing their performance in e-news article analysis, the research provides valuable insights into the use of association rules for knowledge

discovery, addressing the challenges posed by vast textual information available on the internet [19].

Navigating the complexities of battery management, a study introduces a hybrid neural network method for predicting the State-of-Health (SOH) and Remaining Useful Life (RUL) of Lithium-Ion batteries. Integrating Convolutional Neural Networks (CNN), Bidirectional Gated Recurrent Units (BGRU), and Deep Neural Networks (DNN), the proposed method aims to enhance precision in estimating battery conditions. Validation using NASA datasets demonstrates the effectiveness of the hybrid approach in achieving high estimation accuracy for improved battery performance management [20].

In summary, these 20 papers encapsulate a diverse range of cutting-edge research topics. From the nuanced art of musical saw bowing by humanoid robots to the strategic integration of blockchain technology in retail and insurance sectors, the studies contribute significantly to fields such as energy systems, manufacturing, healthcare, and information technology. These research endeavours collectively showcase the interdisciplinary nature and continuous advancements in contemporary research, offering valuable insights into the ever-evolving landscape of scientific exploration.

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