

# Edge of excellence: JEC's Scopus achievement, doors 2025 breakthroughs, and Volume 4 Issue 1 (2025) highlights

Serhiy O. Semerikov<sup>1,2,3,4,5</sup>, Tetiana A. Vakaliuk<sup>3,2,1,5</sup>

<sup>1</sup>Kryvyi Rih State Pedagogical University, 54 Universytetskyi Ave., Kryvyi Rih, 50086, Ukraine

<sup>2</sup>Institute for Digitalisation of Education of the NAES of Ukraine, 9 M. Berlynskoho Str., Kyiv, 04060, Ukraine

<sup>3</sup>Zhytomyr Polytechnic State University, 103 Chudnivsyka Str., Zhytomyr, 10005, Ukraine

<sup>4</sup>Kryvyi Rih National University, 11 Vitalii Matusevych Str., Kryvyi Rih, 50027, Ukraine

<sup>5</sup>Academy of Cognitive and Natural Sciences, 54 Universytetskyi Ave., Kryvyi Rih, 50086, Ukraine

**Abstract.** This editorial highlights recent edge computing advancements from the doors 2025 workshop and JEC Volume 4, Issue 1, while celebrating the journal's acceptance into Scopus. The paper examines innovative solutions addressing distributed systems challenges, including IoT-based monitoring systems, intelligent traffic prediction algorithms, and security implementations for resource-constrained environments. Architectural frameworks like Akka for smart grids and edge-deployed large language models represent significant technological developments. The editorial acknowledges Scopus indexing as recognition of the journal's scientific integrity and the collaborative efforts of the editorial community. It demonstrates how edge computing continuously evolves to optimise resources, reduce latency, and enhance security across diverse networked ecosystems.

**Keywords:** edge computing, Scopus indexing, IoT systems, doors 2025, distributed architectures, resource optimisation, MQTT messaging, large language models, smart grids, Akka framework, traffic prediction, edge security, FPGA optimization, environmental monitoring

## 1. Introduction

In recent years, edge computing has emerged as a transformative paradigm in distributed systems, bringing computation and data storage closer to where they're needed. This approach reduces latency, conserves bandwidth, and enhances privacy by processing data locally rather than sending everything to distant cloud servers. The field continues to evolve rapidly, with researchers addressing challenges in resource management, security, and application development.

This article examines the key contributions from doors 2025 workshop and the Journal of Edge Computing, Volume 4, Issue 1, highlighting breakthrough technologies, emerging trends, and potential applications of edge computing in the coming years.

## 2. doors 2025: an overview

doors 2025 workshop, its fifth iteration, brings together academics and industry experts to advance edge computing research. Organised by Zhytomyr Polytechnic State University and the Academy of Cognitive and Natural Sciences, this peer-reviewed international event explores the rapidly evolving field of edge computing (figures 1 and 2).

✉ 0000-0003-0789-0272 (S. O. Semerikov); 0000-0001-6825-4697 (T. A. Vakaliuk)

✉ [semerikov@acnsci.org](mailto:semerikov@acnsci.org) (S. O. Semerikov); [tetianavakaliuk@acnsci.org](mailto:tetianavakaliuk@acnsci.org) (T. A. Vakaliuk)

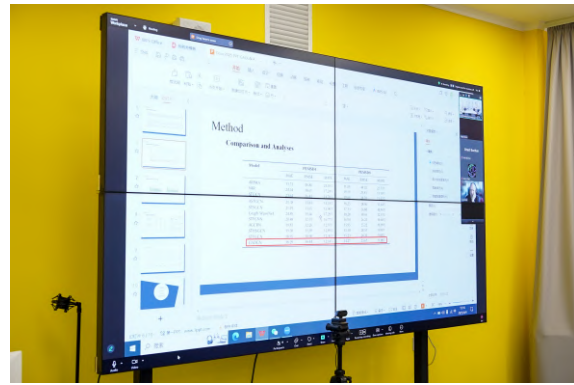
🌐 <https://acnsci.org/semerikov> (S. O. Semerikov); <https://acnsci.org/vakaliuk> (T. A. Vakaliuk)



© Copyright for this article by its authors, published by the Academy of Cognitive and Natural Sciences. This is an Open Access article distributed under the terms of the Creative Commons License Attribution 4.0 International (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.



(a)



(b)



(c)



(d)



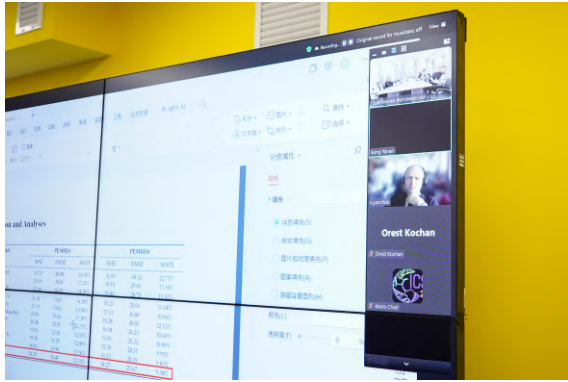
(e)



(f)

**Figure 1:** doors 2025 (part 1).

Edge computing moves data processing closer to where it's needed – at devices, sensors, and user endpoints – rather than relying solely on centralised cloud infrastructure. This approach has become essential with the proliferation of IoT technologies that require minimal latency, stronger privacy protections, and real-time processing capabilities. The 2025 edition received 28 paper submissions, with 13 accepted for publication – 9 as full papers and 4 as shorter contributions [17]. Research presented includes solutions for climate monitoring systems, regression analysis for atmospheric data, and advanced traffic flow prediction algorithms.



(a)



(b)



(c)



(d)

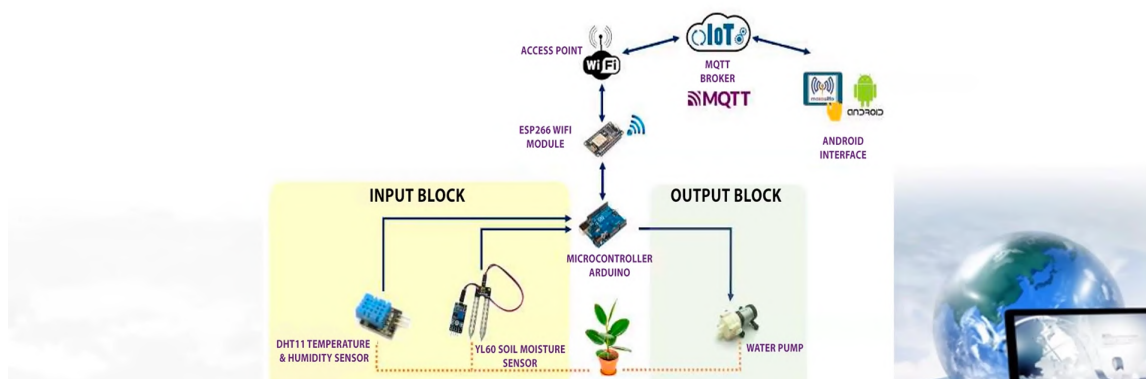
**Figure 2:** doors 2025 (part 2).

Prasol et al. [9] presents an innovative approach to plant care through edge computing and IoT technology (figure 3). The work addresses the growing need for technological solutions in maintaining indoor plants, especially relevant for remote workers. Their solution combines modern technologies, including MQTT protocol for efficient device communication, edge sensors for environmental monitoring, and solar power for autonomous operation. The system architecture integrates hardware components that collect temperature, humidity, and light data with a sophisticated software stack featuring PostgreSQL for user management, InfluxDB for time series data, and Redis for performance optimisation. The functional prototype includes an intuitive mobile application allowing users to register plants via QR codes or Bluetooth, visualise real-time metrics through an informative dashboard, and receive timely care recommendations.

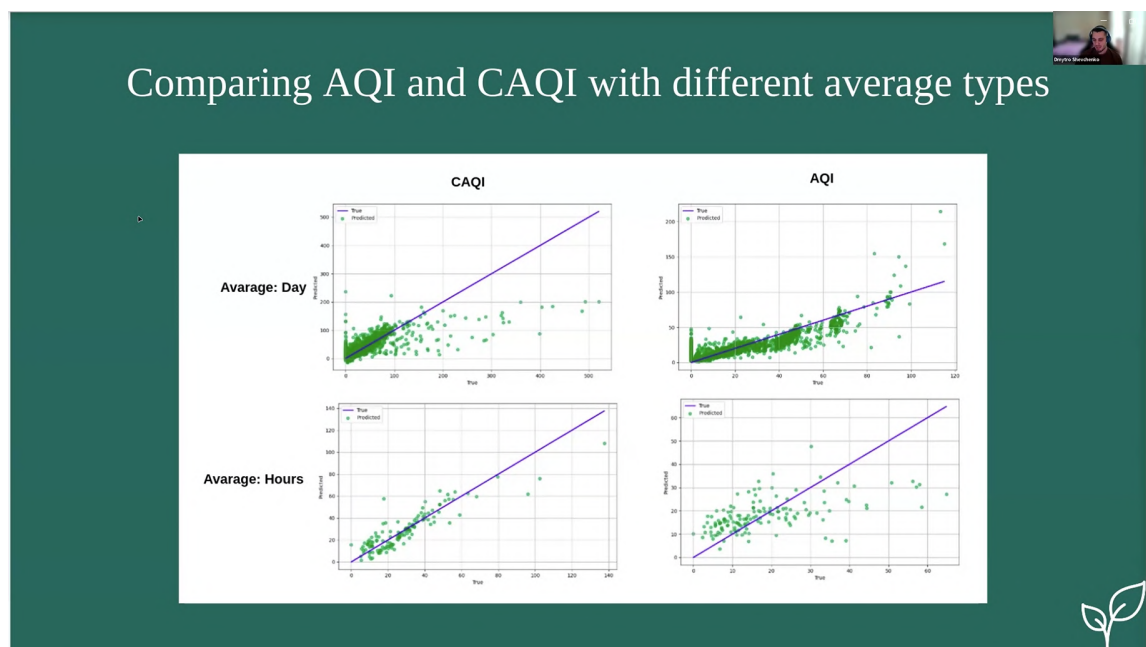
Shevchenko and Holub [13] presents a study on using regression analysis to identify patterns in atmospheric air monitoring data collected through IoT-based systems (figure 4). The authors investigate how meteorological conditions affect air quality indices. The study emphasises the critical importance of air quality monitoring for environmental safety and public health. The researchers developed a system architecture that integrates IoT edge devices with data collection platforms, including municipal monitoring stations, community initiatives like SaveEcoBot, and MQTT servers. The data is stored in PostgreSQL databases. Their methodology focuses on applying ordinary least squares regression to analyse relationships between key



## Research methodology



**Figure 3:** Excerpts from the paper presentation [9].



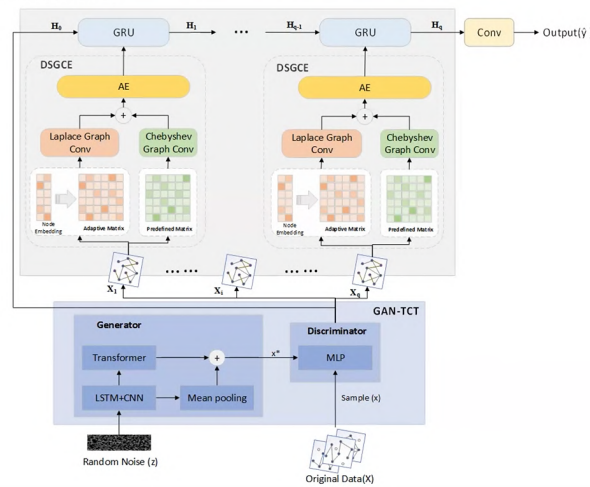
**Figure 4:** Excerpts from the paper presentation [13].

atmospheric parameters (temperature, humidity, wind speed, and radiation) and air quality indices – specifically the Air Quality Index used in the USA and the Common Air Quality Index used in Europe. They created a custom analytical module using Python’s StatsModels library that allows for flexible parameter configuration across different time frames and monitoring stations.

Song, Wei and Liu [15] presents a novel approach to predicting traffic flow using a combination of advanced neural network architectures (figure 5). The authors identify two key limitations in existing traffic prediction models: the inability to properly handle missing data in sensor readings and the shortcomings of using only a single graph structure to capture traffic relationships. The proposed Generative Adversarial Dual Graph Network model addresses these issues through two main components. First, it uses a Generative Adversarial Network-Transformer-CNN Fusion module to fill in

## Method

### Model Overall Architecture



**Figure 5:** Excerpts from the paper presentation [15].

missing values in traffic data by combining a long short-term memory network, a convolutional neural network, and a transformer to capture both temporal and spatial patterns in the data. Second, it introduces a dual graph convolutional fusion coding mechanism that simultaneously processes both static predefined graph structures (based on prior knowledge) and dynamic adaptive graph structures (generated through node embeddings).

Chaban et al. [3] presents a novel approach to improving cardiac MRI classification in edge computing environments (figure 6). The authors identify primary obstacles in cardiac MRI classification, including domain shifts across heterogeneous datasets, limited annotated data, and privacy regulations. These challenges are particularly

**Background: Cardiac MRI in Cardiovascular Diagnosis**  
Importance and Challenges

**Importance of Cardiac MRI:**

- ▶ Vital non-invasive tool for assessing cardiac structure, function, and pathology.
- ▶ Crucial for timely and accurate diagnosis to improve patient outcomes.

**Challenges in Automated Analysis:**

- ▶ **Domain Shift:** Data heterogeneity from different scanners/protocols hinders model generalization.
- ▶ **Data Scarcity:** Limited availability of large-scale annotated datasets due to expert effort and cost.
- ▶ **Privacy Concerns:** Regulations restrict data sharing, limiting dataset size and diversity.

**Figure: Example Cardiac MRI Scan**

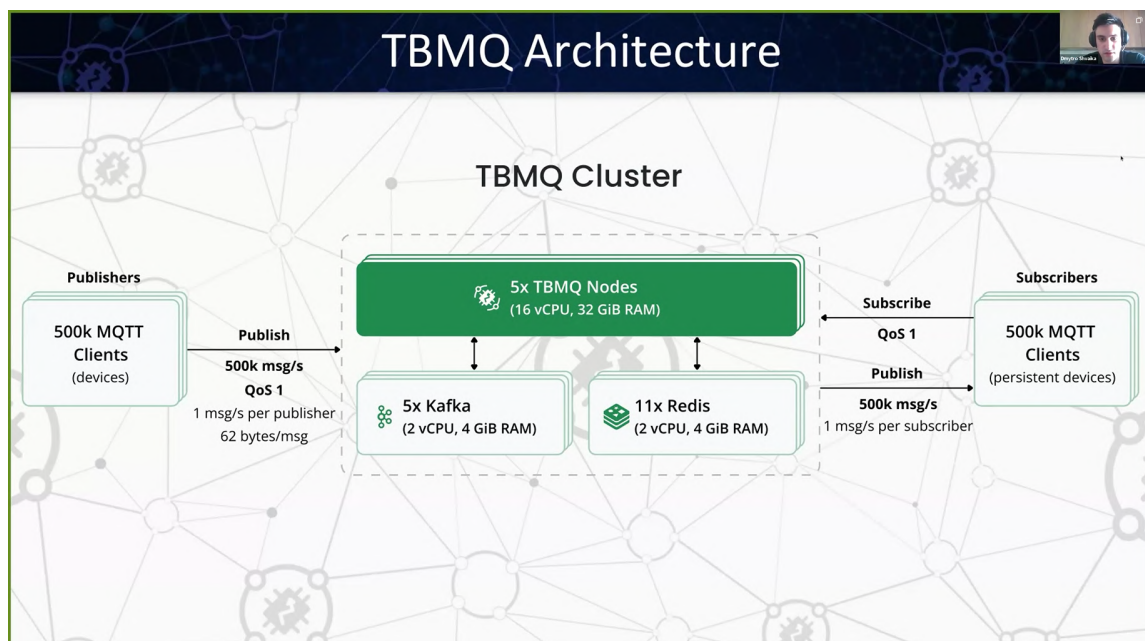
**Need for Robust Solutions**  
Automated, generalizable, and privacy-preserving methods are essential for edge deployment.

**Figure 6:** Excerpts from the paper presentation [3].

problematic when deploying deep learning models on resource-constrained edge devices, hindering real-time diagnostics and data protection. The experimental results show EMTKD achieves 88.5% accuracy and 92.5% area under the curve on target domain images, outperforming several state-of-the-art baseline models. Ablation studies demonstrated the importance of the adaptive weighting, domain adaptation, and semi-supervised learning components in improving performance under edge computing constraints.

Shvaika et al. [14] presents a comprehensive evaluation of TBMQ, a scalable and fault-tolerant MQTT broker designed for P2P messaging in IoT applications (figure 7). The paper focuses on TBMQ's performance in handling high-throughput P2P communication scenarios. The study's methodology involved performance testing in an AWS Elastic Kubernetes Service cluster with a distributed architecture built on Kafka and Redis. The researchers conducted a series of tests scaling from 200,000 to 1,000,000 messages per second, simulating 500,000 publisher-subscriber pairs with each client operating at 1 message per second using QoS 1 for reliable delivery. Test results demonstrated TBMQ's impressive capabilities, showing linear scalability as workload increased. CPU utilisation on TBMQ nodes remained consistently around 90% across all test phases, indicating efficient resource utilisation. The system maintained low latency even at peak throughput of 1 million messages per second. The paper also discusses planned optimisations, particularly for Redis performance. One such optimisation involves modifying the hashing mechanism for client identifiers to group more clients into the same Redis hash slot, potentially reducing overhead and improving efficiency.

Maliarskyi and Oleksiuk [7] presents a comprehensive review of modern tools for quality assurance in edge computing systems (figure 8). The authors identify several key features of edge computing testing, including the need to evaluate performance under diverse network conditions, system reliability in autonomous operations, security in less-controlled environments, and seamless data flow. They emphasise that continuous validation, adaptability testing, and real-time data validation are essential to maintaining operational efficiency. A significant contribution of the paper is the



**Figure 7:** Excerpts from the paper presentation [14].



## Testing tools selection criteria



| Criteria             | Indicator   |
|----------------------|---|
| <b>Scalability</b>   | 1.1 Load Handling: Maximum number of concurrent users, devices, or data streams the tool can manage.<br>1.2 Horizontal Scaling: Support for distributed environments by adding more edge nodes or servers.<br>1.3 Vertical Scaling: Ability to optimize performance by increasing resource utilization (CPU, memory, storage) on existing nodes.<br>1.4 Stress Testing: Performance under high data loads, network traffic, or concurrent operations.<br>1.5 Latency Maintenance: Ability to maintain low latency as the system scales. |
| <b>Compatibility</b> | 2.1 Multi-Platform Support: Compatibility with operating systems and hardware architectures<br>2.2 Protocol Support: Support for edge-specific protocols<br>2.3 Containerization: Support for container technologies (e.g., Docker, Kubernetes) often used in edge deployments.<br>2.4 Interoperability: Integration with different IoT platforms, cloud backends, and middleware.<br>2.5 Real-Time Processing: Support for real-time data processing and decision-making capabilities.   |
| <b>Integrity</b>     | 3.1 CI/CD Support: Compatibility with CI/CD tools like Jenkins, GitLab CI/CD, GitHub Actions, Azure DevOps, or CircleCI.<br>3.2 Automated Test Execution: Capability to trigger tests automatically during build, deployment, or code changes.<br>3.3 Version Control Integration: Compatibility with version control systems like Git for managing code and configurations.  |
| <b>Cost saving</b>   | 4.1 Upfront Cost: Competitive price of purchasing the tool or system.<br>4.2 Subscription Model: Availability of flexible pricing models, such as pay-as-you-go or annual subscriptions.<br>4.3 Free Trial or Open Source: Availability of free versions or open-source alternatives.   |
| <b>Licensing</b>     | 5.1 Licensing Transparency: Support for commercial, academic, or non-profit licensing.  |
| <b>Ease of Use</b>   | 6.1 User Interface (UI): Presence of an intuitive and visually accessible graphical interface.<br>6.2 Documentation: Availability of comprehensive user guides, tutorials, and knowledge bases.<br>6.3 Support Channels: Availability of help via chat, forums, email, or phone support.<br>6.4 Customizability: Flexibility to tailor the tool's settings, workflows, or reports to specific needs.  |

**Figure 8:** Excerpts from the paper presentation [7].

establishment of criteria for selecting edge computing testing tools. These criteria include scalability (load handling, horizontal and vertical scaling), compatibility with edge architectures, integration capabilities, cost considerations, licensing, and ease of use. For each criterion, the authors propose specific indicators for measurement. The paper concludes that QA teams need to aggregate a comprehensive set of tools to effectively test functional aspects, latency, performance, security, fault tolerance, and resilience in edge computing systems.

Romanuke, Dementiev and Yaremko [10] presents a conceptual model of an IoT-based embedded system designed to improve perception in sports analysis through mechanisation of player movement on a miniaturised field (figure 9). The system addresses limitations in current visual displays by creating a tangible, mechanical representation of sports players' movements that can be observed from any angle, providing better spatial awareness than traditional 2D screens. This is particularly valuable for coaching staff analysing tactical movements, as well as for people with visual impairments who can perceive the game through touch. At the core of the system is a Raspberry Pi Compute Module 5, which processes data collected from wearable sensors or optical tracking systems in real-time. The player's position is represented by a magnetic marker that moves on top of a miniaturised field, controlled by a carriage with magnets underneath. This carriage is moved by two stepper motors using an H-Bot belt system for maximum speed and reliability. The software architecture divides functionality into four parallel processes: movement control, system core operations, data acquisition, and external command processing. This parallelisation allows for efficient operation without noticeable delays. This technology has applications beyond entertainment. It provides coaches with enhanced analysis tools and offers people with visual impairments a new way to experience sports competitions through tactile feedback combined with audio commentary.

Li et al. [6] presents an improved version of the sparrow search algorithm (ISSA) for 3D path planning of multiple UAVs (figure 10). The authors address limitations in UAV path planning, particularly in complex environments with obstacles. Traditional path planning methods like A-algorithm, PRM algorithm, and artificial potential field meth-

*doors-2025: 5th Edge Computing Workshop, April 4, 2025, Zhytomyr, Ukraine***Table 3**

The main power characteristics of the system

| Component, process, state   | Estimated power | Commentary or explanation  |
|-----------------------------|-----------------|--|
| Raspberry Pi Compute Module | 2...10 W        | Depends on operations and settings   |
| Stepper motor               | up to 45 W      | Depends on movement phase and driver settings  |
| Vibration motor             | 1 W             | In continuous vibration mode   |
| TMC2209 drivers             | 0.03 W          | Typical consumption  |
| VL53L0X sensor              | 0.06 W          | Average power consumption at 10 Hz with 33 ms ranging sequence   |
| Other peripherals           | up to 1 W       | LEDs, interfaces, circuit passive elements   |
| Motor release               | up to 10 W      | Drivers stop to hold the motors, while the other peripherals still work  |
| Sleep mode                  | 2.5 W           | The computing module is in minimum load mode, the other peripherals are turned off   |
| System peak consumption     | up to 103 W     | A 103 W peak is possible when both motors start moving at the same time at maximum speed; this corresponds to a situation, when the player starts accelerating either horizontally or vertically (diagonal acceleration is realized with a single stepper motor) |
| Average system consumption  | 19.3...22.1 W   | The carriage is moved about 50 % time at most, which corresponds to the player who covers a distance of 10.08 km   |

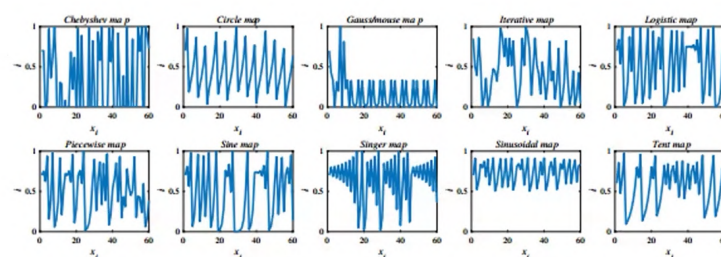
10

**Figure 9:** Excerpts from the paper presentation [10].

## Method

### Chaotic mapping-based population initialization

The use of chaotic sequences ensures a rational distribution of individual sparrows and increases population diversity.

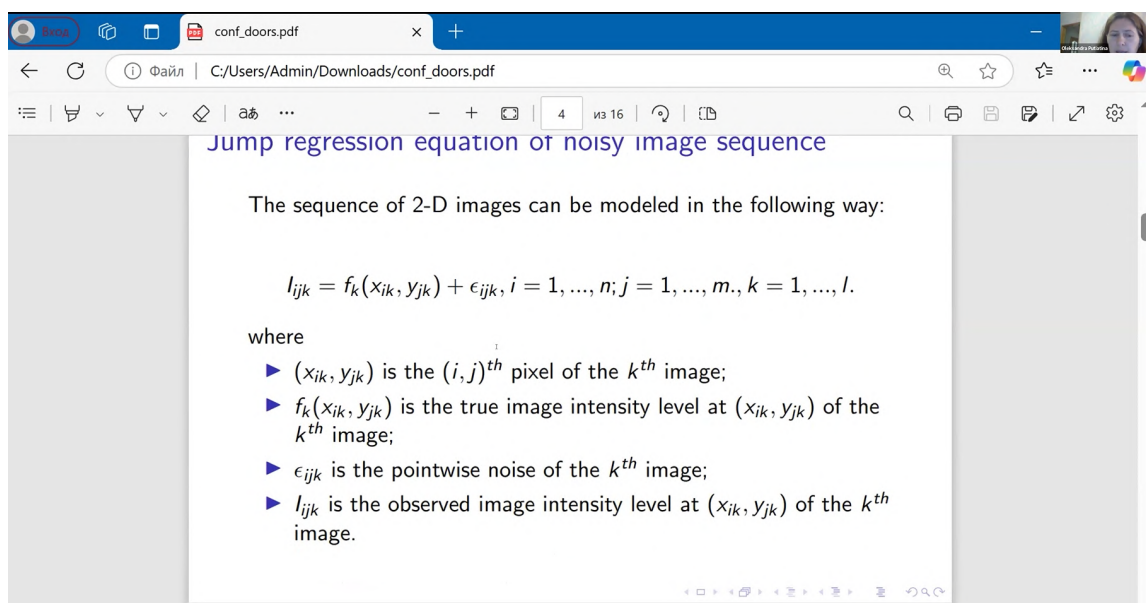
**Figure:** Ten common chaotic maps.**Figure 10:** Excerpts from the paper presentation [6].

ods often struggle in unstructured environments. While bionic population intelligence optimisation algorithms offer new possibilities, they still face challenges with search efficiency and vulnerability to local optimal solutions. The paper introduces three key improvements to the original sparrow search algorithm. The researchers tested their improved algorithm against other optimisation methods (PSO, WOA, GWO, SSA) on



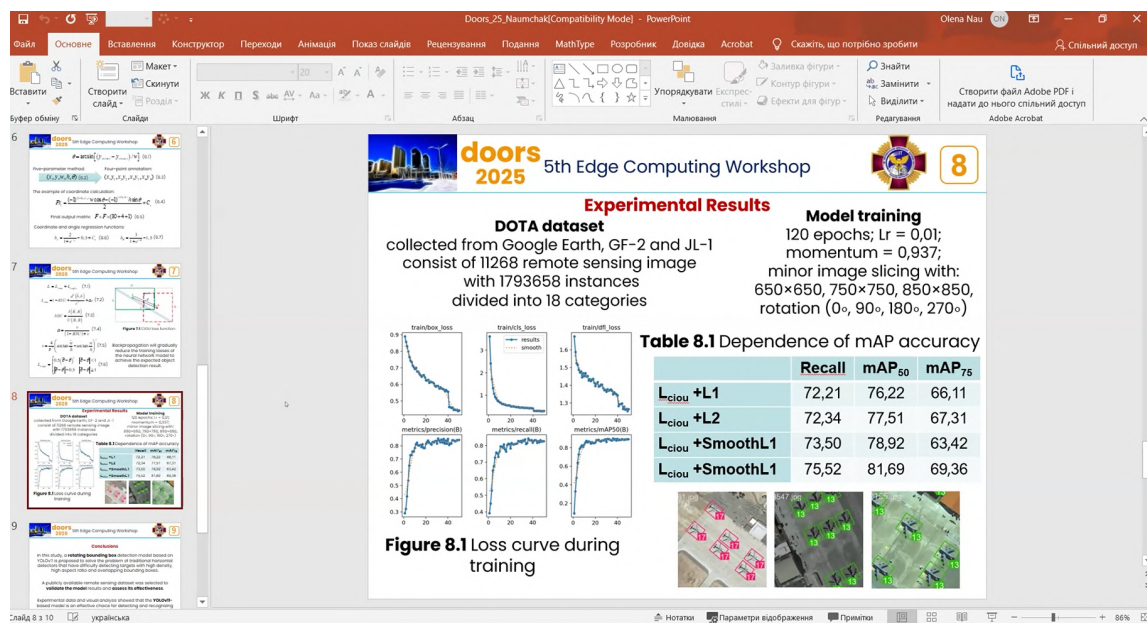
six benchmark functions. The ISSA algorithm demonstrated superior performance in terms of optimisation accuracy and stability. For practical application, they implemented the algorithm for 3D path planning of multiple UAVs in a mountainous terrain environment with seven obstacle areas. The fitness evaluation considered both path length and smoothness. Compared to other algorithms, ISSA achieved better path planning with approximately 50% faster convergence speed. The experimental results showed that ISSA creates smoother trajectories that better fit terrain fluctuations and more effectively avoid obstacles than the original SSA algorithm. The visual comparisons demonstrated that ISSA maintains straighter paths where possible, resulting in shorter overall distances.

Kobylin and Putiatina [5] introduces an alternative image model for video data affected by shot noise. The authors address a specific type of noise that not only affects the current frame but persists in subsequent frames, gradually diminishing over time until it vanishes completely (figure 11). Shot noise is characterised by a sequence of intensity jumps that decay over time, and under specific conditions, this process can converge to a Gaussian distribution. Unlike regular noise that disappears immediately, shot noise diminishes gradually, often arising from hardware defects or camera sensor issues. The researchers propose using the Kalman filter as an effective solution for removing shot noise and restoring compromised image sequences. They present mathematical models of both shot noise and compound Poisson noise (a special case of shot noise), showing how these processes can be approximated by Gaussian noise when the intensity of the underlying Poisson process is high enough. The paper explains how the Kalman filter works for image restoration by applying an iterative process that uses filtered images from previous steps to denoise the current frame. The filter equations involve estimating the true pixel value based on current observations and previously filtered values. In their experiments, the authors tested their approach on a sequence of RGB images where certain pixels were affected by shot noise. Visual comparisons between original, noise-corrupted, and restored images are provided to demonstrate the effectiveness of the approach. The central contribution is a mathematical framework that allows for modelling the effects of random shot noise and compound Poisson jumps in video data, approximating these noise types with Gaussian models, and applying Kalman filtering for effective video restoration.



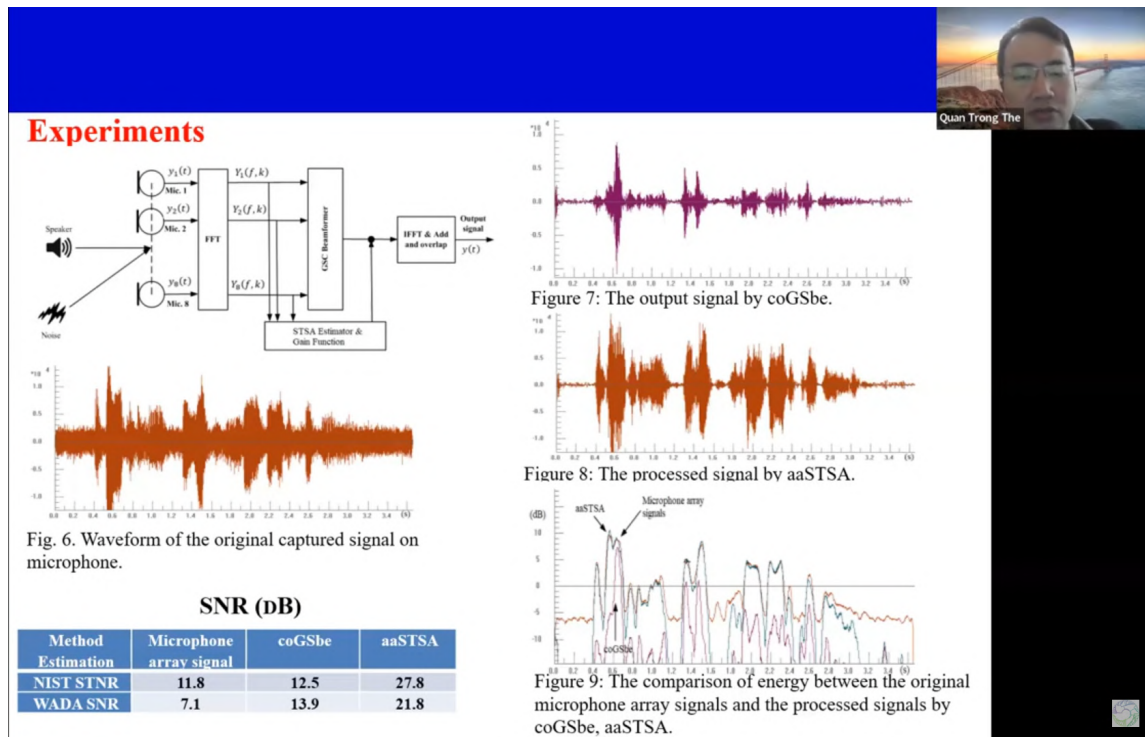
**Figure 11:** Excerpts from the paper presentation [5].

Pilkevych et al. [8] presents an improved model for detecting randomly oriented objects in satellite imagery (figure 12). The research addresses a significant challenge in object detection for remote sensing applications, particularly for military objects that may have large aspect ratios and random orientations. The authors explain that traditional object detection methods using convolutional neural networks typically employ rectangular bounding boxes aligned with image coordinate axes. While this approach works well for objects viewed from perspectives parallel to Earth with small aspect ratios, it's ineffective for detecting military objects in satellite images with random orientations and high aspect ratios. The paper proposes enhancing the YOLOv11 model with a five-parameter regression approach that includes the rotation angle of the bounding box. Traditional models use four parameters (x, y, width, height), but the improved model adds a fifth parameter to represent the angle of rotation between the longer side of the object and the x-axis. This modification allows for more accurate detection of randomly oriented objects. The researchers implement their solution by adding a rotation angle channel to the original YOLOv11 architecture and developing a corresponding angular loss calculation function.



**Figure 12:** Excerpts from the paper presentation [8].

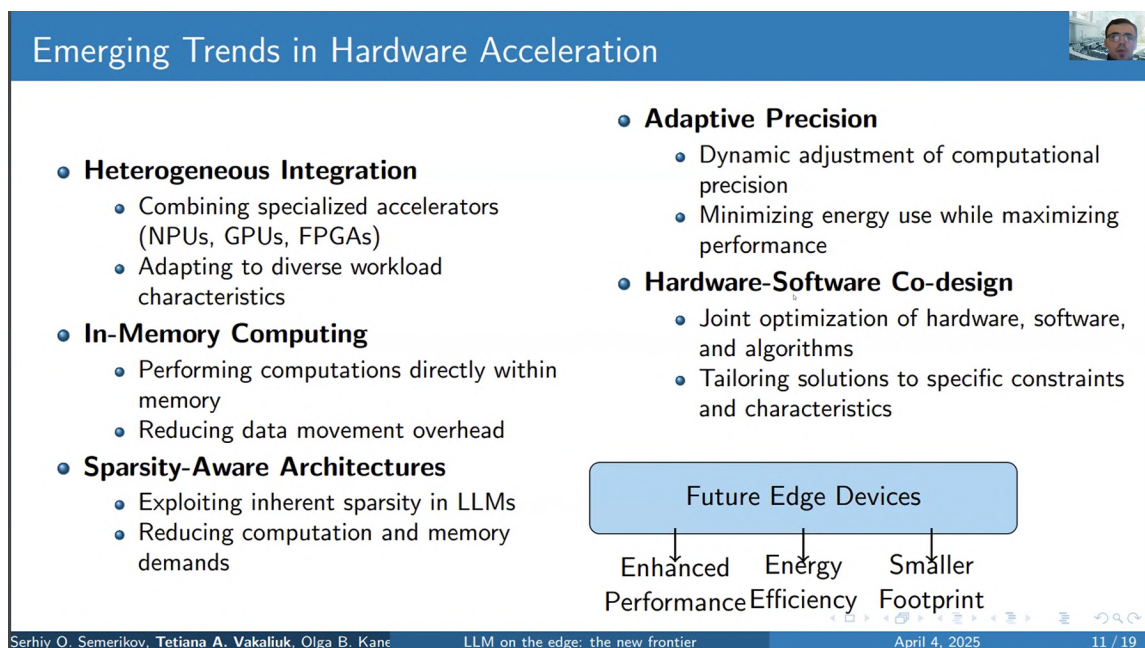
The [16] presents a method for improving speech enhancement in noisy environments using microphone arrays and Bayesian estimators (figure 13). The author addresses the challenge of extracting clean speech from noisy recordings in complex environments. While microphone array beamforming techniques are commonly used in acoustic equipment like hearing aids, surveillance devices, teleconference systems, and smart homes, their performance can degrade in real-world conditions due to factors like array displacement, inaccurate direction-of-arrival calculation, and microphone quality differences. The paper focuses on the Generalised Sidelobe Canceller beamformer, which consists of three main components: a fixed beamformer that steers toward the sound source, a block matrix that suppresses speech to isolate noise, and an adaptive noise canceller that extracts the target speech. Despite its effectiveness, the GSC beamformer often suffers from speech distortion in realistic recording scenarios. To address this limitation, the author proposes exploiting the Bayesian estimator of short-time spectral amplitude to enhance the amplitude of the beamformer's output signal. The mathematical formulation draws on the work



**Figure 13:** Excerpts from the paper presentation [16].

of Ephraim and Malah's STSA estimator, which uses minimum mean-square error criteria and outperforms conventional methods like Wiener filtering and spectral subtraction. The author derives equations for calculating the a posteriori probability density function based on the observed microphone array signals.

Semerikov et al. [12] provides a comprehensive overview of the emerging field of edge-based large language models (LLMs) (figure 14). The authors explore the techniques,



**Figure 14:** Excerpts from the paper presentation [12].



frameworks, hardware solutions, and applications that enable efficient deployment of these powerful AI models on resource-constrained edge devices. The article discusses several open-source frameworks designed specifically for edge deployment, such as TinyAgent, MNN-LLM, and h2oGPT, which provide pre-trained models optimised for resource-constrained environments. Edge-cloud collaborative frameworks like EdgeShard, Edge-LLM, and PAC represent another important approach. These frameworks distribute computational workloads between edge devices and cloud servers, leveraging the strengths of both environments while addressing their limitations. Techniques like adaptive quantisation, frequency-based model caching, and reinforcement learning-based scheduling help optimise this collaboration.

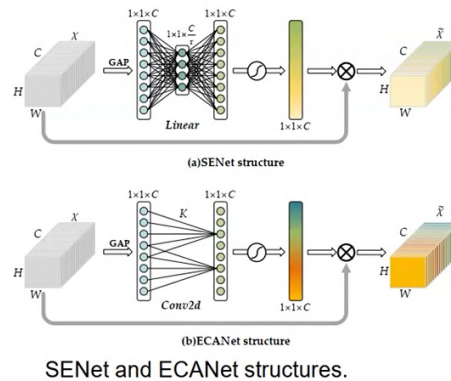
Xue [18] presents an improved vehicle detection method built upon the YOLOv4 architecture (figure 15). The author focuses on enhancing detection performance while reducing computational complexity for practical deployment in smart city traffic systems. The proposed approach replaces YOLOv4's backbone with a lightweight DenseNet and incorporates Effective Channel Attention modules to help the model focus on relevant features while suppressing background interference. Additionally, the system implements Adaptive Spatial Feature Fusion to improve information extraction across different scales and optimise the loss function's weight ratio. Testing on multiple datasets showed impressive results, with the method achieving 98.70% mAP on the RSOV dataset, surpassing standard YOLOv4's 95.17%. Most notably, these modifications reduced computational requirements by nearly half and decreased model parameters by 64%. Ablation studies confirmed that each component – DenseNet backbone, attention mechanisms, feature fusion, and data augmentation – contributed positively to the overall performance improvement.

7

## Method (3)

### Effective channel attention

ECA-Net is an improvement based on SE-Net, including only a small number of parameters while providing significant performance gains.



**Figure 15:** Excerpts from the paper presentation [18].

## 3. JEC Volume 4 Issue 1 (2025): an overview

Ayeni and Adesoba [2] presents the development of an IoT-based home control system using NodeMCU microcontroller and Firebase cloud services. The authors describe a system that allows users to remotely control home appliances and monitor environmental conditions through a mobile application. The system consists of three main components: a hardware unit with the NodeMCU ESP8266 microcontroller

connected to various sensors and relay modules, a Firebase Realtime Database serving as the cloud server, and a mobile application called “My Home” developed using Java programming language on Android Studio. A notable feature of the system is the “Lock Home” function, which allows users to turn off all connected appliances simultaneously with a single button press. When this feature is activated, the PIR motion sensor also becomes active to detect potential intrusions, sending immediate notifications to the user’s mobile device. When compared to commercial IoT platforms like Google Nest and Amazon Alexa, the authors note that their system offers simpler but customizable functionality. This research demonstrates how IoT technology can be effectively implemented for home automation using affordable components like NodeMCU and free cloud services like Firebase, making smart home technology more accessible for practical applications.

Rozlomii, Yarmilko and Naumenko [11] examines how resource constraints in embedded IoT devices affect their security capabilities and proposes optimised strategies to enhance protection while considering these limitations. The authors identify several key resource limitations that affect IoT device security, including limited memory, restricted computational power, constrained energy consumption, and limited network bandwidth. The paper examines various security risks arising from these constraints, such as buffer overflows due to limited memory, energy attacks aimed at depleting device batteries, and computational limitations that prevent the use of robust encryption. Mathematical models are presented to analyse these risks, including equations for evaluating encryption efficiency relative to battery levels and models for analysing network overload probabilities. To address these challenges, the researchers propose several resource-saving security strategies. These include lightweight cryptographic algorithms that consume 30% less energy than traditional methods, adaptive power management techniques that reduce energy consumption by 25%, memory optimisation approaches that decrease requirements by 35%, and adaptive security mechanisms that adjust to changing operational conditions. The effectiveness of these strategies was validated through various testing methodologies, including emulators, energy monitoring tools, and simulation environments.

Hryshchuk and Zagorodnyuk [4] discusses energy optimisation techniques for FPGAs used in edge computing. The authors explain that edge computing, which processes data closer to its source, helps address latency, bandwidth, and privacy challenges in IoT environments. FPGAs are highlighted as particularly valuable for edge computing due to their reconfigurability, low power consumption, and high performance for specific applications. The authors developed and evaluated an architecture for general-purpose FPGA-based edge computing systems with enhanced power management capabilities. Their implementation uses an Intel Max 10 FPGA on a Terasic DE10 Lite board with a NIOS II soft-core CPU and Micro-C RTOS. They conducted experiments measuring energy consumption during matrix multiplication operations at different clock frequencies (50, 80, and 100 MHz) and matrix sizes.

Arnob et al. [1] evaluates state-of-the-art intrusion detection systems (IDS) methodologies that use Deep Learning approaches and advanced feature engineering techniques. The authors examine several optimisation techniques for IDS, including feature selection algorithms, hyperparameter tuning, and neural architecture search. The research explores resilience against emerging threats like zero-day attacks and adversarial techniques. The article also discusses the integration of blockchain and quantum computing technologies to enhance data privacy, resilience, and scalability in IDS.

Yaroshynskyi et al. [19] presents Akka as an effective framework for creating distributed, resilient systems that can scale efficiently and recover from failures. The authors explain that smart grids integrate advanced technologies to enable two-way

communication between energy providers and consumers, optimising resource usage and improving overall energy system efficiency. These systems face challenges including big data processing, fault tolerance, and consumer interaction, which the Akka framework helps address. The article discusses how Akka's actor model provides a mathematical framework for parallel computing, enabling the representation of asynchronous interactions between distributed network nodes. Actors in Akka are independent structural units within a hierarchical system, each with its own state that can model entities within the power grid. The actor system can integrate external information sources like sensors to assess environmental changes, and the hierarchical nature allows for the physical distribution of smart grid subsystems across different servers. The paper compares Akka with alternative technologies, noting its advantages over microservices-based approaches, distributed data platforms, and autonomous agent platforms. The authors highlight how Akka Cluster and Akka Sharding enable physical distribution and elasticity in computation, which is essential for geographically dispersed smart grid control systems.

#### **4. A new beginning**

It is with immense pride and gratitude that we announce a watershed moment in the *Journal of Edge Computing's* history: our acceptance into the prestigious Scopus database. This accomplishment represents far more than a mere technical milestone – it constitutes formal recognition of our journal's scientific integrity, research quality, and growing influence in the field of edge computing.

The Scopus Content Selection & Advisory Board has specifically acknowledged our success in attracting and publishing high-quality research papers that demonstrate measurable impact within the scientific community. This endorsement validates the rigorous standards we have maintained since our inception and positions our journal among respected scholarly publications worldwide.

This achievement would not have been possible without the dedication of our editorial team, whose commitment to excellence has been unwavering. We extend our deepest appreciation to each editor who has meticulously upheld our standards through careful review processes and thoughtful curation of content. Your expertise and diligence have been the cornerstone of our success.

To our authors: your innovative research, original thinking, and willingness to share your discoveries through our platform have been instrumental in building our journal's reputation. The quality of your contributions has directly influenced our acceptance into Scopus, and for this, we are profoundly grateful.

To our reviewers: your rigorous assessments, constructive feedback, and commitment to scientific integrity have ensured that only the most robust research appears in our pages. The countless hours you have invested in the peer review process have elevated the standard of our publications and strengthened our scientific foundation.

As we embark on this new chapter, our inclusion in Scopus will significantly enhance the visibility and discoverability of research published in the *Journal of Edge Computing*. Authors can expect increased citations, broader international exposure, and greater recognition for their work. For readers, access to our content through the Scopus platform will integrate our publications into one of the world's most comprehensive research ecosystems.

In this issue, we continue our tradition of presenting cutting – edge research that pushes the boundaries of edge computing technology and applications. The papers selected for publication reflect current trends and future directions in our rapidly evolving field, addressing critical challenges and proposing innovative solutions.

Looking ahead, we remain committed to further elevating our standards and ex-



panding our influence. We will continue to solicit groundbreaking research, facilitate meaningful academic discourse, and serve as a premier platform for knowledge exchange in edge computing.

This Scopus indexing is not the culmination of our journey but rather a significant milestone along our path of continuous improvement and scientific contribution. We invite all of you – readers, authors, reviewers, and editorial team members – to join us as we advance into this exciting new era for the Journal of Edge Computing.

## References

- [1] Arnob, A.K.B., Chowdhury, R.R., Chaiti, N.A., Saha, S. and Roy, A., 2025. A comprehensive systematic review of intrusion detection systems: emerging techniques, challenges, and future research directions. *Journal of Edge Computing*, 4(1), pp.73–104. Available from: <https://doi.org/10.55056/jec.885>.
- [2] Ayeni, P.O. and Adesoba, O.C., 2024. IoT-based home control system using NodeMCU and Firebase. *Journal of Edge Computing*, 4(1), pp.17–34. Available from: <https://doi.org/10.55056/jec.814>.
- [3] Chaban, O., Manziuk, E., Markevych, O., Petrovskyi, S. and Radiuk, P., 2025. EMTKD at the edge: An adaptive multi-teacher knowledge distillation for robust cardiac MRI classification. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.42–57. Available from: <https://ceur-ws.org/Vol-3943/paper09.pdf>.
- [4] Hryshchuk, O. and Zagorodnyuk, S., 2025. Managing energy consumption in FPGA-based edge computing systems with soft-core CPUs. *Journal of Edge Computing*, 4(1), pp.57–72. Available from: <https://doi.org/10.55056/jec.717>.
- [5] Kobylin, O. and Putiatina, O., 2025. Some aspects of real-time image denoising influenced by shot noise and compound Poisson noise. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.109–117. Available from: <https://ceur-ws.org/Vol-3943/paper21.pdf>.
- [6] Li, Z., Zong, X., Hao, J. and Kochan, O., 2025. Multi-UAV 3D path planning based on improved sparrow search algorithm. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.97–108. Available from: <https://ceur-ws.org/Vol-3943/paper18.pdf>.
- [7] Maliarskyi, V.O. and Oleksiuk, V.P., 2025. Review of modern tools for edge computing systems quality assurance. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.67–80. Available from: <https://ceur-ws.org/Vol-3943/paper16.pdf>.
- [8] Pilkevych, I.A., Romanchuk, M.P., Naumchak, O.M., Fedorchuk, D.L. and Naumchak, L.M., 2025. Improved model for detecting randomly oriented objects on remote sensing images. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.118–126. Available from: <https://ceur-ws.org/Vol-3943/paper26.pdf>.
- [9] Prasol, N.S., Furikhata, D.V., Vakaliuk, T.A. and Regenel, T.Y., 2025. Integration of edge devices and IoT to create a climate monitoring system for plants. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.4–19. Available from: <https://ceur-ws.org/>

[Vol-3943/paper01.pdf](#).

- [10] Romanuke, V.V., Dementiev, S.Y. and Yaremko, S., 2025. An IoT-based system of mechanizing sport competition motion for perception improvement. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.81–96. Available from: <https://ceur-ws.org/Vol-3943/paper17.pdf>.
- [11] Rozlomii, I., Yarmilko, A. and Naumenko, S., 2025. Innovative resource-saving security strategies for IoT devices. *Journal of Edge Computing*, 4(1), pp.35–56. Available from: <https://doi.org/10.55056/jec.748>.
- [12] Semerikov, S.O., Vakaliuk, T.A., Kanevska, O.B., Moiseienko, M.V., Donchev, I.I. and Kolhatin, A.O., 2025. LLM on the edge: the new frontier. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.137–161. Available from: <https://ceur-ws.org/Vol-3943/paper28.pdf>.
- [13] Shevchenko, D.V. and Holub, B.L., 2025. Regression analysis as a tool for identifying patterns in atmospheric air monitoring data. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.20–27. Available from: <https://ceur-ws.org/Vol-3943/paper04.pdf>.
- [14] Shvaika, D.I., Shvaika, A.I., Landiak, D.I. and Artemchuk, V.O., 2025. Scalable and reliable MQTT messaging: evaluating TBMQ for P2P scenarios. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.58–66. Available from: <https://ceur-ws.org/Vol-3943/paper12.pdf>.
- [15] Song, Y., Wei, S. and Liu, D., 2025. GADGN: A dual graph convolutional architecture for traffic flow prediction. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.28–41. Available from: <https://ceur-ws.org/Vol-3943/paper07.pdf>.
- [16] The, Q.T., 2025. Bayesian estimators-based microphone array speech enhancement in adverse environment. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.127–136. Available from: <https://ceur-ws.org/Vol-3943/paper27.pdf>.
- [17] Vakaliuk, T.A. and Semerikov, S.O., 2025. Preface. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.1–3. Available from: <https://ceur-ws.org/Vol-3943/preface.pdf>.
- [18] Xue, M., 2025. Studying the efficiency and performance of the vehicle detection method based on feature fusion and attention enhancement. In: T.A. Vakaliuk and S.O. Semerikov, eds. *Proceedings of the 5th Edge Computing Workshop (doors 2025)*, Zhytomyr, Ukraine, April 4, 2025. CEUR-WS.org, *CEUR Workshop Proceedings*, vol. 3943, pp.162–177. Available from: <https://ceur-ws.org/Vol-3943/paper19.pdf>.
- [19] Yaroshynskiy, M., Prymushko, A., Puchko, I., Sirotkin, O. and Sinko, D., 2025. Akka as a tool for modelling and managing a smart grid systems. *Journal of Edge Computing*, 4(1), pp.105–115. Available from: <https://doi.org/10.55056/jec.822>.