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Editorial

Special Issue on Safe and Reliable AI for Smart Sustainable Cities

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1. Introduction

Today, most of the world's inhabitants live in cities. The development of ICT and other technologies creates favorable conditions for governments and municipalities to build smart city systems for various purposes [1]. The main aim is to increase the comfort of living in smart cities. The latest developments in computational intelligence, robust hardware development, and the ability to process enormous datasets collected using millions of connected multisensory devices open up new opportunities for developing and improving all smart city systems [2]. This creates unique advantages for effective promotion and support of the transformation of urban areas; however, there are still several requirements to be addressed for the development and operation of such systems.

Experts are increasingly considering the concept of smart sustainable cities that involves all the benefits of smart cities, as it focuses on a continuous transformative process [3]. It must ensure the sustainable development of a smart city and open up different types of capacities for its inhabitants. To implement this concept, it is necessary to develop stable, secure, reliable, and interoperable infrastructure systems to support ICT-based applications and services [4]. In today's post-industrial society, the creation of such infrastructure systems requires the combined use of IoT and big data technologies and artificial intelligence tools [5]. The automation of many processes in smart city subsystems depends on the reliability and security of the AI-based solutions underlying them [6]. These two conditions are critical for smart sustainable city systems because the wellbeing and safety of people depend on them.

This Special Issue covers safe and reliable AI-based solutions which rely on fast and accurate processing of various sensory data to control and sustainably develop smart city subsystems for different purposes. Identifying applied solutions using multiple AI methods and tools [7] that demonstrate readiness for practical application in various systems and services of a smart sustainable city is the main aim of this Special Issue.

Special Issue topics included, but were not limited to, the following:

- IoT-based solutions for data collection, aggregation, and transmission;
- Machine learning and cognitive computing for supporting smart cities' services;
- Modernization of the telecommunication infrastructure in smart cities;
- Reliable AI for service delivery in ICT infrastructure;
- Self-adaptation and self-management in IoT-based smart systems;
- Big data management and analytics in complex systems;
- Technology-enabled and integrated transport and logistic systems;
- Pollution and waste management in urban ecosystems;
- Electricity reliability, efficiency, and power stability in urban areas;
- Resource-efficient solutions for smart municipal management services;
- Safe software and integrated solutions for smart sustainable cities;

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- Emerging technologies for the development of sustainable cities.

2. Contributions

We obtained nine submissions by authors from Ukraine, Slovakia, China, Saudi Arabia, and Egypt. Only five were accepted after a careful review process and then published in the Special Issue.

The authors of [8] aimed to investigate the performance of a wireless LAN based on the IEEE 802.11 standard. In particular, this work was based on modeling the extensive network with a different number of access categories when processing different levels of priority traffic. It was experimentally established that the performance of a large local network with two access categories is significantly higher than the performance of the same network with four levels of access categories in terms of processing high-priority traffic. The authors proved the possibility of substantially increasing the performance of such networks in the conditions of an adaptive configuration of the number of access categories at the MAC sublayer.

In [9], the authors consider the communication processes in a wireless communication environment in the conditions of the need to ensure the effective functioning of the critical application system. The authors created a new mathematical model of person–system interactions between the base station and the selected terminal. It is based on the use of queuing systems. This approach provided the possibility of formalization and, consequently, a comparison of several functional characteristics for the chosen organization scheme of human–system interaction.

The investigation in [10] aimed to improve the accuracy of intellectual analysis of short datasets. This will provide the opportunity to carry out an effective decision-making process for a particular phenomenon or object in the absence of sufficient data to implement the training procedure. The authors proposed a new method to increase the dimensionality of a small dataset. It is based on using the principles of axial symmetry of the response surface. Implementations of the training procedure based on the thus expanded set of data took place using a nonlinear iterative machine learning algorithm. The authors' procedure for forming the prediction result significantly increases the accuracy of the analysis of short datasets. The experimental studies conducted by the authors confirmed the effectiveness of the proposed approach in solving the stated task.

The authors in [11] consider the problem of determining the position of the LIDAR with high accuracy. The urgency of this task is due to the need to develop automated navigation systems in smart cities for various purposes. The authors developed new algorithms for determining the current position of the LIDAR. Improving its efficiency is achieved with parallelization procedures using modern technologies. It significantly reduced the computational complexity, in particular with the use of a multi-core computer architecture. The proposed solutions can be used to implement practical robotics tasks for subsystems of a smart city.

In [12], the authors solve image pre-processing tasks. The authors developed a new method of image filtering for biometric protection systems. It is based on the theory of Ateb functions. In particular, the authors developed a new type of transformation by combining the Gabor transform, wavelet transform, and Ateb functions. It was named wavelet–Ateb–Gabor transformation. The obtained results demonstrate a significant improvement in filtration quality by constructing various shapes and sizes curves using the proposed transformation.

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