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EDITORIAL

Special issue on ambient intelligence, IoT, and Smart City

Ji Su Park[1] · Francesco Colace[2] · Yang Xiao[3] · Jong Hyuk Park[4]

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Along with the rapid advancement in digital sensing technologies, the Internet of Things (IoT) is fundamentally supported in various smart city applications, including smart factory, smart grid, logistical vehicles, and so on. However, deployment of IoT devices in smart city infrastructure provides significant challenges such as ubiquitous sensors, easy tracking, lightweight computational capabilities, high scalable computing, security, etc. Moreover, various properties of smart IoT devices require significant improvement in the existing smart city infrastructure.

Recently, Ambient intelligence has emerged that builds upon ubiquitous, pervasive, and human-centric computing to enable interaction with humans by unobtrusive embedded devices in electronic environments. It provides intelligent services autonomously through user input, including voice, gesture, and other non-interruptive methods. It has become an emerging paradigm in advancing smart IoT applications to improve people's lifestyles. It can provide a scalable, highly connected, more integrated, reasonably secure, and intelligent solutions for smart city infrastructure. With ambient intelligence, the smart city platform offers multisource data and sensing possibilities for digitally integrated IoT devices. Various data sources, such as manufacturing data, information systems, smart IoT objects, sensing devices, can be supported intelligently by applying ambient intelligence. It also offers integrated solutions and improves the Quality of Experience in the IoT ecosystem. Scalable technology can also be addressed using ambient intelligent concepts. Thus, ambient intelligence can play a significant role in handling exiting challenges to achieve the full potential of smart city applications and services.

The special issue aims to publish state-of-the-art research contributions in addressing challenges in smart city applications and IoT with the help of ambient intelligence. It involves the theoretical and practical contributions on advanced smart city applications and ambient intelligence, where challenges to scalable computing, storage, centralization, computational bandwidth, security and privacy, and analytics, are addressed. The submitted manuscripts were reviewed by experts from both academia and industry. After several rounds of reviewing, the highest quality manuscripts were accepted for this special issue. Totally, we have received 18 manuscripts and 9 papers are accepted in this SI. This special issue will publish by Journal of Ambient Intelligence and Humanized Computing as special issues.

The degradation of physical components of safety critical smart-world CPSs would deteriorate the performance of the smart system and lead to loss of human life with significant damage to properties. Hence, planned preventive replacement of physical components of the system is vital to extend the lifetime of the system, to reduce maintenance cost and to avoid risks that may cause major harm to life and property. Alemayehu et al. (2021) focus on a cost effective preventive replacement strategy that recovers failure of physical components of safety-critical smart-world CPSs by mainly considering deterioration state of the physical component of the system.

The eGAN model adds edge detection to improve the GAN model and is required for ambient intelligence interconnection between objects and humans, such as IoT, smart city, and autonomous driving. Edge detection extracts edges of the image and creates an image rapidly, but the arbitrarily set threshold can lead to unstable connections. Therefore, Lee and Park (2021) analyze various GAN models and edge detection methods to solve this problem and improve the

✉ Jong Hyuk Park
jamespark.seoul@gmail.com

Ji Su Park
jisupark@jj.ac.kr

Francesco Colace
fcolace@unisa.it

Yang Xiao
yangxiao@ieee.org

[1] Jeonju University, Jeonju-si, South Korea

[2] Università Degli Studi Di Salerno, Salerno, Italy

[3] The University of Alabama, Tuscaloosa, USA

[4] Seoul National University of Science and Technology (SeoulTech), Seoul, South Korea

performance of eGAN models as well as propose a new edge detection technique using threshold setting.

Security-by-Design is applied to reduce the complexity of a product by considering security in the initial stage of the development lifecycle and performing product requirement analysis in the design stage to ensure product reliability. The system is used in various fields, including automotive and advanced weapon systems. However, implementing [] in the field is difficult given that standards or guidelines related to Secure SDLC only contain abstract and declarative content. Therefore, Kang and Kim (2021) propose the functional correctness, safety integrity, and security assurance (CIA)-level based Security-by-Design framework to combine an evidence-based security approach standard with existing Secure SDLC.

A smart factory is an intelligent industrial unit that applies the combination of ICT and traditional manufacturing to the entire process of planning, requirement analysis, design, production, distribution, and sales. However, information in the operational technology area is a core asset of the company that can be leaked to the outside. Therefore, identifying and responding to potential security threats in a smart factory environment is important. Yi et al. (Yi and Jeong 2021) discuss security issues and problems in the smart factory architecture and propose a smart factory security model to solve security problems and responses to cyberattacks.

Degradation of physical components of safety–critical smart-world CPSs will deteriorate the performance of the smart system and lead to loss of human life with significant damage to properties. Hence, planned preventive replacement of physical components of the system is vital to extend the lifetime of the system, reduce maintenance cost, and avoid risks that may cause major harm to life and property. Dwivedi et al. (2021) put forward an efficient zero-knowledge-based authentication scheme to verify devices in the network without knowing the information about user identity or revealing any other data entered by users.

A considerable amount of energy is consumed by IoT sensors in the transmission of data. Hence, a cluster head (CH) is selected through an optimization algorithm to transmit data while efficiently using energy. However, the optimization algorithm utilizes additional time to converge and change the cluster head. Accordingly, SanKar et al. (2021) proposes a new Caledonian crow learning algorithm (NCCLA) to identify the appropriate CH in the cluster. Cluster formation and CH selection are processes generally performed in NCCLA. Euclidean distance is applied to create a cluster within the network. The NCCLA algorithm is proposed to determine the optimal CH in the cluster.

Chang et al. (2021) design a universal financial fraud awareness model to prevent sharing that can be criminal through fake, malicious, or fraudulent information. The model first targets accurate fraud detection and classification using natural language processing (NLP) technique. An antifraud chatbot is then implemented as an instance of the model and deployed on a widely used social network service called LINE. This implementation aims to manage finance fraud cases and provide antifraud suggestions to deal with foreseeable fraud events.

.Smart applications require fast data acquisition, parallel processing, and dynamic resource sharing. However, these requirements are inefficiently supported by traditional wireless sensor networks (WSNs) due to the deficiency of computing resources and the lack of resource-sharing. Almurisi et al. (2021) explores a coeffective solution based on cloud computing and virtualization techniques to address these challenges.

Signal compression technology for effective signal transmission and abnormal beat detection for arrhythmias is important in ECG signal monitoring systems. However, reconstructing the compressed signal of abnormal bit detection is unsuitable for low-power and -capacity embedded devices. Lee et al. (2021) offer a method for compressing signals into a small number of vertices, including FP, using an optimized dynamic programming-based linear approximation approach.

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