

Guest Editorial Smart Cities

Petar Šolić, Luigi Patrono, Toni Perković, and Aitor Almeida

Growing global needs are creating more comfortable urban spaces, moreover as global population is expected to double by 2050. To achieve the concept of the smart city, there are still amount of efforts to be done, all opening significant opportunities related to the economic growth, health, wellness, energy efficiency, and transportation, all with aim to promote sustainable development of cities. Fundamental research is needed to achieve effective integration of computing systems, physical systems, data sources, and infrastructure which have a major impact on the quality of life.

This special issue, dedicated to the concept of the smart cities comprises a set of papers that deal with a number issues appearing in the process of moving towards building efficient smart cities architectures. Gathered technical contributions went throughout standard review process with at least three reviews per paper. Total of 12 accepted contributions are divided into three main groups; ranging from the hardware to the upper networking layers and finally ending with application layer. The first group relates to the hardware improvements that make core sensing infrastructure possible. The second group of papers discuss how the available data could be delivered throughout the networking enabled by the communications infrastructure. Finally, the third group of papers describe how the related applications should enable this possibility to make it visible for the users,.

In the paper "The Sensing Characteristics of ZnO Tetrapods Synthesized by Microwave Evaporation" authored by A.S. Afify, A. Elsayed, A. S. A. Khadra, and M. Hassan, authors aimed to produce humidity sensors by using zinc powder and a microwave oven. By authors' knowledge, wide variety of materials have been studied as sensing elements for humidity sensors and used for commercial devices, one of them is ZnO. These sensors are characterized by their stability, low cost and high sensitivity. Their developed sensors have shown a significant response towards relative humidity starting from 30%.

In the paper "A Non-Intrusive Low-Cost Kit for Electric Power Measuring and Energy Disaggregation", the authors R.

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Quindai, B. M. Barbosa, C. M. P. Almeida, H. S. Ramos, J. J. P. C. Rodrigues, and A. L. L. Aquino present a kit to collect data of electric loads of a house and perform the disaggregation monitoring. Collected data could be further used for various purposes. To collect the data, authors' approach is to measure the electromagnetic field in a non-intrusive way by employed developed embedded system. The measuring system has been validated and the results show the possibility to collect and perform the energy disaggregation.

The paper "A Modulator-less Beam Steering Transmitter based on a revised DDS-PLL Phase Shifter Architecture", authored by G. D'Amato, G. Avitabile, G. Coviello and C. Talarico present hardware based solution for modulator-less beam steering transmitter which is further based on a revised DDS-PLL phase shifter architecture. The solution aims at the low-data rate for IoT systems in wide class of applications that requires firmware execution and enhanced connectivity.

In the paper "A Combined 90/900 MHz IC Architecture for Smart Tag Application", the authors A. Leoni, L. Pantoli, V. Stornelli, G. Ferri, P. Šolić, and M. Russo present the hardware improvement for RFID systems, where combining Radio-Frequency (RF) energy harvesting in dual band – GSM and FM radio together with the power available from the RFID reader makes the system more reliable. In fact, tags read range can be improved.

In the paper "Next-Generation Infrastructure and Technology Issues in 5G Systems", the authors K. Cengiz, and M. Aydemir present, in the tutorial fashion, challenges and potential/reasonable solutions for 5G systems. These challenges are elaborated through infrastructure and technology point of view.

In the paper "A Co-Simulation Framework for Integrated Planning and Analysis of Wide Area Measurement and Protection Systems", authors H. A. Tokel, R. A. Halaseh, G. Alirezai, and R. Mathar present co-simulation environment and tool chain for the integrated planning and subsequent integrated simulative performance analysis of a Wide Area Measurement and Protection System, or shortly WAMS. Through an example application, authors show the impact of communication network performance and failures on the state estimation accuracy. This co-simulation framework provides a useful environment for future work in the development and analysis of distributed state estimation, optimization, and fault detection algorithms under consideration of the interdepen-

dependencies between power grids and communication networks.

The paper "Interval Tree-Based Task Scheduling Method for Mobile Crowd Sensing Systems", authored by A. A. A. Gad-ElRab, and A. S. Alsharkawy presents the scheduler of the sensing tasks in order to minimize the energy consumption by reducing the sensor utilization, while consequently reducing the energy and data traffic needs in mobile crowd sensing systems. The experimental results by using synthetic and real data show that the proposed scheduling method can minimize the energy consumption and preserve the task requirements compared to existing algorithms.

In the paper "Top-Down Delivery of IoT-based Applications for Seniors Behavior Change Capturing Exploiting a Model-Driven Approach", e-health related, the authors A. Caione, A. Fiore, L. Mainetti, L. Manco, and R. Vergallo, present IoT mobile-based solution for the monitoring of elderly people behaviour. Their approach involves the usage of a sensor tag wristband that periodically sends data to a smartphone application through BLE protocol. It relies on the L-WoX middleware that enables the communication with the WoX cloud platform.

In the paper "A Novel Function Complexity-Based Code Migration Policy for Reducing Power Consumption", the authors H. Choi, Y. Koo, and S. Park aimed at optimizing the power efficiency of heterogeneous memory in embedded systems. This is important as typical designs should consider hardware limitations, such as size, weight, or battery capacity. Authors proposed a detailed function complexity concept further on improving the efficiency. Experiments and quantitative analysis have been performed in order to validate the proposed algorithm.

Paper "Secure Data Communication using File Hierarchy Attribute Based Encryption in Wireless Body Area Networks" authored by B. Chandrasekaran, R. Balakrishnan, and Y. Nogami deals with securing Wireless Body Area Networks (WBANs) in healthcare system. Authors propose a more secure and efficient data communication scheme for WBANs by using an efficient File Hierarchy CP-ABE (FH-CP-ABE). The system is evaluated by the means of message size, energy consumption, computation cost and compared to the existing work.

In the paper "Complete Model for Automatic Object Detection and Localisation on Aerial Images using Convolutional Neural Networks", the authors D. Bozic-Stulic, S. Kruzic, S. Gotovac, and V. Papic propose and validate a novel approach for an automatic object detection and localisation on aerial images. The main idea of this approach is to create an optimal flight route plan to capture desired area, make a mosaic of collected images, create world file transformation and load the mosaic image with the appropriate world file in GIS software, as well as to detect objects of interest and their locations in the resulting image and on the map. This approach is useful in monitoring terrain abnormalities since the terrain is sustainable to the weather changes and time of the year. It can provide a help to search

and rescue teams in their operations since object detection in a high-quality mosaic image is generally not a difficult problem.

Finally, in the paper "A Smart IoT-Aware System For Crisis Scenario Management", the authors M. Mongiello, F. Nocera, A. Parchitelli, L. Patrono, P. Rametta, L. Riccardi, and I. Sergi propose an Internet of Things(IoT)-based framework, aiming at monitoring environmental parameters within buildings in order to alert rescue workers in case of dangerous situations, like fire. A hardware infrastructure driven by a software layer adds flexibility and adaptability to the Complex Event Processing engine and to a rule engine-based reflective middleware that manages and analyses raw data, in conjunction with a knowledge base that models the application domain. This approach aims at reducing the intervention time of rescuers and saving more lives.

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