



## Green data collection and processing in smart cities

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Published online: 5 July 2020

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Cities are growing at a fast pace and by 2050, 70% of the world's population is expected to be urban. In this context, it is important for cities to become “*smarter*” and to be ready to accommodate this huge number of citizens and to face new arduous challenges, e.g., traffic congestion, air pollution, waste management, and water monitoring.

In the last few decades, a lot of attention has been given to the evolution of urban development towards technology, innovation, and globalization, highlighting the need of *smarter* urban ecosystems. The term used to describe this revolution is “Smart City”.

Smart cities are heterogeneous systems, merging technological and social aspects, fostering the citizen participation. Efficiently running all these systems together in a collaborative manner at an urban metropolitan scale raises a large set of new challenges that range from urban-scale social and physical sensing to cloud-based urban data management, going through energy-efficient wireless communication protocols, privacy by design, heterogeneous distributed data collection and assimilation, visual analysis, and urban system software engineering.

This special issue discusses how these important challenges are currently addressed in the context of green smart cities, from energy issues to wireless communications going through privacy and vehicular networks.

We received several submissions of high interest. The review process helped to select the best ones, guaranteeing the quality of the form and the content, and ensuring the scientific rigor and technical correctness. Hereafter, we provide a summary of each paper in this special issue.

The first article entitled “Comparison of Energy Simulation Applications Used in Green Building” from the Australian College of Kuwait focuses on green buildings which aim is to provide comfortable life for its residents, while facing the negative impacts on the surrounding environment. It provides a deep investigation, analysis, and comparison of the performance of the most common software applications used for simulating and modeling the energy consumption in green buildings. Based on this review, the authors highlight the best application based on unified selection criteria, which include various sets of design parameters and operating conditions.

The second paper from Nataša Maksić and Milan Bjelica, “M/M/1 Model of Energy Efficient Ethernet with Byte-based Coalescing,” investigates the energy consumption of Ethernet communications in urban applications. To reduce it, the authors propose an M/M/1 model for byte-based coalescing on Ethernet links compliant to energy-efficient Ethernet standard. The paper then discusses application of the proposed model for the evaluation of energy efficiency of 10GBASE-T Ethernet links in future IoT data centers within smart cities.

The third paper, “An anonymous and identity-trackable data transmission scheme for smart grid under smart city notion,” focuses on the security of data transmission over wireless communications in smart grids for an urban environment. It proposes several data protection mechanisms together with the wireless transmission protocols adapted for smart grid data flows.

A major issue of green smart cities is the road traffic. A means to improve flows and reduce their negative effect on the environment is to rely on vehicular networks. The fourth paper, “Density Connected Cluster Based Routing Protocol in Vehicular Ad Hoc Networks,” proposes a new routing protocol for such networks, allowing better communication

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performance in terms of packet delivery and latency, which directly improves the reliability of the system and its consumption.

Finally, one of the rising communication technologies in smart city sensing is LoRa. The last paper of this issue proposes “A Study of the LoRa Signal Propagation in Forest, Urban, and Suburban Environments” based on real experimentations conducted in different environments. This study allows a good understanding of the message propagation and shows the limitations and strengths of such a technology, especially in an urban environment.

While this special issue is far from delivering a complete coverage on this exciting research area, we hope that these articles give the audiences a taste of the main trends and current research topics, and provide them an opportunity to explore and collaborate in the related fields. Finally, we would like to thank all the authors and reviewers for the quality of their contribution which made this special issue possible.

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