

Guest Editorial

Special Issue on Smart Sensors for Smart Grids and Smart Cities

SMART city and smart grid are stimulating topics which have spurred a wealth of multidisciplinary research activities for the past few years. Cities and their grids are undergoing remodeling to assure effective services to growing population with heightened demand. Users continuously define new requirements, thus becoming active part in the management and future design of cities and power grids. Investment in buildings, transportation, healthcare, energy and public services brings with it new features that improve quality of life; smart mobility, traffic control, home automation, effective water supply, energy efficiency, renewable energy and new public services are just some examples of the modern revolution we are witnessing.

The two frameworks, smart grids and smart cities, are intimately interconnected since a smart grid sits at the heart of the smart city. Energy efficiency, transportation and management require infrastructures which must be more reliable, sustainable and resilient; a smart grid cannot fully exist without a smart city. Vice versa building a smart city involves a transformation of the traditional electricity network, building upon smart technologies. Transducers and sensors play an important role in enabling new features and improving the performance of city public services as well as enhancing the quality and efficiency of power supply. A number of open research questions need to be answered however, before the full potential of smart grids and smart cities is achieved. Building on the existing literature base, this Special Issue aims to present and highlight advances and emergent technologies, best practices, implementations, applications and innovative research outcomes concerning the design and the development of sensors and sensor networks for smart grid and smart cities applications. It provides readers with a clearer overview of the current state of the art on this field and intends to stimulate the international scientific community to further advance the topical area.

A variety of topics are proposed and discussed in the Special Issue, through its 29 articles. The topics range from data acquisition to remote monitoring applications for both aspects of grid and cities. Manuscripts have been contributed by researchers from Europe, Asia and America. All papers provide interesting and promising advanced developments in the area. It includes research articles on remote sensing technologies to improve the management and efficiency of

the power grid, and innovative research concepts and methods to address the new needs and demand arising in health care, transportation, and public supply services having social impact on people.

In detail, the proposed smart grid applications include articles on advanced metering infrastructure and smart power meters to monitor energy flow in electric network, innovative contactless current sensors, sensors to monitor the presence of trace moisture in SF₆ Gas insulated switchgear, synchrophasor sensors and phasor measurement units for protecting the transmission line, the definition of the requirements to assure grid sensors interoperability, sensors calibration, power line data aggregation, the design of sensor interface devices, and models to detect attacks against power grid sensors.

The smart city applications present in the issue include algorithms to assure energy efficiency for street illumination, models for optimal placement of surveillance cameras, algorithms for estimating and tracking human indoor navigation, a novel battery status sensing system for electric vehicles, sensors measuring vehicle weigh in motion to assess traffic, sensing techniques to detect leaks in water pipes, discussion on the application of the graph signal processing to sensor networks, sensing systems to evaluate influence of pollution and micro-climatic conditions on the quality of life in city environment, a prototype of a multi-parametric sensor network installed on the public lighting system with a cloud-based analytical model, sensors for ambient assisted living and homecare using sensing of electricity data.

Finally, we would like to thank all authors for their contributions and reviewers for their efforts to ensure quality. We thank Lauren Young and the Sensors Journal Staff for their support, efficiency and competence.

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