



IEEE Design & Test Special Issue Call for Papers:
**Smart and Autonomous Systems for Sustainability: Sustainable Computing and
Computing for Sustainability**

Aims and Scope:

We are witnessing the rise of the data-driven science paradigm, in which massive amount of streaming data can be analyzed to make sense to be able to take intelligent decisions for sustainability over multiple time scales (e.g., short-term vs. long-term planning). Intuitively, “sustainability” refers to the ability to maintain certain performance or efficiency over time. This concept in the context of computing systems can be seen as “sustainable computing” – computing systems that maintain certain performance reliably by consuming low power for a very long period of time. To enable sustainable computing, we need adaptive approaches for managing the computing resources, and methods for improving reliability and security of computing systems. In another direction, computing algorithms and computing systems together with large amount of data can be used to meet the human needs of the present without compromising the ability of future generations to meet their own needs (“computing for sustainability”). For example, managing the power system with increasing use of renewable sources of electricity. To enable computational sustainability for diverse applications, we need appropriate computational/learning algorithms and hardware systems.

Smart and autonomous systems are characterized by context-aware computing and control to optimize a set of high-level objectives. These systems are ubiquitous in many Internet-of-Things (IoT) and Cyber-Physical Systems (CPS) applications. They are truly cognizant in the sense that they monitor the environment, represent the current state of things, and make appropriate control decisions. Some representative examples include: 1) Smart energy systems that need to continuously take control actions (e.g., storing and releasing energy, turning transmission lines on and off) based on the sensor data from the demand side (e.g., homes, businesses, electric vehicles) and supply side (e.g., weather, status of different power lines and equipment); 2) Smart ecosystem managers whose goal is to maintain the health of the ecosystem by taking actions that fight the spread of invasive species, fires, and diseases; 3) Health monitoring and interventions for personalized health care; and 4) Smart devices / circuits / chips for sustainable computing.

In this context, the special issue on Smart and Autonomous Systems for Sustainability will introduce, explore, and investigate the challenges and opportunities in developing foundations of both sustainable computing and computing for sustainability for emerging application domains. The aim is to offer the readers without the background on smart and autonomous systems and computational sustainability, a clear perspective of the rich landscape of both academic and industrial endeavors in the design of intelligent systems. The special issue will not only showcase the state-of-the-art but also articulate the innovations and advances required for adopting this technology for a large class of emerging application domains.

Topics of Interest:

We invite submissions on approaches for sustainable computing and computing sustainability and their combination. Topics of interest include but are not limited to, the following:

- Design of smart computing systems for energy-efficiency and robustness
- Energy-aware computing and communication among heterogeneous IoT systems
- Algorithms and data analytics methods for improving reliability and security of computing systems
- Specifications, models, hardware and software co-design for smart systems
- Theoretical foundations, algorithms, and hardware to enable adaptability and reconfigurability in smart systems
- Mathematical and computational models for smart sensing and decision making
- Cognizant architectures for efficient mining of data streams, and decision making under uncertainty
- Data analytics and machine learning algorithms to enable smart systems
- Diverse applications including smart grids, transportation, health care, robotics, smart cities etc.
- Robust and safe algorithms for data analytics and decision making
- Human-in-the-loop and semi-autonomous systems

Submission and Review Process:

Prospective authors should follow the submission guidelines for *IEEE Design & Test*. All manuscripts must be submitted electronically to IEEE Manuscript Central at <https://mc.manuscriptcentral.com/dandt>. Indicate that you are submitting your article to the special issue on Smart and Autonomous Systems for Sustainability. Submitted manuscripts must not have been previously published or currently submitted for publication elsewhere.

Manuscripts must not exceed 5,000 words, including figures (with each average-size figure counting as 200 words) and a maximum of 12 references (50 for surveys). This amounts to about 4,000 words of text and a maximum of five small to medium figures. Accepted articles will be edited for clarity, structure, conciseness, grammar, passive to active voice, logical organization, readability, and adherence to style. Please see *IEEE Design & Test* Author Resources at http://www.ieee.org/publications_standards/publications/authors/magazines.html to view links in Submission Guidelines Basics and Electronic Submission Guidelines and requirements.

Schedule:

- Manuscripts due: 1 June 2018
- Reviews completed: 15 July 2018
- Revisions due: 15 September 2018
- Final version due: 15 October 2018

Guest Editors:

Jana Doppa, *Washington State University, USA*
 Paul Bogdan, *University of Southern California, USA*
 Justinian Rosca, *Siemens Corporate Research, USA*