Proposal for Special Session at IFAC IAMES 2024

Title:

Sustainable Districts' Optimization and Control

Organizers:

- Luca Parodi, Post-Doc, University of Genoa, E-mail: luca.parodi@edu.unige.it
- Virginia Casella, PhD Student, University of Genoa, E-mail: virginia.casella@edu.unige.it
- Yassine Ennassiri, PhD Student, University of Genoa, E-mail: yassine.ennassiri@edu.unige.it

Scope and motivations of the Special Session:

Sustainable districts represent a defining frontier in urban planning and development, offering a vision of eco-friendly, resilient, and thriving communities. Of course, to achieve sustainability within these districts, it is necessary to address a range of interconnected challenges, including energy efficiency, waste reduction, transportation optimization, and fostering social well-being. At the core of this complex undertaking rests the incorporation of optimal design, management, and control strategies.

Optimal design serves as the foundational pillar for sustainable districts, providing the blueprint for environmentally responsible and livable urban spaces. It encompasses the physical layout, infrastructure, and architecture of the district, all aimed at maximizing energy efficiency, minimizing environmental impact, and promoting the well-being of its residents. Key principles of optimal design include smart land use, green building techniques, and the incorporation of urban green spaces. By implementing optimal design principles, sustainable districts can offer residents an improved quality of life and create spaces that are inviting and resilient.

Optimal management complements optimal design by ensuring the efficient allocation and utilization of vital resources, such as energy, water, and waste management, within the district. Effective resource management includes optimizing energy consumption, intelligent water management, and strategies for efficient waste collection and recycling. Optimal management not only promotes environmental stewardship but also yields significant economic benefits. The decision-making involved in optimal management offers district leaders the ability to make informed choices, adapt to changing conditions, and respond to unforeseen challenges effectively.

Optimal control takes sustainability to the next level by providing real-time, dynamic regulation of systems within a district to achieve its sustainability goals. These dynamic adaptations lead to significant reductions in resource consumption and environmental impact.

In summary, optimal design, management, and control are essential components of sustainable districts, working together to create environmentally responsible, economically viable, and socially equitable urban environments. By integrating these strategies, districts can achieve their sustainability goals, not only reducing their ecological footprint but also creating resilient, vibrant communities for their residents. This special session will explore innovative solutions, offer case studies, and share best practices that demonstrate how the integration of these strategies can lead to a brighter, more sustainable urban future.

Some possible sub-topics for this Special Session are:

Proposal 2 submitted to 3rd IFAC Workshop on Integrated Assessment Modelling for Environmental Systems. Received November 13, 2023.

1. Smart Urban Planning and Sustainable Design
2. Optimal Control of Sustainable Districts
3. Energy Communities Design, Management and Control
4. Transportation and Mobility Solutions for Sustainable Districts
5. Real-time Adaptive Control Systems for Resource Optimization
6. Integrated Data Analytics for Decision Support in Sustainable Districts
7. Waste Reduction and Circular Economy Practices
8. Resilience and Climate Adaptation in Urban Planning
9. Water Resource Management
10. Applications to Case Studies

Proposal 2 submitted to 3rd IFAC Workshop on Integrated Assessment Modelling for Environmental Systems. Received November 13, 2023.