Advanced Intelligent and Sustainable Transportation Systems: Emerging Research, Technologies, and Applications

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1. Description

The transportation sector is undergoing a major transformation driven by rapid technological advances and the growing need for sustainable mobility solutions. Traditional systems are increasingly challenged by modern urban environments that demand higher efficiency, improved safety, adaptability, and reduced emissions. Recent developments in Artificial Intelligence (AI), the Internet of Things (IoT), Cyber-Physical Systems (CPS), and green mobility technologies are reshaping the design and operation of transportation networks.

The convergence of these technologies enables intelligent, real-time management of transport systems, predictive traffic analysis, route optimization, and autonomous operations. AI processes large-scale traffic data to enhance network efficiency, while IoT devices provide continuous monitoring of vehicles, infrastructure, and environmental conditions. CPS ensures seamless coordination between vehicles, infrastructure, and control centers. At the same time, green mobility solutions such as electric vehicles, energy-efficient transport modes, and renewable energy integration strengthen environmental sustainability. By combining intelligent technologies with sustainable strategies, these innovations pave the way for cleaner, safer, and more efficient transportation systems tailored to the evolving needs of smart cities

This Special Session is designed to provide a platform for researchers, engineers, and practitioners to present cutting-edge research, innovative solutions, and real-world applications in the field of intelligent and sustainable transportation. It aims to foster collaboration among academia, industry, and governmental organizations, promoting knowledge exchange and the dissemination of new methodologies. Contributions are encouraged to address both theoretical and practical aspects of modern transportation systems, including algorithm development, system architecture, modeling, simulation, and case studies.

Key areas of interest include intelligent decision-making frameworks, optimization techniques for traffic and fleet management, digital twin technologies for predictive analysis, and autonomous mobility solutions. Multimodal transport management, integrating multiple forms of transportation such as public transit, personal vehicles, shared mobility, and last-mile solutions, is also of great interest. Emphasis is placed on strategies that enhance system resilience, adaptability, and scalability in response to changing urban demands and environmental conditions.

The session seeks papers that explore the integration of AI and IoT for real-time traffic monitoring, predictive maintenance, and adaptive control strategies. Contributions on vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-everything (V2X) communication are highly encouraged, as they play a critical role in enabling cooperative and autonomous transport networks. Similarly, research on intelligent routing, congestion mitigation, and energy-efficient transport planning is welcomed.

Practical implementations and empirical studies are strongly encouraged, particularly those demonstrating the deployment of intelligent and sustainable transport systems in real-world settings. Case studies highlight challenges, successes, and lessons learned in implementing smart mobility solutions provide valuable insights for both research and practice. Papers that explore the use of digital twins for modeling, simulation, and predictive analytics of transportation systems are especially relevant, as these approaches can support

decision-making and system optimization in dynamic environments.

Furthermore, contributions addressing the design and evaluation of autonomous vehicle systems, including perception, control, decision-making, and safety, are highly relevant. Research that integrates sustainability considerations with intelligent mobility, such as energy-efficient routing for electric and hybrid vehicles, optimized charging strategies, and environmentally aware traffic management, will be particularly valuable. The session also welcomes studies on intelligent logistics, smart public transportation, and sustainable urban mobility planning that demonstrate measurable improvements in efficiency, safety, and environmental impact.

This Special Session aims to showcase innovative research that pushes the boundaries of intelligent and sustainable transportation systems. It provides a venue for the exchange of ideas, presentation of novel methodologies, and discussion of emerging trends and technologies. By highlighting advances in AI, IoT, CPS, digital twins, autonomous mobility, and green transport strategies, the session seeks to contribute to the development of smarter, safer, more efficient, and environmentally responsible transportation systems. The ultimate goal is to accelerate the transition toward intelligent, sustainable, and resilient transport ecosystems that meet the evolving needs of modern urban environments.

2. Topics of Interest

- AI and machine learning for traffic prediction and control
- Real-time traffic monitoring and incident detection
- Connected and cooperative intelligent transport systems (C-ITS)
- Electric vehicle (EV) integration, charging optimization, and scheduling
- Renewable energy solutions for transport infrastructures
- Life-cycle assessment and carbon footprint reduction methods
- V2X communication and cooperative driving
- Safety, reliability, and cybersecurity in autonomous mobility
- IoT-enabled smart roads, smart parking, and intelligent logistics
- Cloud/edge computing architectures for transportation
- Digital twins for real-time system monitoring and prediction
- Multimodal transport data fusion and decision-support systems
- Deep learning models for spatiotemporal mobility data
- Transport system risk analysis and resilience strategies
- Cybersecurity for connected and automated transport
- Smart city mobility solutions and governance
- Sustainable logistics and supply chain transportation

3. Bibliographies

Naourez Ben Hadj received the Ph.D in Electrical Engineering from ENIS, in 2011 and Habilitation to Direct Research (HDR) in 2021 from Laboratory of Electronics and Information Technologies (LETI) at the National Engineering School of Sfax (ENIS), University of Sfax. She is currently an A. professor with the Department of Electrical Engineering at ENIS. Her research interests are centered on Energy efficiency and energy management of electric vehicles, on Renewable Energy (analysis and design of PM generators for wind turbine conversion, PV energy forecasting using deep learning...), on design of electrical machines and on fault diagnosis in permanent magnet motors. Dr. Ben Hadj has authored numerous cited papers in journals and serves as a reviewer for leading journals in her field.

Houda Daoud was born in Sfax, Tunisia in 1980. She received the Electrical Engineering Diploma then the Master degree in electronics from the National School of Engineering of Sfax "ENIS", respectively, in 2004 and 2005. She joined the Electronic and Information Technology Laboratory of Sfax "LETI" from June 2004 to August 2025 and she has been Assistant professor at the National School of Electronic and telecommunication "ENET'COM" from 2012 to 2024. Actually, she has been Associate professor at the National School of Electronic and Telecommunication "ENET'COM". She joined the Laboratory of Advanced Electronic Systems and Sustainable Energy (ESSE) since September 2025. Her current research interests are in smart and intelligent systems design and development for different fields. She is author and co-author of several journal papers, conference papers and book chapters.

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Dr. Wissem Abbes is an Assistant Professor of Computer Science whose research focuses on evolutionary algorithms, cloud computing, and artificial intelligence. He holds a Ph.D. in Computer Science, and his academic work focuses on optimization methods and intelligent computational models for solving complex problems in large-scale and distributed systems.
In addition to his research and teaching activities, Dr. Abbes actively participates in the scientific community. He serves as the General Secretary of the IEEE Computational Intelligence Society Tunisia Section and the General Secretary of the ARSII Sfax Chapter (Association for Scientific Research and Innovation in Computer Science), where he contributes to advancing research collaboration, scientific innovation, and knowledge dissemination in the field of computational intelligence.