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EDITORIAL

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Special issue: Next generation smart transportation systems: envisioning a carbon-neutral, connected, intelligent, equitable transportation

In recent years, rapid urbanization, population growth, and increasing concerns about climate change have led to a growing demand for innovative and sustainable transportation solutions. As we strive to meet these challenges, the development of next-generation smart transportation systems has emerged as a critical focus for researchers, industry leaders, and policymakers worldwide. These advanced systems have the potential to revolutionize the way we move people and goods, integrating cutting-edge technologies or concepts such as artificial intelligence, electrification, connected and automated driving, and advanced aerial mobility. This special issue aims to provide a platform for the exchange of ideas, research findings, and best practices, fostering a deeper understanding of the opportunities and challenges presented by this paradigm shift in transportation. By exploring the diverse aspects of carbon neutrality, connectivity, intelligence, equity, and verticalization, we hope to foster a multidisciplinary dialogue and shed a light on the development of sustainable, efficient, and equitable transportation solutions for the future.

Focusing on the theme of “Next Generation Smart Transportation Systems: Envisioning a Carbon-Neutral, Connected, Intelligent, Equitable Transportation”, this special issue in Frontiers of Engineering Management has collected 10 papers intending to explore the solutions for future transportation modes.

Automated driving has recently attracted significant attention. While considerable research has been conducted on the technologies and societal acceptance of autonomous vehicles (AVs), investigations into the control and scheduling of urban automated driving traffic are still nascent. **Li et al.** introduce a novel global control mode for urban automated driving traffic. Its core concept involves the central scheduling of all autonomous vehicles within the road network through vehicle-infrastructure cooperation, thereby optimizing traffic flow.

Yang et al. introduce a data-driven algorithm for rolling eco-speed optimization in AVs aimed at enhancing vehicle operation. The algorithm integrates a deep belief network with a back propagation neural network to formulate a traffic state perception mechanism for predicting feasible speed ranges. The proposed algorithm results in a 12.2% reduction in energy consumption relative to standard driving practices, without a significant extension in travel time.

Yang et al. investigate the use of AVs in bus rapid transit lanes. They develop a dynamic joint optimization

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model that adjusts autonomous vehicle speeds and bus timetables to minimize vehicle travel times while reducing bus passenger waiting times. To address the computational challenges of large-scale scenarios, they implement a simulation-based heuristic algorithm framework, which significantly improves the system throughput compared to existing benchmarks.

Urban rail transit (URT) plays a pivotal role in mitigating urban congestion and emissions, positioning it as a sustainable transportation alternative. **Huang et al.** propose a decision support model that integrates operational control strategies pertaining to passenger flow and train capacity utilization. This model's efficacy was assessed using data from the COVID-19 outbreak in Xi'an, China, at the end of 2021.

Bus bunching has been a persistent issue in urban transit systems, and it remains a challenge not fully resolved. **Yang et al.** summarize the existing solutions and serve as a guide for relevant research in this area. They divide them into five directions, i.e., operational strategy improvement, traffic control improvement, driver driving rules improvement, passenger habit improvement, and others.

Zhong et al. propose a unified optimization model to jointly optimize the bus charging plan and energy storage system power profile. The model optimizes overall costs by considering battery aging, time-of-use tariffs, and capacity service charges. The numerical simulations demonstrate that the proposed method can optimize various operational decisions in seconds.

Cheng et al. explore a public transport (PT)-based crowdshipping concept as a complementary solution to the traditional parcel delivery systems. Their findings suggest that PT-based crowdshipping can decrease the total kilometers traveled by vehicles, the overall working hours of drivers, and the number of vans required for last-mile deliveries, thereby alleviating urban traffic congestion and environmental pollution.

Guan and Bao investigate whether e-hailing performs better than on-street searching for taxi services. They prove that whether e-hailing performs better than on-street searching mainly depends on the density of idle vehicles within the matching area and the matching period.

Ma et al. propose an algorithm for train delay propagation on double-track railway lines under First-Come-First-Serve (FCFS) management. This algorithm offers a valuable tool for dispatchers to manage and reschedule trains in response to delays, thereby enhancing the resilience and efficiency of railway operations.

Yan et al. explore urban air mobility (UAM) as a strategy for mitigating escalating traffic congestion in major urban areas as a consequence of a static transportation supply versus dynamic demand growth. It offers an indepth overview of UAM development, highlighting its present state and the challenges of integration with established urban transport systems.

Finally, we would like to express our sincere gratitude to the contributing authors who generously share their insights and views. We are also grateful to the reviewers, the journal editors and the publisher for their help in facilitating the review and editorial process of this special issue.

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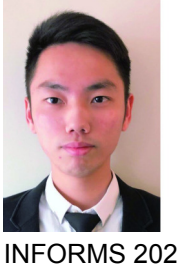

Dr. Kai Wang is currently an Associate Professor at the School of Vehicle and Mobility, Tsinghua University, China. He was a Research Scientist at Heinz College, Carnegie Mellon University from 2021 to 2022, and a Postdoctoral Associate at Sloan School of Management, Massachusetts Institute of Technology from 2019 to 2021. Dr. Kai Wang's research spans large-scale, stochastic, and data-driven decision-making, with primary applications in smart transportation and logistics systems. His research has appeared in top-tier journals such as *Operations Research*, *Management Science*, *Transportation Science*, *Transportation Research Part B, etc*. It has been recognized with several academic distinctions, e.g., INFORMS 2023 Harvey Greenberg Research Award, INFORMS 2021 Transportation Science & Logistics Society Best Paper Award, etc.