Received: 29 October 2023 | Accepted: 19 February 2024

DOI: 10.1049/itr2.12499

IET Intelligent Transport Systems

The Institution of Engineering and Technology WILEY

GUEST EDITORIAL

Guest editorial: Electro-mobility for urban traffic and transportation

1 | INTRODUCTION

Electro-Mobility (e-Mobility) represents the concept of utilizing electric power-train techniques, in-vehicle information, communication techniques and related equipment to enable wise electric propulsion of vehicles and fleets. It has been recognized as not only a major innovative field of innovation in the coming decades but also a dominant technology for urban mobility in the future. Motivated by the need to improve fuel efficiency, meet emission requirements and satisfy market demands for lower operational costs, a large number of concrete plans for e-Mobility have been conducted and great efforts have been made in many countries.

However, the broad adoption of electric vehicles (including car and bus) by the public is still a challenging task today, due to high prices of the batteries and their long charging duration. More importantly, the seamless incorporation of e-Mobility into urban transport systems at this time still needs a series of advanced measures to ensure secure and safe operations of vehicles, rational developments of relevant standards, wise planning of urban infrastructure etc. Furthermore, it is also necessary to further analyze the potential effects of e-Mobility on individual daily mobility behavior, automotive supply chain and the long-term environmental protection of this technology accurately in quantification details. This covers a broad interdisciplinary area of research and development towards the success of the next generation of mobility solutions. The current Special Issue is focused on research ideas, articles and experimental studies related to "Electro-Mobility for Urban Traffic and Transportation" for Modeling, simulation, analyzing and forecasting for e-Mobility, and the various aspects of Electro-Mobility in related applications.

2 | PAPERS IN THE SPECIAL ISSUE

In this Special Issue, 13 papers were submitted with five papers accepted; overall the submissions were of high quality, which marks the success of this Special Issue.

The five papers that were finally accepted can be divided into four categories, namely, social investigation, battery power, on-board information and scheduling control. The first kind of paper conducts a social survey. Based on the analysis of the survey results, it understands the public's willingness to use electric vehicles and provides some constructive suggestions. This category includes Bosehans et al. The second type of paper provides a direct solution for the stability of energy power of electric vehicles by proposing a new model of battery detection and dispatching. This paper is by Zhang et al. The third kind of paper establishes a new model for the problem of vehicular information transmission and provides users with a scheme of active decision-making. This category includes a paper by Kyung et al. The fourth type of paper provides solutions for optimizing the allocation of EV related resources (parking lots, charging stations, roads etc.) by proposing a new scheduling control model. These papers are of Yang et al. and Zhang et al. The following is a brief introduction to this dissertation.

Bosehans et al. investigated the willingness of potential users to use shared electric vehicles provided by electric shared mobility hubs (eHUBs) as an alternative to commuting or food shopping trips, therefore providing new evidence on the suitability of eHUBs to be a part of people's daily routines. The survey was conducted among the general population in seven European cities. The survey items included various attitudinal and socio demographic factors that were used to predict respondents' willingness to use shared electric modes from eHUBs using logistic regression. Through the analysis, the factors that can greatly increase the willingness to use shared travel mode are found, and other influencing factors such as people's current travel behavior and vehicle ownership are discussed.

Zhang et al. proposed a battery voltage fault diagnosis method. The voltage prediction models based on BP neural network (BPNN) were established, respectively, for four driving conditions of electric vehicles, and the superiority and stability of the four well-trained BPNN models were verified. Then, the voltage anomaly level and threshold of fault diagnosis are determined according to the difference of driving conditions. The verification results show that the proposed method can achieve good voltage prediction and fault diagnosis of electric vehicles under various working conditions.

Kyung et al. proposed POSCO, an oPportunistic Offloading Scheme for COntent delivery service in electro-mobility networks. POSCO makes a decision on whether to use the vehicle's cache VC or edge cache EC for the content delivery service,

and when the VC is not available, the user determines whether to choose VC or EC for content download. If VC is chosen, content downloads are delayed to improve VC utilization, and if EC is selected, users can download content without any delay or service interruption. A Markov decision process problem is also established and solved using a value iteration algorithm. The evaluation results show that the proposed scheme is superior to the comparison scheme based on expected reward.

Yang et al. proposed real-time and fixed-time shared parking spot allocation models based on time window constraints. The real-time model adopts dynamic response service mechanism and introduces multi-objective decision weighting method to construct weighted evaluation function. The 0–1 programming model of user optimization is established by using branch-bound algorithm. The fixed-time model adopts the periodic service mechanism, in which the rejection penalty factor is introduced to add penalty cost. Then, a 0–1 programming model with system optimization is constructed, in which genetic annealing algorithm is used to solve large-scale calculation problems. The results show that the real-time allocation mode reflects the advantage of the user optimal allocation mode when the supply is greater than the demand, and the fixed-time allocation mode has the advantage of the system resource utilization efficiency.

Zhang et al. designed the optimal operation cost of e-bus charging stations based on charging prices and congestion tool. In the case of electric power and transportation network coupling, a method of e-bus charging station configuration is proposed. A non-dominated genetic algorithm-II (NSGA-II) is used to solve the multi-objective optimization problem to maximize the captured traffic flow and minimize the infrastructure investment at the same time. The effectiveness of NSGA-II method is proved, and the feasibility of the e-bus charging station allocation method is verified by simulation results.

3 | SUMMARY

All the papers selected for this special issue show that the field of electric vehicle are steadily advancing. Continuous breakthroughs have been made in the fields of power technology, vehicular communication and intelligent scheduling, and even interdisciplinary fields, providing inspiration for the seamless integration of e-Mobility into urban transportation systems in the future.

AUTHOR CONTRIBUTIONS

Dalin Zhang: Conceptualization; writing—original draft; writing—review and editing. **Sabah Mohammed**: Conceptualization; supervision; validation; writing—original draft; writing—review and editing.

ACKNOWLEDGEMENTS

First, the authors wish to express their gratitude to all the contributors who submitted novel scientific results in this special issue and to the anonymous reviewers, whose expert work allowed the realization of this endeavor. The authors aspire that this effort should contribute to the further development of Electro-Mobility and increase the concern of the scientific and technological community in the respective area. Last, the authors should not omit to express their appreciation to the journal's editors-in-chief and the editorial office for their support throughout this venture.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

GUEST EDITOR BIOGRAPHIES

Dalin Zhang received his Ph.D. degree in computer science from the Beijing University of Posts and Telecommunications in 2014. In 2017, he was a postdoctoral researcher with the School of Electronics and Computer Engineering, Purdue University, USA. He is currently an associate professor of computer science and software engineering at Beijing Jiaotong University. His current research interests include intelligent transportation systems, railway information technology, software engineering, and system security. In the field of railway information technology, he mainly applies technologies such as big data analysis, data mining, text recognition, and business flow management to improve the efficiency of railway operation and maintenance and monitoring. His research results have been successfully deployed in China's high-speed railway operations. In the field of software engineering and system security, his research focuses on developing applications of program analysis and testing for improving software and system reliability, security, and performance. These research areas are mainly in software engineering and also data mining and programming languages. He is a member of the China Computer Federation (CCF) and the CCF Technical Committee of Software Engineering (TCSE).

Sabah Mohammed research interest is in intelligent systems operating in large, nondeterministic, cooperative, highly connected, survivable, adaptive or partially known domains. His continuous research is inspired by his Ph.D. work back in 1981 from Brunel University (UK) on the employment of the Brain Activity Structures for decision making (planning and learning) that enable processes (e.g. agents, mobile objects) and collaborative processes to act intelligently in their environments to timely achieve the required goals. Having trained in medicine with a computer science Ph.D. in Artificial Intelligence (AI), Dr. Mohammed is full professor at the department of Computer Science at Lakehead University (Ontario Canada) since 2002 and core professor at the Ph.D. BioTechnology program at Lakehead. Prior to his work at Lakehead University, Dr. Mohammed was the chair of three computer science departments at HCT, Philadelphia and Applied Science Universities.

He is the founder and editor-in-chief of *Emerging Technology of Web Intelligence* (JETWI) as well as the co-supervisor of the Smart Health FabLab at Lakehead University. Dr. Mohammed is currently the chair of the special interest research group on Smart and Connected Health with the IEEE ComSoc eHealth TC. Dr. Mohammed is currently working on the development of IoT and mobility technologies that have impact on improving healthcare services at remote areas like Northwestern Ontario region. Dr. Mohammed is also the editor-in-chief of *IGI Global International Journal of Extreme Automation and Connectivity in Healthcare* (IJEACH). Dr. Mohammed is a professional engineer of Ontario (PEng), information processing professional with CIPS and senior member of IEEE with research supported by major granting organizations like NSERC, CFI, MITACS, THBRHSC and ONCAT.

Alessandro Calvi is an associate professor of roads, railways and airports at the department of engineering of Roma Tre University. He received a MS degree in civil engineering with honours and a Ph.D. degree from Roma Tre University. He is the editor-in-chief of *Advances in Transportation Studies*, an international journal and the associate editor of *Traffic Injury Prevention*. Moreover, he has served as guest editor and is a member of Editorial Boards for various international journals. He has been a member of the scientific committee and keynote speaker and chairman for several international conferences.

He is author of over 100 papers published in international journals and conference proceedings within his main research interests as road infrastructure design, road safety, road and railway materials and road and railway maintenance and rehabilitation. Specifically, one of his main research interests is the non-destructive assessment and health monitoring of civil engineering infrastructures, such as railways and roads and the development of non-destructive laboratory and on-site tests for the characterisation of soils and construction materials of railways and roads. He has published several texts concerning the evaluation of road projects in terms of safety under a multidisciplinary approach, taking into account the analysis of driver behaviour, especially using driving simulators and naturalistic driving approach. The majority of his research activities are based on driving simulation technology (in the field of road safety and design) and the use of ground penetrating radar for applications to transportation infrastructures. He has participated in several international and national research projects and other activities.

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