

Editorial for the journal of rail and rapid transit high speed rail: Education interchange conference special edition

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High Speed Rail (HSR) has been flourishing across the globe, providing a low carbon transport solution for moving people within and between countries for over half a century. With high speed lines operational or planned in 45 countries, there is a growing need for tailored education and research to meet the particular needs of the sector. The High Speed Rail: Education Interchange (HSR:EI) conference invited stakeholders from across the world to share their challenges, experience and ideas, to create a platform for future collaboration in research and to help shape future education programmes.

Due to the worldwide pandemic, HSR:EI was hosted virtually by the Birmingham Centre for Railway Research and Education at the University of Birmingham in December 2020. It brought together over 100 participants and contributors for a programme of thought-provoking presentations from industry and academic experts, showcases of current technical and educational research, discussion round tables and a workshop on facilitating collaboration. This special issue of the *Journal of Rail and Rapid Transit* showcases a number of the technical contributions presented during the conference, at the cutting-edge of research applicable to HSR.

Alongside the rapid growth of HSR networks, railways have been trending towards the digitalisation of operations and control. Managing the complexity of interfaces between trains and infrastructure at high speed, whilst ensuring passenger safety and performance, is being supported by advances in Traffic Management Systems, Automatic Train Operation, remote sensing, evidence-based decision support tools and other innovations. The five papers in this issue deal with one or more of these varying aspects of digitalisation.

Liu et al., (2021) focus on the testing and validation of Traffic Management Systems, which monitor and control train movements across a network, presenting the communication Platform for Traffic Management demonstrator (OPTIMA) developed through the Shift2Rail OPTIMA project. The systematic approach for the validation of Traffic Management Systems through the communication platform is discussed.

Hyde et al., (2021) also consider the context of future Traffic Management Systems in their work on use cases for

obstacle detection and track intrusion detection systems, part of the Shift2Rail SMART2 system concept. As railways introduce Automatic Train Operation, there is a need to automate this detection role for different types of railway operation.

Further insight into Automatic Train Operation for HSRs is provided by Feng et al., (2021). The authors present a notch-based train speed trajectory optimisation model to determine realistic energy-efficient train trajectories for high speed trains which have traction and braking notches, an advance on typical models which do not consider notches.

Ketphat et al., (2021) also focus on train control, introducing multiple state movements for simulating a train's movement under a virtual coupling system, whereby trains run at minimum separation in a virtual convoy. The potential benefits in capacity, safety and stability are explored through simulation.

The paper by Sasidharan et al. (2021) presents a decision support tool to inform economically justified asset management strategies. Derailment risks associated with railway track conditions and the impact of different maintenance interventions are evaluated from a whole life-cycle cost perspective using commercially available data.

It is clear from the diverse topics covered that the digitalisation of railway operations and control, particularly for HSR, provides a rich field for future innovative research. We are grateful to the paper authors for sharing their advances at the HSR:EI conference, and to the Journal of Rail and Rapid Transit editorial team and reviewers for enabling them to share their work with a wider audience. We hope that this Special Issue will be of interest to the global railway community.

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