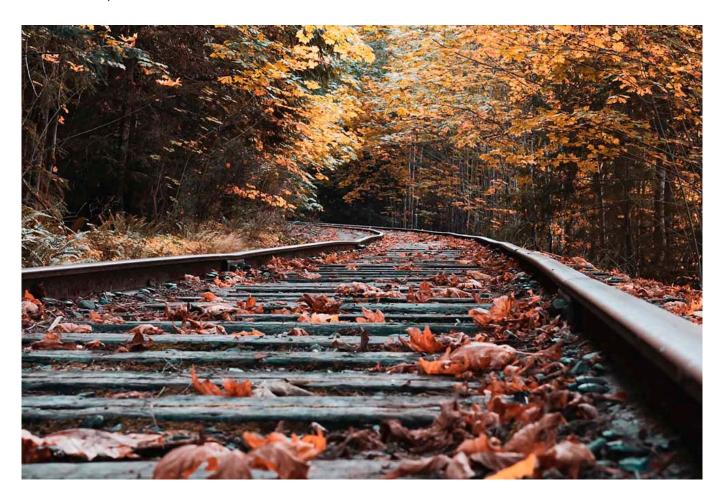# University rail department snaps up prestigious prize

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The University of Huddersfield's Institute of Railway Research has scooped a prestigious Institution of Mechanical Engineers (IMechE) prize.

They won thanks to their research paper which discussed the work its engineers were doing to design a simulation tool to help train operators, maintainers and integrators optimise braking performance on their vehicles.

The paper, called 'Modelling and simulation of the train brake system in low adhesion conditions' has won the IMechE's "T A Stewart-Dyer Prize/ Frederick Harvey Trevithick Prize".

Created by the University's Dr Hamid Alturbeh, Julian Stow and Professor Gareth Tucker, with the assistance of Alan Lawton from the Rail Delivery Group, the research was funded under the University's strategic partnership with the Rail Safety and Standards Board (RSSB).

Judges singled the paper out under criteria of being the most meritorious on the subject of railway engineering and for its contribution or achievement in that field. It has been published by the Journal of

Rail and Rapid Transit and describes the methodology behind the 'Low Adhesion Braking Dynamic Optimisation for Rolling Stock' (LABRADOR) simulation tool, and how it can predict the train brake system performance.

Discoveries made using the LABRADOR tool can support decision-making in the design and optimisation of the braking system including wheel slide protection, sanders and the blending and control of friction and dynamic brakes in low-adhesion conditions.

Low adhesion is a major problem for the UK's railway industry, especially during Autumn when leaves falling on the track can cause costly delays amounting to approximately £80 million per year.

Dr Alturbeh said: "There are ten million trees around the railway line in the UK which leads to thousands of tonnes of leaves that get stuck on the track and this makes the track very slippery.

"This means trains must run at a reduced speed, accelerate slower and brake earlier. A build-up of leaves can also make it harder for signallers to detect a train's location, which can then be the cause of further delays," he added.

Dr Alturbeh explained what makes the LABRADOR train braking model unique is the way the tool has been configured to preserve the modularity of the various sub-systems within the braking system. This allows the model to be extended to represent longer trains and also to model the various brake system architectures present in older, contemporary and future rolling stock.

"LABRADOR allows the study of specific brake control features such as 'Wheel Slide Protection System' strategies, sanding effectiveness, dynamic brake utilisation, traction performance and more. This understanding will benefit train operators, maintainers and integrators by helping them optimise the braking performance of their trains," said Dr Alturbeh.

The Institute of Railway Research (IRR) is based within the University's School of Computing and Engineering. It is known as a world-leading centre in the field of railway engineering and safety and, in 2018, became a UK Rail Research and Innovation Network (UKRRIN) Centre of Excellence in Rolling Stock.

The IRR's research played a key role in improving knowledge of how railway vehicles interact with the track, including performance aspects such as suspension performance, wheel-rail contact, traction and braking.

Working closely with industry and academic partners, this has led to a number of new tools and techniques which are now used to predict deterioration of railway wheels and rails, to optimise the vehicle track interface, to increase safety and reliability levels, reduce cost and improve performance of the railway system.

Director of the IRR, Professor Simon Iwnicki, said: "This is at least the fourth time in the last few years that members of the IRR have won a prestigious IMechE prize," said Professor Iwnicki.

"Not only is this a clear recognition of the excellent work being carried out at the Institute, but it also

highlights the quality of the research papers being published by our members."

The paper is online here.

Image supplied by University of Huddersfield