

Smart sensors could end rail chaos from 'leaves on the line'

November 16 2016



Credit: University of Birmingham

Train delays due to leaves on the line could be a thing of the past if a prototype developed at the University of Birmingham is adopted by railway networks.

Every year, thousands of commuters endure the frustration of Autumn delays caused by the accumulation of leafy slush on train tracks – and these problems usually reach their peak in mid-November, when leaf loss is coupled with high levels of moisture in the air or on the ground.

Lee Chapman, Professor of Climate Resilience from the University, was inspired by the Internet of Things, which uses a range of innovative power, communication and sensing technology to aggregate real-time, on the ground, data.

Funded by EPSRC and the Rail Safety and Standards Board, he worked with Alta Innovations, the University of Birmingham's technology transfer company, to transform the concept into a reality. His new technology, called AutumnSense, uses low-cost sensors to continuously measure the level of moisture on the railway line at potentially thousands of sites across the network. By linking this data with a leaf-fall forecast, operators can identify where and when the risk is greatest. This allows the precise and efficient use of automated treatment trains, which can clear the lines before the morning rush hour starts. His team are now testing the next element of the solution which is a low-cost method to count the number of leaves remaining on the trees.

Professor Chapman's team had previously developed low-cost devices that are fitted to lamp-posts, and transmit data on road surface temperatures, to show precisely where road gritting is needed, and where it isn't. The road technology, called WinterSense, is currently being tested by commercial partners and is expected to be in mass production by the end of this winter.

Professor Chapman said, "One of the major issues with road and rail safety is that hazardous conditions are usually highly localised. For remedial actions to be efficient, and demonstrate 'best value' for the taxpayer, resources should be deployed where they are needed, rather

than in a blanket fashion."

He is marketing AutumnSense and WinterSense through AltaSense, an operating division of Alta Innovations, and hopes to incorporate by Autumn 2017.

He said, "Even though leaf loss and damp conditions can largely be predicted - and despite automated treatment trains working round the clock from October to December - a windy, rainy night still causes havoc for commuters. We have run an initial trial of AutumnSense on a stretch of London Underground tracks that are above ground, and are hoping to move quickly towards a fuller network wide trial."

Wet leaves pose a very real safety challenge for train operators, potentially doubling the braking distance and causing signalling issues, or 'disappearing trains' on the rail control systems due to the electrically insulating effect of the leaves which can prevent operation of track circuits. Leaves on the line are only an issue when they are mixed with moisture or dew, creating a slippery, Teflon-like substance.

Provided by University of Birmingham

Citation: Smart sensors could end rail chaos from 'leaves on the line' (2016, November 16)
retrieved 17 April 2024 from <https://phys.org/news/2016-11-smart-sensors-rail-chaos-line.html>

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