New tech to tackle leaves on the line and de-ice platforms set to revolutionise British rail travel

- twenty-five projects across Great Britain win share of £9.4 million in fourth round of First of a Kind competition
- projects including innovative 5G wifi infrastructure, hydrogen-powered freight trains and speedy new seat-switching app awarded funding
- government-backed fund aims to bring new technology onto the railways to make them cleaner, greener and safer, as the UK leads the way to net zero carbon emissions

Automatic de-icing concrete on platforms and a rapid seat reservation-swapping service could soon make journeys easier by banishing slippery surfaces in winter and guaranteeing passengers a seat, Transport Secretary Grant Shapps announced today (17 June 2020), following a national competition to make the railways cleaner, greener and more passenger-friendly.

The Department for Transport, in partnership with Innovate UK, has awarded 25 pioneering projects a share of £9.4 million in the 2020 First of a Kind (FOAK) competition, which encourages innovation in the rail industry.

Inventors have come forward with a host of ambitious projects to transform rail travel, including low-energy concrete slabs that automatically heat up in freezing conditions to help prevent passengers from slipping on icy platforms and the Seatfrog Train Swap app, which will allow passengers to quickly and remotely update their seat reservation to another service.

Several winning projects will also help the government reduce the railway's environmental impact and support decarbonisation, including a world-first zero emission machine for removing and replacing rails, and hydrogen-based steam turbines to provide zero-emission, low-noise rail freight.

Other schemes supported by the competition include next-generation lightweight composite poles to provide passengers with faster, more reliable 5G wifi, and the development of safer and more resilient glazing for train windows to help prevent glass windows being smashed and protect passengers.

Transport Secretary Grant Shapps said:

> I am delighted to announce the winners of this year's FOAK competition, which will support better, more environmentally friendly journeys. Crucially, these pioneering projects will also ensure that passengers have a more efficient, reliable and responsive railway, making their journeys simpler and easier.
>
> From clever technology on platforms to prevent icy surfaces, new

'seat-switching' apps and improved 5G wifi connections, harnessing innovation will be crucial to modernising the network and making our railways greener and cleaner, as we build beyond coronavirus (COVID-19) and look to the future.

Ian Campbell, executive chair of Innovate UK, said:

These high-quality projects illustrate the appetite of UK organisations to develop new and exciting innovations for rail transport that improve customers' user experience, optimise railway efficiency, and are environmentally sustainable.

Now in its fourth year, the competition was open to organisations of all sizes and sectors whose technologies could help to create a greener, more cost-effective and customer-friendly railway with greater capacity.

Previous winners include new technology from Porterbrook in partnership with emissions specialist Eminox, which successfully reduces harmful emissions from diesel trains by over 90%.

South Western Railway completed a six-month trial in March of the technology that saw an emissions reduction system fitted to the exhaust of a Class 159 train used by passengers between Waterloo and Exeter.

The trial delivered immediate reductions in pollution from nitrous oxides by over 80% and hydrocarbons, carbon monoxide and particulate matter by more than 90%, and is the first successful transfer of proven automotive technology to a rail environment.

OpenSpace Thameslink also received funding for its plans to provide station management with a set of next-generation tools to help with crowd management at London St Pancras International. The project, in conjunction with Govia Thameslink Railway Ltd, immediately found this helped with easing crowds to help maintain social distancing during the coronavirus (COVID-19) pandemic.

The full list of winners are:

Customer experience

Project	Lead organisation	Summary
Train Swap	Seatfrog Ops Limited	Allows passengers to quickly and remotely update their seat reservation to a new service.
Dynamic Capacity Management	Esoterix Systems Ltd	Introduces utility-style ticketing that adjusts to travel patterns and rewards particular choices, using a monthly subscription that will help customers to save money on a large upfront fee.

Project	Lead organisation	Summary
Next-generation composite poles for a 5G-enabled railway	Hive Composites Ltd	Installation of lightweight composite poles along railway lines, to improve wifi speed, consistency and connection on the rail network for all rail passengers.
Illumin-heated concrete platform coper slabs	Sheffield Hallam University	Illuminated and heated low-energy concrete slabs used on railway platforms that automatically switch on in freezing conditions to help prevent passengers from slipping on ice.
LAMINAR	iProov	Demonstrates how biometrics can dramatically enhance the passenger experience, reduce congestion, improve safety and enhance security.
Track to Train communications to Transport for Wales	Ingram Networks Ltd	Lab-based study into new very high-speed communications technology for railways demonstrating very cost-effective trackside to train communications infrastructure over the whole 8km length of the heritage railway in Leicestershire, at speeds of 10Gbps+.

Environmental sustainability

Project	Lead organisation	Summary
Prototype zero emissions Trac Rail Transposer (TRT-e)	Unipart Rail Limited	A zero-emissions machine that removes and replaces rails.
LoCe: Less oil, Cleaner exhaust	Porterbrook Leasing	Transferring novel retrofit technology onto one of Porterbrook's Class 170 Turbostar vehicles to enable mid-life diesel engines to rapidly become more environmentally sustainable.
Zero-emission rail freight power	Steamology Motion Ltd	A hydrogen-based steam turbine system that delivers zero-emission power solutions for existing rail freight locomotives.
Daybreak	Riding Sunbeams Ltd	Focuses on decarbonisation of the railway industry. It has developed direct connection between renewable energy generation and overhead lines of the railway systems.
Resi-Glaze	Far-UK Ltd	Aims to develop an innovative and resilient glazing solution to ensure passenger safety on trains and potential CO_2 emissions saving.

Project	Lead organisation	Summary
HydroFLEX Raft Production	BCRRE	A power pack design to enable a hydrogen train to work in service, minimising the loss of passenger saloon space.
A novel, low environmental impact, composite railway footbridge	Associated Utility Supplies (AUS) Ltd	A low environmental impact footbridge, which will be the first railway footbridge made entirely from fibre reinforced polymer. It will be significantly easier to install than the equivalent steel bridge, greatly reducing network disruption and local environmental damage.

Optimised and cost-effective maintenance

Project	Lead organisation	Summary
Integrated Optical Fibre Sensing (OptRail-PRO) to	rcm2 limited	Optical fibre sensors that monitor the condition of switches and crossings on railway tracks.
Train Axle Crack Monitoring	TAMON – Perpetuum Ltd	Helps to reduce returns to depot by using sensors and pattern-recognition technologies to monitor for cracks in train axles.
High-Speed Cryogenic Blasting for Rail Cleaning to Alleviate Low Adhesion	The University of Sheffield	High-speed cryogenic cleaning system for tracks to prevent low adhesion and slow running of trains.
InnoTamp	Fugro	Data gathering to ensure the maintenance of optimum rail alignment.
Thermal Radiometry for the Remote Condition Monitoring of Railway Vehicles	Rail Innovations	Uses thermal radiometry camera technology to measure temperatures of mechanical systems on moving trains. This enables automatic alarms to be sent over the Internet in the event of an over-temperature occurrence.

Optimised railway operations

Project	Lead organisation	Summary
Minimising disruption of overhead line renewals via novel headspan assemblies	Associated Utility Supplies (AUS) Ltd	Span wire clamping system to enable rapid, low-cost overhead line equipment headspan renewals with minimum network disruption.
Trainserv Software User Trial and Preparation for Commercialisation	Cogitare Ltd	Trainserv integrates multiple sources of real-time data for use by rail workers to help them improve services and respond to incidents.

Project	Lead organisation	Summary
Cleartrak on Train Testing (CoTT)	Garrandale Limited	Innovative and efficient system for processing toilet waste, reducing cost and maintenance requirements.
IRIS: Information system for railway station staff	Liverpool John Moores University	A new kind of information system for frontline station staff to enhance communication and enable them to help passengers in making travel decisions/planning more effectively.
Railway Optical Detection and Obstructions-Tunnel & Station Monitoring	Vortex IoT Limited	Sensors and data analysis tools to detect and identify intrusion and obstructions on the track, and send real time situational alerts to the rail control centre to prompt further investigation.
Improving resilience through a surface water flooding decision support system	JBA Consulting	Seeks to develop a first-of-a-kind surface water flood forecasting and early warning system for Network Rail using technology and data to map the surface water flood likelihood in real time, ahead of the event and forecast rainfall intensity.
Improved railway operations through train-mounted water addition	CoCatalyst Limited	Spraying a small amount of water from the train when slippery rails are detected to improve train traction and braking, and prevent subsequent services from being affected.