

Innovate UK

Results of Competition: First of a Kind: Demonstrating Tomorrow's Trains Today

Competition Code: 1710_SBRI_FOAK_RAIL

Total available funding is £3.6m

Note: These proposals have succeeded in the assessment stage of this competition. All are subject to grant offer and conditions being met.

Participant organisation names	Project title	Proposed project costs	Proposed project grant
42 Technology Limited	Adaptable Carriage	£349,590	£349,590

Project description - provided by applicants

Traffic growth and congestion acts as a brake on economic growth, as well as exacerbating climate and health concerns in our towns and cities. Solving these issues in a sustainable manner requires best use of all available modes of transport. The railways should play a much greater role for movement of passengers and freight (particularly the rapid growth in ecommerce deliveries into urban areas), but the inflexible nature of today's rolling stock hinders the ability of the train operators to respond. Hence passenger trains may be overcrowded during the rush hour, but grossly under-utilised at other times of the day and night; holiday seasons create major logistical challenges due to lack of space for baggage; those with cycles and wheelchairs may struggle to find space on the train; and despite the exponential growth in white van traffic, the ability for parcel carriers to exploit spare capacity on passenger trains (as BR previously operated through its Red Star service) is constrained by any space for roll cages. To address these various challenges, 42 Technology has developed the Adaptable Carriage, a unique train passenger seat mounting system, which enables seats to be automatically folded and slid along the carriage sides. The technology behind the concept has been developed through funding by the Rail Safety and Standards Board (RSSB), as a winner of their "Tomorrow's Train Design Today" Competition. Developed with input from stakeholder across the rail and logistics industries, a full-sized, prototype module of working Adaptable Carriage seating was publicly demonstrated at Railtex 2017 to prove technical feasibility. Analysis has shown that the UK rail industry could generate over £20Bn, and reduce carbon emissions by over 120 MTCO_{2e}, per year through moving goods by excess passenger seat capacity instead of road. City centre to city centre journeys are typically 40% quicker by rail than road, and provide direct access to retailers and customers. To progress towards realising this opportunity, Innovate UK is helping to de-risk the first installation of the technology in a train carriage. Following successful testing and demonstration of the carriage, the opportunity exists to pilot the technology through synergies with the Flexible Freight programme being promoted by the rail industry Technical Strategy Leadership Group (TSLG).

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Transcal Engineering Limited	New seating approach to maximise train passenger capacity	£349,904	£349,904

Project description - provided by applicants

The challenges facing the UK's transport infrastructure are significant and include immediate and growing capacity-related issues. For example, between 1997 and 2015, the number of UK passenger rail journeys doubled to 1.6 billion and the country's train fleet is forecast to grow by up to 89% over 30 years. However, alongside this success story, we have growing issues of overcrowding in many of our urban and suburban transport networks, especially at peak times. As reported in the press in recent years, on some rail services, passengers are not so concerned that that they will be able to get a seat, but rather that they will be able to get on the train at all.

We have developed three seating solutions. Horizon and Island Bay provide an ingenious way to help increase capacity on public transport journeys, whilst aiming to improve the passenger experience and Aerolite integrates weight saving technologies and design principles from the Aerospace industry.

Horizon allows between 20-30% more seats per carriage (based on a typical commuter train), as well as increased standing space, making it an ideal solution for high density short journeys.

Island Bay is a flexible seating solution that provides regular seats during off-peak, and a higher density configuration during peak hours resulting in 15-20% more seats and increased standing capacity. Island Bay is designed for longer journeys and routes with varying capacities.

Aerolite is lighter, slimmer and more comfortable' than other options. The slim profile offers more legroom or increase passenger density.

Horizon, Island Bay and Aerolite will provide a mass-transport vehicle high-density seating solution, adaptable across vehicle types, and with Island Bay, configurable according to demand.

All three solutions will be integrated onto a single demonstration carriage for the Inotrans 2018 show in Berlin before being taken around the UK busy stations, where it will be available for people to view and comment upon.

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Unipart Rail Limited	CloseRFIT	£350,000	£350,000
Project description - provided by applicants			
<p>CloseRFIT is a first in-service trial of the technology developed as part of the CloseR project funded by RSSB and Innovate UK. The CloseR system allows operators to engage with each customer individually, enhancing and rewarding the customer's travelling experience, whilst improving the efficiency of on-train operations. In-seat technology identifies individual passengers, allow automated validation of their seat reservation/ticket status, reducing the need for train crew to undertake revenue protection activities. The system can make reservations and release unused seat reservations during a journey, to ensure optimal use of available capacity, without the need to move passengers who have chosen an unreserved seat. Mobile device applications empower train crew to enhance the customer experience by providing value added services. Customers also receive timely, personalised, and relevant information regarding all stages of their journey. This next generation capability allows operators to engage with individual customers like never before (prior to, during and after their journey) and forms the foundation for the provision of a further array of value adding customer services in the future, by extension of the loyalty scheme to include other modes and partners where appropriate to further improve the customer experience and create new revenue generating opportunities for operators.</p>			

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Virtuosys Limited	First of a Kind: Demonstrating Tomorrow's Trains Today	£345,401	£345,401

Project description - provided by applicants

The aim of the project is to develop a system that supports a wide variety of applications for train operators and passengers. The system comprises of infrastructure, designed and certified for deployment on a UK rail passenger vehicle, and a set of applications, targeted at the rail industry, to demonstrate the capabilities of the system. The system operates with an intermittent backhaul connection to the internet. The applications are able to provide useful functions during travel, even without internet access, and support additional capabilities with periodic internet access when the train is in coverage or at a station. Open interfaces are used to encourage application development by 3rd parties and the fostering of a wider ecosystem. The platform provides a secure environment for communication between applications and base services. A number of existing applications are envisaged to demonstrate the key benefits of the platform and include a mobile PA announcement service, a secure messaging service and a local Content Delivery Network. A new application will be developed that will enable the train operator to have access to CCTV from their phone. The 'CCTV Live Feed' application supports selection between a number of live feeds and allows the train operator to ensure that train doors are clear before departure, luggage is secure and that passengers are distributed uniformly through the train. This reduces instances of passengers standing when there is seating available. Some CCTV feeds can also be made available to passengers through a similar mobile app, but showing only relevant feeds. For example, a feed from each carriage could be made available so passengers could see where empty seats were located or a feed for the buffet car could be used by passengers to avoid queuing at certain times. Again, the mobile applications demonstrate an open interface that can be integrated with other 3rd party applications. With the existing links between Angel Trains and every UK Train Operating Company the project will conclude with a demonstration on a live rail vehicle that will allow the railway organisations to see how the technology can be deployed and for rail staff and customers to provide feedback on the applications and the user experience.

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Meyouandus Ltd	AR Trainkit & Fantasia Express	£343,000	£343,000

Project description - provided by applicants

Any train company can get you from A to B. But where's the fun in that?

Imagine taking a train from London to Edinburgh, on the way certain landmarks come alive. A sea monster off the coast of Holy Island; A herd of Newcastle supporting TOON zebras running along the A1 near Newcastle; Viking villages in the fields around York.

A few miles before the experiences you receive a notification to tell you to place your phone into the Google cardboard provided and watch out of the window. You also have the opportunity to take photos of what you can see and share them. So much technology is cold and clinical. This concept is all about imagination and seeing how you can turn a train journey into an adventure.

Not only would this provide a wonderfully unexpected diversion on the journey but also a way to highlight landmarks that often go unnoticed by passengers. Many immersive projects are insular and take the viewer on a very personal journey. We are interested in how this experience can radiate out from the direct participants into the surroundings.

How the excitement of direct participants will affect other family members and people in adjacent or nearby seats. We are confident that if we can create a good AR experience for one passenger, it will create a buzz within the rest of the carriage.

Working with Virgin Trains East Coast this project is not only about creating a world class Augmented reality experience but also a new AR and locative media platform for trains. The "Fantasia Express" becomes a showcase of what is possible using this platform.

Importantly the platform itself facilitates and simplifies the creation and distribution of other experiences specifically for trains. This flexibility means that content can be targeted to passengers and journeys and offers a variety of new commercial opportunities to train operating companies. For instance imagine an accountant travelling on their daily one-hour train journey to work and twenty minutes in they receive a notification and look out of the window to see a virtual bubble appear in a building offering a similar job. Or passing by a beautiful country house and see a bubble appear over it offering a heavily discounted weekend away.

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Transreport Limited	Transreport Passenger Assist System	£350,000	£350,000
Project description - provided by applicants			
<p>The Transreport Passenger Assist System is a technology that enables rail passengers with specific needs to request in advance, at station, and most importantly in-carriage, any assistance they may require in a sensitive and considerate manner with staff nearby receiving the requests on their smartphones, which then automatically navigates them to the passenger. If no staff are present in the vicinity, the technology automatically informs a central control system from where the appropriate assistance is arranged. For passengers, the system works with or without smartphones, and further allows family and friends to monitor the location of the passenger throughout their journey with a 'share my journey' option. The system is being positioned to replace the current outdated disability booking system based on emails. The system enables an immersive experience for those passengers with specific needs by allowing them to enjoy their train journey and in-vehicle environment through the knowledge of having a passenger assist system that is reliable and real-time, reducing anxiety and increasing confidence.</p>			

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Block Dox Limited	TRAFFIC – TRAIIn Footfall From Intelligent Counters	£350,000	£350,000

Project description - provided by applicants

Rail passenger numbers in the UK doubled between 1996 and 2016 (currently 1.7billion p.a.) whilst the supply of train kilometres rose by ~50%, with implications for overcrowding on services and associated impacts on train delays, passenger comfort, safety and passenger satisfaction. Thus, 9.1% of rail services are delayed by incidents at stations of which 40% are due to alighting and boarding passengers at an annual societal cost of ~£55m per year. Meanwhile there were 6,866 passenger injuries on the UK rail network in the year to September 2016, of which 50% were due to slips, trips and falls, 21% were platform edge incidents and 9% were due to contact with object or person. Finally, 20% of passengers complain about insufficient sitting/standing room, whilst 24% are dissatisfied with space for luggage and 40% are dissatisfied with facilities such as toilets - both related to higher usage on busier services.

TRAFFIC will address these issues by modifying sensors that detect people in buildings for use in the rail environment, and use them to continuously, cheaply and accurately monitor how people use trains. This is important because such data could be used to accurately assess and predict passenger flows, provide more space on trains and a personalised customer experience. This in turn would enable: train and station staff to dynamically and proactively manage crowding situations; train planning staff to devise more realistic railway timetables; train and station maintenance teams to better plan both day-to-day and longer-term maintenance schedules; and train buyers and manufacturers to better specify new trains and underpin future passenger guidance systems (e.g. through a smartphone app).

In these ways, TRAFFIC will support the UK Department for Transport's vision "to make journeys better: simpler, faster and more reliable" whilst supporting jobs, enabling business growth, and bringing the UK closer together.

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Guide Dogs for the Blind Association	Inclusive On-board Experiences through Digital Augmentation	£350,000	£350,000

Project description - provided by applicants

Inclusive On-board Experiences through Digital Augmentation

(Delivered in partnership between Guide Dogs for the Blind Association, Microsoft, Pointrlabs, and Virgin Trains East Coast)

The number of people living with sight loss is expected to reach four million by 2050 and, as a charity, Guide Dogs is committed to developing new ways of enabling people with sight loss live with freedom and confidence. The development of SMART Travel and Transport networks combined with digital technologies provides a unique opportunity for us to help shape the future for all those that find themselves excluded from society to enable people to travel easily between different areas, increasing wellbeing and confidence.

This project aims to facilitate truly end-to-end journeys for visually impaired customers travelling by rail. It brings together a number of compelling transformative innovations - 3D soundscape technology, indoor navigation, and intelligent sensors - in a world's first proof of concept combining real-time presence related information based on location which is enhanced through 3D spatial audio to enable passengers and crew to enable a person to naturally and intuitively map their position without the encumbrance of reverting to a phone which is disruptive and a cause of inconvenience to other passengers seeking to make their way to their seat.

In a real-time environment indoor navigation beacons will be installed at two UK railway stations which will be supplemented by tracking technology onboard a train service, enabling end-to-end navigation between two Guide Dogs regional offices. Integration with the 3D audio-rich technology will allow visually impaired passengers to be guided through the whole journey from the office to the station, onto the train, during the train journey, and off the train to the final destination. The incorporation of additional intelligent sensors will facilitate a richer experience to alleviate moments of anxiety associated with finding one's seat, locating the buffet cart, knowing if the toilet is occupied etc.

It is hoped that this innovation will empower and encourage more visually impaired people to travel by rail, increase their independence, and reduce well-known sources of anxiety associated with rail travel. The proof of concept will lead the way for onboard navigation technology and future research in this area.

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Proxad Ltd	Wayscout : real time onward journey platform for rail passengers on the train	£256,490	£256,490
Project description - provided by applicants			
This project will deploy new real-time onward journey ride matching technology on Gatwick Express train carriages to provide a novel personalised end-to-end journey experience for rail passengers and demonstrate how travellers can expect rail to form the backbone of future journeys in the emerging Mobility-as-a-Service paradigm.			

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Enable International Limited	Smart-Train - A Responsive Passenger Management System	£330,995	£330,995

Project description - provided by applicants

Smart-Train is a proven technology solution for managing train occupancy by guiding rail passengers to available seats, in real-time. The system has been designed to eliminate the challenges that passengers currently face when trying to identify and locate available seating, whilst waiting for a train and whilst on board. By matching a passenger's individual requirements with a train's current seating availability, Smart-Train ensures an enhanced journey experience. Additionally, Smart-Train facilitates safer and more efficient management of station platforms, train boarding and alighting, for operators both with and without seat reservation systems. As such, Smart-Train constitutes the first extendable and fully supported dedicated commercial application programming interface (API) for passenger flow optimisation, through integration with the rail industry's incumbent supply-chain.

The primary aim of this project is to validate the technical feasibility and commercial model for Smart-Train, through a pilot on the UK rail network that will include feedback from passengers and rail operations staff. The project will evaluate the extent to which Smart-Train delivers against customer experience and train operator benefits. The outputs achieved will enable the commercial launch of the Smart-Train solution during 2019 after project completion. The innovation can be easily integrated into an Innovate UK show-case "Train of the Future", alongside other rail technologies being funded through this competition.

Smart-Train is being developed by Stratford-upon-Avon based Enable International, a supplier of bespoke data management solutions to the rail industry, with direct support from Arriva UK Trains, a UK division of the German train operating and logistics company, Deutsche Bahn.

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