How researchers could relegate 'no connection' frustrations on trains and planes to the history books

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Academics from Heriot-Watt University have developed an antenna which, they believe, will end the frustrations of billions of passengers each year who lose internet connectivity on journeys globally.

Focusing initially on railway and Internet of Things markets, the research aims to improve Internet connectivity during the 1.8 billion[1] rail passenger journeys taken each year. At present, a third are unable to use WhatsApp due to poor connectivity while two thirds cannot connect to train wi-fi.[2]

Addressing the challenge, the Heriot-Watt team's flat panel antenna will connect to satellite technology in space, maintaining connectivity while on the move.

The prototype is expected to enter field trials before the end of this year with a major rail operator.

Samuel Rotenberg, a research engineer from Heriot-Watt University, said: "Poor connectivity on journeys is

one of the leading frustrations of passengers globally. Today's users are used to fibre-optic superfast broadband, with 4G connectivity seen as the minimum standard. Yet, on the move, our connectivity is patchy and continually interrupted.

"Cities provide continuous connectivity using a large network of antennas. However, there are fewer placed in rural areas, especially along railway tracks, which results in the signal being lost.
However, extending the ground network to improve access in rural area is expensive and unreliable for transportation.

"Antennas for satellite communication are, in the main, large, heavy, bulky and dish shaped so aren't aerodynamic and are impractical for high-speed trains to carry. Our research has developed a flat panel antenna which will communicate with satellites throughout a journey, without loss of connectivity. It's fairly lightweight, at a fraction of the cost of existing solutions and will provide global coverage. Its design specifications mean it could also be adapted for the Internet of Things, and planes as they fly in the middle of the ocean.

"The benefit of using satellites, whether Geostationary (GEO) or Low Earth Orbit (LEO), means connectivity is seamless for all passengers regardless of the number of people trying to connect onboard."

The team, which aims to spin-out a company named Infinect, has already attracted high profile funding from the European Space Agency, the Department for Transport (T-TRIG award) and via the High Growth Spin-Out Programme run by Scottish Enterprise.

Samuel, co-founder and lead engineer of Infinect, has also been awarded a place on the prestigious ICURe Innovation to Commercialisation Programme, funded by Innovate UK.
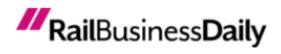
Professor George Goussetis, principal investigator on the project, said: "The UK is a market leader in digital communications and this technology will open up new, high-growth markets for satellite communications. Significantly, our technology also has the dual benefit of improving the security of transport vehicles, providing a continuous real-time stream of data so, in the event of any unforeseen problems, the connectivity will help support the onboard team."

Paul Devlin, Head of Commercialisation at Heriot-Watt University said: "This game-changing technology is the first Heriot-Watt project to be part of the ICURe programme which aims to support academic researchers on their commercialisation journey. In the last year, we have nurtured three companies through spin-out from Heriot-Watt and supported over 100 entrepreneurs at our dedicated enterprise facility, GRID[3]."

[1] Source: The Office of Rail and Road (ORR) – rail regulatory body. UK statistic

[2] uSwitch survey of 1,000 adults (2019)

[3] Source: GRID (Global Research, Innovation and Discovery) at Heriot-watt provides a springboard for a new generation of technological entrepreneurs, providing an environment for collaborative research,

learning and innovation and a culture that supports and celebrates entrepreneurship.

Photo credit: Heriot-Watt University