UNIVERSITY OF BIRMINGHAM | Business with Birmingham

Digital Rail Systems

Research and knowledge transfer is crucial to improve the speed, safety, resilience, sustainability, operations, and management of railways across the globe. The University of Birmingham seeks to translate its findings into tangible improvements and impacts on rail networks. Our integrated research and consultancy approach provides solutions to grand system-wide challenges, as well as at component level and sub-system level.

We are the leading university in a £92 million partnership that is set to transform the UK's rail infrastructure. Through engaging with 17 key industrial partners, the University has successfully secured £28.1 million of funding from the UK Research Partnership Investment Fund (UKRPIF) to complement £64 million from industry, which has been utilised to establish the UK Railway Research and Innovation Network (UKRRIN).

The Digital Systems Innovation Centre (DSIC) is part of UKRRIN's network of Centres and is led by the University of Birmingham. The Centre is supporting innovation in rail transport and looking at railway control and simulation, data integration and cyber security, condition monitoring and sensing, and improved methods for technology introduction.

Our expertise

- Railway control and operations simulation
- Data integration and cyber security
- Condition monitoring and sensing
- System optimisation
- Rail traffic management
- Next generations of control systems

Success and impact

- We are completing a number of projects to develop and implement metro system energy saving optimisation strategies. We expect to drive out energy savings of over 10% on specific metro systems as a result of this work.
- Our researchers have developed the i-R3D2, a novel track crack detection system, designed for use on in-service vehicles. We are developing a standard XML interface that links the i-R3D2 cloud-based system to existing Network Rail databases via an OSA-CBM compliant model.
- We are developing a standard wireless communications framework and interface through our project WiRailCom (EU FP7) for use with intelligent, self-contained, sensors nodes powered by energy harvesting technologies.

THE UNIVERSITY OF BIRMINGHAM IS THE LEADING UNIVERSITY IN A **£92 MILLION PARTNERSHIP** THAT IS SET TO TRANSFORM **THE UK'S RAIL INFRASTRUCTURE**

DELIVERING A STEP CHANGE IN RAIL TRANSPORT THROUGH DIGITAL TECHNOLOGY

Digital Rail Systems

Key projects

The Digital Systems Innovation Centre: DSIC will allow for the development of products and processes to be accelerated through to commercialisation, within a safe, virtual environment. Potential business cases can be rapidly tested for feasibility and investment opportunities significantly de-risked.

Network Rail strategic partnership in data integration and management: A £1.6 million, five-year Strategic Partnership between the University of Birmingham and Network Rail. Through this partnership, we are advising on new ICT technologies and trends, developing concept-based data models for unambiguous data exchange between ICT systems within rail and the wider multimodal transport system and finding new ways of combining and exploiting existing data resources.

Hi-Tech Rail: In partnership with the Rail Alliance, a considerable number of SMEs were encouraged to enter the rail sector to develop outlets for their innovations. The project, which was funded by the European Regional Development Fund, had three work packages:
i) enabling technology transfer
ii) development support
iii) demonstration opportunities

The project supported 82 SMEs and developed ten technology case studies which were independently found to attract two companies to the region. 77% of the companies felt that as a result of the intervention of the Birmingham Centre for Railway Research and Education (BCRRE), their turnover in rail has or was likely to increase, and 37% thought that they would need to create additional jobs.

ONTIME: This EU FP7 project seeks to integrate railway timetabling, real-time train rescheduling and operations management, with driver advisory systems for advanced traffic management.

Capacity4Rail: An EU FP7 project aiming to increase capacity for rail networks through enhanced infrastructure and optimised operations.

SCEPTICS: A project to investigate the threats posed to the industrial control systems used in transport networks by cyber-attacks and to devise assessment processes for system evaluation. This project is in collaboration with the Rail Safety and Standards Board (RSSB).

'THESE ARE EXCITING TIMES FOR RAILWAYS. SOCIETY RELIES ON RAILWAY SYSTEMS MORE THAN EVER BEFORE; THEY HAVE BECOME INTEGRAL TO HOW PEOPLE LIVE AND ECONOMIES GROW IN THE 21ST CENTURY. AT BCRRE, OUR WORK IN RESEARCH AND EDUCATION IS HAVING AN IMPACT ACROSS THE GLOBE IN REALISING THE TRANSFORMED BENEFITS OF RAILWAYS.'
PROFESSOR CLIVE ROBERTS, DIRECTOR OF THE BCRRE

Getting in touch

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