

Institute for Transport Studies Research Report 24/25



UNIVERSITY OF LEEDS



Two Post Graduate Research (PGR) students outside of ITS

Editor's Note

It has been my privilege as editor of the ITS Research Report for 15 years to have worked among talented and friendly colleagues.

In my role as Research Support Manager, I have also been the Quality Assurance Officer for ITS ensuring our research is delivered to the high standards of ISO9001.

Whilst conducting internal audit of research projects, as well as occasionally attending research seminars and inaugural lectures of new professors, I have been privy to the breadth of fascinating work undertaken at ITS by dedicated and skilled academic colleagues.

I have watched, with an element of pride, how many Early Career Researchers expand their activities to include teaching and PhD student supervision as well as becoming grant-holders in their own right to achieve promotions and eventually become Chairs (Professors) in their field of expertise.

The quality of the research delivered by ITS is reflected in the journal papers, for example those listed at the end of this report.

The breadth of research is demonstrated in our Research Reports. Its relevance to all users of transport including passengers and pedestrians, be it their safety, choice of travel mode, improved travel comfort and travel conditions across the globe is an important impact of our research.

In my time at ITS I have also met a multitude of wonderful research students from many different countries who return to their homelands to become captains of industry. The stories of our alumni are also told in the ITS Research Reports.

I now bow out pending retirement and pen my gratitude to Zoe Clough, Kelly Butterworth and Matthew Booth who have contributed to the publication of this research report.

Joanna Carder

Key Highlights of 2024/25



Professor Tim Thornton, Professor Paul Allen, Mayor Tracy Brabin, Professor Richard Batley, Professor Shearer West

1. Leadership in major regional transport initiatives

ITS plays a key role in the **Centre for Transport in Cities (centric)** partnership (launched 2025).

This collaboration with the Institute of Railway Research at the University of Huddersfield is a strategic alliance with West Yorkshire Combined Authority and supports the £2.5bn West Yorkshire Mass Transit scheme (tram system between Leeds and Bradford). ITS researchers contribute to: Transport planning and appraisal; Economic Modelling and Policy Design for regional investments. Prof Richard Batley said "Centric will play a pivotal role by providing independent expert advice along with research that identifies areas for innovation and opportunities for education and skills development." Centric aims to create a blueprint for future urban transport systems globally demonstrating strong policy impact and real-world influence in UK transport strategy.

2. Major Funded Research Programmes

Researchers at ITS are involved in several large-scale, multi-year research projects, including:

Decarbonisation & Sustainability

- **TransiT Hub (2024-2029)**: part of a £46m UK initiative focused on transport decarbonisation led by **Prof Greg Marsden**

- **PATH2ZERO (from 2025)**: advancing net-zero transport systems across Europe, led by **Prof Caroline Mullen**
- **Digital Twinning Research Hub (from 2024)**: using simulation and digital models for cleaner transport systems led by **Prof Phil Wheat**

Climate & energy systems

- Work within the **Energy Demand Research Centre (EDRC)** on governance and place-based energy use led by **Prof Greg Marsden** and **Prof Kate Pangbourne**

Social inclusion & Safety

- Road safety for autistic children and young drivers led by **Dr Yee Mun Lee** and **Dr Ruth Madigan**
- Driver behaviour and ADAS technologies led by **Prof Natasha Merat, Dr Ruth Madigan, Prof Oliver Carsten, Dr Ibrahim Ozturk and Prof Gustav Markkula**
- Equity and social issues in e-mobility (e-SAFE) led by **Dr Steve O'Hern**

These show a strong **focus on net zero, safety, and inclusive mobility systems.**

3. Cutting-edge research themes

ITS continues to lead globally across four interdisciplinary research areas:

Key Highlights of 2024/25

- **Climate & Environment** (decarbonisation, air quality, ecosystems)
- **Data Science & Technology** (AI, modelling, digital twins)
- **People & Places** (behaviour, equity, accessibility)
- **Adaptation & Resilience** (climate impacts, disruptions)

This reflects ITS's strategy to develop **connected, inclusive, productive and resilient mobility systems**.

For further information check our website - <https://environment.leeds.ac.uk/transport-research>.

4. Global academic leadership and events

ITS hosted the International Transportation Economics Association (ITEA) Conference and Summer School (June 2024) in Leeds. The conference attracted leading academics worldwide and featured Nobel Laureate Joseph Stiglitz as keynote speaker. This reinforces ITS's role as a global hub for transport economics and research exchange.

5. Innovative facilities and digital tools

Continued development of **Virtuocity**, ITS's simulation and modelling environment enabling: "Human-in-the-loop" city design; Policy testing and Transport Planning scenarios supporting evidence-based decision-making and smart city innovation. **For Further information see page 15**

ITS hosts several software packages that support transport planning, air quality monitoring and simulation. **For further information see page 56**



Yu Wang, Charisma Choudhury, Panagiotis Tsoleridis, Khatun Zannat

6. Policy and societal impact

ITS research directly informs **government policy and global sustainability transitions** with research on topics including:

- Studies on **air pollution exposure** led by **Dr James Tate, Dr Karl Ropkins** and **Dr Chris Rushton**
- Work on **electric mobility transitions**, e.g. motorcycle electrification in Indonesia and e-cargo bike uptake in the Lake District National Park led by **Dr Ian Philips** and **Prof Zia Wadud**
- Research feeding directly into the National decarbonisation strategy; Urban transport planning; Public health and environmental policy. For further examples see the section on Research Projects in this report

Continued global reputation

- ITS is one of the UK's largest transport research centres and is ranked among the top transport research institutions globally
- ITS maintains a reputation for high research quality with 97% of research outputs rated "world-leading" or internationally excellent (REF2021)

This introductory text was obtained by AI and edited by Joanna Carder, Research Support Manager.



A train waiting to depart for TransIT (see pg 22)

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Highlights - RS5C Conference Hosted at Leeds

Leeds hosted the 20th International Conference on Road Safety on Five Continents (RS5C) in September 2025, celebrating 20 years of advancing road safety. Hosted by VTI in collaboration with the University of Leeds, RS5C brought together global experts to share knowledge and insights and included a tour of Virtuocity. There were 215 participants from 37 countries and 6 continents at the conference and 30 oral sessions with about 135 presentations were held. Read more [here](#).



Ibrahim at Cloth Hall Court welcoming delegates

Student Sustainability Research Conference 2025

The SSRC25 is a carbon neutral conference where students across all levels share their sustainability knowledge. Students experienced presentations, workshops, performances and art installations from students across Yorkshire and the Humber. Be inspired, moved, and feel a sense of community surrounded by people who care about our planet's future and want to learn more. Tickets included a free plant-based lunch. The conference took place in Parkinson Court on 5 March 2025.



A group of students enjoying the conference

Highlights - International Transport Economics Association (ITEA) Conference 2024 Hosted at Leeds

The ITEA Annual Conference and ITEA Annual School on Transportation Economics in 2024 were hosted by the Institute for Transport Studies (ITS) of the University of Leeds, UK. The conference was held June 26th to 28th, and the school from June 24th to 26th.

The aim of the ITEA Annual School is to provide young researchers with a high-quality introduction to academic research on transportation economics, including many recent advances in the field. The School's program consisted of a series of lectures and tutorials conducted by some of the most prominent researchers in transportation economics. Furthermore, the students are given the possibility to present their own work at the Conference.

Additional aims of the ITEA Annual Conference are to promote scientific excellence in the field of transportation economics and to provide a forum for scientific exchange. Research presented at the conference covered both theory and empirical work, including all transport modes and a wide range of research methodologies.

The conference was held in honour of the late Richard Arnott and is sponsored by the UK Department for Transport.

Joseph Stiglitz of Columbia University was the keynote speaker.

On behalf of the Institute for Transport Studies, Professor Andrew Smith (Chair of the Local Organizing Committee) and the members of his organizing committee; Dr Chiara Calastri, Dr Thijs Decker, Dr Dan Johnson, Dr Manuel Ojeda Calbral and Dr Alex Stead organized a vibrant and successful conference.



Leeds Town Hall



Professor Andrew Smith

Highlights -Transport in a Climate Crisis



Noel Cass



Greg Marsden



Jillian Anable

In March 2025, the Institute for Transport Studies hosted a full-day event looking at the impact of transport on the climate. The event explored how climate change is taught across the curriculum, covering aviation and emissions, eco-anxiety and sustainable travel alternatives. Organisers of the event **Professor Greg Marsden**, **Dr Noel Cass**, and **Professor Jillian Anable** emphasised how crucial it is to change our travel behaviours, transform the transport sector, and reduce its impact on climate change. [Click here to see the video of the event](#). The event included discussions on flying less, greening the curriculum and test-riding of e-cargo bikes - [click here to watch](#).

The event included a challenge to discover how far it was possible to travel from ITS in 24 hours. There were only two rules: firstly, that departure from ITS was to be after 06:00 on Thursday 27 March and secondly that flying was not allowed. Three entries were submitted from **Dr Andrew Tomlinson** (Guinness world record holder for travel by public transport from Land's End to John O'Groats – see details here), **Prof Kate Pangbourne** (sustainable travel guru) and Key Travel.

Using **Andrew's** itinerary it was (almost) possible to reach Budapest in the time available:

"As there is a +1 hour time difference on mainland Europe the arrival into Budapest is 24 hours and 2 minutes after departure from ITS and 997 miles away (as the crow flies). The connection in London is probably unworkable due to the need to go through security and passport control at St Pancras and an earlier train from Leeds (depart 06:05, arrive St Pancras 08:30) would give a better chance of success."

Meanwhile **Kate** was easily able to reach Rome in a shorter time with the following itinerary:

"This journey is much faster and also goes further reaching Rome 22 hours and 35 minutes after leaving ITS at a distance of 1046 miles (as the crow flies), although it could be argued to be a slightly less classy experience with Kate having to endure the discomforts of an overnight Flixbus for 5 hours from Parma to Rome. However, her connection in London is more workable and she achieves this greater distance by keeping moving and avoiding any extended waits unlike Andrew who must wait 3 hours at Sopron in Hungary."

So the prize for the farthest one can get from ITS within 24 hours went to **Kate Pangbourne**, who applied no special expertise, just using a widely available online map that can be used for journey planning.

A third entry was requested from Key Travel, (tapping into their vast database of services and connections to produce a highly optimised route), who confirmed that Edinburgh is indeed reachable in 24 hours by train from Leeds.

Influencing Policy



Oliver Carsten

Professor Oliver Carsten was featured on the PACTS (Parliamentary Advisory Council for Transport Safety) site recently where he argued that recent vehicle approvals in the UK and EU had blurred the line between assisted and automated driving, allowing hands-off systems while keeping drivers responsible. He raised concerns about safety, driver attention, and the ethics of holding humans accountable for partially automated systems. See the full piece [here](#)

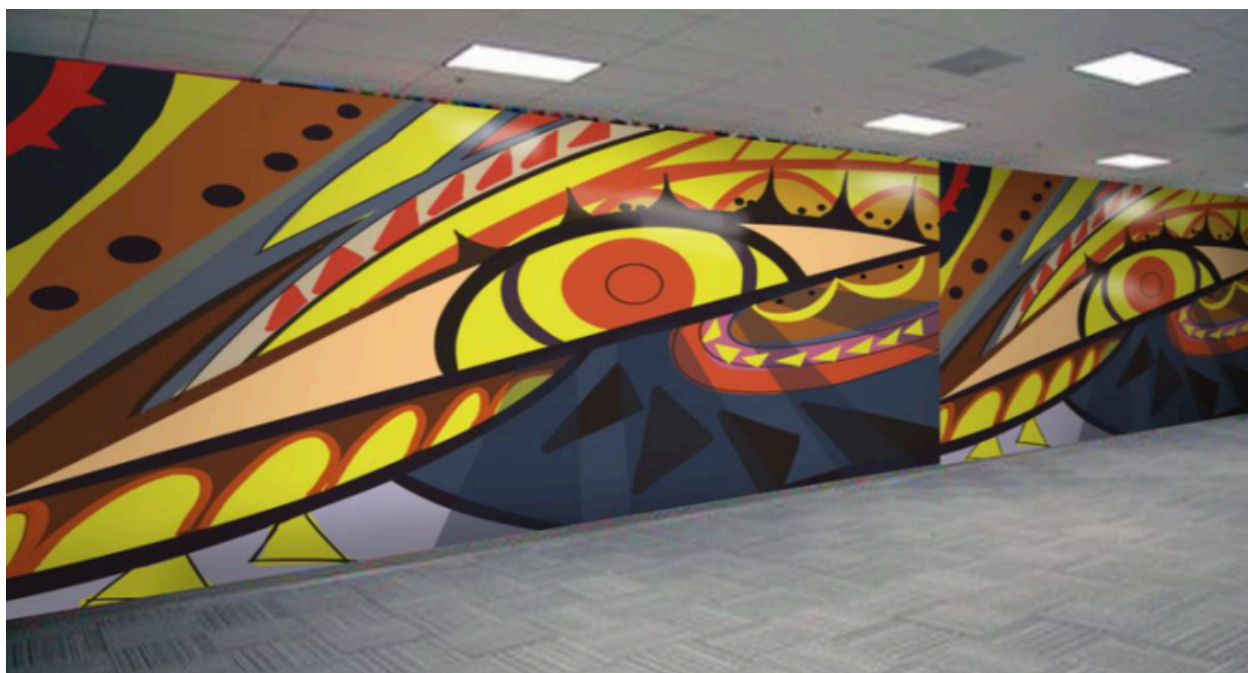
Professor Jillian Anable was appointed to a government advisory panel which provided advice to the Secretary of State for Transport – the Department for Transport Capital Review Panel.

The Secretary of State for Transport announced an internal review of the Department for Transport's capital portfolio in July 2024. The panel was made up of independent experts from industry, academia and civil society, whose participation is voluntary and not remunerated.

See full details and other members of the panel [here](#)



Jillian Anable



Art in Transport

Art in Transport

Since featuring the topic of Art in Transport in our 2022 Research Report, Dr Paul Timms has presented worldwide on what has been learned through the research by our Masters students, with presentations being made at the Technical University of Vienna (TUW), the University of Sap Paulo (USP), Thammasat University (Bangkok) and the Royal Thai Government's Department for Land Transport (DLT). Presentations have covered the following results:

- Surveys of pedestrians and passengers reflected that art is widely recognized to be beneficial in improving travellers' experience
- There are many initiatives worldwide involving art and transport, and it is a quickly growing area of research interest
- When transport students start exploring art they encounter a variety of methods, art forms and reactions from people
- Creativity, emotion and cultural awareness are tools that professionals can use, in addition to technical planning, to enhance the travel experience
- Travel is not only about efficiency, sustainability or comfort but also about enjoyment in transport
- The travel environment should not be homogeneous. Research has shown that art objects of various scale and type are appreciated by passengers, pedestrians and passers-by, be they paintings, sculptures, music (such as pianos at station concourses), decorative tiles, poems, seat upholstery, interactive displays, fine art posters in place of adverts, museum pieces or locally and culturally relevant installations. Occasional pieces of art, well integrated into the environment are likely to catch the attention of travellers, allowing one's eyes to stop wandering and rest for a while.



Art in Transport

Art in Transport

Impact:

In co-operation with West Yorkshire Transport Authority, poems have been posted on buses in a project called 'Roots and Journeys – Promoting local culture through poetry on Yorkshire Transport'

A collaboration of arts institutes at the University of Leeds (Leeds Arts and Humanities Research Institute, and Leeds Poetry Centre) with the Institute for Transport Studies is a pilot project financed by the University of Leeds. It aims to enhance the travel experience by displaying poems on buses (and related facilities) and bridge the gap between the technical orientation of transport planning and cultural expertise.



Art in Transport

Art in Transport has been incorporated in the following taught modules: MSc Traffic Management; the undergraduate module Transport Land Use and Development (TRAN2020); and the Sustainable Cities MSc Mobility module. Dissertation topics on offer to students in the ITS MSc programmes and the Sustainable Cities MSc programme include: Visual art in public transport; Mural art and graffiti; Music in public transport; Architecture of public transport stations; Gentrification and public art.

A presentation on Art in Transport was given to the Annual Meeting of the Human Factors and Ergonomics Society (European Chapter).

Awards and Prizes



Susan Grant-Muller

Prof Susan Grant-Muller was appointed Co-Director of Leeds Institute for Data Analytics (LIDA) in February 2024.

In her role, Susan ensures LIDA continues to work in collaboration with multi-disciplinary academic communities to grow world-class data science and AI at Leeds, in alignment with the University's 10 year strategy. Susan remains in her position in ITS as Chair in Technologies and Informatics and Fellow of Alan Turing Institute.

Prof Charisma Choudhury successfully extended her Future Leaders Fellowship (£567K over 3 years). This phase focuses on extending the theme of fusing different types of data and bridging CM, UC and ML in the context of emergency situations – during natural disasters and acute transport network disruptions, in particular. The research focus for the 1st phase of NEXUS was to model day-to-day activity and travel decisions (choice of travel mode, destination, time-of-travel) - in the context of emerging modes (self-driving cars, air taxis, hyperloops) and the challenging environments of the pandemic and political unrests.



Charisma Choudhury



Ejiro Ikoko

Ejiro Ikoko won the Young Researcher Competition in the crossmodal - passenger category of the TRA VISIONS 2024.

Her PhD research on “Mobility as a Service (MaaS) for Women and Goods Movement in Sub-Saharan Africa” addresses critical mobility needs and proposes inclusive, participatory solutions. Ejiro's passion for her work and homeland is truly inspiring. We wish her continued success in advancing innovative mobility solutions!

Prof Charisma Choudhury became Chair of the International Association for Travel Behaviour Research (IATBR) for 2024–2025, marking a fantastic achievement and recognition of her leadership in the field.

IATBR is a global community dedicated to advancing travel behaviour research, bringing together experts from across academia, industry and the public sector.

The Institute for Transport Studies (ITS) is strongly represented on the Board, with Dr Chiara Calastri serving as Treasurer and Dr Thomas Hancock as a Board Member (both 2024–2027).



Charisma Choudhury

Awards and Prizes

Dr Noel Cass was awarded ‘Paper of the Year’ by JEPP (Journal of Environmental Policy and Planning). His paper, originally published in 2010, was selected for republication in an Open Access 25th anniversary issue. Good Neighbours, Public Relations, and Bribes: The Politics and Perceptions of Community Benefit Provision in Renewable Energy Development in the UK was chosen as the Editor’s Choice for the 25th anniversary special online collection of JEPP because it “exemplified the excellence and conceptual engagement that the journal strives to showcase.”



Noel Cass



Natasha Merat celebrating her OBE at
Buckingham Palace with Family

Prof Natasha Merat was awarded an OBE (Officer of the Order of the British Empire) for services to Future Transport Systems including innovation in automated vehicles.

“I am deeply honoured and humbled to have received this award. It was completely unexpected and I was in shock for quite a few minutes when the letter arrived a few Saturdays ago,” she said.

Prof Simon Shepherd, ITS Director said: “This recognition is well deserved for Natasha’s leadership of Virtuocity and impact in the field. Natasha said this could not have been achieved without her amazing team, but the Virtuocity team are inspired by Natasha’s enthusiasm and dedication.”

Read more about Virtuocity on pg 15

Awards and Prizes



Andrew Tomlinson

Dr Zia Wadud was awarded the Rees Jeffrey Prize for his paper Fully automated vehicles: the use of travel time and its association with intention to use by the ICE (Institution of Civil Engineers) publishing awards. You can read the article Zia wrote here: [True scale of carbon impact from long-distance travel revealed | Institute for Transport Studies | University of Leeds](#)

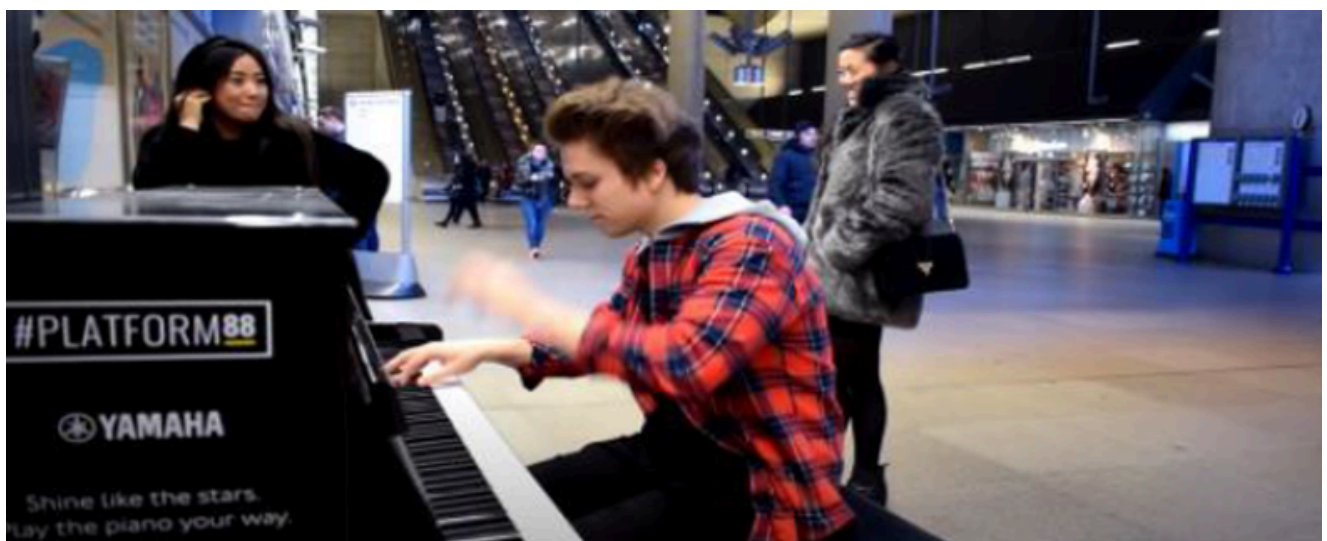


Zia Wadud



Katie Lewis

Alumna, **Katie Lewis** won the 2024 Voorhees-Large Prize for her dissertation 'The Benefits of 'Running for the Train': A Review of the Effects of Active Travel on the Business Case of the Transpennine Route Upgrade'. [Click here to read more about Katie and her award here.](#)



Art in Transport

PhD Awards 2024/25

Seventeen postgraduate students celebrated their PhD awards in 2024/25 (see pg 56 for class graduation photo):

Yeni Noviyanti Sagala (pictured on pg1) 'Young Indonesian motorcyclists: Exploring unsafe riding behaviour to develop and evaluate road safety education interventions'; **Athanasios Tzigieras** 'Cognitive mechanisms of behaviour estimation: Modelling pedestrian interpretation of approaching vehicle behaviour'; **Philip Churchman** 'Transition co-design for purposive United Kingdom road freight decarbonisation'; **Maximiliano Lizana Maldonado** 'Modelling changes in public transport demand amid disruptive events'; **Ruifan Tang** 'Innovative train delay prediction and propagation analysis: Integrating machine learning and graph embedding for enhanced railway operations'; **Yue Yang** 'Automated vehicle-pedestrian interaction: The effects of communication strategies and repeated exposures'; **Chenzhao Zhai** 'Understanding driving-related anger and developing intervention strategies to improve road safety in China: The role of self-consciousness, mindfulness and cognitive appraisal'; **Lawrence Amodoi Alongu** 'Demand for electric and hybrid cars: Modelling vehicle transactions and type choice'; **Yu Wang** 'Using multiple sources of data to understand the heterogeneous preferences of travellers for developing differentiated policies'; **Pinar Bilgin Tengilimoglu** 'The effects of ridesourcing services on vehicle ownership and the taxi market in the United Kingdom'; **Oguz Tengilimoglu** 'The readiness of road network and its implications for automated vehicle operations'; **Sidi Sun** 'The impact of rail structural reform on the supply and demand of railway'; **Lydia Novitriana Nur Hidayati** 'Modelling Indonesia's national sea freight transport'; **Siyi Lin** 'Policymaking for marketisation of highway maintenance management in less developed provinces of China'; **Chen Peng** 'Understanding and improving user comfort in automated driving'; **Rosie Samuel** 'Messaging for environmentally sustainable commuting post disruption'; **Khatun Zannat** 'Improving transportation planning tools for the Global South : applying advanced modelling frameworks to address data issues and accommodate behavioural complexities'

One postgraduate student was awarded an MPhil in 2024: **Shuwei Lin** 'Who do we choose to spend our leisure time with? Insights from discrete choice and machine learning models'

Four of the graduated students went on to become members of ITS staff: **Yue Yang, Yue Wang, Chen Peng** and **Khatun Zannat** (pictured on pg 3)

Virtuocity - Simulation Suite

Virtuocity is a unique programme for city simulation and co-design. It provides an immersive, “human in the loop”, simulation and visualisation facility, powered by academic models and industry software, and delivered by an interdisciplinary team of academics with decades of expertise between them.

Virtuocity is an all-encompassing simulation facility including a driving simulator, a Truck Simulator and the UK’s most advanced pedestrian simulator, together with an array of Virtual Reality headset and motion-capture technology. This state-of-the-art facility enables researchers to simulate different environments for a wide range of road users, ensuring its services are always in high demand.



The original dome shaped housing of the simulator

Launched in 2006 with funding from the UK and European governments and industry, the University of Leeds Driving Simulator (UoLDS) continues to be one of the most technically advanced driving simulators in use within a research environment anywhere in the world today - and by far the most advanced in the UK. Prior to 2024, the simulator [JC1] had supported more than 30 significant UK and EU-funded projects totalling more than £15 million.

Pete Woodthorpe, Virtuocity Programme Manager, said “2023 was an incredibly busy year for UoLDS projects, with about 350 participants attending eight different experiments, operating on more than 125 days throughout the year – a significant increase on usage from pre-pandemic levels.”



Computer systems are housed where the wheels in a standard car would be

Virtuocity - Driving Simulator Upgrade

During 2024, UoLDS received a cutting-edge refurbishment which included; installation of an all new Nissan Qashqai vehicle cab including custom dashboard and infotainment screens, new native 4K[J2C] projector array and image generation computers and all new projection enclosure and a completely rebuilt custom simulator software architecture and visual rendering.



Refurbished housing for the Nissan Qashqai vehicle cab

The refurbishment allows Virtuocity to further develop its track record of world leading human-in-the-loop simulation projects with an up-to-date interface vehicle, improved performance and graphical appearance and a more robust system.

Significant projects utilising the upgraded facilities include **Hi-Drive**, advancing the European automated driving from 'Conditional Automation' towards 'High Automation' by demonstrating in large-scale trials the robustness and reliability of CAD functions, **Waymo**, the first completed study in the newly refurbished driving simulator collecting data on over 100 participants and **Enhancing Novice Driver Safety** (ENDS) which is a piloted driver training programme for young, novice drivers aimed at safety evaluation.

Professor Natasha Merat, Chair in Human Factors of Transport Systems, who leads research at Virtuocity said: "In the past 18 years, driving, the road environment and vehicles themselves have changed considerably. We're excited this refurbishment will allow Virtuocity and the wider University to maintain our relevance as the world moves to connected and autonomous vehicles."



View from inside the dome showcasing the upgraded projectors

Inaugural Lectures

Maths, Minds, and Motorways: Understanding Human Behaviour Through Models

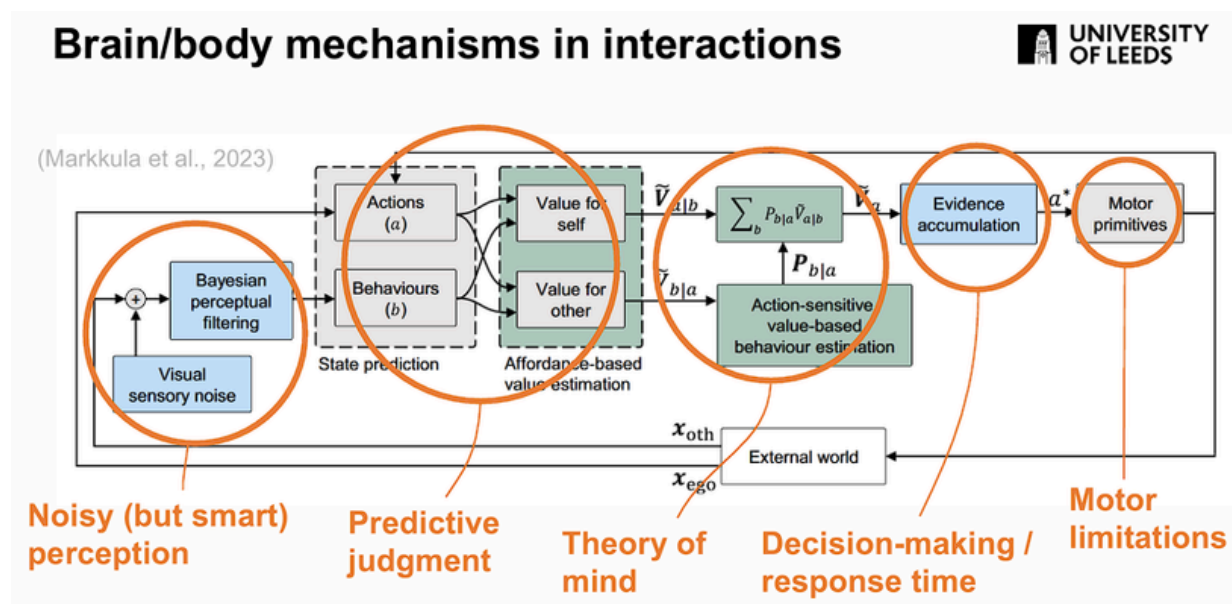
Prof Gustav Markkula



Gustav Markkula

Professor Markkula discussed how human behaviour can be understood and predicted using mathematical models, both in general and with a particular emphasis on his own research in modelling of human road users. He outlined why it is useful to make mathematical models of human behaviour, how it can be done, with methods spanning from neuroscience to machine learning, and considered the current limitations, future possibilities and ethical aspects

Professor Gustav Markkula is Chair in Applied Behaviour Modelling where his work sits at the intersection of engineering, neuroscience, and human behaviour. With a background in engineering and cognitive science, his research focuses on modelling human decision-making and motor control, particularly in the context of driving, transport safety, and autonomous systems. He previously spent more than a decade in the automotive industry at Volvo, working as a systems engineer, project manager, and technical specialist on R&D projects relating to driving safety, driver distraction, human-machine interfaces, and driver behaviour. During this time, he also completed a PhD on mathematical modelling of driver behaviour to support virtual testing of safety systems. Since joining ITS in 2015, Gustav has led interdisciplinary collaborations that bridge psychology, artificial intelligence, and transport technologies, contributing to safer road traffic and more human-aware automated systems. His work is widely published [see our publications list at the end of this research report] and has informed both academic understanding and real-world applications in mobility and human-machine interaction.



Transport - a demanding Transition

Prof Kate Pangbourne



Kate Pangbourne

Professor Kate Pangbourne, Chair of Transport Transitions, set out an interdisciplinary research agenda for addressing the decarbonisation, social justice and environmental challenges that are posed by the transport sector.

Kate talked about the career transitions that led to her current role, forged from the usual vicissitudes of life, a highly interdisciplinary set of work experiences, and a profound concern for people and the planet which is our only home. She wove this into an exploration of the demanding nature of the urgent need for transitioning our current transport system (and way of life) away from hyper mobilities, the associated unsustainable acceleration in resource consumption and the unfolding biodiversity catastrophe. An environmental concern dating back even before the ground-breaking Rio Conference of 1992 lies at the heart of Kate's work.

As featured in our 2023 Annual Research Report, Kate is leading the Governance theme of the Energy Demand Research Centre.

Data Science for Future-Proof transport Planning

Prof Robin Lovelace



Robin Lovelace

Professor Lovelace discussed his impact journey from including:

- Developing the national Propensity to Cycle Tool (www.pct.bike)
- A secondment to the No. 10 Downing Street data science team
- Building data capacity at Active Travel England (plan.activetravelengland.gov.uk)
- Research on integrated transport in Portugal (biclar.tmlmobilidade.pt) and the Network Planning Tool for Scotland.

Robin's approach emphasizes reproducible, open, and verifiable research. Robin is passionate about open source software and community building, leading to R packages and books: Geocomputation with R (r.geocompx.org) and Geocomputation with Python (py.geocompx.org).

Prof Lovelace's recent study in Portugal demonstrates that replacing 10% of car journeys with cycling and public transport shows significant social, environmental and economic benefits. A high proportion of car trips in urban areas of Lisbon could be replaced by a combination of public transit and cycling for the first-and-last mile. Doing so could reduce annual carbon dioxide (CO₂) emissions by up to 28,000 tons. See full story [here](#).

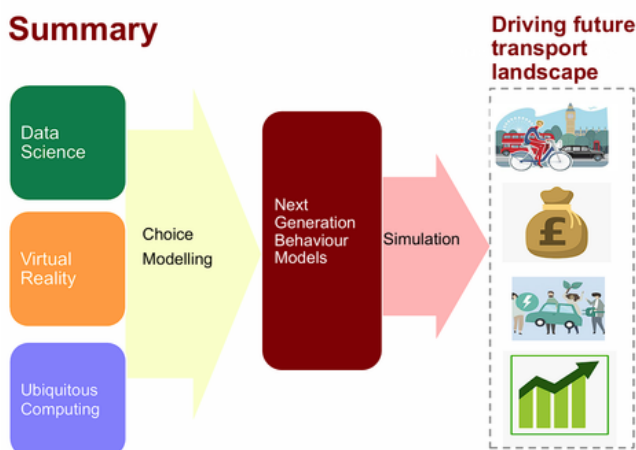
Next Generation Travel Behaviour Models: Bridging Choice Modelling and Data Science

Prof Charisma F. Choudhury



Charisma Choudhury

Summary



One of the slides from Charisma Choudhury's inaugural presentation

Charisma's current research focuses on leveraging emerging data sources for travel behaviour modelling, especially in the context of the Global South. These datasets range from passively generated sources (e.g., mobile phone records, smart cards, video images) to physiological sensor data (e.g., skin conductance, EEG recordings). Modelling travel behaviour using these data sources involves developing methodologies that combine data science, ubiquitous computing, and choice modelling techniques. Her research excellence in this area has earned her the Faculty for the Future Award (2011) and the UKRI Future Leaders Fellowship (2020).

Minding the Gaps: Transport's Transition Toward Net Zero

Prof Zia Wadud



Zia Wadud

Zia Wadud is a Professor of Mobility and Energy Futures. He has multidisciplinary expertise as an engineer and econometrician in transport-automation interactions, transport and energy demand, decarbonizing transport and data analysis in national and international context. His recent works on the impacts of vehicle automation, and vehicle sharing (ride sourcing/Transportation Network Companies), long-distance travel, and multi-country comparison of costs and adoption of Electric Vehicles gained not only academic, but also international media attention (Times, New York Times, Guardian, Business Insider, MIT Tech Review, etc.).

In his inaugural lecture, Zia talked about interactions between transport, energy and the environment, and how his research journey had helped advance the understanding of these interactions. His pioneering work on travel behaviour, energy and the carbon implications of vehicle automation was demonstrated, along with his more recent work on new mobility services (e.g. Ubers). Zia also graphically demonstrated the negative impact of aviation on climate change and the pitfalls of focusing only on vehicle electrification to achieve global transport decarbonisation.

Staff Changes and Visitors to ITS

During 2024 and 2025 we welcomed **Dr Afzal Ahmed** (Teaching Fellow, former ITS PhD graduate), Postdoctoral researchers **Jamal Amani-Rad, Dr Angela Smith, Dr Chenxi Wang, Dr Dingsong Cui, Dr Gokcay Balci, Dr Georges Sfeir, Dr Wen-Long Shang, Dr Katy-Anne Moseley, Dr Milad Mehdizadeh, Dr Luma al-Saadi, Dr Yue Yang** (ITS PhD graduate), **Dr Caroline Tait** (ITS PhD graduate), **Dr Peter King, Dr Lin Fu, Dr Azita Farashi** and **Hsuan Chao** (Software Engineer at Virtuocity) and **Wenjing Li**.

We bade farewell to **Jorge Garcia de Pedro** (Virtuocity software engineer) and to postdoctoral researchers **Vishnu Radhakrishnan, Eugeni Vidal-Tortosa, Aravinda Srinivasan, Nadia Naqvi, Christian Bretter, Wenjing Li, Jin Liu, Joseph Talbot, Jingyuan Di, Alice de Sejournet** and **Chen Peng**. We wish them all success in their continuing careers.

Best wishes to the following staff who retired: **Dr Yvonne Barnard, Prof Gerard de Jogn** and **Prof Chris Nash**.

Research Visitors: **Lu Liu**, technical director of the National Centre for standardisation of testing equipment for roads and bridges at the Research Institute of Highway (RIOH), Beijing was hosted by Dr Yue Huang. A professor from Sapienza University, Rome was hosted by Prof Andrew Smith. **Prof Yul Yunazwin Nazaruddin** from the Institute of Technology, Badung, Indonesia was hosted by Dr Mahdi Rezaei, **Prof Lisette de Senerpont Domis** from Netherlands Institute of Ecology was hosted by Dr Jingyuan Di. **Prof B Zhou** was hosted by Prof Ronghui Liu to collaborate on an ISTTT paper (see publications list in the appendix), **Prof Otto Nielsen, Dr Thomas Rasmussen, Dr Lawrence Duncan and Laurent Cazor** (all from the Technical University of Denmark) were hosted by Prof David Watling to work on several joint research activities.

During 2024 and 2025 we also welcomed the following visitors to our **Virtuocity Suite**, 15 West Yorkshire Advanced Motorcyclists, 5 members of staff from Mississippi State University, **Birsen Donmez** from University of Toronto, **Jonathan Tager** fVP Research at U Pretoria, **Isabella Hinterleitne** from Tech Meets Legal, A group of 30 for a Seminar on Arts and XR from Leeds Arts University, 20 people from VRU, **Prof Shankar Sankaran** from University of Sydney, University South Carolina, Indonesian Traffic Police, Leeds City Council, **Toshiya Hirose and colleagues** from Shibaura Institute for Technology, **Johan Engstrom** from Waymo, **Karl Proctor** of JLR, IPS Conference which included a wide ranging group as part of Inclusive Public spaces demonstration, **Kyoya Ishii** from SIP AFUS, **Alon Zivony** from University of Sheffield, A group of 60 for the Festival of Social Sciences, **Rosie Revell and colleagues** from Leeds City Council, **Ben Beck** from Monash University, West Yorkshire Combined Authority, **Katie Daniel and Helen Niblock** from EPSRC Regional Group, **The Advanced Analytical Division** at DfT, Hosted Hi Drive SP6 Meeting, **Bob Bateman** from Nissan, **WYCA VIP** including **Wes Streeting** and **Katie White** North Leeds MP, **Prof Yul Yunazwin Nazaruddin** from Institute of Technologfy Bandung, ISO Academic and Industry researchers, **Eloisa Machado and Jorge Bandeira** from University of Aveiro, **John Paddington and Agne Vaitenkenaite** from ERTICO, **Amanada Stephens** from Monash University, **Sebastian Glaser and Andry Rakotonirainy** from QUT, **Catherine Thristain and group** from Equality & Human Rights Commission, **Charles Symons, Megan Philips and Caroline Oetzmann** from UKHSA, **Paul Salmin** from U of Sunshine Coast, **Chris Cato** from Zenvo, **Mike Lenne** from Seeing Machines, **Prof Lan Yang** from Chang'an University, **Arlene Astell** from University of Nortumbria, Toronto.

In Memoriam – Emeritus Professor Joyce Dargay



Joyce Dargay

Colleagues were saddened to learn of the passing of **Emeritus Professor Joyce Dargay**, on 9th October 2024.

A distinguished scholar, outstanding teacher, and much-loved colleague, Joyce was recruited as Reader in Transport Demand Analysis in the Institute for Transport Studies in 2006 and became chair of Transport Econometrics in 2008.

Joyce enjoyed extensive international collaborations with well-known energy and transport specialists at universities in the USA, France, Finland, Germany and The Netherlands. In addition, her academic expertise and experiences were put to good use in advising government agencies and private companies in the energy and transport sectors in the UK, Sweden, France, Finland, Colombia, the Netherlands and the USA, as well as the OECD, EU and IEA.

Born and educated in New Jersey, USA, Joyce gained a BSc in Mathematics from Drexel University before studying Chemistry and Crystallography at Somerville College, Oxford, under a Royal Society studentship. She later moved into Economics, beginning an international academic career in Sweden at the University of Stockholm and the Industrial Institute for Economic and Social Research. Joyce was awarded her PhD by the University of Uppsala for pioneering work on dynamic modelling, an approach that defined her scholarship.

After research fellowships at the Oxford Institute for Energy Studies and St Antony's College, Joyce joined the Transport Studies Unit at Oxford and later UCL, serving as Deputy Director.

An internationally recognised authority in transport and energy economics, Joyce's research powerfully influenced policy and practice. Remembered for her intellect, generosity, and humour, she will be greatly missed.

Research Projects 2024/25

During 2024 and 2025 ITS secured over 60 research grants. A small selection of these are mentioned in the following pages. The full list of projects and the ITS personnel working on them can be found on pgs 26–30. Further information in relation to projects which have a dedicated website can be found at the hyperlinks, shown in [underlined blue text](#).

Infuze ([Inspiring Futures for Zero Carbon Mobility](#))

Grant holder: **Professor Greg Marsden**

Investigators: **Professor Jillian Anable, Dr Roger Beecham, Dr Chiara Calastri, Professor Charisma Choudhury, Professor Ed Manly**

Funded by: **EPSRC**

Collaborators: **12, see more on [website](#)**

Dates: **August 2024 – July 2029**

INFUZE is developing an innovative framework for participatory urban mobility science. The project is based on the principle that new sustainable mobility systems should be created with society rather than expecting society to adapt to them. Its approach uses participatory and inclusive design, design futures methods and the integration of technical tools within design, evaluation and learning processes. A key aim is to open the black box of transport planning so that people can engage more fully with decision making and ask challenging questions about how mobility systems are shaped.

The project works with local communities, businesses and government partners to imagine new ways of travelling and to support the creation of more inclusive and better designed places.

Impact: By collaborating with local delivery partners, INFUZE is helping people access the travel they need without relying on private car ownership. This supports a more inclusive society and contributes to a fairer local economy.



Graphic from the Infuze project website



Greg Marsden

Research Projects 2024/25

TransiT ([Twinning for Decarbonising Transport](#))

Grant holder: **Professor Greg Marsden**

External primary investigators: **Phil Greening and David Flynn**

Investigators: **Professor Kate Pangbourne, Professor Simon Shepherd**

Funded by: **EPSRC**

Collaborators: **University of Glasgow, University of Cambridge, Durham University, University College London, University of Birmingham, Herriot-Watt University and 67 partners**

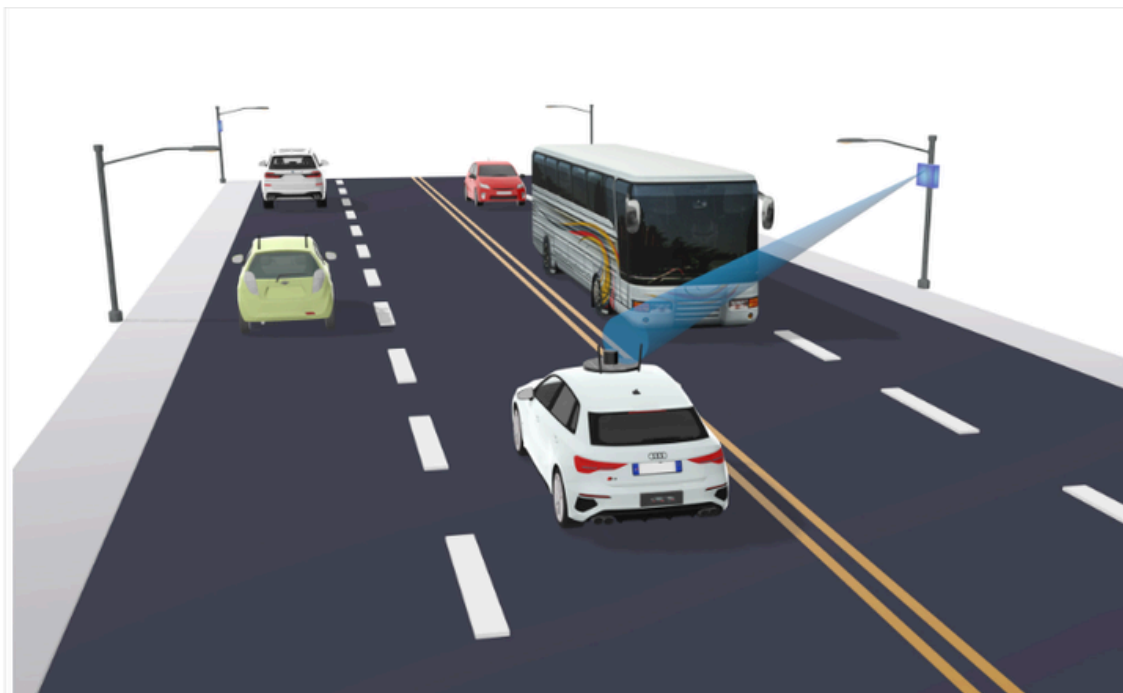
Dates: **July 20024 – June 2029**

Professors Greg Marsden, Kate Pangbourne and Simon Shepherd are helping to lead **TransiT**, a £46 million Transport Decarbonisation Hub that is working to accelerate the reduction of carbon emissions from UK transport. The initiative is supported by the UK government and more than sixty partner organisations. It brings together expertise from its collaborators. ITS is contributing specialist knowledge on transport policy and effective approaches to decarbonisation.

The project has received £20 million from the Engineering and Physical Sciences Research Council, with an additional £26 million provided by companies and organisations in the digital, energy and transport sectors. Partners include transport operators, regulators, vehicle manufacturers, technology firms and energy suppliers, making TransiT one of the largest collaborations of its kind.

TransiT is using **digital twin technology** to identify the most cost effective, safe and energy efficient pathways to decarbonisation. A digital twin is a virtual, data informed model of a real transport system that can incorporate live sensor data and allow rapid testing of new scenarios before they are implemented.

The project is examining how digital twins can support real time system management, enable better planning decisions and show where these tools offer the greatest potential to reduce emissions. It is also exploring the ethical and social considerations associated with increased automation. The work aims to improve understanding of future transport needs and to support the development of new tools that can help travellers, planners and policymakers choose more sustainable options at local, regional and national levels.



Graphic from the TransiT project website

Research Projects 2024/25

Humans meet technology behind the wheel

Grant holder: **Dr Ibrahim Ozturk**

Investigators: **Dr Ibrahim Ozturk, Dr Ruth Madigan**

Funded by: **Department for Science, Innovation and Technology (DST)**

Dates: **October 2025 – September 2027**

Advanced driver-assistance systems, including lane-keeping assist and adaptive cruise control, are now standard in most new vehicles and have been shown to reduce crash risk. Despite this, their adoption and the consistent, correct use of these technologies in everyday driving remain uneven.

Evidence highlights a notable paradox: many drivers deactivate, disengage from or distrust features designed to improve safety. This project seeks to address a fundamental yet often overlooked question, how do users interact with in-vehicle technologies, and what measures can be taken to overcome the challenges observed?

To understand these interactions and ensure an inclusive approach, the project will involve in-depth interviews with individuals across a range of age groups and genders, alongside collaboration with key stakeholders. The findings will support the development of practical recommendations to inform more intuitive interface design, strengthen driver education, and shape future regulatory frameworks. Ultimately, the project aims to improve the alignment between emerging technologies and human behaviour, contributing to safer and more reliable travel experiences.



Graphic depicting humans interacting with technology



Ibrahim Ozturk

Research Projects 2024/25

Autistic Children Matter

Grant holder: **Dr Yee Mun Lee**

Investigators: **Dr Yue Yang, Hsuan Chao**

Funded by: **The Road Safety Trust**

Collaborators: **University of Nottingham and Leeds City Council**

Dates: **June 2025 - August 2027**

Autistic Children Matter brings together autistic children aged 11–13, their caregivers, Independent Travel Training (ITT) road-crossing trainers, and engineers to better understand road-crossing experiences and challenges.

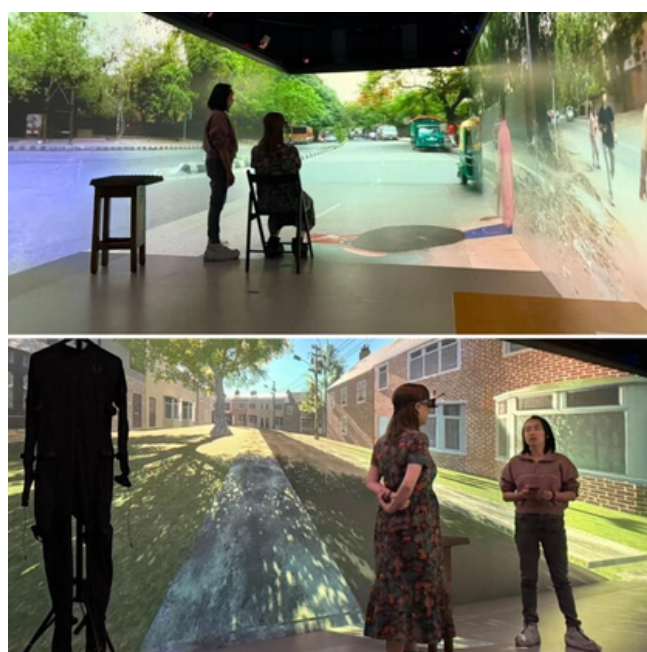
Exploring the specific difficulties autistic children face at both signalised and unsignalised crossings, how they cross roads, and why these challenges arise are key focuses. Insights from ITT trainers at Leeds City Council (LCC) are drawn from existing training reports, alongside questionnaire responses collected from caregivers nationwide.

To complement these perspectives with objective evidence, the study uses HIKER, the UK's largest pedestrian simulator. This enables comparisons between how autistic children and a control group cross unsignalised roads, examination of how caregivers' crossing decisions influence their children's behaviour, and evaluation of how different signalised crossing designs affect autistic children. These crossing designs, developed in collaboration with the LCC engineering team, are assessed using eye-tracking technology to understand visual attention during road crossings.

Working with a Local and National Stakeholder Advisory Group the team ensured their research remains grounded in real-world needs. The findings contribute to practical recommendations for improvements in infrastructure design, education and training, and policy, with benefits expected in the short and medium term.



Yee Mun Lee standing outside Virtuocity



Yee Mun Lee with participants inside Virtuocity

Research Projects 2024/25

e-SAFE ([More Information](#))

Grant holder: **Dr Steve O'Hern**

Investigators: **Dr Ibrahim Ozturk, Dr Ruth Madigan, Professor Caroline Mullen**

Funded by: **The Road Safety Trust**

Collaborators: **Leeds City Council, West Yorkshire Combined Authority, The Parliamentary Advisory Council for Transport Safety**

Dates: **July 2025 - June 2026**

e-SAFE explores the factors shaping road safety for e-mobility users, with a focus on identifying anti-social behaviours and key risks on the road. It examines how these risks are experienced across different groups, including young adults and gig economy workers.

Focusing on the West Yorkshire region, the project assesses the challenges surrounding safe e-mobility by quantifying road safety risks and pinpointing areas of high activity. Findings are shared widely with the sector, helping to inform safer, more inclusive approaches to e-mobility.



Steve O'Hern



e-SAFE's logo

Researchers and their project activity during 2024/2025

Name	Project
Amani Rad, Jamal	SYNERGY
An, Zihao	COCOMO, PATH2ZERO
Anable, Jillian	ACCESS, CARS, ELEVATE, Evaluate Local NO2 Plans, INFUZE, UKERC_4 Mobility Theme
Barnard, Yvonne	FAME
Batley, Richard	Academics4Rail, Congestion and Travel Time Reliability, Evaluate Local NO2 Plans - Phase 2, RSSB Partnership Phase 5, RSSB Partnership Phase 6, Welfare Appraisal Under Land-Use Change
Bhaduri, Eeshan	NEXUS Renewal, UKERC_4 Mobility Theme
Boussad, Yanis	Decarbonising Uber Ride Services, McMatcher Pedestrian Modelling, Rail Standards, TransiT
Brown, Llinos	COVID19 Extension to Transport, Travel & Social Adaptation, EDRC-Governance Theme, TRANSAS: Segmentation analysis of travel attitudes, UKERC_4 Mobility Theme
Calastri, Chiara	ADROIT, INFUZE, RSSB Partnership Phase 5, TOZCA
Carsten, Oliver	CERTAIN
Cass, Noel	ELEVATE, e-Safe, INFUZE
Chao, Hsuan	Autistic Children Matter, Enhancing Novice Drivers' Safety (ENDS), Hi-Drive
Chen, Haibo	ePowerMove, nPETS, ZEV-UP
Choudhury, Charisma	INFUZE, NEXUS, NEXUS renewal, TOZCA
Cirino-Goncalves, Rafael	CERTAIN, Comparative eye-tracking analysis in Driving, Enhancing Novice Drivers' Safety (ENDS), Hi-Drive, Seeing Machines FWshp extension, SHAPE-IT
Cui, Dingsong	ZEV-UP
Daly, Michael	Enhancing Novice Drivers' Safety (ENDS), Waymo Simulator Study (AIDE)
De Jong, Gerard	Welfare Appraisal Under Land-Use Change
De Sejournet, Alice	ELEVATE
Dekker, Thijs	DRYVER, REEB Patnership Phase 5, SYMBIOSIS
Di, Jingyuan	DRYVER

Researchers and their project activity during 2024/2025

Name	Project
Farashi, Azita	App for Cholera Prediction
Fu, Lin	Healthy Low-Carbon Transport Hub (HLTH)
Garcia de Pedro, Jorge	Hi-Drive, NEXUS
Goodridge, Courtney	Hi Drive
Grant-Muller, Susan	Clean Travel IAA, Decarbonising Uber Ride Services, Rail Standards
Hancock, Thomas	NEXUS, NEXUS Renewal, SYNERGY
Havran, Ondrej	ZEV-UP
Hess, Stephane	SENSITISE (Discrete Choice), SYNERGY
Huang, Yue	NAPIC
Hussain, Tanveer	Hi-Drive
Jiang, Like	nPETS, Role of Demand Responsive Transport 2
Johnson, Dan	Quantification of WEIs - Phase 2, Role of Demand Responsive Transport 1, Role of Demand Responsive Transport 2, RSSB Partnership Phase 5, Urban Economics
King, Peter	INFUZE
Lee, Yee Mun	Autistic Children Matter, Exploring Safety-Critical Issues, Hi-Drive, Unwritten Rules of the Road
Li, Wenjing	Hi-Drive
Lin, Yi-Shin	COMMOTIONS
Lin, Zhiyuan	Auto-Freight, Tipping Points of Delay
Liu, Jin	nPETS, Train Unit Capacity
Liu, Ronghui	Academics4Rail, Auto-Freight, National Policy on Soot-Free Buses for Nigeria, Tipping Points of Delay
Liu, Ye	nPETS, OPTIWASP, ZEV-UP

Researchers and their project activity during 2024/2025

Name	Project
Lovelace, Robin	ATUMSCOTLAND (NPTSCOT), BICISCHOOLS, Evaluate Local NO2 Plans, Evaluate Local NO2 Plans - Phase 2, Exploring Safety- Critical Issues, SATURN
Madigan, Ruth	Enhancing Novice Drivers' Safety (ENDS), e-SAFE, Hi-Drive
Markkula, Gustav	CERTAIN, COMMOTIONS, IAA-Automated Vehicles Testing with Human-Like Traffic, ICT Discipline Hop, Waymo Simulator Study (AIDE)
Marsden, Greg	EDRC-Place Theme, E-DRONE, Future Flight in Place, INFUZE, TransiT
Mehdizadeh, Milad	INFUZE
Merat, Natasha	Hi-Drive, ML-based Physiological Sensor Fusion
Morgan, Malcom	ATUMSCOTLAND (NPTSCOT), CARS, EDRC-Place Theme
Moseley, Katy-Anne	McMatcher Pedestrian Modelling
Mullen, Caroline	COCOMO, e-SAFE, PATH2ZERO, UKERC_4 Mobility Theme
Naqvi, Nadia	UKERC_4 Mobility Theme
Nellthorpe, John	Evaluate Local NO2 Plans. Evaluate Local NO2 Plans - Phase 2, Exploring Safety-Critical Issues, Healthy Low-Carbon Transport Hub (HLTH), RSSB Partnership - Phase 5, RSSB Partnership - Phase 6, Welfare Appraisal Under Land-Use Change
O'Hern, Steve	CYCLE-LAB, e-SAFE, FAME
Ojeda-Cabral, Manuel	RSSB Partnership Phase 5, RSSB Partnership Phase 6
Ozturk, Ibrahim	CERTAIN, Enhancing Novice Drivers' Safety (ENDS), e-SAFE, Hi-Drive, SHAPE IT, West Yorkshire Traffic Culture
Pangbourne, Kate	EDRC-Governance Theme, TransiT
Pattinson, Jo-Ann	Clean Travel IAA, COCOMO, FAME, Rail Standards, TransiT, Trustworthiness of Life-Long Learning Systems (RAILSb)
Peng, Chen	e-Safe, Hi-Drive
Philips, Ian	CARS, ELEVATE, Evaluate Local NO2 Plans, Evaluate Local NO2 Plans - Phase 2, HELMET 2
Pierce, David	Academics4Rail, PATH2ZERO, RSSB Partnership Phase 6, SNCF Partnership Extension, SYMBIOSIS, XCROSS

Researchers and their project activity during 2024/2025

Name	Project
Radhakrishnan, Vishnu	ML-based Physiological Sensor Fusion
Rezaei, Mahdi	Hi-Drive, MaViS, ML-based Physiological Sensor Fusion
Ropkins, Karl	Evaluate Local NO2 Plans, Evaluate Local NO2 Plans - Phase 2, National Policy on Soot-Free Buses for Nigeria, TRANSITION Clean Air Network
Rushton, Chris	BIBHEALTH&AIRQUALITY, Evaluate Local NO2 Plans, Evaluate Local NO2 Plans - Phase 2
Sfeir, Georges	SYNERGY
Shang, Wen-Long	ePowerMove
Shepherd, Simon	PATH2ZERO, TransiT
Smith, Andrew	Academics4Rail, EDRC-Place Theme, PHD EU RAIL, RSSB Partnership Phase 5, RSSB Partnership Phase 6, SNCF Partnership Extension, SYMBIOSIS, XCROSS
Solernou-Crusat, Albert	Hi-Drive, Waymo Simulator Study (AIDE)
Song, Fangqing	SYNERGY, TOZCA
Srinivasan, Aravinda	COMMOTIONS, Waymo Simulator Study (AIDE)
Stead, Alex	Fare Elasticities Post Covid, RSSB Partnership Phase 5, RSSB Partnership Phase 6, SNCF Partnership Extension
Tait, Caroline	ELEVATE, HELMET 2
Talbot, Joseph	ATUMSCOTLAND (NPTSCOT), BICISCHOOLS
Tate, James	BIB HEALTH&AIRQUALITY, Evaluate Local NO2 Plans, Evaluate Local NO2 Plans - Phase 2

Researchers and their project activity during 2024/2025

Name	Project
Tomlinson, Andrew	McMatcher Pedestrian Modelling, Rail Standards
Tran, Trang	CQC Efficiency Network, Fare Elasticities Post Covid
Tsoleridis, Panagiotis	NEXUS, SYNERGY
Vidal-Tortosa, Eugeni	SATURN
Wadud, Zia	App for Cholera Prediction, National Policy on Soot-Free Buses for Nigeria, UKERC_4 Mobility Theme
Wang, Chenxi	ePowerMove, ZEV-UP
Wang, Judith	OPTIWASP
Wang, Yu	NEXUS Renewal
Wang, Zhao	ATUMSCOTLAND (NPTSCOT), ZEV-UP
Watling, David	NAPSTI, nPETS, OPTIWASP, ZEV-UP
Wheat, Phill	CQC Efficiency Network, Fare Elasticities Post Covid, Healthy Low-carbon Transport Hub (HLTH), RSSB Partnership Phase 5, RSSB Partnership Phase 6, SNCF Partnership Extension
Woodthorpe, Pete	CERTAIN
Yang, Yue	Autistic Children Matter, SHAPE IT
Yang, Yuanxuan	Decarbonising Uber Ride Services, McMatcher Pedestrian Modelling, Rail Standards
Zannat, Khatun	OPTIWASP

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Pete Woodthorpe showing a slide from a presentation on VirtuoCity's current research areas

Software

The Institute for Transport Studies develops and uses a number of software platforms:

Place Based Carbon Calculator

Developed by Dr Malcolm Morgan this free online tool maps the carbon footprint of every neighbourhood in Great Britain. The tool can help communities target their highest carbon-emitting activities.

Website: carbon.place/

SATURN

A powerful and flexible highway assignment package to create both strategic and local traffic models SATURN has been continuously developed over the last 30 years by the combination of academic theoretical rigour through Dr Dirck Van Vliet and the Institute for Transport Studies, and the practical knowledge of Atkins Limited.

Website: saturnsoftware2.co.uk/

DRACULA

Developed by Professor Ronghui Liu, the DRACULA software provides detailed junction simulation, among other functionalities, to improve the management of traffic congestion.

Website: dracula-simulation.leeds.ac.uk/

sfnetworks

Developed by Prof Robin Lovelace and colleagues funded by R Consortium, Geospatial networks are graphs embedded in geographical space. Both the nodes and edges in the graph can be represented as geographic features: the nodes most commonly as points, and the edges as linestrings. Geospatial networks play an important role in many domains ranging from transportation planning and logistics to ecology and epidemiology. The structure and characteristics of geospatial networks go beyond standard graph topology, and therefore it is crucial to explicitly take space into account when analysing them. The team created sfnetworks to facilitate such an integrated workflow. Sfnetworks combines the forces of two popular R packages: sf for spatial data science and tidygraph for standard graph analysis. The core of the package is a dedicated data structure for geospatial networks, that can be provided as input to both the graph analytical functions of tidygraph as well as the spatial analytical functions of sf, without the need for conversion.

Additionally, we implemented a set of geospatial network specific functions, such as routines for shortest path calculation, network cleaning and topology modification. sfnetworks is designed as a general-purpose package suitable for use across different application domains, and can be seamlessly integrated in tidyverse workflows.

Impact: Improved software for spatial network analysis.

Website: luukvdmeer.github.io/sfnetworks/

Propensity to Cycle Tool (PCT)

Propensity to Cycle Tool (PCT) Developed by Dr Robin Lovelace with colleagues in Cambridge and CycleStreets. net, the Propensity to Cycle Tool is a planning support system to improve cycling provision in regions or at specific points on the road network. PCT has generated many spin-off projects funded, among others, by Local Authorities, Sustrans, Welsh Government and the Irish Government.

Website: pct.bike

Network Planning Workspace for Scotland (NPW.scot)

New in 2025, the NPW is designed to enable local authorities to plan a cycle network for the area, using segregated infrastructure on key routes and ensuring local places are properly connected without severance.

Prof Robin Lovelace, Dr Malcolm Morgan and Dr Joseph Talbot

Website: <https://npw.scot/>



Prof Simon Shepherd celebrating with PhD graduates and ITS staff.

End