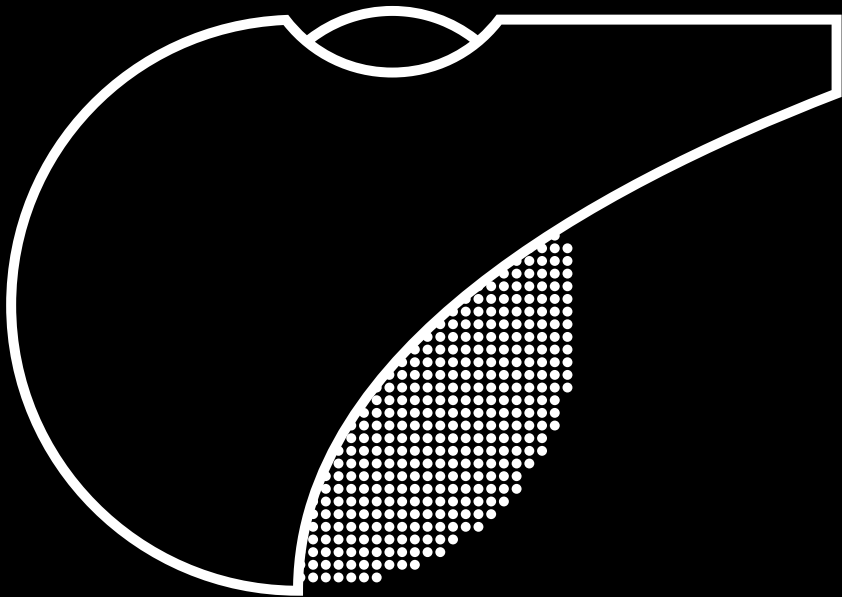


21st Century
Traffic Control
The Invisible Referee



I am delighted to welcome you to “21st Century Traffic Control: the Invisible Referee” - an exhibit prepared by my colleagues in the Transportation Research Group within the Faculty of Engineering and the Environment - one of the UK’s longest established and leading centres for multi-disciplinary transport teaching and research. The University of Southampton is a research-led institution committed to the advancement, communication and application of knowledge for the benefit of all society - and the problems that transport pose us as we move to a sustainable low-carbon economy are both urgent and challenging. This exhibit describes the world of Intelligent Transport Systems - and how the information and communication technology revolution might lead us to a better future.

I do hope you enjoy our exhibit, its games and demonstrations. Most importantly, I hope you find time to engage with the young team of scientists and engineers who are presenting their fascinating work.

Kind regards



Professor Don Nutbeam PhD FFPH

Vice Chancellor
University of Southampton



Play the 3 exciting activities at the exhibition



Scalextric

Our track has one big difference - it's got traffic lights! Race our cars while you learn how "inductance loop" technology is used to detect vehicles and control the traffic lights.



Junction Control

How well can you control the traffic lights? Can you beat the computer? Can you post the high score? Keep the traffic running smoothly to keep delays and pollution to a minimum.



Highway Control

Have you experienced a "phantom" jam? You reach the front of the queue and there's nothing there to explain it. Can you stop "flow breakdown" and keep the cars moving freely?

Rail Services for the Future

“...the rail network was not
built to serve modern
travel patterns”

Have you ever wondered why some train journeys seem to take for ever? When instead of going straight from A to B, the train goes via C, and you then have to wait around for a connecting train at D? This is because the rail network was not built to serve modern travel patterns.

In their EPSRC-funded project “Increasing Rail’s Mode Share Within The Constraints Of The Existing Railway Network”, Prof. John Preston, Dr Simon Blainey and Dr John Armstrong find ways to liberate rail services from their historical constraints. A key area of interest is inter-urban journeys, where rail services are relatively slow compared to the car. For some of these journeys, there is capacity to schedule extra, faster and more direct trains - and thus improve the overall rail travel experience.



Simon Blainey
Research Fellow

“Rail travel should be a
fast track experience,
not a mystery tour!”



Bus Priority in Cities

Buses carry lots more people than cars. So why do we let them get stuck in traffic? And why do they never appear when you want one? – then three come at once! Well, we know why and we know how to stop it – bus priority. It just needs commitment and investment to do it.

“London has implemented a new £100 million+ iBus system”

Dr Nick Hounsell has been researching bus priority at Southampton for over 20 years. Based on studies all over Europe, he is now helping Transport for London implement bus priority for some 8000 buses at 2000 traffic signal junctions, using their new £100+ million satellite-based iBus system. With new algorithms and purpose-built modelling developed at Southampton, iBus is offering quicker, more reliable journeys for passengers – as well as providing real-time passenger information and better scheduling. So, if you want to see technology used to provide efficient, clean and sustainable transport, look no further than the bus!



Dr Nick Hounsell
Reader in Highways and Transport

“One bus can carry 50+ passengers and remove 40 cars from the street.”



Motorway Traffic Forecasting & Control

“... the jam has rolled up
the motorway towards
you, rather like a wave”

Have you ever sat in one of those frustrating “phantom” traffic jams? When you get to the front of the queue - there is no blockage, no accident, no apparent problem. The explanation is that the jam started far in front of you (usually at a busy junction) and has rolled up the motorway towards you, rather like a “wave”.

In his EPSRC-funded project “A Multiscale Framework for Forecasting Highway Traffic Flow”, Prof. Eddie Wilson uses Mathematical models and computer simulation to help understand what causes phantom jams. The hope is that in future - we’ll be able to forecast motorway traffic in much the same way that we forecast the weather today. What’s more - dynamic speed limits and so-called “ramp metering” have been shown to help stabilise and smooth traffic flow - and Eddie’s theories support algorithms which ensure that those systems work in the best possible way.

Eddie Wilson
Professor of Modelling & Simulation

“The collective behaviour of thousands
of individual drivers can be complex and
highly counter-intuitive.”



Extending Flight Operations in Degraded Visual Environments

Has your flight ever been delayed due to poor weather? It has been estimated that 16,800 airline flights were cancelled in 2007 in Europe due to low visibility conditions, and in some major airports almost 50% of arrival delays are due to low cloud and poor visibility.

“16,800 airline flights were cancelled in 2007 in Europe”

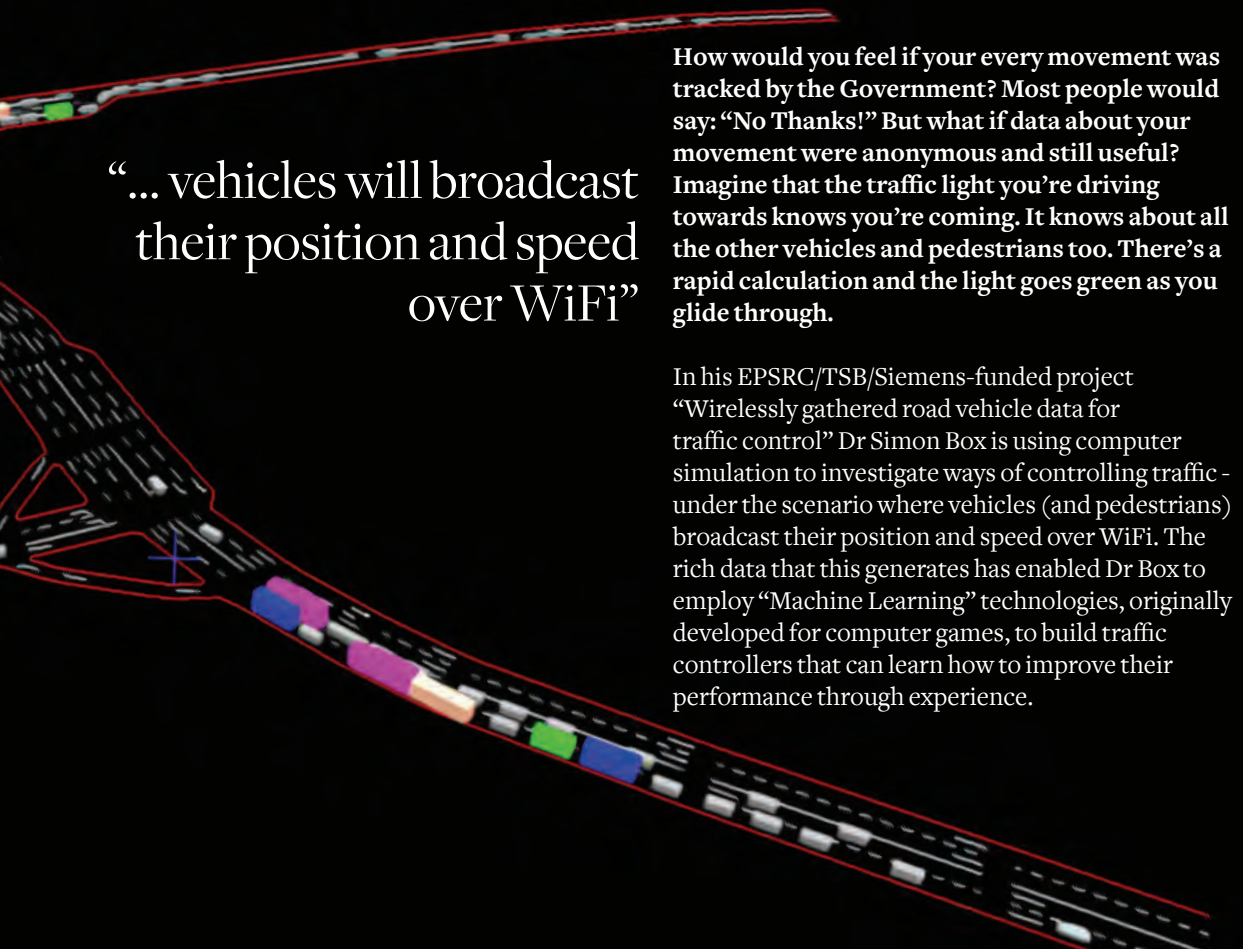
In his ALICIA project funded by the EU, Professor Neville Stanton is working with 41 European partners to develop the aircraft technology and tasks necessary to reduce delays in Europe associated with poor weather by at least 20%. Examples include head-up displays that will allow pilots to see through fog and low clouds so that they can land aircraft as normal. It is anticipated that this project will provide very significant economic advantages to airlines as well as welcome benefits to the European traveller.

Neville Stanton
Professor of Human Factors in Transport

“Problems cannot be solved by technological innovation alone - those innovations have to be used by people and designed for the way they think.”



Vehicle Tracking & Traffic Control



“... vehicles will broadcast their position and speed over WiFi”

How would you feel if your every movement was tracked by the Government? Most people would say: “No Thanks!” But what if data about your movement were anonymous and still useful? Imagine that the traffic light you’re driving towards knows you’re coming. It knows about all the other vehicles and pedestrians too. There’s a rapid calculation and the light goes green as you glide through.

In his EPSRC/TSB/Siemens-funded project “Wirelessly gathered road vehicle data for traffic control” Dr Simon Box is using computer simulation to investigate ways of controlling traffic - under the scenario where vehicles (and pedestrians) broadcast their position and speed over WiFi. The rich data that this generates has enabled Dr Box to employ “Machine Learning” technologies, originally developed for computer games, to build traffic controllers that can learn how to improve their performance through experience.

Simon Box
Research Fellow

“Traffic Control is a textbook Engineering problem with one big difference: Each vehicle is controlled by an independent human and their behaviour is not always predictable.”



Safer & Greener Driving

“...smoother use of the accelerator and better gear selection can save around 15% CO₂ emissions”

We all think we are good drivers - the reality is different. Research has shown that smoother use of the accelerator and better gear selection can save around 15% CO₂ emissions. But we all need help to learn to drive like this!

In the Foot-LITE project (see www.footlite.net for a list of sponsors and partners), a smart-phone App has been developed to assist safer and greener driving. The App integrates real-time data from the vehicle engine management system and a novel camera (that employs computer vision techniques), and uses it to deliver advice via the smart-phone display - advice that is tailored to the driving conditions at that instant. Prof. Mike McDonald and Dr Tim Felstead have conducted “naturalistic” trials of the equipment - installed in ordinary everyday vehicles. The ongoing challenges are to understand just how far this approach can improve driving technique.



Tim Felstead
Research Fellow

“Everyone is an expert when it comes to driving, especially when they are in the passenger seat - well now they can sit on your dashboard.”

21st Century Traffic Control
The Invisible Referee

invisible-referee.soton.ac.uk



Selected Projects

Factor 20: reducing CO₂ emissions from inland transport by a major modal shift to rail.

EPSRC grant reference EP/H024743/1.

A Multiscale Framework for Forecasting Highway Traffic Flow.

EPSRC grant reference EP/E055567/1.

ALICIA: All Condition Operations and Innovative Cockpit Infrastructure.

EU 7th Framework project.

<http://www.alicia-project.eu/>

Wirelessly gathered road vehicle data for traffic control and other applications.

EPSRC grant reference EP/J500173/1.

Foot-LITE: enabling safe and green driving.

EPSRC grant reference EP/F005067/1.

<http://www.footlite.net/>

Sponsors

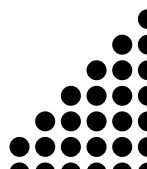
EPSRC

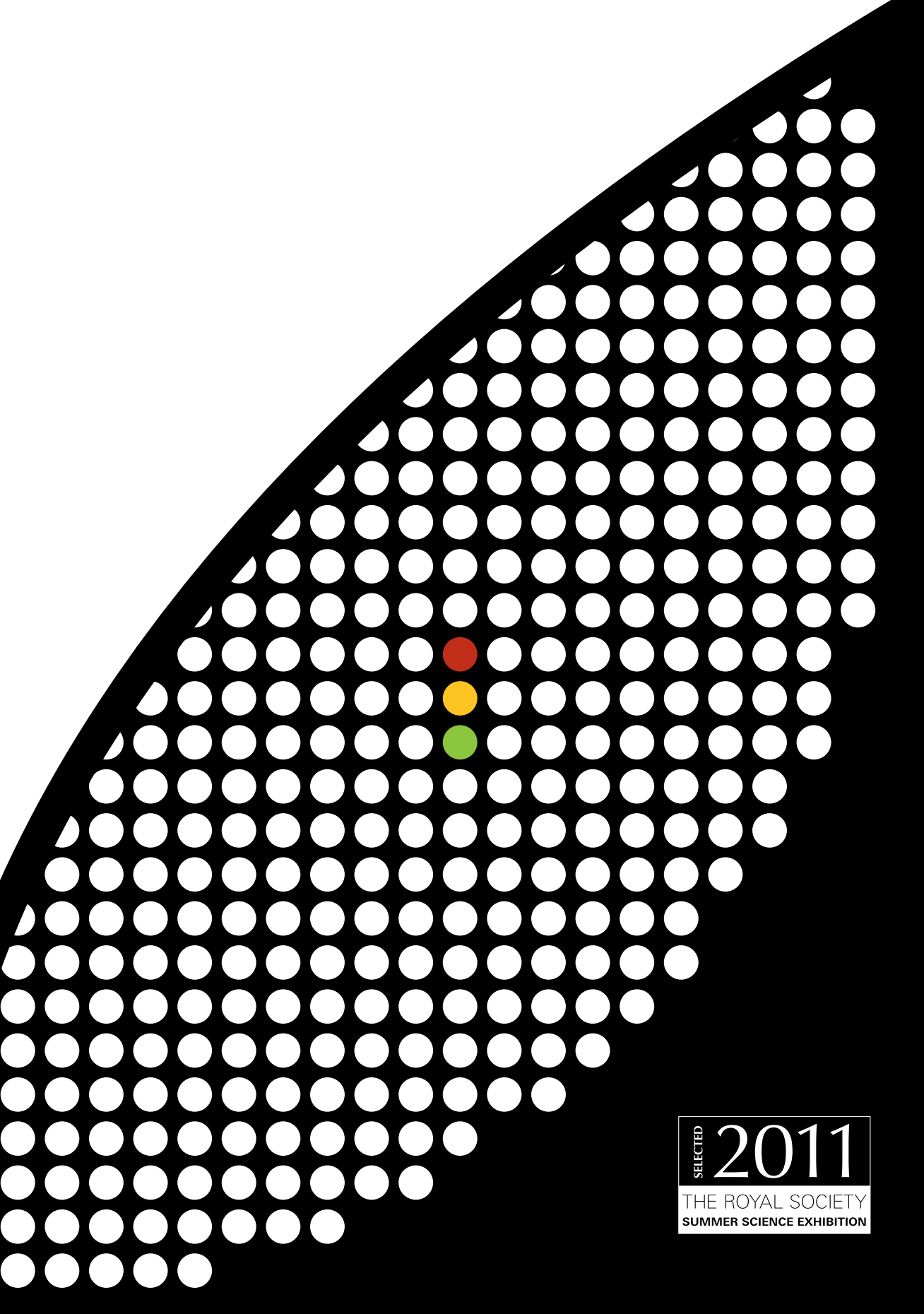
Pioneering research
and skills



SIEMENS







SELECTED 2011
THE ROYAL SOCIETY
SUMMER SCIENCE EXHIBITION