

MEET THE EXPERTS

INVESTIGATING

NZ'S TRANSPORT FUTURE

education.nzta.govt.nz

ISSUE 35 | APRIL 2017

Investigating New Zealand's transport future is the vital work for members of a cutting-edge research team at University of Waikato.

Look through the doors of a lab at the University of Waikato and you see a real car, parked up in a dark room and facing large projection screens. This is the driving simulator of the Transport Research Group and it is used to test out ideas that lead to safer and smarter use of our roads.

Computer cables snake out from under the car. The rear vision mirrors are replaced with video screens and cameras inside record the driver's activity. Researchers sit in a control room next door, selecting simulations to run and speaking instructions through a microphone.

When tests are underway, people sit in the car and drive through simulated New Zealand roads.

Associate Professor Samuel Charlton, Chair of Psychology and member of the Transport Research Group, says the lab allows researchers to study transport in ways that wouldn't be safe in real traffic.

'We have a state of the art driving simulator. We can try things out that have never been tried before: new road markings, new signs, new ways of interacting with in-car devices. And we can do that safely.'

The simulator screens both real video and animations of New Zealand roads. The team can code in virtual road features for testing.

'Things like wire rope barriers and rumble strips - improvements that people now take for granted - were tried out in this room first, so we could see how drivers would react,' says Samuel.



Samuel Charlton

The Future Transport Competition is now open for years 1-13 students.

education.nzta.govt.nz/competition

THINK LIKE ENGINEERS

Investigation and design projects – such as entries for the Future Transport Competition – get students thinking in ways that parallel the work of engineers. Here are some thoughts from transport engineer Bridget Burdett and educator Pam Hook.



Bridget: Transport engineers exist to enable participation through transport. We're all about creating environments where people can move about freely and access places safely. Engineering is about creating a future.



Pam: As teachers, we're always looking for ways to help students understand more deeply the things that really matter. Sharing our roads safely is an example. We can start by being curious. We gather information and data. We interpret that data and make sense of it. Then we create ways to improve the opportunity or challenge we found – just like an engineer would. This way, the competition not only supports careers education, it provides an opportunity for active participatory citizenship.



Bridget: The competition very much aligns with the way decisions are made in engineering practice. We try to be curious about where the problems are and what forms those problems take. And then we investigate. We look at all the factors affecting those problems and what evidence we can find to help work on solutions. And then we get creative.



Pam: The competition is an opportunity for educators interested in giving students an authentic context for practising critical, creating and caring thinking. It provides STEM learning opportunities. And it does that through a student process which models the way a transport engineer looks at how to create new things and how to make things better.

A career as a transport engineer

Bridget Burdett works as a transport engineer. She's also working on a doctorate through Waikato University. Her topic is driver behaviour psychology.

'I come from a background in road safety with an interest in how humans behave, how mistakes happen and what we might be able to do about it.'

Bridget completed a civil engineering degree at the University of Canterbury and then a master's degree in transport engineering.

In a recent project, she investigated how many people were not visiting a set of shops – comparing pedestrian counts with census data on local people, especially those who use mobility aids.

'That helped the council justify putting in a raised pedestrian crossing at a roundabout to slow the traffic down. Engineering gives you different ways of approaching a question like why aren't the people there.'

See video online:
[education.nzta.govt.nz/
competition](https://education.nzta.govt.nz/competition)



Bridget Burdett

Visits from engineers



Schools entering the Future Transport Competition could also arrange a visit from Futureintech ambassadors. Ambassadors are people who work in engineering, technology and science-based roles, including as transport engineers.

'They can relate to the students, and their career pathways are still relevant and available,' says Gay Watson, a facilitator.

'Teachers see it as a way to bring to life the learning that students are doing. It makes relevant connections between the curriculum and careers.'

Ambassadors visit students from senior primary and upwards, with an emphasis on years 5-10.

'They can provide a lot of information and inspiration for students who are beginning to make those important subject choices that can have an impact on careers.'

futureintech.org.nz

ENGINEERS AND STUDENTS: DESIGN THINKING

WITH THANKS TO BRIDGET BURDETT AND PAM HOOK

ENGINEERS

Concept stage	Consider evidence of how and why people use transport. Consult with public. What are the problems? What solutions will fix these? Find best option.
Design	Work out detailed design in line with constraints - see <i>boxed text</i> .
Construction	Keep transport moving during roadworks. Keep public informed.
Opening	Monitor how well it works.

STUDENTS

Bring in ideas	Acquire and consolidate surface knowledge about a challenge or opportunity. Talk to stakeholders - consider their needs.
Interpret	Make connections to consolidate deep understanding. Develop criteria for a suitable solution.
Extend	Use knowledge in new way. Make something or improve something.
Evaluate + report	How well did our new ideas or solution meet our criteria? Revise ideas.

CONSTRAINTS Engineers have to design transport projects within various constraints. For example:

Budget: can we afford it?
Land: can we fit it in?
Strategic fit: is it a priority?
Effectiveness: will it work for users?

Timing: Should we do this now or later?
Construction time: how long will it take?
Limits of technology: can we do this now?
Equity: whose lives will be improved?

Career profile posters online

Future Transport Competition entries can be games or narrative formats. Career profile posters give students insights into how related skills and interests can translate into learning and career pathways. These feature interviews with emerging professionals:

- Game programmer, game designer, game artist
- Journalist, illustrator, GIS consultant

Download posters from the competition site:
education.nzta.govt.nz/competition



HELPING NEW ZEALAND LOOK FORWARD ON TRANSPORT

Find out how New Zealand transport researchers investigate ways to make our journeys safer.



Nicola Starkey

The driving simulator with its car and computer screens is one of the main research tools of University of Waikato's Transport Research Group (TRG).

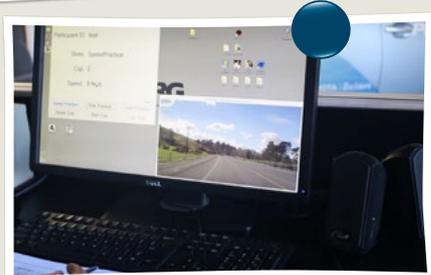
'The Transport Research Group does research on how to make transport safer, mainly focused on car drivers and driver behaviour,' says Professor Nicola Starkey.

She says team members have different backgrounds - including psychology, law, computer science and engineering. They work together because all these fields of

knowledge contribute to the future of transport at a time of rapid technological change. Autonomous vehicles and connected vehicles (which send and receive data over the internet) are a reality now, with prototypes being tested on streets worldwide.

'Legal researchers are going to be important, with these vehicles raising questions such as can you travel in an autonomous vehicle when you are over the legal drinking limit?' says Nicola.

'Computing and mathematical sciences are needed to investigate the cybersecurity of connected vehicles. The possibilities of outside people hacking into a vehicle are enormous.'



The group is researching what New Zealanders think about connected and autonomous vehicles. Associate Professor Samuel Charlton says a national survey shows people do have privacy and security concerns. He says new vehicle types are developed and released by tech companies in a similar way to the advent of smart phones, and it is up to researchers, legislators and transport planners to ensure the transport system is ready.

'The challenge for us in New Zealand is to be able to take advantage of the promise of that technology with the economic benefits it offers, the accessibility, the safety.'

He says the TRG is planning a trial of connected and autonomous vehicles on central Wellington streets. The capital's narrow, busy roads with parked cars, cyclists and bus lanes are a good test, both of the vehicles and of driver reactions. This trial is no more than two years away.

ENTER THE FUTURE TRANSPORT COMPETITION

Teams of three or more students can enter until 30 June. Students find opportunities or challenges in New Zealand transport to investigate. They use their ideas to enter either a narrative or a playable game. Prizes are organised by Years 1-6, 7-10 and 11-13. Student and teacher support material and the entry form are online:

 [education.nzta.govt.nz/competition](https://www.education.nzta.govt.nz/competition)

