New model to better predict crash blackspots

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QUT researcher Amir Afghari won the Outstanding Paper award by the National Academies of Sciences, Engineering and Medicine for his research into a new blackspot identification method.

QUT has developed a new blackspot identification method that offers an unbiased prediction of crash counts and allows a more accurate way to identify high-risk crash sites.

Amir Pooyan Afghari, from QUT's Science and Engineering Faculty, said the blackspot program aimed to reduce crashes by targeting high-risk locations and funding remedial works such as re-aligning the geometry or widening the shoulder of the road.

However, Mr Afghari said current methods of identifying crash blackspots failed to fully take into account the three potential sources of crash contributing factors – geometrical characteristics of the road, spatial features of the surrounding environment, and driver behaviourial factors, when determining high-risk sites.

"Instead of acknowledging these three distinct sources of crash causal factors, current blackspot identification methods are based on the fundamental assumption that crashes are the result of a single, risk-generating process," Mr Afghari said.

"Research has shown around 70 per cent of crashes are caused by driver behaviour, while another 10 per cent are the result of the spatial features of the surrounding environment such as climatic conditions or proximity to schools, which leaves just 20 per cent caused by engineering factors.

"If transport agencies are treating blackspots with an engineering solution when the predominant cause of the crash is driver error or the environment, then this may ultimately lead to a waste of public funds and the misidentification of true black spots."

As part of Mr Afghari's study, crash data from Queensland's state-controlled roads were run through the QUT blackspot identification model known as the Bayesian latent class model.

"Instead of considering a single crash risk, the QUT model analysed multiple crash risk processes and the result was the identification of an additional 321 crash counts in the top 20 high-risk sites," he said.

"For example, if a driver enters a curve at high speed (higher than the speed limit), then hits a kangaroo and then it starts to rain, the current method doesn't individually acknowledge the three contributing factors causing the crash.

"The end result may be an engineering solution that seeks to fix the road condition that won't necessarily remedy the environmental factor or driver behaviour (in this case, speeding) that led to the crash.

"What we found was that the prediction ability and accuracy of our model and the overall ability to detect crash blackspots was improved when two distinct contributing factors, the roadway geometry and the environment were taken into account."

Mr Afghari said the next step of the project would be to incorporate the third risk generating process - driver behavioural factors - into the modelling and take a closer look at Queensland's top 20 blackspots and identify whether they were true blackspots that could be fixed with a road engineering solution.

"Ultimately we want to spend public funds wisely on engineering solutions only when an engineering solution is required.

"If driver behaviour or environmental factors are contributing factors, then we need to spend or divert money to strategies that address those issues."

Mr Afghari's research received international recognition when it was selected from more than 5000 papers to receive the Outstanding Paper award by the National Academies of Sciences, Engineering and Medicine in the United States.

More information: A Bayesian latent class safety performance function for identifying motor vehicle crash blackspots. eprints.qut.edu.au/92751/

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