Modelling the future’s transportation systems
塑造未來的運輸系統

Although he studies traffic flow patterns in rapidly developing cities, Prof. William Lam took the road less travelled when choosing his discipline. Rather than focusing on structural engineering during his graduate studies in civil engineering, he found himself “more interested in human behaviour, particularly how it affects transportation systems”. Now Chair Professor and Associate Head of the Department of Civil and Structural Engineering, Prof. Lam is a pioneer in transportation system modelling which he describes as “a relatively new discipline”.

A fascination that began when he interviewed passengers at a bus stop in the middle of a Canadian winter as a Master’s student has led Prof. Lam ever deeper into travel behaviour and how it changes over time under different weather conditions. Recently, as one of a group of five collaborators from Hong Kong and the Chinese mainland, he received the 2011 National Natural Science Award (Second Class) for significant contributions to the numerical study of how human behaviour influences the spatial-temporal features of urban traffic-flow distribution.

When asked how receiving the highly prestigious award would change things for him, Prof. Lam responded that it would “provide me with more opportunities to collaborate with scholars in the mainland”. This is a crucial element of his engineering outlook, as he is constantly searching for ways to exchange knowledge and hone his professional understanding of how transportation systems should be designed. He currently holds the Changjiang Dahaier Professorship at Beijing Jiaotong University and is often invited to give guest lectures and seminars on his current research work at other mainland universities.

That work is particularly intense in Hong Kong, where Prof. Lam has received 12 Earmarked Research Grants since 1998. He says he has achieved that remarkable feat by treating every proposal as though it were a paper to be submitted to a leading international journal. But he is also quick to note that the proposal is only the beginning—the research and its outcomes are what matter most.

One outcome that has been particularly important is the result of Prof. Lam’s work on traffic speed and journey time estimation. Having received funding from PolyU for a niche area project in early 2000, he and his team devised a transport information system for estimating traffic speeds and travel times. Although it covered only a small part of Hong Kong at first, with the collaboration of Autooll Limited, the scope expanded and the team completed several related projects for the Transport Department. 2008 saw the launch of a ‘speed map’ on the Transport Department’s website, which was further updated in 2010.

The system allows the general public to ‘track the real-time traffic conditions on the major roads’ through interactive maps of Hong Kong’s major districts. Users can click to find which routes are congested and what the travel speeds currently are, with updates every two minutes. Given the system’s usefulness in a city that offers very few alternative routes, it fittingly received an award for the Best Public Service Application (Small Scale Project) at the 2008 Hong Kong
Under the supervision of Prof. Lam Jing, Lu Hua won the Chartered Institute of Highways and Transportation (Hong Kong Branch) Student Paper Award 2011.

In her essay (left) she describes the importance of using transportation information in urban planning. In the image (right) are several interactive transportation pages.

ICT Awards. The system has since been extended to provide travel times on various general signs for drivers wanting alternative tunnel routes beneath the Victoria Harbour. Under this "Journey Time Indication System", drivers on Hong Kong Island can now see real-time traffic information while travelling on the major roads along the harbour, which is particularly useful when there have been traffic incidents or temporary road closures.

One of Prof. Lam’s current projects is devoted to extending this system to Beijing or other cities in Asia, such as Bangkok, so that it can be used to predict travel times and traffic incidents. That has meant adapting it to new traffic conditions, with Prof. Lam offering Beijing’s professors of transportation a key difference on the roads of the capital as compared to Hong Kong.

For a scholar who has already achieved so much locally and in the mainland, Prof. Lam is always satisfied with the state of knowledge in the present. Indeed, forecasting travel demand in a system always focuses on the future. To understand how a transportation system might accommodate a certain level of future demand, "we have to understand how people change their travel behaviour over time", he said. That involves dealing with various uncertainties, and only then can "a realistic transportation system for our next generation" be achieved.

Prof. Lam’s concern for the next generation is also evident in his teaching, which covers transport planning, and highway engineering. "We have to educate our students to learn independently", he commented, "because nowadays knowledge is forming very fast." Students should not only know how to use computer models in sophisticated software, but also know the theories behind these models so they can detect when the output is incorrect.

His students have certainly responded to the challenge, with some taking out best paper and project awards in recent years. As part of a new breed of transportation engineers, they are emerging into a profession that Prof. Lam suggests will be playing a much more active role in planning not only locally, but also in the broader Pearl River Delta and throughout Asia. It is, after all, a more fundamental element of the human behaviour for a sustainable transportation system that Prof. Lam has long studied to collaborate with neighbours rather than to compete.

The system will have a significant impact in Hong Kong, where the existing infrastructure is under pressure due to the increasing number of people. The system will help to reduce traffic congestion and improve the quality of life for residents.

Journey time Indicators on gantry signs

Real-time Traffic Information System

They are the most significant developments in transportation technology in Hong Kong in recent years.