Optimising the crowd with smart technologies

SMU's Professor Lau Hoong Chin is leading a team to solve urban problems of crowds, queues, and congestion.

“The work we are doing at UNICEN is aligned with Singapore’s vision to be a Smart Nation, a key aspect of which is to make good use of technology to help people and businesses make smart decisions.”

Professor Lau Hoong Chin, Professor of Information Systems and Director of Fujitsu-SMU Urban Computing and Engineering (UNiCEN) Corp Lab

A Special Feature Brought to You By Singapore Management University

From theme park to taxis

With Fujitsu as a key technology provider for the 2020 Tokyo Olympics, the company hopes to create ways to manage large crowds, especially in Singapore, which can be used during the games itself. A precursor to the lab’s current work is a project with Resorts World Sentosa to help manage crowds as well as optimize the visitor experience.

“Uncertainty is the name of the city. Every day, tens of thousands of people enter the park. Queues and crowds hamper their experience,” he explained.

Prof Lau’s team at SMU’s Living Analytics Research Centre developed a crowd monitoring and control system, and a mobile app. Users of the app can input ride preferences, schedules, and group sizes, along with other factors like height, weight, and health restrictions. Like a user’s GPS device, the app is interactive in that it provides the best recommendations in real-time to individual visitors based on their preferences, and takes into account current weather conditions, operational status of lines and queue lengths.

“Research shows the opportunity to develop functional technologies and interfaces for online crowd management in solving larger urban issues, like reducing taxi queues,” said Prof Lau.

What is interesting is that the mobile app, coupled with the underlying intelligent system, is capable of monitoring and co-ordinating crowd movements.

“The aim is to help both commuters and taxi drivers make smart decisions in real time through the mobile app,” he said.

While technology players like Uber and GrabTaxi have helped commuters get the rides they want, Prof Lau said that the UNICEN Corp Lab aims to take the taxi business to a higher level of competition, proactivity, and dynamically matching supply and demand in scale.

Highways in Singapore can be harrowing in situations where there is a large volume of traffic during events like the Singapore F1 Grand Prix (or) indomitable weather.

“Let’s work to have a study of its effects in ak calendar with large crowds as well as worldwide and be able to anticipate where taxi queues will be, rather than simply react to it. When queues have developed, tourists can actually predict howfar in advance and what is going to happen in tea queues, you can reduce a lot of unnecessary wait times.”

Other than the taxi problem, Prof Lau’s team is also working with Suntec Singapore Convention & Exhibition Centre on an app to improve the experience of thousands of visiting delegates.

“It takes a lot of effort to control your own itinerary to attend the various demonstrations and talks within a convention, and meet with different people you want to meet. Wouldn’t it be nice if you had an intelligent personalized software agent to help you plan your activities on the fly according to your preferences and needs?”

Again, the underlying aim is to help individuals avoid long queues, hence the app would recommend delegates to avoid such crowds.

The same app can also be extended to large shopping malls and leisure facilities to help the general public, as well as benefit retail and food and beverage outlets, he added.

From taxis and commuters to ships and freight

The idea of dynamic demand and supply matching is not only restricted to people flows. UNICEN is tackling the problem of co-ordinating maritime and urban freight traffic in Singapore.

Singapore is the busiest port in the world in terms of shipping tonnage, with some 120,000 vessels calls annually. High cargo volumes and maritime traffic growth port authorities went to see higher level of vessel co-ordination sailing through crowded and narrow Singapore waters for safety and efficiency purposes.

The UNICEN team will develop intelligent co-ordination and planning algorithms that can aid in efficiently ingesting hipots and provide customized guidance to different stakeholders involved in the maritime traffic management.

And as freight enters the port, the urban challenge is last-mile logistics, which is the movement of goods from the port to the point of consumption.

Singapore’s logistics industry is largely fragmented and uncoordinated, and operations have no incentives to share orders with one another.

However, congestion will only increase as freight volumes grow, as a result of growing trade, e-commerce, and an ageing population, which requires more home deliveries, Prof Lau said.

“For example, instead of company A and B both sending their own trucks to a particular shopping mall and jamming up both the roads and the loading bays, it would be more efficient if the logistics providers can consolidate their loads onto fewer trucks and co-ordinate the trips of their deliveries. This would lower transaction fees, and reduce traffic and carbon footprint within the city,” he said.

Prof Lau said that for such a scheme to work, operators need to begin when solutions in collaboration, he is leading team to design-market mechanisms and incentive structures that would make sharing of bulk loads across logistics providers increase in volumes grow, as a result of growing trade, e-commerce, and an ageing population, which requires more home deliveries, Prof Lau said.

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This project provided the opportunity to develop functional technologies and interfaces for online crowd management in solving larger urban issues, like reducing taxi queues,” said Prof Lau.

What is interesting is that the mobile app, coupled with the underlying intelligent system, is capable of monitoring and co-ordinating crowd movements.

“The aim is to help both commuters and taxi drivers make smart decisions in real time through the mobile app,” he said.

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This is a monthly series brought to you by the Singapore Management University. Next month’s feature will discuss the importance of nurturing workplace leaders with cultural awareness and contextual understanding.

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