

Spacing Singapore to improve social distancing

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Four days before Singapore implemented its 'circuit breaker' to stem the spread of COVID-19 on April 7, SMU Associate Professor of Information Systems Rajesh Balan and NUS Yong Loo Lin School of

Medicine Professor Michael Chee launched the Singapore Spacer project. The Singapore Spacer is a tool that uses Wi-Fi signal strength to identify places with high concentration of human traffic.

By creating software using the Perl language, Professor Balan was able to capture the Wi-Fi signals from the thousands of mobile devices across the NUS campus, thereby solving a problem Professor Chee had fretted over at the start of 2020.

"I thought about pre-symptomatic transmission in March before the data emerged [and] I envisaged a crowd detecting system that could passively and anonymously collect information about people concentration," Professor Chee tells the Office of Research and Tech Transfer.

He had been thinking about what a colleague, Professor Wang Linfa at the Duke-NUS Medical School, had told him following a trip to China in January. Professor Wang, who led research in identifying bats as the natural host of the SARS virus back in 2003, had warned about a disease that was less lethal than SARS "but would spread more widely."

"I contacted someone I knew and he suggested I speak to Rajesh. We assembled a team of people who were complete strangers in a very short time and created a system in NUS to map people density."

COVID-19 in schools and the commercial space(s)

The system aggregates and maps over time when and where people congregate, which helps inform decision-makers on the effectiveness of policies: "When lecture halls effectively shut as a result of the implementation of e-learning, are students amassing at some other location?"

"What we are trying to do is help our universities who are facing the

same problem, which is "How will we provide safe environments for our students?" explains Professor Balan. "Through systems like this, we will provide insights as to how the spaces are being used, how [social distancing](#) is being maintained, where people are going, and whether the flow of people is effective."

"I'm supplying the technology for this [project](#) while Michael focuses on the engagement with end users, insights, policies, and access to key people. It works well."

Professor Balan had been working on the Perl scripts gratis until July when he applied for and was awarded a grant under the National Research Foundation (NRF) Central Gap Fund. Essentially a proof-of-concept (POC) grant, Professor Balan will run the project for two months until September as the first step towards commercializing the underlying technology.

"NRF has decided that this project has the opportunity to produce something tangible in two months that will be of use country-wide. That's why they awarded us the grant."

Beyond tracking people—anonynously—for the purpose of restricting disease spread, the underlying technology can be applied to any situation involving large numbers of people. Professor Balan points out that malls, hospitals, and F&B establishments can use the technology so long as the purpose is identified, be it crowd control, traffic flow, or something else.

As Institutes of Higher Learning have recently started Academic Year 2020/21, Professor Balan is collecting data to iron out the kinks in the system to achieve dual goals: provide insights to improve social distancing measures, and create a more robust product for commercialisation.

"We are building it so that we can show that it's actually useful, and that will be proven once the school semester is out," he observes. "We'll demonstrate it at SMU and NUS and maybe someone will show interest."

"We're going to use the grant money and harden some of the prototypes. It's not really commercially ready yet. This is an opportunity to come up with some improvements."

Unusual beginnings

While the project could prove to be an invaluable social distancing and crowd management tool beyond COVID-19, its genesis was atypical of the projects that constitute the bulk of academic research.

"Usually projects come about because somebody has a great research idea, or they have a paper they want to publish, et cetera," observes Professor Balan. "This came out without talk of papers or anything like that. This was about knowing something needs to be done, and we have the opportunity to do something."

"This was not a 'research project' as such," offers Professor Chee, echoing Professor Balan. "The idea from the start was how to help people by reducing risk of transmission by social distancing."

"The project was an excellent illustration of how a technically and logistically complicated project could be pulled off by strangers with different skill sets working together for a common goal. I think this speaks volumes about the ability of Singaporeans to get together to solve challenges. I personally was encouraged by the level of co-operation and camaraderie experienced when the project was most active."

Provided by Singapore Management University

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