



Singapore Spacer: Mapping concentrations of people in campus buildings

A NUS-SMU collaborative effort with industry for mapping people concentrations on campus showcases Singapore's diverse assets in combating COVID-19

SINGAPORE, 6 April 2020 (Monday) - COVID-19 has spread far and wide because it is highly contagious and also because it can start spreading before symptoms appear. Confirmation regarding this type of spread has emerged over the last days but a group of researchers at the National University of Singapore (NUS) and the Singapore Management University (SMU) foresaw this three weeks ago and teamed up to create a tool that enables administrators to estimate people counts in different buildings on campuses.

The tool enables decision makers to identify places on campus where people concentrations are high. Like an eye in the sky, it allows leaders to make principled choices about what actions to take to reduce the likelihood of person to person COVID-19 transmission. It also can inform about the effectiveness of policies. For example, when lecture halls effectively shut as a result of the implementation of e-learning, are students amassing at some other location?

“The beauty of this system lies in its ability to accumulate useful information and to share it without further disrupting life on campus,” said Professor Michael Chee from NUS, who led the initiative.

“By using Wi-Fi signal strength received from thousands of mobile devices across campus, location information can be aggregated and mapped over time to inform about where and when people aggregate,” added Associate Professor Rajesh Balan from SMU who provided the key techniques to map devices to locations.

The system which went live on 3 April 2020 was set up in record time as a result of close collaboration between the university-based design team and its support persons, IT professionals, NUS leadership and private companies including Aviation Virtual and ESRI who provided mapping support.

“During SARS, I felt powerless to help but over the 17 years since then, Singapore’s scientific base has grown so much, I was determined to put these intellectual assets to work. It is one thing to have an idea, but to move it into something real instead of just being anxious or negative, is something very important at this time,” Prof Chee said. “Most of the interdisciplinary team have different backgrounds. Apart from myself and Assistant Professor Thomas Yeo, a world leader in brain mapping and an academic staff at NUS, almost every other contact we made was a cold call made from recommendations collected from anyone who offered tips.”

Strangers from different backgrounds came together, worked collaboratively using social media and remote conferencing tools to collectively build something that may be of benefit to society.

The next step in the Spacer project is to work with the Nanyang Technological University to put up the same system and concurrently plan to upscale the effort to the whole of Singapore. For this, a different method of data collection will be necessary. Think of the latter effort as Google Maps or Waze for planning a trip, but for managing human rather than vehicular traffic. We use Google Maps or Waze every day to help us avoid crowded roads. Everyone contributes some anonymized personal information to benefit the whole community. Co-operation of telecom operators to obtain cellular data like in Germany, Italy and Austria, is presently being sought.

Locking down the whole country is what has been practiced in several countries. However, this cannot be sustained for long periods without significant damage to the economy and to collective psyches. By having intelligent management of people concentrations and flows, the Spacer project seeks to provide a calibrated solution for limiting disease spread that complements efforts made by another home-grown technological initiative 'Trace Together' which focuses on contact tracing.

Statistical modelling shows that a combination of measures is necessary to clamp down the spread of COVID-19. Associate Professor Alex Cook, statistical epidemiologist from NUS who published the modelling study in a major scientific journal on 23 March 2020, reinforced the point that, "there is room for multiple approaches".

What is important, the team agrees, is that we work together, stay engaged and support one another's efforts to contain this global menace.

Please refer to the Annex and <https://bit.ly/2ULHmzD> for more information about the Singapore Spacer.

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About National University of Singapore (NUS)

The National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education, research and entrepreneurship, with a focus on Asian perspectives and expertise. We have 17 faculties across three campuses in Singapore, as well as 12 NUS Overseas Colleges across the world. Close to 40,000 students from 100 countries enrich our vibrant and diverse campus community.

Our multidisciplinary and real-world approach to education, research and entrepreneurship enables us to work closely with industry, governments and academia to address crucial and complex issues relevant to Asia and the world. Researchers in our faculties, 29 university-level research institutes, research centres of excellence and corporate labs focus on themes that include energy, environmental and urban sustainability; treatment and prevention of diseases common among Asians; active ageing; advanced materials; as well as risk management and resilience of financial systems. Our latest research focus is on the use of

data science, operations research and cybersecurity to support Singapore's Smart Nation initiative.

For more information on NUS, please visit www.nus.edu.sg.

About Singapore Management University

A premier university in Asia, the Singapore Management University (SMU) is internationally recognised for its world-class research and distinguished teaching. Established in 2000, SMU's mission is to generate leading-edge research with global impact and to produce broad-based, creative and entrepreneurial leaders for the knowledge-based economy. SMU's education is known for its highly interactive, collaborative and project-based approach to learning

Home to over 10,000 students across undergraduate, postgraduate professional and post-graduate research programmes, SMU, is comprised of six schools: School of Accountancy, Lee Kong Chian School of Business, School of Economics, School of Information Systems, School of Law, and School of Social Sciences. SMU offers a wide range of bachelors', masters' and PhD degree programmes in the disciplinary areas associated with the six schools, as well as in multidisciplinary combinations of these areas.

SMU emphasises rigorous, high-impact, multi- and interdisciplinary research that addresses Asian issues of global relevance. SMU faculty members collaborate with leading international researchers and universities around the world, as well as with partners in the business community and public sector. SMU's city campus is a modern facility located in the heart of downtown Singapore, fostering strategic linkages with business, government and the wider community. www.smu.edu.sg

ANNEX

Figure –Identifying campus buildings that are highly occupied as assessed by Wi-Fi devices connected. A downward trend in occupancy is noted in late March and the first days of April.

