HKUST Researchers Develop First Innovative Fusion-based Location Sensing Technology to Shape a Smart City

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A research team at the Hong Kong University of Science and Technology (HKUST) recently invented a new fusion-based technology which achieves remarkably improved accuracy to position people indoor, enabling novel smart location-based applications such as indoor navigation, location-based personalized recommendation, crowd analysis and people flow control.

Developed by a team led by Prof Gary Chan of the Department of the Computer Science and Engineering, the location sensing technology – a software suite which fuses Wi-Fi with other signals on mobile platforms – is the first of its kind deployed in Hong Kong. It could reduce the position error to less than 2.5 meters in general environment, three times more accurate than traditional approaches. To locate a person, the technology combines signals from multiple sources such as Wi-Fi, geomagnetic field, Bluetooth, video and accelerometer reading. It has been deployed in Harbour City at Tsim Sha Tsui, and is now under commercial trials in malls (in collaboration with New World Development Research and Development, PCCW Solutions, and Link) and hospitals.

‘Existing location-based technologies often draw signals from a single source. As different signals have different limitations, their accuracy is not so satisfactory and their application environment is not general enough,” said Prof Chan, also Director of Entrepreneurship Center at HKUST. “Our technology is to fuse the signals to combine their strengths while overcoming their limitations. The higher location accuracy makes possible novel location-based services and facilitates Hong Kong’s development as a smart city.”

The technology can also create synergy with the government’s smart lamp posts pilot scheme announced earlier as an initiative of the Smart City Blueprint, which plans to install multifunctional smart lamp posts starting 2019 to facilitate collection of real-time city data in enhancing city management and other public services. Incorporated with the technology, the lamp posts will not only provide timely location-based services to tourists and general public, but will also create immense social value on helping to find missing people, pets and preventing them from getting lost.

Funded by the Innovation and Technology Commission’s Innovation and Technology Fund and managed by Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM R&D Center), Prof Chan’s technology is now being commercialized through two start-ups run by HKUST graduates.

The fusion technology is based on fingerprinting. Survey is first conducted to collect the signals at different locations of a given site. Using machine learning, the signal’s characteristics at these locations are analyzed and modeled. Upon detecting signals from a user, the location of the user can then be estimated accurately and efficiently. Patents of the technology have been filed in the US and mainland China.

About The Hong Kong University of Science and Technology

The Hong Kong University of Science and Technology (HKUST) (www.ust.hk) is a world-class research university focuses on science, technology and business as well as humanities and social science. HKUST offers an international campus, and a holistic and interdisciplinary pedagogy to nurture well-rounded graduates with global vision, a strong entrepreneurial spirit and innovative thinking. HKUST attained the highest proportion of internationally excellent research work in the Research Assessment Exercise 2014 of Hong Kong’s University Grants Committee, and is the world’s second in the latest QS’ Top 50 under 50 ranking. Its graduates were ranked 12th worldwide and top in Greater China in Global Employability University Survey 2017.


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