SMU-SIS students develop mobile app for the visually impaired in Singapore

Zafirah Salim | March 18, 2016

SIS student Cui Lingting (right) and Associate Prof Benjamin Gan with the plaque and certificate for UCIS 2016 Best Paper award.

Fourth-year School of Information Systems (SIS) students from the Singapore Management University have achieved the Best Paper award at the 6th Undergraduate Conference in Information Systems hosted by the Information Systems Programme at the Dietrich College of Humanities and Social Sciences, Carnegie Mellon University, Pittsburgh, U.S.A. on 27 February 2016.

This year, the conference revolved around the theme of 'Humanising IT', in which participants were asked to consider the evolving rule of IT in all facets of human life. 12 out of 70 undergraduate research papers were accepted and presented at the event.

SMU's paper, titled *ICT-Travel: Mobile Public Transport Companion for the Visually Impaired*, detailed its iOS mobile app, called *ICT-Travel*, which is designed for the visually impaired to aid them to use the public transport in Singapore.

The SMU-SIS team, comprising Cui Linting, Kenny Ngo and Benjamin Gan Kok Siew, found that access to public transportation in Singapore remains a challenge for disabled persons because efforts by the Land Transport Authority are mostly focused on fare subsidies and wheelchair accessibility on public transport.

Since those who are visually impaired face a different set of challenges, the app's features - such as route recommendation, notification of bus arrival and notification to alight - are all designed to be user-friendly for them.

Currently, most map services, interaction interface, and local bus guide applications present various difficulties to the visually impaired when they want to find out how to navigate from one place to another via public transport. The *ICT-Travel* app simply requires the input of the user's origin and destination to generate a recommended

route, leveraging the iPhone's GPS function to determine the origin. Alternatively, visually impaired users can opt for voice-to-text input by utilising the OpenEars software developed by Carnegie Mellon University. For users who frequent a fixed journey, the team also created a module to save a recommended trip plan as 'Favourite'.

Additionally, *ICT-Travel* provides updated bus arrival times by the minute. All the possible bus services that a visually impaired commuter can take at a certain bus stop based on the recommended route given will be listed, and he/she will also receive an audio notification of the estimated time of arrival of the earliest bus service.

Lastly, the team built into *ICT-Travel* a small geofence (a virtual perimeter) of about a 10-metre radius around every bus stop along the trip. This allows the app to track the number of bus stops left on the trip prior to arrival. This information is updated in real-time, using the smartphone's GPS function, and it will be subsequently sent to the user via notifications when nearing the destination.

In line with this, the team also implemented a shake function that will announce the current address of the user as a form of reassurance. On top of that, upon reaching the destination, *ICT-Travel* will detect if the actual GPS location matches the intended destination.

The app has since undergone a test by visually impaired users from Dialogue in the Dark Singapore on their daily travel routine for more than two months. After this trial, the SMU team better understood the needs of the users, and has continuously refined the app to cater to their specific needs.

"It was a great experience to learn from peers and professors from around the world about "Humanising IT". Their insights on the topic were very impressive, and inspired me to look at IT and life from a different perspective. I realised there are many areas, such as healthcare and migration, in which IT can contribute to improving lives. Winning the Best Paper award will encourage me to continue studying and applying IT to better the lives of people," said team member Cui Linting.