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Engineering an innovative transport system for sustainable future mobility



The NUS Engineering team comprises students (from left to right) Zhang Yiran (ESP Year 4); Liu Chong (Research Engineer, ESP Class of 2016); Zhang Xiaoyang (ESP Year 3); Jin Yuejiao (PhD student, ESP Class of 2016); and Su Dou (ME Year 3). Absent: Gwee Chia Hong (ESP Class of 2016).

A group of NUS Engineering students from the Engineering Science Programme is participating in the Land Transport Authority (LTA) Engineering Challenge for Sustainable Future Mobility. The competition aims to build up Singapore's engineering talent pool by encouraging innovation, creativity and engineering skills among tertiary students and Engineering professionals to co-create projects to help create an attractive and robust land transport network.

There are two challenging topics – "Sustainability Mobility" and "Future Mobility (Self-Driving Vehicles)" – for which the participants are invited to rethink how our Singapore's transport landscape would be like in the years ahead. Under "Sustainability Mobility", participants will explore how to make Singapore a "car-free" walkable city, where the street space is centred on pedestrians. "Future Mobility (Self-Driving Vehicles)", on the other hand, allows participants to use their

creativity to imagine how on-demand, door-to-door mobility service provided by self-driving vehicles would transform our transport landscape.

Supervised by Associate Professor Palani Balaya (Department of Mechanical Engineering/Engineering Science Programme), the NUS Engineering students - Zhang Yiran (Team Leader); Jin Yuejiao; Zhang Xiaoyang; Liu Chong, Gwee Chia Hong, and Su Dou – and their proposed Auto-Smart Bus (ASB) system have been shortlisted for Stage 2 of the LTA Engineering Challenge. The ASB is an independent transport system, consisting of the auto-bus, which can run in fixed routes, as well as the smart calling system, that directs the nearest auto-bus to go to the corresponding stop once it is called. The ASB system complements the country's current public transport system. It will also improve the efficiency of the transport system in HDB towns, particularly in areas which are not readily accessible by Mass Rapid Transit (MRT).

Said Team Leader Yiran, "MRT, bus and systems constitute the transport system in Singapore. In terms of public transport, the MRT system is most extensive, direct and reliable. The bus system, which complements the MRT system, is used to serve the feeder routes in HDB towns. Instead of buses, private cars, and other transport systems operating between HDB towns, we propose the ASB system as a replacement to provide an integrated small scale transportation system, in terms of fewer operating circle routes and small capacity buses. These circle routes are evenly arranged around the main traffic centres, namely the MRT station and bus interchange. They are able to cover most of the residential areas, so that all the residents can reach the ASB system within walking distance. To be efficient, the circle route is approximately one square kilometre, and the operating time of one circle route is 10 minutes."

For the final stage of the competition, the NUS Engineering team is required to develop a prototype of their proposal, and they must clearly present the key engineering principles behind their proposal, and how their ASB system complements the existing transport networks as it transforms Singapore into a liveable and car-lite city.

Teams with outstanding entries will be eligible for the following prize awards – Gold (S\$10,000); Silver (S\$5,000); Bronze (S\$3,000) and Commendation (S\$1,000). They will be judged using a Point System, based on five aspects: Creativity/Innovativeness; Technical Feasibility; Relevance; Effectiveness; and Quality of Deliverables. A certificate of participation will be given to all shortlisted teams in Round 2. Shortlisted entries will also be showcased at the Singapore International Transport Congress and Exhibition in October 2016.