# About Us

*The ST Engineering-NTU Corporate Laboratory aims to strengthen Singapore's R&D innovation by encouraging public-private research collaboration between universities and companies. It marked a pivotal event for the regional R&D community as it represents a key thrust in our national effort to spearhead applied research into Robotics and Automation Systems.*

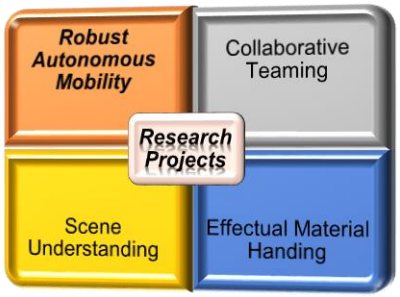
### *Lab Vision*

- *Develop collaborative and autonomous unmanned systems that integrate seamlessly and safely in extreme and complex environments.*
- *Two strategic thrusts*
  - ***APART** Airport Precision Airside Robotics Technology*
  - ***CRISP** Crisis Response Intelligent Support Programme*
- *Multiply operational effect while reducing manpower.*
- *Develop critical Technology Readiness Level (TRL) 4-6 DUAL-USE intelligent and unmanned enablers to sustain competitive advantage.*

### *Rationale of the Lab*

- *De-risk up-stream TRL 1-3 technologies.*
- *Transit critical TRL 4-6 technologies for commercialisation.*
- *Develop IP pipeline to sustain continuous innovation.*

*The Corp Lab aims to recruit over 100 researchers and staffs at full capacity to pursue research in four tracks:*

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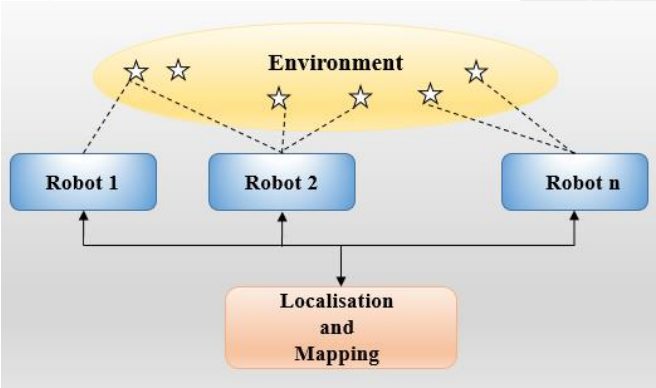
# ST Engineering–NTU Corporate Laboratory

# Robotics Is Within Your Reach

## Collaborative Multi-Robot Exploration

To realise the full potential of multi-robot collaboration, robots need to share information to establish some form of shared awareness regarding the task and their surrounding environment. Our team is currently developing a collaborative simultaneous localisation and mapping (CSLAM) solution, by which the fused sensor signals delivered by all robots can be utilised to generate a more accurate mapping during exploration of 3D environment. The centralised algorithm distributes information to each robot and allows optimal coordination of multiple robots for the exploration task.

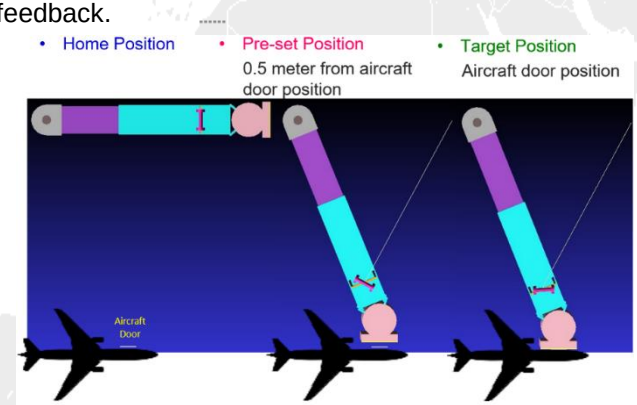



## Obstacle Detection Using Stereo Vision

The project aims to develop lightweight and robust stereo vision technique that can support autonomous navigation and collision avoidance of an unmanned vehicle in an unknown environment. Effort has been made on developing visual SLAM, stereo vision obstacle detector and the computation of path planning in real time whenever obstacle has been located.

## Automated Passenger Boarding Bridge

This project focuses on the development of an automated passenger boarding bridge (Aerobridge) to replace the existing manual operation by a qualified licensed operator. Investigation has been made to determine the sensor system used for the positioning of the aerobridge. Ongoing effort involves the development of a control system, which is intended to guide the aerobridge from home position to the aircraft door position based on optimal path planning and the sensor feedback.




## Precision Landing for UAV

Our vision based landing technologies allow a Tricopter UAV to land accurately on a static as well as a moving target, while not depending on high-end GPS or inertial sensing system. This makes our system low-cost and scalable to support large disaster relief operation. Experimental results have validated the satisfactory landing precision of the proposed method with adequate robustness under different illumination and weather conditions.

## Smart Wheelchair System

Moving a group of individuals with reduced mobility between locations using manual wheelchair can be strenuous and labor intensive. Our research team is developing a smart wheelchair system that enables the transportation of multiple persons at a time with minimal human supervision, while ensuring the safety and comfort of the individuals. The state-of-the-art autonomous system combines a group of smart wheelchairs to travel as a convoy, in which one is closely following the other. This forms a platoon of wheelchairs that is driven by smart technology and is able to self-navigate and move cooperatively to the target destination.

## Object Classification

To enable an autonomous vehicle operates safely under busy traffic condition, a fast and robust object classification system is needed for recognising various types of vehicles, cyclist and pedestrians operating in a complex environment. A learning algorithm has been developed and proven to achieve reasonably good results for object classification with much shorter training time than those that use conventional methods. Real time demonstration also showed that our in-house developed object classifier is able to label vehicles detected with a reasonable high level of confidence.