

## INSTRUCTIONAL ASSEMBLY & DISASSEMBLY OF AN A/C COMPRESSOR USING AUGMENTED REALITY

Augmented Reality (AR) can aid a user in the acquisition and retention of information. In the automotive industry, AR could minimize errors in long and memory-intensive operations. This project aims to assist the process of assembling and dismantling various parts of an automobile by incorporating the use of augmented reality (AR) with PTC software. The augmented models offer step-by-step instruction to help ease the workload of the user and enhance the user safety throughout the assembly and disassembly process of an Air-Conditioner Compressor.



Main page of the instructional augmented reality app showing the overall compressor assembly.

**SUPERVISOR**  
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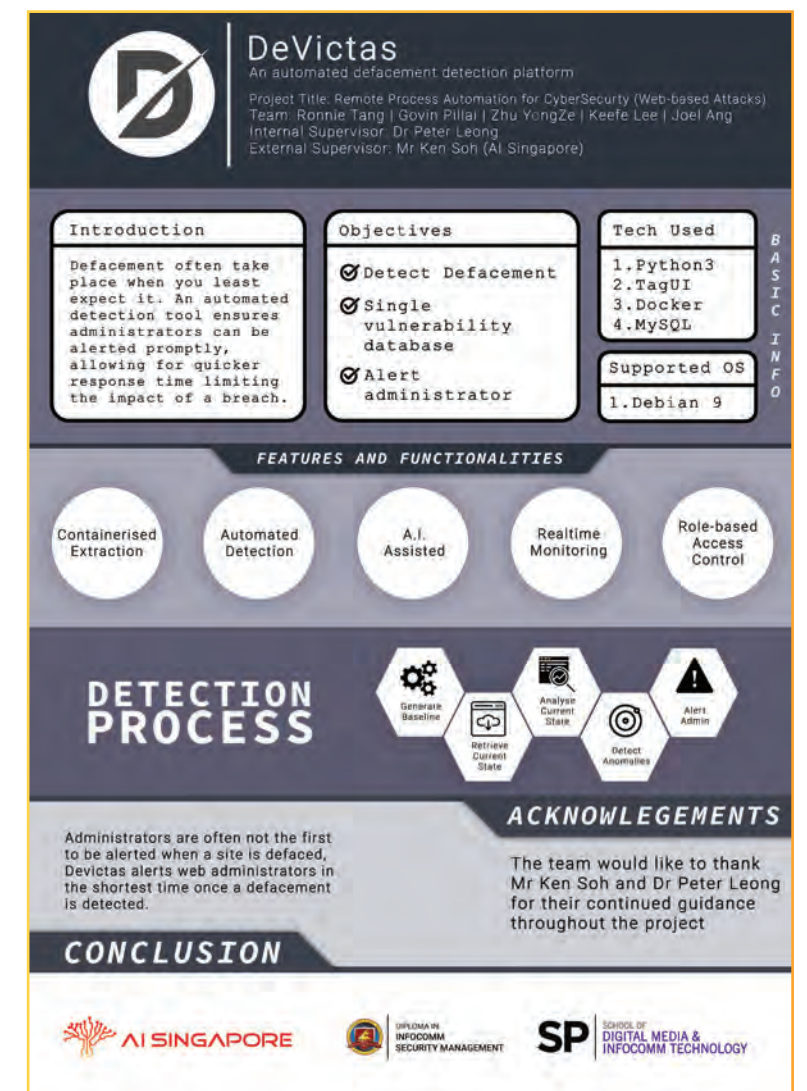
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## ROBOTIC PROCESS AUTOMATION (RPA) FOR CYBERSECURITY (WEB-BASED ATTACKS)

This project aims to use an open source Robotic Process Automation (RPA) tool to check a list of websites periodically for signs of attack and maintain a database of common web attacks by using information available from OWASP and other similar sites. Limitations and vulnerabilities found in TagUI will also be documented as part of the analysis.

**SUPERVISOR**  
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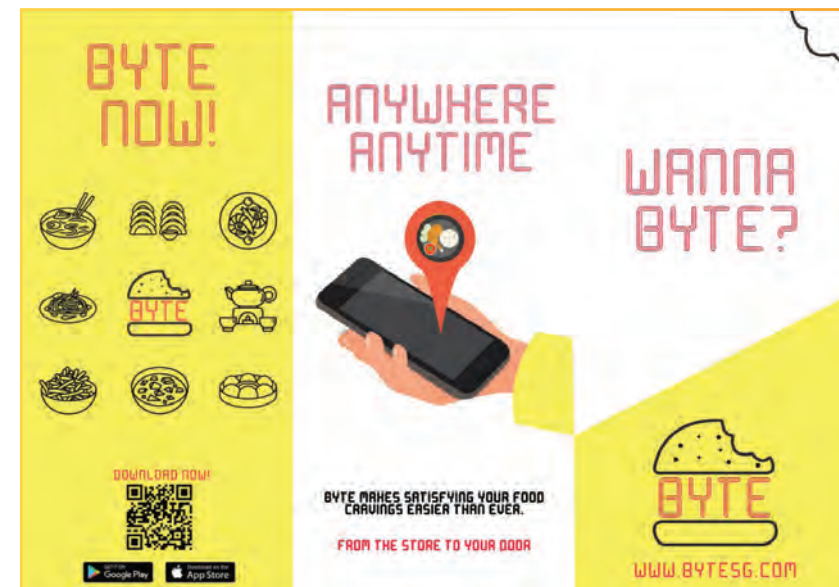
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Poster.

## BYTE SG

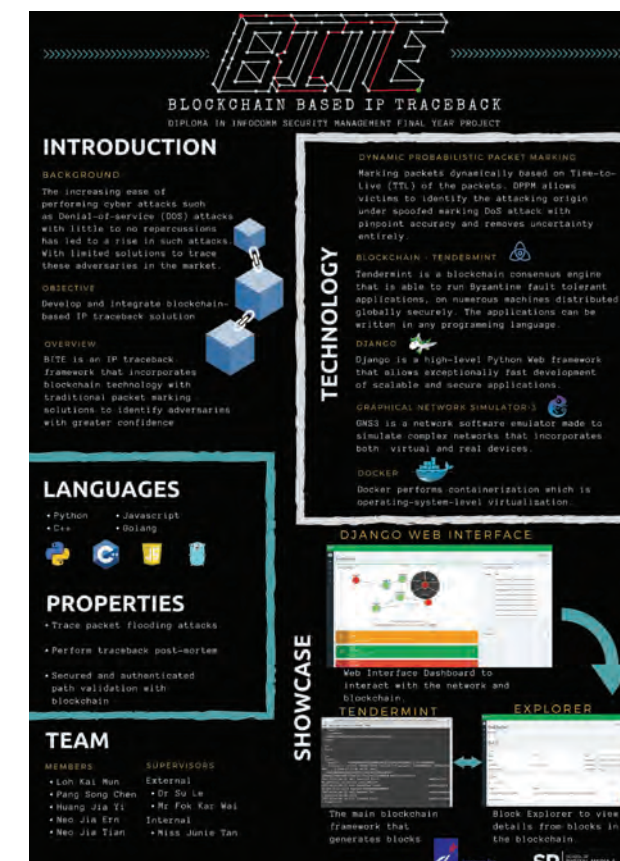
The aim of this project is to uberize the purchasing of food on campuses through the use of technology. This system not only allows a user to purchase food conveniently but also allows another user to earn additional income by delivering the food. This creates an eco-system within campuses such as SP's and creates opportunities for some users to earn extra cash even as others avoid peak hour queues.



Poster.

**SUPERVISOR**  
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Poster.

## BLOCKCHAIN-BASED IP TRACEBACK (BITE)

The Final Year Project Blockchain based IP Traceback (BITE) utilizes blockchain technology, together with traditional packet marking solutions to determine the origins of Internet Protocol (IP) packets accurately, while at the same time, ensuring the integrity and authenticity of the recorded information. This Internet packet-tracing solution can then be used to trace the origin of a cyber-attack so as to identify adversaries with greater confidence.

**SUPERVISOR**  
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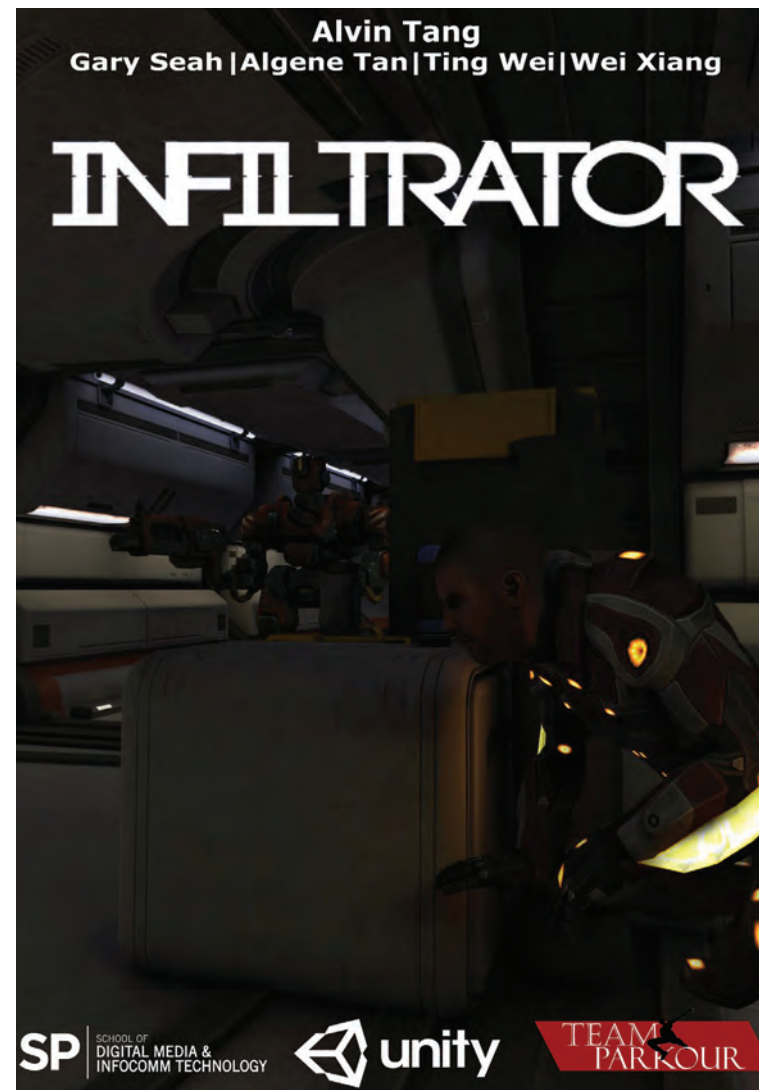


## INFILTRATOR

Infiltrator is a multiplayer stealth action game where users use their surroundings and their parkour abilities to traverse the world and complete objectives in order to stop robots that have taken over the world. The game is developed by Diploma in Information Technology (Game Development Specialization) students from Singapore Polytechnic.

**SUPERVISOR**  
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**TEAM MEMBERS**  
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Poster.



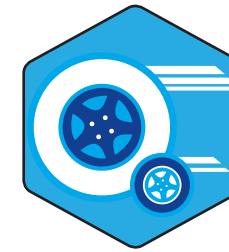
Poster.

## KIDZANIA'S QUEUE MANAGEMENT SYSTEM: Q-ZEE

KidZania Singapore often has to cope with an overwhelming response from kids for their facilities. This has led to hour-long queues, frustrated kids and parents, and an overall unpleasant experience at many of their popular stations. The KidZania's Queue Management System : Q-Zee is a queue management system developed by SP that automates the queue process, thus enabling visitors to wait comfortably for their turn.

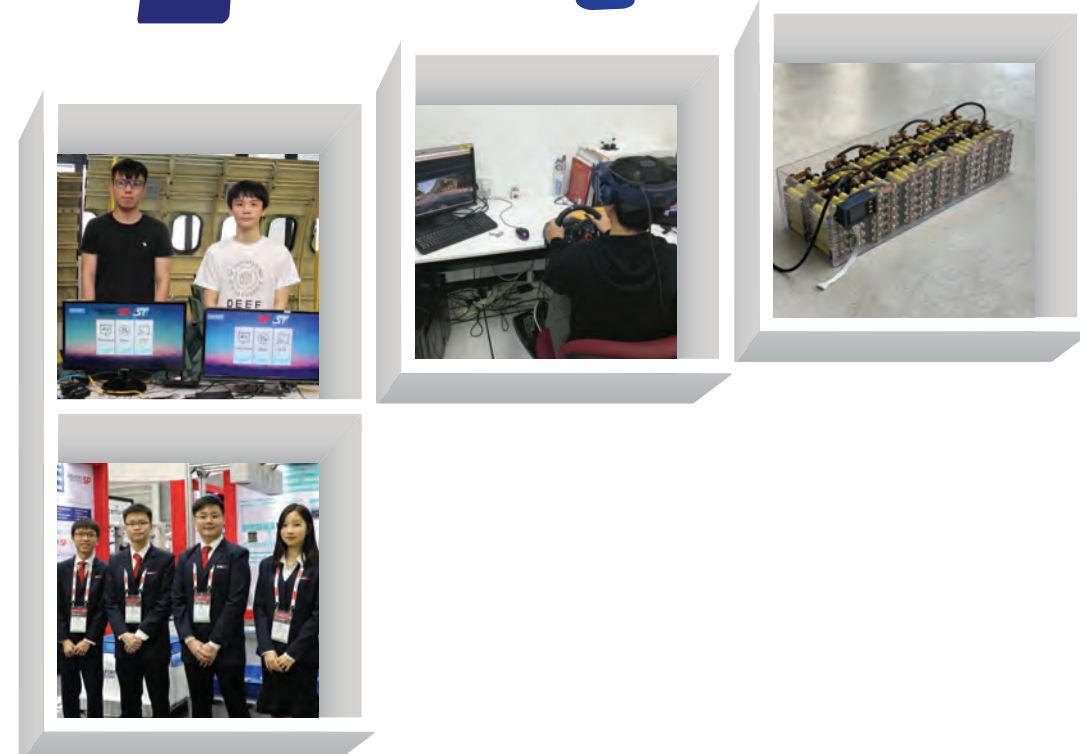
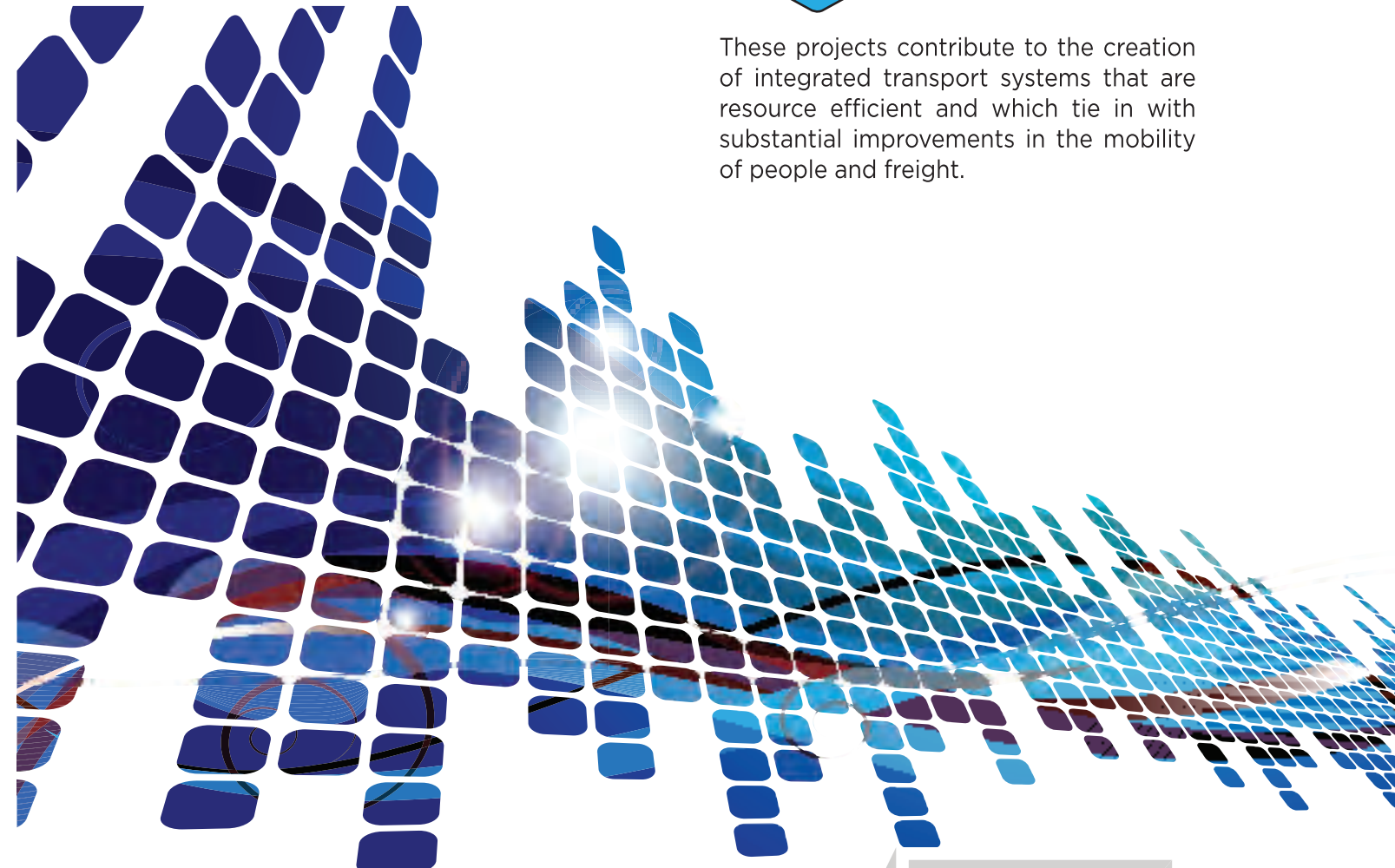
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Meng Jiayu,  
Tan Ying Xuan Chermaine



## TRANSPORT & MOBILITY

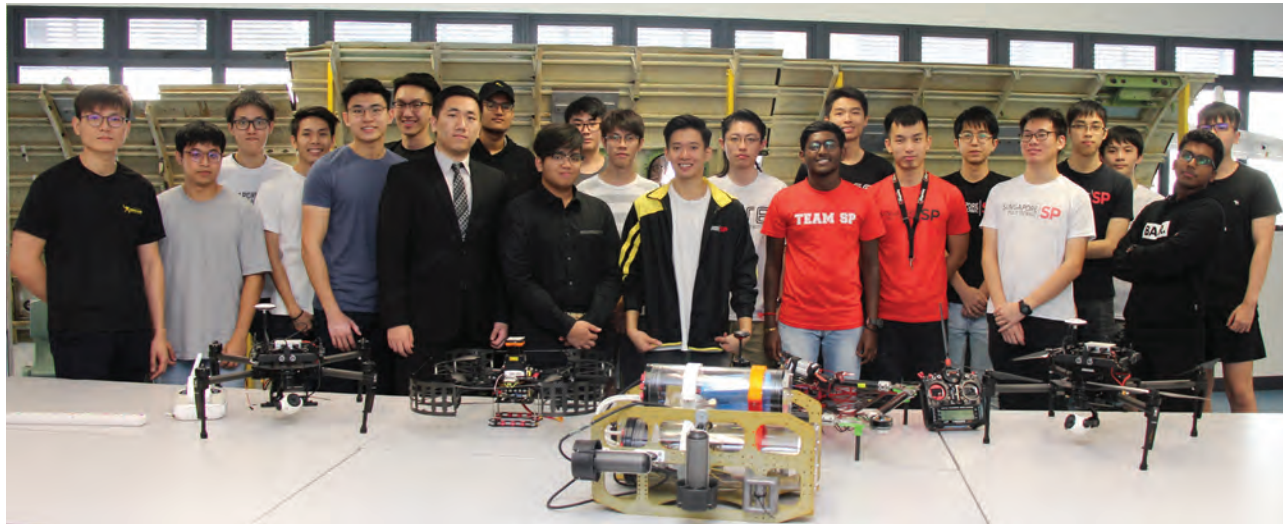
These projects contribute to the creation of integrated transport systems that are resource efficient and which tie in with substantial improvements in the mobility of people and freight.





## SP SECURE

The SP Secure drone system takes campus security and surveillance to new heights. The objective of this project is to develop a fully autonomous drone surveillance system where drones patrol the campus day and night, rain or shine, and autonomously respond to alarms/threats. They can also transmit live videos, communicate and collaborate with other security drones on their own. The system is a SMART Campus initiative that makes the grounds safer for students and staff. In future, with 5G connectivity, high bandwidth data like high definition video can be streamed for real-time surveillance and decision making.



The Smart and Secure Team with their equipment.

### SUPERVISORS

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### TEAM MEMBERS

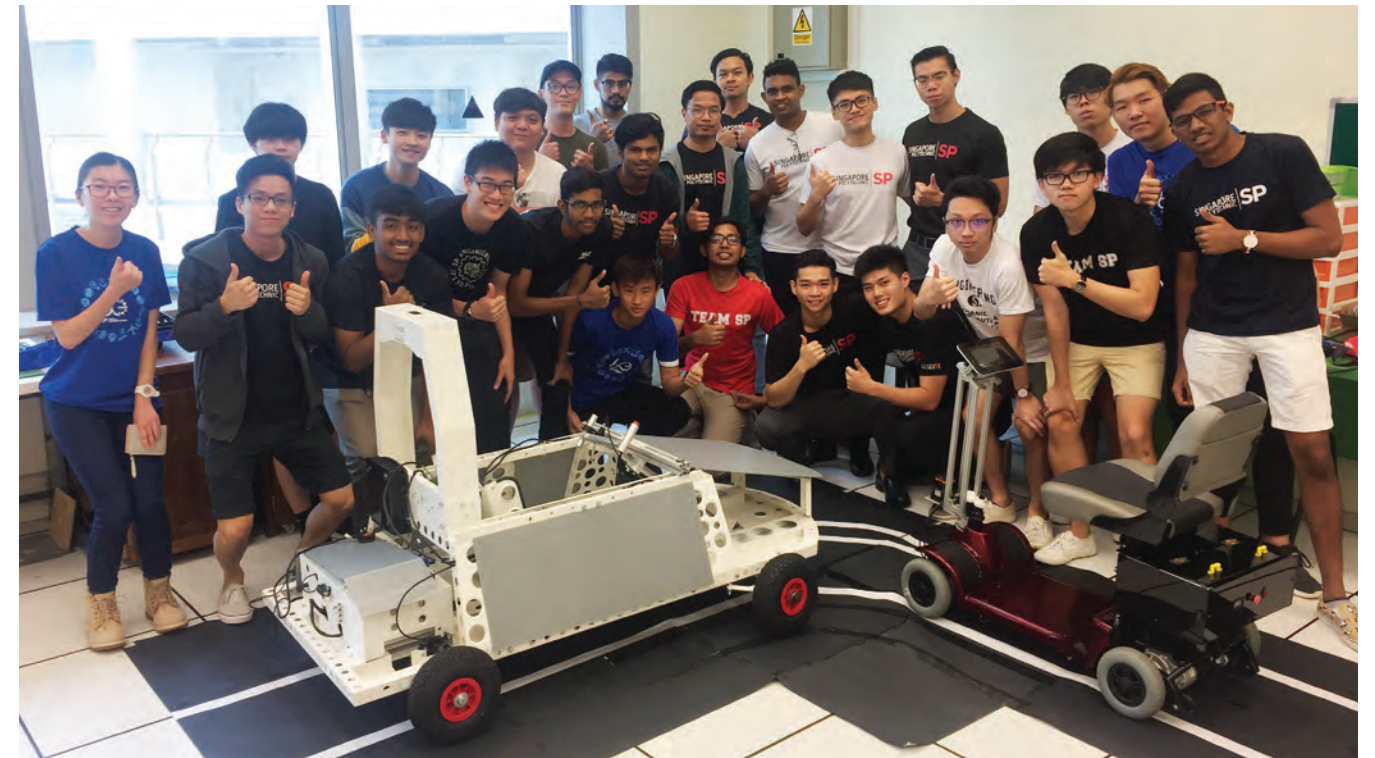
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### INDUSTRY PARTNERS

4KOpen, STMicroelectronics

## SP DRIVERLESS AND ELECTRIFYING CAR (SPDEC)

There is little doubt that driverless cars will be the norm in future. However, it is already a reality now in SP! A group of EEE students has developed a smart electric car, SPDEC, which can move about within SP campus without any human intervention. SPDEC is hailed via a smartphone and all rides are paid using cryptocurrency. Moving forward, the technological boundary will be pushed further when 5G connectivity is deployed. The low latency provided by 5G will allow real-time video to be streamed to the cloud for data analytics and decision making.



SPDEC team and our cars.

### SUPERVISORS

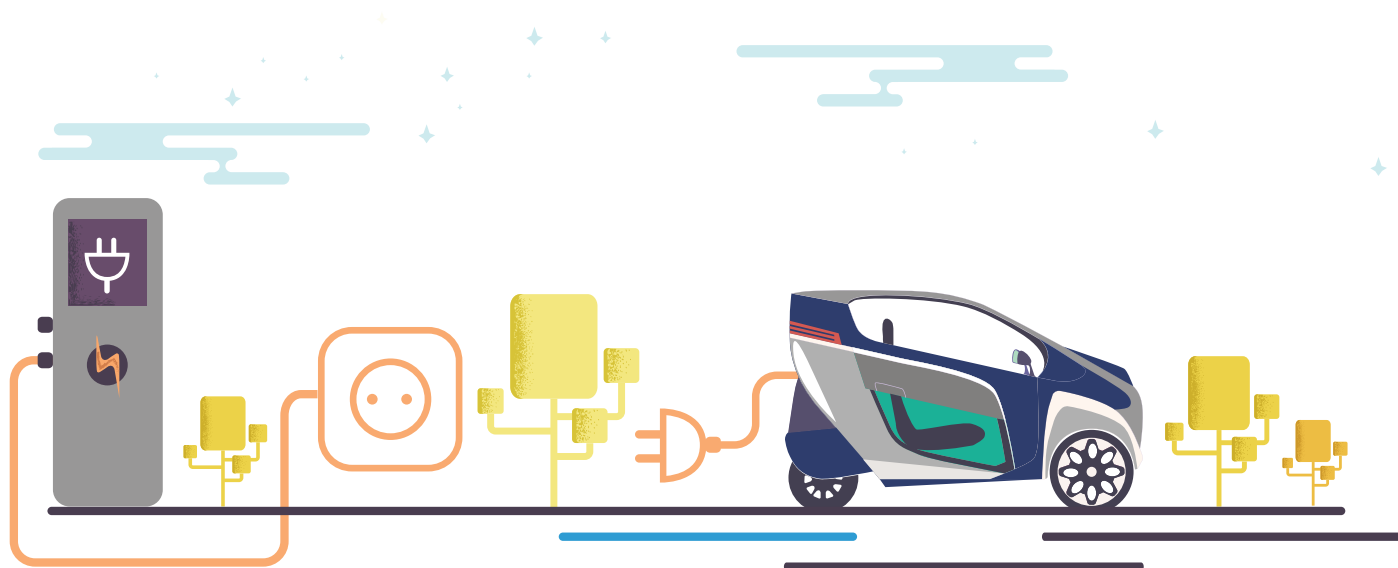
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### INDUSTRY PARTNER

ST Engineering Land Systems Ltd





## INTEGRATING DRONE AND VR TECHNOLOGY IN LAND SURVEYING

The objective of this project is to integrate drones into the surveying task to improve the efficiency of collecting accurate survey data in a much shorter timeframe. An autonomous drone will be dispatched to perform topographic surveys of a rail corridor. A 3D model is built using the real survey data, which will then be integrated with VR technology to provide users with a tour experience of the rail corridor, allowing them to witness the beauty of the place without physically being on site.



The team with a 3D model of the old Bukit Timah Railway Station.

### SUPERVISORS

Tan Hwee Siang, Allen Liu

### TEAM MEMBERS

Vincent Fernandez, Lee Ming Yang, Tan Yi Yang Eugene

### INDUSTRY PARTNERS

Bentley Systems, Urban Redevelopment Authority

## INNOVATIVE AGV WITH INDUSTRY 4.0 TECHNOLOGIES

Automated Guided Vehicles (AGVs) offer a means of transport that facilitates the movement of goods, parts and products in factories. A group of EEE students worked closely with various industry partners to develop an AGV, with Industry 4.0 in mind, which is capable of integrating seamlessly into IoT systems. It allows for wireless power charging which enables the AGV to operate continuously without the risk of down time due to dead batteries.



AGV, Cobot and sensors.

### SUPERVISOR

Carlos Acosta

### TEAM MEMBERS

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### INDUSTRY PARTNER

SEW-EURODRIVE PTE. LTD.

## AUTOMATED TRANSPORTER 1819S1

This project see the design and development of an autonomous transporter that can transport a person with a payload in an indoor space. It meets a growing need for personal transportation in public places such as via electric powered scooters or hoverboards. It also meets the demand for personal transportation in indoor facilities where a vehicle can navigate and move to a specified destination. Path planning and collision avoidance ensures that the vehicle travels safely to a destination in a specified time frame.



Automated Transporter.

### SUPERVISOR

Tan Tuan Kiat

### TEAM MEMBERS

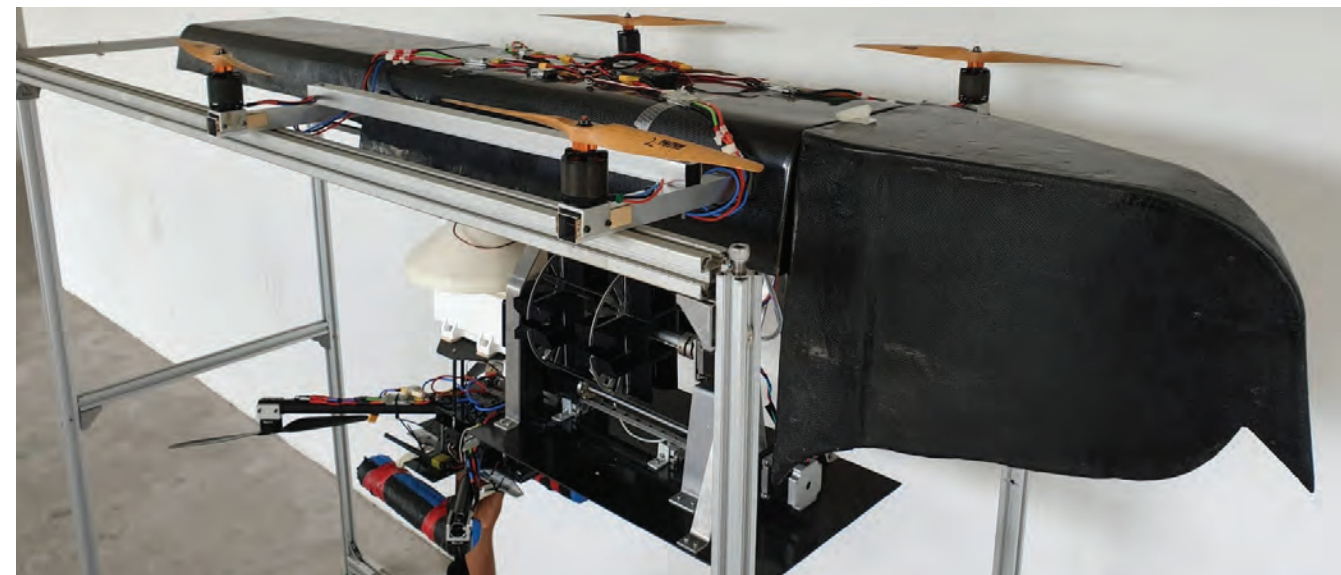
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### INDUSTRY PARTNER

SICK Product Center Asia Pte Ltd

## SURVEILLANCE AIRSHIP WITH CHASER DRONE PHASE 3

This is an industrial collaboration project with TwinRock that aims to create a surveillance airship capable of launching and recovering drones. It also explores the possibility of carrying out a fully-autonomous mid-air drone-to-drone battery swapping system. This self-sustaining ecosystem consists of an Airship, a Drone, and a Battery-Swapping System (BSS), all working together to achieve seamless automation. The Airship contains the BSS and acts as a Mothership to which the drone would return to for battery swapping. This entire process would take place mid-air, making this autonomous system a first of its kind.



Depiction of a drone undergoing aerial battery swapping. Pictured are the Surveillance Airship, Battery-Swapping System and drone.

### SUPERVISORS

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### TEAM MEMBERS

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### INDUSTRY PARTNER

TwinRock Pte Ltd



## DATUM WITH HYBRID ENGINE AND GROUND CONTROL STATION (GCS)

The Detachable Aviation Transporter Unmanned/Manned Multirotor Vehicle (DATUM) is a versatile modular aerial vehicle capable of customization with a payload capability of up to 90kg. It runs on a Hybrid Engine Fuel Management (HEFM) system that enables it to have a flight time of at least 30 mins. One of the main objectives of this project is to enable the vehicle to take part in the Boeing GoFly Competition. Hence it must conform to all of the competition requirements. To support and enhance fly-ability a Ground Control Station (GCS) was also built.

### SUPERVISORS

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### TEAM MEMBERS

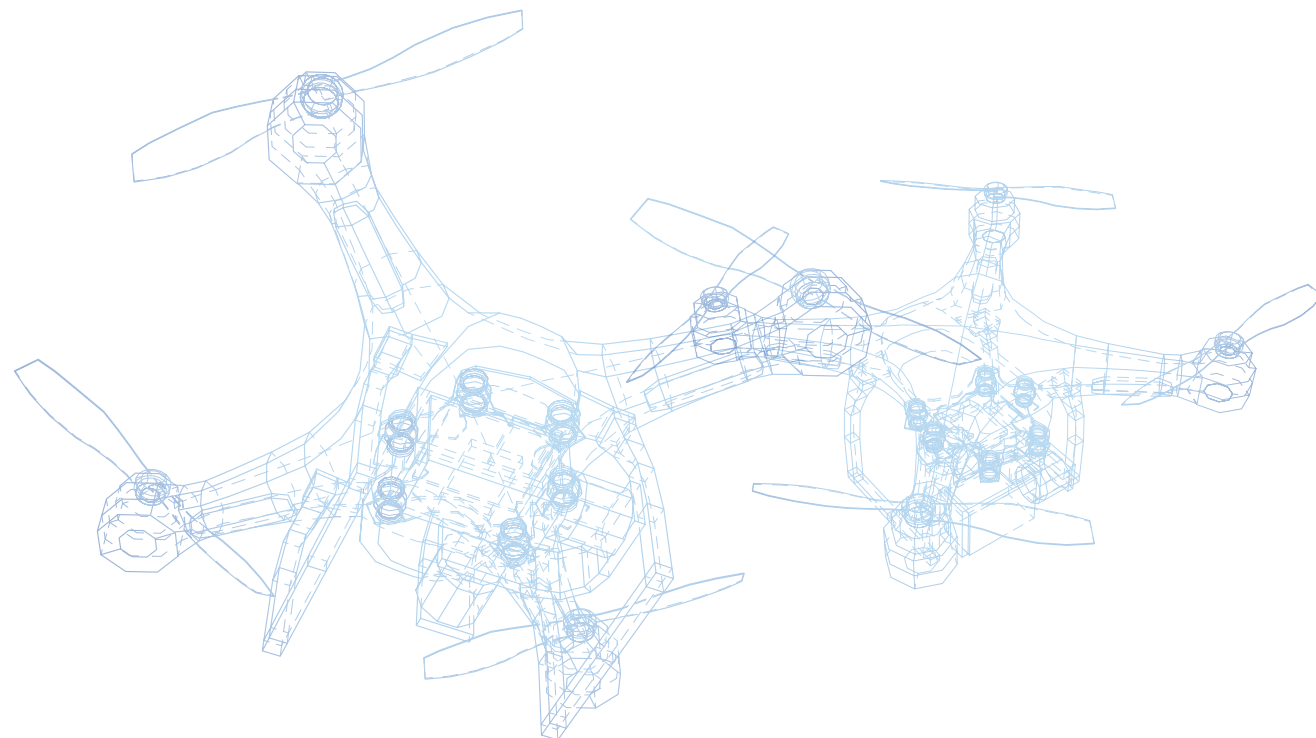
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### INDUSTRY PARTNER

Flare Dynamics



DATUM With hybrid engine.



## SP TECH TO MARKET

The Research and Technology Development at SP is application-driven, aligning itself closely with industry needs and the broader national agenda. These projects showcase our efforts in developing technology that is industry-relevant, with strong potential for market impact.

