

# TRAINING WITH AR & VR **APPLICATION**

SUPERVISOR Cathy Cong

**TEAM MEMBER** Huang Qing

ENGINE ROOM SIMULATOR Marine engineers undergo long hours of training and practice to be competent for the job on-board. While they are on land, they train using simulators. These simulator trainings are specially designed for the marine engineers to familiarise themselves with the operational routines and procedures to help them acquire necessary competencies in a risk-free environment with different realistic scenarios. Despite the advantages of maritime simulators, there are disadvantages associated with their use. This project employs the use of VR and AR which complement traditional simulator training to overcome the disadvantage that come with using traditional simulators.



# **INFOCOMM** & MEDIA

These projects deal with digital technologies in the new era of infocomm-enabled applications and digital media. These projects handle interactive applications involving infocomm technologies.













### **Our Client**

KidZania is a privately held international chain of indoor family entertainment centers currently operating in 24 locations worldwide and receiving more than 68 million visitors since its opening, allowing children to role play adult jobs and earn currency.

### **About Memories**

Web application that will allow users to upload their photos they have taken at places of interests and choose from the variety of products that Kidzania has to offer. After placing an order, it will be then defined to their badd soon a cell

### **Our Features**

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Users will have almost unlimited izability of their product.



Friendly user interface and a quick and efficient system to place your order in no til

#### **Admin Configurations**

Filled with a plethora of settings, you will be able to easily configure the solution to your



### Dashboard for Smart Manufacturing showing various machines.

## IOT DATA ACQUISITION AND VISUALIZATION PLATFORM

SUPERVISOR Lim Joo Ghee

TEAM MEMBER Wai Yar Aung

INDUSTRY PARTNER Creideas Technologies Pte Ltd The aim of this project is to create an IoT Data Acquisition and Visualization Platform that is highly configurable to meet user needs. This has the potential to help expand the business opportunities of a company to reach currently untapped markets. The platform has been used in smart factory and smart agriculture applications.



### TRAIN DETRAINMENT PROCEDURES USING VIRTUAL REALITY (VR)

SUPERVISOR Sufyan Zainalabidin

TEAM MEMBERS Allen Lim Jun Xian, Khrishnathan S/o Ravindran, Arwind Raj A/I Balakrishnan

INDUSTRY PARTNER Land Transport Authority

#### Fire simulation within Train Car.

This project will enable the Thomson-East Coast Line (TEL) railway staff to utilise VR technology to enhance existing training procedures through game-based learning. Conducting onsite trainings are costly logistically as sections of the site must be shut down and manpower are allocated to ensure all safety aspects are observed during training. A VR training programme provides an alternative mean to training where railway staff can familiarise themselves with procedures and scenarios during break time with bite-sized VR programmes. The technologies used in this project are easy to use and affordable, ensuring seamless integration with facilities and employees.



# TRAINING SIMULATION OF TRACK ACCESS USING VIRTUAL REALITY

SUPERVISOR Hui Mei Lin

### **TEAM MEMBERS**

Timothy Tan Tse Siang, Izzat Bin Razali, Yap Chong Xuan Harry, Lee Kai Yang

INDUSTRY PARTNER Land Transport Authority

#### Station View of new Woodland Station in VR.

This project is about using Virtual Reality for LTA/SMRT to simulate training on their track access. The VR software aims to familiarise LTA/SMRT personnel with correct track access procedures and safety protocols, even before the personnel is on the actual track. Using the software, personnel will realise that unless they adhere to safety protocols, their lives could be endangered.



### LOGEE GATE - ENHANCE TEACHING & LEARNING OF LOGIC GATES THROUGH AUGMENTED REALITY

SUPERVISOR Sufyan Zainalabidin

### **TEAM MEMBERS**

Tan Yuan Pin, Weng Linjie

In Electronic Engineering Principles (ET1201), students are introduced to Logic Gates through circuit construction on a breadboard. Without prior knowledge, this module can be daunting for students as they cannot fully grasp the circuitry logic. LogEE Gate uses interactive guided instructions to superimpose relevant graphics and explain concepts of Logic Gates through Augmented Reality (AR). This provides greater clarity and visualization to students, laying the groundwork for a quick, yet in-depth understanding, of breadboard and IC components.



ProjectNEST, is a comprehensive and easy to use Cyber Range Builder platform that allows Trainers to easily create and maintain different Cyber Ranges to train and assess their trainees. The aim of the project is to provide an integrated set of tools to create and maintain a customizable cyber security training site. The training site will be used to train future batches of representatives from Singapore Polytechnic for the upcoming World Skill Competition in the Cyber Security trade.



Karl Kwan

Poster.

### **TEAM MEMBERS**

Peter Febrianto Afandy, Kuek Chee Hean, Lai Yong Rong, Keegan Tang Sze Kang



THE CLEANING SIMULATOR

SUPERVISOR Vincent Goh

#### **TEAM MEMBERS**

Phua Tze Cheng Jennifer, Zeng Zhicheng, Tan Poh Heng, Goh Jun Lin Wayne

INDUSTRY PARTNER Ministry of Clean

Cleaning Equipment.

The aim of this project is to use virtual reality simulation to help train cleaners on Workplace Safety. It makes use of virtual reality to allow for a more immersive experience for cleaners. Instead of just recording down notes, cleaners perform actions and therefore become more aware of the consequences of not following safe workplace practices. This higher level of engagement ensures that cleaners will remember the safe workplace practices.



Memories @ Your Fingertips is a web application that allows users to upload pictures they have taken at tourists attractions and print them out on souvenirs such as mugs, keychains or even pictures. Users will be able to adjust the picture they uploaded by resizing, cropping or adding text to their souvenirs. Users can then select whether they want their order to be delivered to their house or hotel room.



# 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.













### AEV TEAM 2019.

## 5G ENABLED SELF-DRIVING ELECTRIC VEHICLE

#### SUPERVISORS

Phyoe Kyaw Kyaw, Low Lee Ngo, Sing Mong Nguang, Goh Say Seng, Zhang Liandong, Rick Chua, Niu Tianfang, James Yee, Boey Kai Ming

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#### **INDUSTRY PARTNERS**

ADVANTECH CO. SINGAPORE PTE LTD, SICK Pte Ltd, Siix-AGT Pte Ltd, YHI Corporation (S) Pte Ltd SP has delivered its first 5G self-driving electric vehicle that provides safer, faster and smarter transport service to passengers within SP campus. Outfitted with a GPS unit, an inertial navigation system and a range of sensors, the car can sense its environment and navigate without human input. Passengers can book the ride using a mobile device, and enjoy secure transactions through a digital currency payment option using Blockchain network. Environmental safety monitoring features are added to detect fire, smoke and accidents using artificial intelligence, and alerts are sent to security officers, allowing for a quicker response to campus accidents.





# UAV FOR INFRASTRUCTURE INSPECTION

### SUPERVISORS

Tan Hwee Siang, Shanker Maniam, Niu Tianfang, James Yee

#### TEAM MEMBERS

Lim Rui Xiang Calvin, Dai Jiahua, Ou Lexuan, S Kishanntini, Tan Yan Heng, Chang Po Yan, Ting Hong Yu Reynard, Muhammad Iqshan Bin Mohd Sa'ad, Hoo Chan Yong, Aaron Dominic Joseph Murzello, Dalvin Arumugam, Ian Lim, Gaanesh Theivasigamani, Marshall Ang Wei Qian

The team with their Autonomous Flying Machines.

The project deploys a UAV for inspection of infrastructure at heights and images/videos are captured and transmitted to a remote location through 5G Network for automated inspection offline. Using Deep Learning Techniques, the system is able to detect specific features, like cracks, and highlight them without the need to manually scan through thousands of images. It is programmable to fly a certain flight path to cater to users who cannot fly a UAV. It is useful for deployment for building inspections.



The project aims to improve commuters' safety, comfort and experience while taking a train ride. It enables predictive maintenance to be carried out for better reliability and ease of cabin maintenance for the staff. Its features include auto-lighting control, faulty light detection, environment based temperature control, loud noise disturbance detection, auto deployment of ramp for the disabled and shock detection for potential track fault, all of which increases the system's reliability and comfort level for all commuters, including the disabled and wheelchair bound.





DEVELOPMENT OF COMPOSITE STRUCTURE USING TFP TECHNIQUE

SUPERVISOR Kelly Koh

**TEAM MEMBERS** Lim Bao Jie, Ang Kai Xian, Tan Qi Ji, Low Wen Xuan

Project group with aircraft wing.

Composite materials such as Carbon Fibre Reinforced Polymer (CFRP) composites are widely used in the aerospace industry because of the outstanding performance they can offer when compared to other common materials. The objective of this industry collaboration project is to develop an optimized aerospace aircraft composite structure using the Tailored Fibre Placement (TFP) Technique. The increased performance of an aircraft component with an optimized designed outcome can be realised and made possible with this technique.



# **OFFICE TRANSPORTER**

SUPERVISOR Tan Tuan Kiat

### **TEAM MEMBERS**

Jervis Lu Shi Tian, Jowell Nim, Javier Quek Peng Heng, Goh Kenneth, Chua Yi Wei, Ryan Lim Rui Yan, Gan Li Wei, Goh Pei Herng

### INDUSTRY PARTNER

SICK Product Center Asia Pte Ltd



### Office Transporter back view.

The aim of this project is to design and develop an Airport Wireless Aircraft Tow Bar System to help enhance operational effectiveness and reduce manpower

requirements. The system will also improve safety during Aircraft Towing and

prevent against injury due to electrocution by static discharge on contact during

operation under thunderstorm conditions. It will also be able to send information

In this project, an autonomous transporter is designed and developed that can transport documents in an indoor office space. It features autonomous navigation and control, where the transporter can move to a pick up point upon remote request, collect documents and send them to a selected destination. Path planning and collision avoidance ensures that the vehicle travels safely to its desired destination.



back to HQ for reference.

## AIRPORT WIRELESS AIRCRAFT TOW BAR SYSTEM (PHASE 2)

#### SUPERVISOR Liew Hui Sing

### **TEAM MEMBERS**

Lau Shou Zheng, Ehren Thor Zhan Liang, Muhammad Syafiq Bin Rosli, Mah Hawk Cheung

**INDUSTRY PARTNER** 

EquiVoltM Pte Ltd



### The Survellience Control System, with Drone.

The Surveillance Airship is equipped with state-of-the-art surveillance systems attached, providing the ground operator with real-time footage of the mission area. Whenever a close-up view of a target is necessary, the Chaser Drone will be deployed. The Chaser Drone is capable of surveying, tracking and following any target autonomously using computer vision and Al/ML Technology. The weatherproof drone is also equipped with an advanced obstacle sensing and avoidance system and multiple CNS systems for redundancy.

# SURVEILLANCE CONTROL SYSTEM

SUPERVISOR Teo Ye Wei

#### **TEAM MEMBERS**

Wong Garyn, Muhamad Raziq Bin Zaidi, Bryan Chai Siong Yi, Muhamad Luqman Al-hakim Bin Sudirman, Syed Makthum S/o Syed Abthahir, Ng Jun Rong, Elson Chua Yu Xuan, Yeo Kai

#### INDUSTRY PARTNER TwinRock Pte Ltd

IWINROCK Pte Ltd



# 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.







# Aerogel Sample

# SILICA AEROGEL FOR SUSTAINABILITY & SMART URBAN SOLUTIONS

**SUPERVISORS** Handojo Djati Utomo, Li Xiaodong

**TEAM MEMBERS** 

Sakalesh Ashoka Rugi, Lim Jun Jie Jordan, Nicolaus Syaiful This study aims to find an alternative use for fly/bottom ash and develop a high value added material, like silica aerogel which is a synthetic ultralight solid material with nanometre-scale pores derived from gel. It is 99% air by volume, exhibiting the lowest thermal conductivity of any known solid with good transparency. It can be used as a super insulator for sustainable buildings, reducing noise level and indoor temperature of residential buildings, thereby improving living and health conditions. It can also retain its large specific surface area, allowing for rapid, effective removal of inorganic and organic contaminants in water mediums.



### REAL-WORLD TEST-BEDDING OF INTEGRATED SMART GREEN TECHNOLOGIES

SUPERVISOR Hui Wing Hong

**TEAM MEMBERS** Ong Kok Peng, Alex Tan Jiawei

INDUSTRY PARTNER Singapore Polytechnic Graduates' Guild Electricity Meters Installed at SPGG Admin Office.

This project aims to develop a public showcase of Smart Green technologies with test-bedding at Singapore Polytechnic Graduates' Guild (SPGG) in five areas: 1. The 40kW solar PV systems installed with an average yearly energy yield of 55,200kWh. 2. The smart water monitoring and alert system to measure and record water consumption data. The dynamic measurement data can be viewed online by computer, iPad or phone. 3. Personalised Lighting System (using AWS IOT Core for Cloud-based control and monitoring). 4. Realtime Energy Monitoring (on both PC and Android platforms). 5. Climate Control System (using Machine Learning algorithm).



## A HYDROTHERAPY EQUIPMENT TO ALLEVIATE MUSCLE DEGRADATION CONDITIONS

SUPERVISOR Steven Tan Yih Min

**TEAM MEMBER** Sin Kwang Yang

INDUSTRY PARTNER HydroLife Singapore Pte Ltd With a rapidly aging population, step-down care is becoming more prevalent and available at various VWOs. A sustainable and speedy recovery is important if the seniors are to get back to a stable state of health. This project aims to mechanise hydrotherapy into a mobile hydrotherapy equipment that provides an alternative form of weightless water therapy to help seniors facing muscle degradation conditions. This portable model takes hydrotherapy, traditionally done in a swimming pool, and makes it available everywhere, any time with the eventual goal of becoming fully automated.



# **SP FABLAB**

FabLab@SP began in 2011 and is the result of collaboration among School of Electrical and Electronic Engineering (EEE), School of Mechanical and Aeronautical Engineering (MAE), and Singapore Maritime Academy (SMA). It was conceived to allow staff and students to make "almost anything".







#### Prop Gun.

PROP GUN (PROP MAKING) TEAM MEMBER Kang Jing An Madrid The Prop Gun is a replica gun taking reference from Splatoon and Warhammer40k. It is constructed out of PVC/foam. The gun is bolt-action and is connected to a small water tank. The gun can then spew water out like a regular water gun. The Prop Gun is a project from SP Maker's Club, a CCA in Singapore Polytechnic, which encourages and promotes a maker culture in SP by providing training through workshops and support for projects among a like-minded community of makers.



SHOOTING GALLERY

Yeo Hao Karh, Marcus Lee Wei

Laser Gun.

This project is a shooting gallery, utilising laser guns to hit targets. Within the laser gallery, the targets have sensors to detect laser pulses. The guns are fabricated and fitted with Class 1 lasers to reduce risk of eye injury. The guns have simulated recoil and are made from wood. There are electronic targets for the guns to shoot at. This is a project by SP Maker's Club, a CCA in SP which encourages and promotes a maker culture in SP by providing training through workshops and support for projects among a like-minded community of makers.

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# **SP ENGINEERING SHOW 2020**

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