



**REPUBLIC
POLYTECHNIC**

DISCOVER. TRANSFORM. ACHIEVE



PROJECTS

HIGHLIGHT 2018

A CELEBRATION OF
STUDENTS' & STAFF PROJECTS

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REPUBLIC POLYTECHNIC

THE first educational institution in Singapore to leverage the Problem-based Learning approach for all its diploma programmes, Republic Polytechnic (RP) has seven schools and one academic centre offering forty-one diplomas in Applied Science, Engineering, Management and Communication, Hospitality, Infocomm, Sports, Health & Leisure, and Technology for the Arts.

Republic Polytechnic is committed to nurturing innovation and entrepreneurial learning in an environment that develops problem-solving skills and lifelong learning opportunities. Its holistic and broad-based curriculum prepares students for an active and meaningful role in society as problem solvers, respected professionals and passionate citizens.

Republic Polytechnic strives for excellence by achieving various international and national accreditations, including ISO 9001, ISO 14001, OHSAS 18001, ISO 22301, Singapore Quality Class, People Developer, Innovation Class, and Service Class.

For more information, visit <http://www.rp.edu.sg>

SCHOOL OF INFOCOMM

AT School of Infocomm (SOI), we are committed to foster strong partnerships between academia and industry. We focus on ensuring industry relevance of our programmes and aim to augment students' learning experience through active consultations and interaction with the industry frontrunners.

Besides our primary focus on education, our educators are also engaged in research and development (R&D) work that spans the entire infocomm landscape, with grants funded by public and private organisations. We are also seeking industrial attachment opportunities for our staff to enable them to keep abreast with industry trends and in turn, our students will benefit from the transfer of industrial knowledge.



DIRECTOR'S NOTE

Wong Wai Ling

Director, School of Infocomm
Republic Polytechnic

AT the School of Infocomm, one of the platforms where our students get to work on real world problems is through their Final Year Project. They work on projects that are sponsored by industry with their project team mates. Through the process, students are exposed to problems or needs in industry and put their creative ideas, ICT skills and knowledge to good use to create value for the sponsoring companies. The experience of working in such projects not only help students realise the usefulness and value of ICT skills, they become confident polytechnic graduands who are industry and innovation ready.

Staff are encouraged to work on industry projects, conduct applied research in collaboration with industry partners to exploit new technologies, develop new products and solutions. Some of which are featured in this publication.

I would like to thank our industry partners for providing opportunities to collaborate with the school and my fellow colleagues for their efforts in guiding and inspiring our students in their transformative journey in RP.



FOREWORD

Dr Michael Koh Teik Hin

Deputy Principal, Academic Services
Republic Polytechnic

THIS booklet features some of our students' outstanding Final Year Projects mentored by a dedicated faculty from the School of Infocomm. I hope to share their expertise and capability with you and introduce you to a realm of possibilities that, together, we can make come true. I hope too that you will be prompted to partner Republic Polytechnic after perusing this booklet.

Working on real-world problems and challenges is a key feature of our polytechnic education. Be it developing a web / mobile application, analysing data to understand commuter patterns, designing IT network architecture, proposing a security architecture for a SME, or creating an augmented reality application to help the community, these are all invaluable experiences for nurturing future Infocomm professionals.

I thank you for taking time to read this booklet. I invite you, once again, to partner the School of Infocomm at Republic Polytechnic to build tomorrow's Infocomm leaders.

FACILITIES

WE believe the best way to learn is to allow practice and experimentation. Over the years, we have established several well-designed and well-equipped joint laboratories with leading industry players to support our curriculum, research, capabilities development and industry collaborations which are used by both our staff and students.

- RP-IoT Solutions Centre (in partnership with element14)
- RP-Ixia Cyber Defence Lab
- RP-Microsoft Centre for Smart Technology Exploration
- RP-Palo Alto Networks Cyber Security Lab
- RP-RSA Security Operations Centre
- RP-Samsung Mobile Lab
- RP-Starhub Data Analytics Lab
- RP-Trend Micro Cloud & Visualisation Security Lab
- RP-UofG-Secura Cyber Security Lab

RP-Samsung Mobile Lab



RP-IoT Solutions Centre

CONEXUS CENTRES

EACH Conexus Centre embodies the specific expertise within a defined area. Within the Conexus centre are the reservoirs of knowledge, experience, and expertise that can be drawn upon to bring together cross-functional teams capable of providing solutions to complex problems.

INTERNET OF THINGS (IOT) SOLUTION CENTRE

The IoT Solution Centre was setup to promote the innovation and the adoption of IoT technologies to help local enterprises capitalise on this technology to sharpen their competitive edges, deepen collaboration with industry partners, innovate and showcase interoperable solutions and services to create a better life for our future. It has received tremendous positive feedback and support from the industry, with the strong pool of industry partners which championed IoT.

CONEXUS CENTRES

COGNITIVE SYSTEMS TECHNOLOGY CENTRE (CSTC)

The Centre focuses in growing capabilities, expertise and knowledge in utilising cognitive technologies emanated from artificial intelligence (AI) to create innovative industry driven solutions. Natural language processing, computer vision and enterprise applications are the three key development pillars for this centre. The centre has also developed mixed reality applications for Statutory Boards and multinational corporations (MNCs). Many of the smart applications are powered by AI that can autonomously take higher accurate decisions based on its experiential learning. This capability is driving AI integration into a wide range of applications in information and communication technology (ICT), healthcare, transportation, banking and finance, and other sectors.

DATA ANALYTICS TECHNOLOGY CENTRE (DATC)

The Centre undertakes interdisciplinary applied research to enhance the analytics capabilities of local industries. The works include developing proof-of-concept novel analytics applications and providing consultancy services to help industry to understand their structured and unstructured data. We help businesses (including Small and Medium Enterprises) seize new market opportunities, drive business outcomes and increase revenue growth. We collaborate with research institutions and data providers such as A*STAR's Business Analytics Technology Centre (BATC) and DSO National Labs to harness the latest data analytics technologies, translate or customise their technologies into proof-of-concept solutions for industry applications.

RP-RSA Security Operations Centre



MOU between Republic Polytechnic and Kaspersky Lab

WAYS TO COLLABORATE

SPONSORSHIPS

Students should not be deprived of a quality education in RP because of financial challenges. You can make monetary contributions in the forms of scholarships, bursaries and book prizes, to help further motivate outstanding students and fund tuition fees for the underprivileged, allowing students to fully enjoy the whole polytechnic experience.

INTERNSHIP IMMERSION PROGRAMME (IIP)

All students undergo a 20 to 24 weeks attachment to experience the real world challenges associated with working in the industry. You can give them the opportunity to intern at your company, interact with industry professionals like yourself, and help develop their technical skills.

FINAL YEAR PROJECTS (FYP)

This is a capstone project module undertaken by all our final year students. Each project team typically consists of three to four students, guided by an academic staff. These projects provide students with vital and real world working experience, and create opportunities for industry to tap and develop raw talent. You can give our students a chance to put their skills to the test.

INDUSTRY ATTACHMENT SCHEME (IAS)

The scheme aims to encourage teaching staff to stay updated with the rapid technological changes and keeps curriculum current for RP students. You can give our staff a chance to evolve their skill-sets and refine their thinking.



STUDENT PROJECTS



Educating the Public on Workplace Safety, Health, Environment and Security using AR

SAFETY is important, more so in the workplace. According to the WSH institute, the highest rate of major injuries in the workplace is caused by slips, trips and falls. The third highest rate of minor workplace injuries are caused by cuts. To reduce the occurrences of such workplace incidences, preventive measures need to be put in place. There is a need to increase awareness on workplace safety and health measures in order to reduce the occurrences of these injuries.

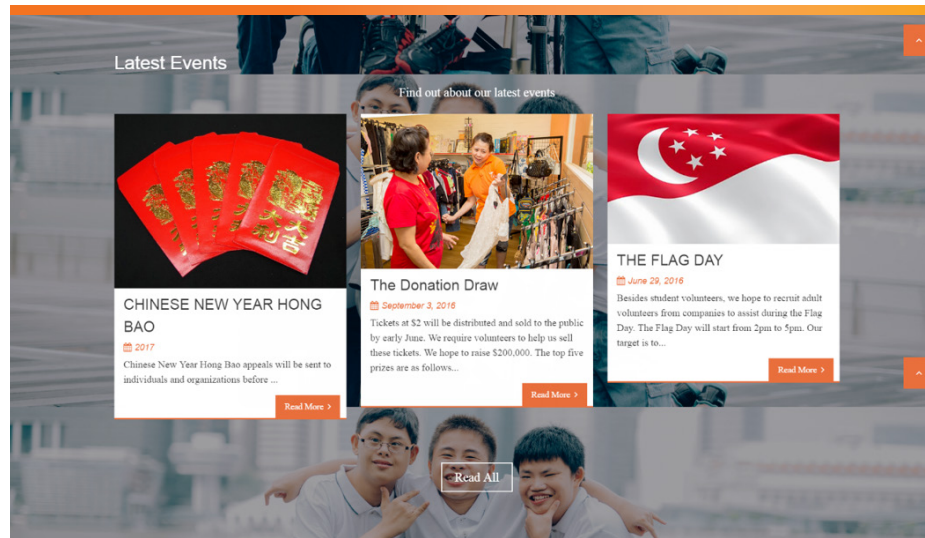
To support an organization's efforts in educating employees, students created a mobile application with an Augmented Reality (AR) feature that can use the device camera to scan and recognize images. The main use of the application is to educate the user on potential hazards and safety measures that could be in place by interacting with the users - displaying narrative and interactive images.

STUDENTS

Yong Teo Li Yi
Boris Yen
Darrshan

SUPERVISOR

Derek Lee



Children's Charities Association Website

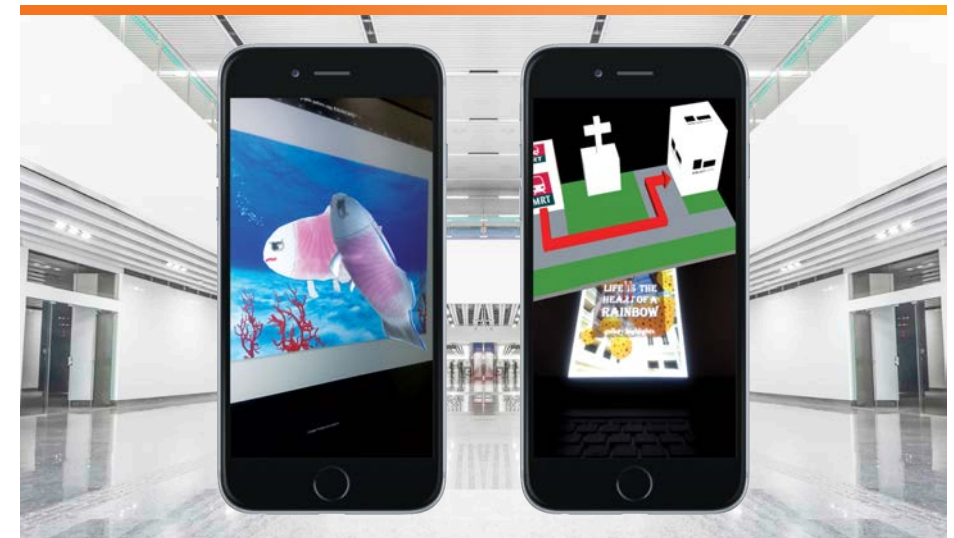
IN collaboration with the Children's Charities Association (CCA) of Singapore, students were tasked to revamp their existing website. The project objective was to update its overall look and feel to be more refreshing and mobile responsive. The WordPress content management system was used to develop the website. As part of the project additional visual contents such as photographs and videos were created.

The project team received an appreciation award from MP Assoc. Prof. Fatimah Lateef for their efforts.



STUDENTS
Siti Nurulain
Amirul Bahri
Nurul Hanan

SUPERVISOR
Aisha Zain



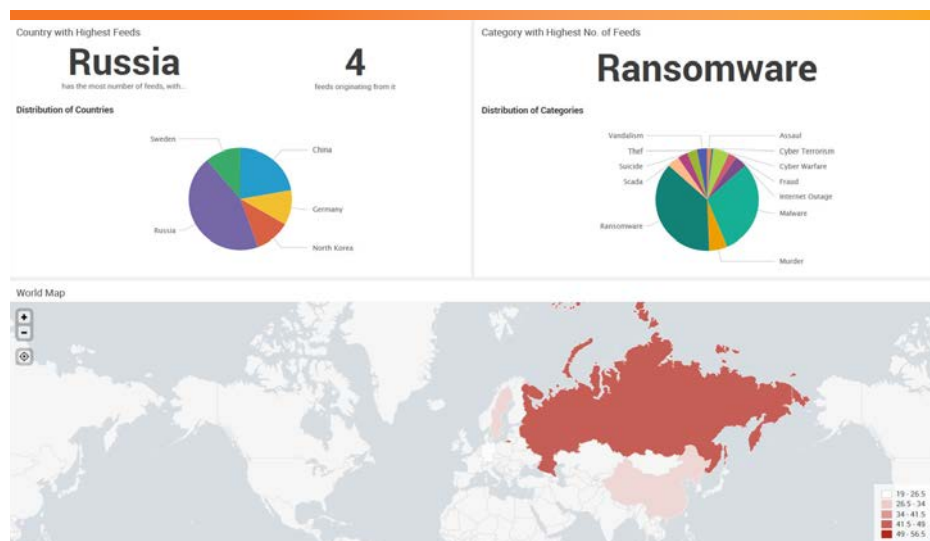
The National Gallery Guide

NATIONAL Gallery Singapore needed to increase the number of youth visitors. The project team was given the challenge to generate ideas and concepts that can serve to draw in the youth visitors, and at the same time enhance their experiences during their visit.

The project team approached the problem by immersing themselves into the role of a youth visitor. They identified that there an opportunity to redesign the existing printed gallery guidebook into something that is more appealing to youths. The team created a compact version of the guidebook that incorporates fun concepts stickers. Users of the new guidebook will be supported by a functional web application for multimedia contents and augmented reality (AR) application for enhanced interactions. Besides the appeal of more engaging contents, there is potential cost saving as there will be lesser need to print the original guidebook.

STUDENTS
Tan Wei Ting
Nicole Lim
Michelle Lim

SUPERVISOR
Azhar Kamar



Splunk Machine Learning Threat Feed Analysis

CYBERSECURITY related incidents are on the rise. News portal reports such issues as they arise. While news alerts can be set in search engines, there is a need to assist security analysts in identifying news that require their attention and possibly response.

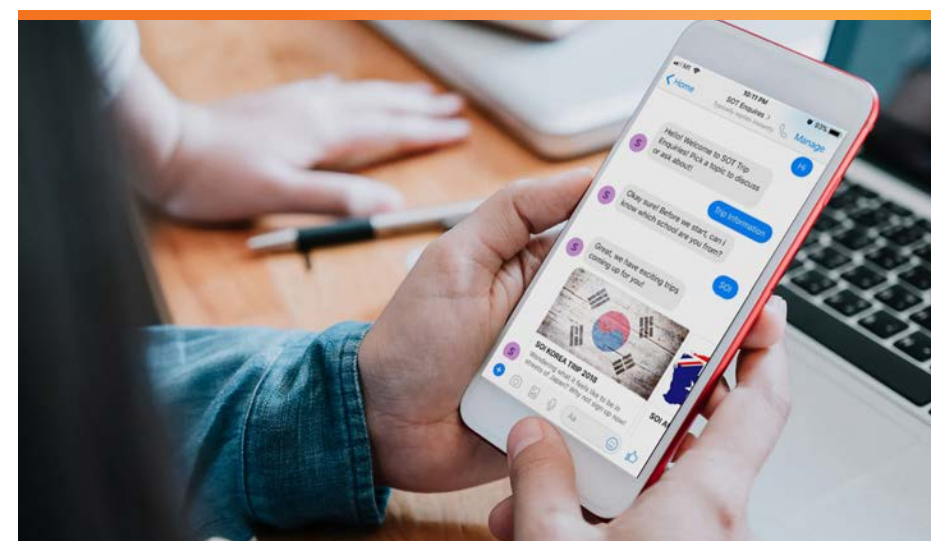
The project collates cybersecurity-related articles from various news websites into Splunk, a data monitoring and analytics software. Thereafter, the articles are classified and correlated with the help of machine learning algorithms, which will be displayed on a dashboard.

STUDENTS

Low Cheong Wah Alan
 Kho Wen Jie
 Lin Jingzhou
 Phoebe Ang

SUPERVISOR

Balasubramanian



ChatBot Buddy

STUDENT Overseas Trips (SOT) enrichment programmes are highly popular with students. Prior to signing up for any trip, students tend to ask the trip leaders on the itineraries, costs and eligibility. Currently, such repetitive queries are attended to either via briefing sessions or through email correspondences. It can be time consuming for the organisers.

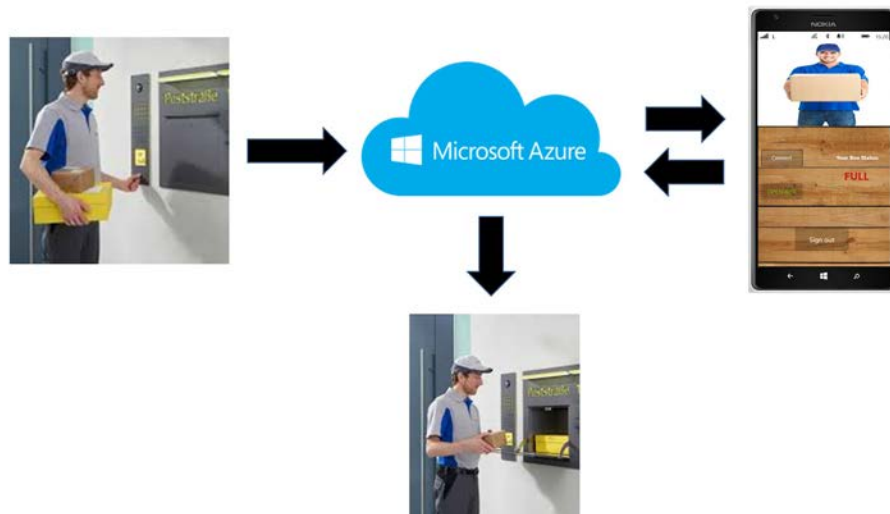
A group of students proposed the use of chatbot as channel for the students to get answers to frequently asked questions. In addition, the chatbot can follow up to pre-register students who are keen on joining a trip. The team successfully created a chatbot that (1) uses Facebook Messenger to interact with the students, (2) integrates with Dialogflow for conversation management and natural language understanding, and (3) utilize traditional data relationship database for content management.

STUDENTS

Xing Yi
 Afika
 Nurin

SUPERVISOR

Tan Poh Keam



Receive On Your Behalf (RYOB)

WITH online shopping on the rise, companies need to ensure customers receive their purchased items in a safe, secured and smooth manner. There are situations when the customer may not be at home and the delivery man is unable to complete the delivery of the items without their acknowledgement. Leaving items at the doorstep may result in theft and disputes.

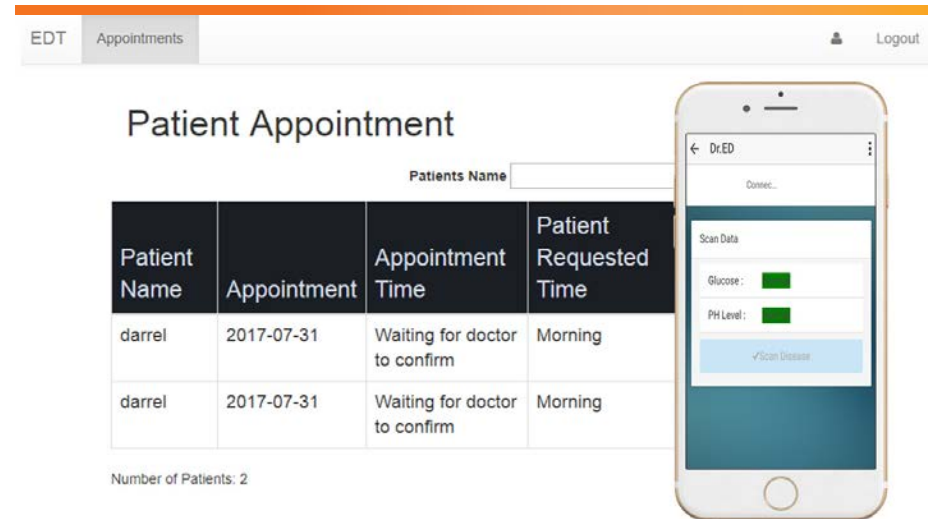
ROYB aims to provide a service to receive deliveries securely. ROYB will be setup at the buyer's house and will receive goods and secure its contents. ROYB will only grant access to an authorised delivery man remotely through a remote authorization granted by the buyer.

STUDENTS

Ruan Yang
Darren Thyng
Sebastian Sim

SUPERVISOR

Shannen Ang



Early Detection of Diabetes

DIABETES is a life-style chronic disease which requires frequent monitoring of sugar levels in the body. The earlier the disease is detected, the easier it is to manage. Currently, the most accurate way of detecting glucose level requires a blood test which is inconvenient and painful.

Students were tasked to develop a prototype system that supports a non-invasive approach for a person to self-monitor his sugar level during the course of the day-to-day biological activities in the toilet. A mobile application was created to extract data scanned with an near-infrared (NIR) spectroscopy scanner. Data collected are send to Amazon cloud server to be analysed for sugar presence and PH levels. An alert to the patient and his doctor is provided should there be an unusual concentration of glucose level and the patient is prompted to make an appointment with his doctor. Charts showing trends are provided in a web application to facilitate further diagnosis.

STUDENTS

Darrel Ong
Lim Hau Yin
Aliif Darwin
Mohammed Sainal Shah

SUPERVISOR

Grace Yap

Severity of setting	Setting
1 Account Policies	
Level 1	Ensure 'Enforce password history' is set to '24 or more password(s)'
Level 1	Ensure 'Maximum password age' is set to '60 or fewer days, but not 0'
Level 1	Ensure 'Minimum password age' is set to '1 or more day(s)'
Level 1	Ensure 'Minimum password length' is set to '14 or more character(s)'
Level 1	Ensure 'Password must meet complexity requirements' is set to 'Enabled'
Level 1	Ensure 'Store passwords using reversible encryption' is set to 'Disabled'
Level 1	Ensure 'Account lockout duration' is set to '15 or more minute(s)'
Level 1	Ensure 'Account lockout threshold' is set to '10 or fewer invalid logon attempt(s), but not 0'
Level 1	Ensure 'Reset account lockout counter after' is set to '15 or more minute(s)'
2 Local Policies	
Level 1	Ensure 'Access Credential Manager as a trusted caller' is set to 'No One'
Level 1	Configure 'Access this computer from the network' is set to Administrators, Authenticated Users
Level 1	Ensure 'Act as part of the operating system' is set to 'No One'
Level 1	Ensure 'Adjust memory quotas for a process' is set to 'Administrators, LOCAL SERVICE, NETWORK SERVICE'
Level 1	Configure 'Allow log on locally' is set to Administrators
Level 1	Configure 'Allow log on through Remote Desktop Services' is set to 'Administrators, Remote Desktop Users'
Level 1	Ensure 'Back up files and directories' is set to 'Administrators'
Level 1	Ensure 'Change the system time' is set to 'Administrators, LOCAL SERVICE'
Level 1	Ensure 'Change the time zone' is set to 'Administrators, LOCAL SERVICE'
Level 1	Ensure 'Create a pagefile' is set to 'Administrators'
Level 1	Ensure 'Create a token object' is set to 'No One'

Automation of Hardening and Security Audits on Virtual Machine Hypervisors

MANUALLY carrying out security audit checks and hardening may result in multiple errors and inconsistencies in the production environment. Automation of these processes (both hardening and checking), whether via a script or custom program, will reduce human error and ensure proper security configuration of these hypervisor platforms.

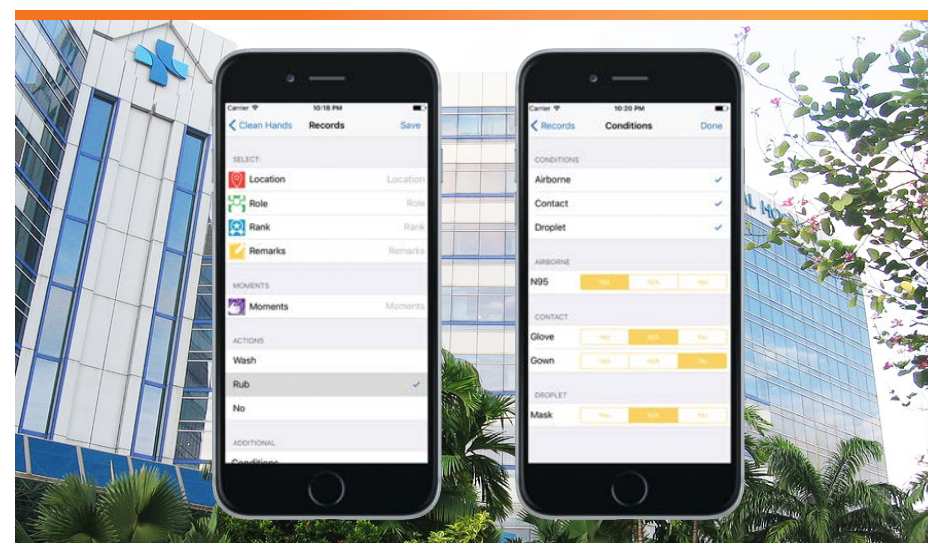
An automated security audit checking and hardening script was developed based on the respective hardening guidelines for each hypervisor (HyperV, vSphere, KVM) that will operate in a fully automated fashion.

STUDENTS

Muhammad Abdul
Muhammad Shahmizan
Irfan Bin Fairuz Nian

SUPERVISOR

Low Ee Mien



Clean Hands

HOSPITAL staff follow a hygiene procedure before performing their routine on the patients. The assessor carefully monitors the staff and their actions during the procedure. For example, the details of the staff are taken down such as their role and the rank. The specific details are taken down as well, like their method of sanitizing (did they wash their hands or used a hand sanitizer).

A lot of data has to be collected due to the amount of specific steps and information recorded. It takes the assessor a lot of time to write it down on pen and paper, and when the physical copy is stored, the space will slowly be used up.

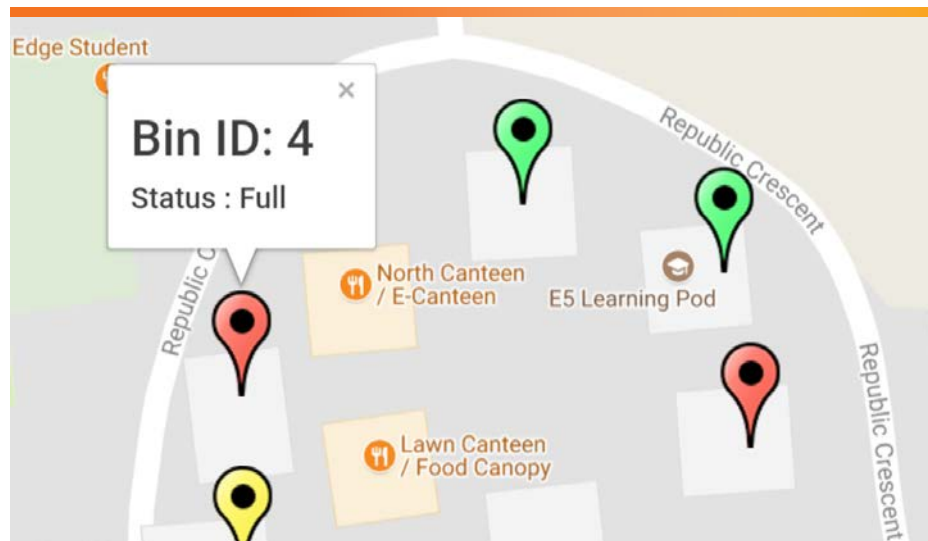
The project team has created an iOS application that makes the work of the hospital staff easier. The application is able to save the records that the assessor has recorded down and sent to the recipient via email with the attached records as a CSV file. It also allows the user to edit records.

STUDENTS

Isaac Tay Peng Bin
Chong Shao Jun Justin
Dian Aisyah Binti Ramli

SUPERVISOR

Ryan Low



Smart Routing for Clearing of Bins

WHEN it comes to disposal of trash, it is the social norm to seek an available bin to dispose of the waste. However, it has been observed that littering still occurs in the vicinity of available bins. This problem is compounded by the fact that sometimes bins are full and not emptied on time. Timely clearance of the rubbish by the cleaning crew will help to alleviate the issue of inappropriate disposal of trash.

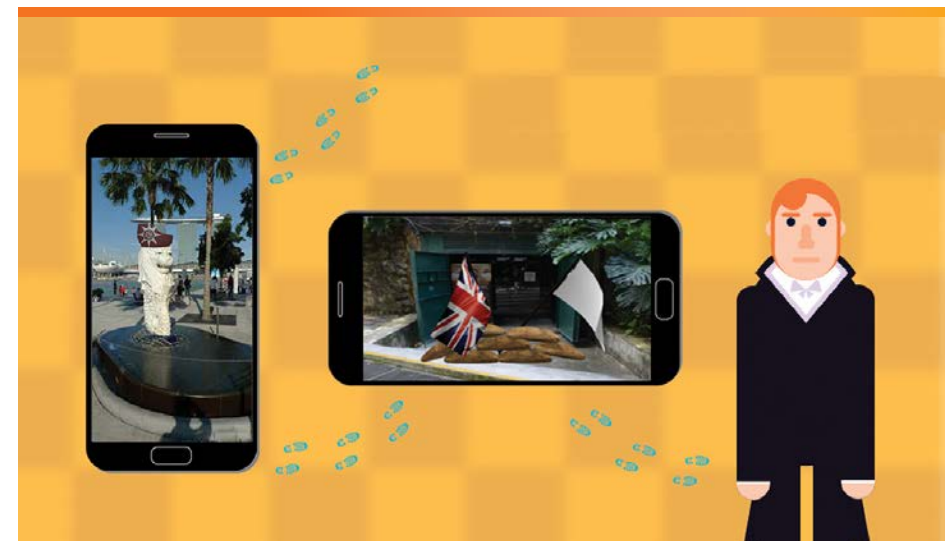
This project aims to achieve a smart alternative to bin management, as well as a go-to web application for cleaners to utilize at work. An IOT based system was created to collect data on the amount of rubbish in a bin. Data from the sensors are presented on a map on a website that will visually indicate if a bin needs immediate attention for cleaning. A Smart Routing component generates and shows the shortest path around the compound for cleaners to take in order to work more efficiently, providing convenience to their working lives. Smoke sensors are also installed to detect fires.

STUDENTS

Delphina Yap Si Hui
Lim Jia Yi
Jacky Wee Jian Wei
Javier Chong Wei Jie

SUPERVISOR

Tan Cheng Kok



Data Logging, Visualisation and Alert System for Environmental and Ecological Monitoring

GLOBAL warming is a major concern for all nations. Although we can feel the effects in our everyday lives, there is a need for a quantifiable way of recording and monitoring the effects. When the readings reach above acceptable levels, the public and government agencies need to be alerted to take precautions and actions to lessen the harmful effects.

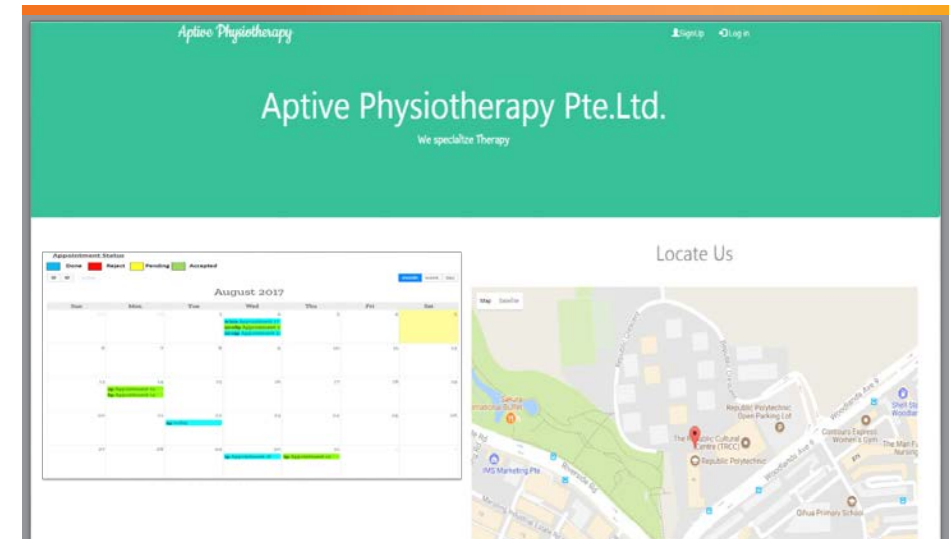
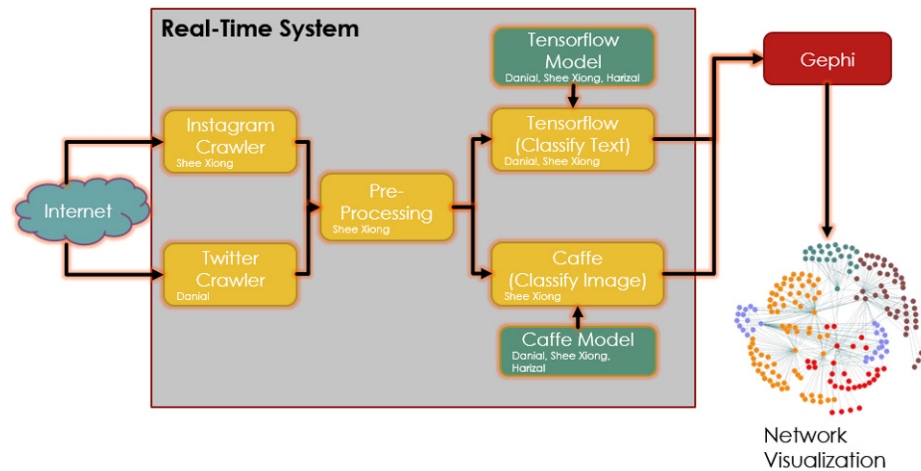
A system using IoT technologies was developed to monitor, log and visualise data collected from various sensors such as Sound, Temperature, Humidity, Smoke/Gas/Haze, Atmospheric pressure and Light sensors. Apart from data logging and monitoring, an alert system is also created when the sensors reach above threshold levels.

STUDENTS

Ahmad Jazli
Nurul Huda
Muhammad Danish Irfan

SUPERVISOR

Bernard Leong



Understanding User Dining Interests

UNDERSTANDING consumers' and categorising them based on interests are important elements to drive marketing strategies. There are many data points available via social media platforms but many organizations are challenged on how to harness these data. The aim of this project is to create a system that collects data from various social media platforms and segment them into different groups.

A real time system is created to predict the user's interest based on real time data collected by web crawlers. This system will collect the data from various social media platforms, such as Twitter and Instagram. The system is trained to predict the consumer's interest and classify them using Tensorflow for text and Caffe for image. All the data collated will be stored in MongoDB. GEPHI is used to visually display the data and segment the classified data into groups based on the image below.

STUDENTS

Chen Shee Xiong
Muhammad Harizal
Danial Ashidiq

SUPERVISOR

Dr Ng Foo Meng

Corporate Website and Appointment Scheduling System

PATIENTS who seek physiotherapy sessions must pre book appointments with the therapists. In its current practice, individual therapists maintain their booking through personal Google Calendar. This created a problem whereby there is no consolidated view of the appointments by all customers. In addition, any booking and cancelling is carried over emails or phone.

The team developed a corporate website that contains the corporate profile, services and staff profile. The website includes an appointment scheduling module. With this module, customers can view the master calendar and book a slot directly. Reminder emails are auto generated to the customers when the appointment date draws closer. Physiotherapists can use the system to check upcoming appointments, as well as the history of a patient's visit.

STUDENTS

Sukphasuth Lipipan
Neo Yanzhen
Shanwei

SUPERVISOR

Florian Muljono



Nexus Trail

UNCOVER Singapore's secrets with a series of curated walking tours. Each self-guided tour is packed with rich stories behind the places, each written by local writers. You'll know the city inside out by the time you're done.

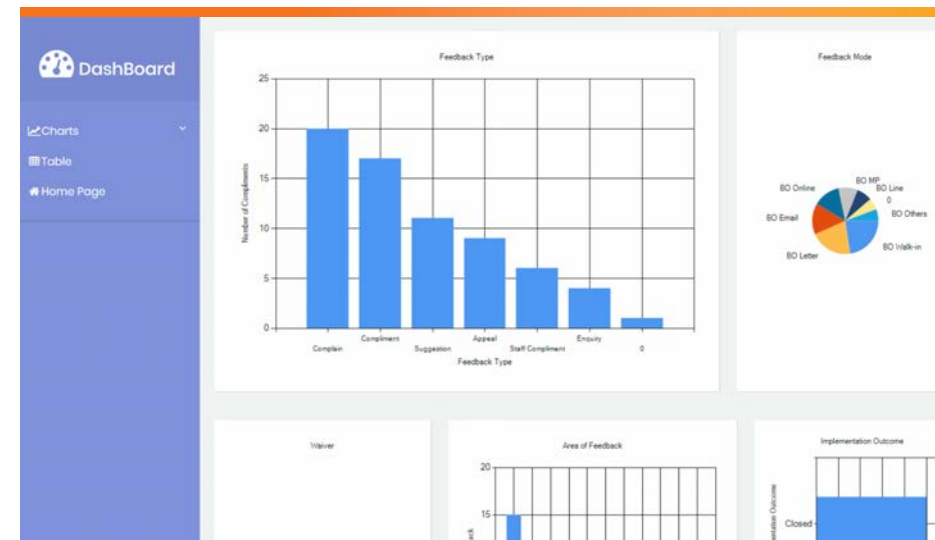
Nexus Trail is one of many trails in Singapore developed by LDR integrated into their app, Locomole. The team was tasked to enhance the trail by making it more enriching and immersive through the use of Augmented Reality. Digital assets in the form of 3D models, graphics and videos were created.

STUDENTS

Chua Chin Yan
Dinesh Kumar
Lin Yi Heng

SUPERVISOR

Tan Hwee Yong



Electronic Form to Obtain and Analyse Service Feedback

HOSPITAL service feedback is collected manually and the operational staff needs to enter data into a Microsoft Access application for collation of feedback. This process is time consuming and is prone to data entry errors. As a result, reports cannot be generated in time to address service concerns.

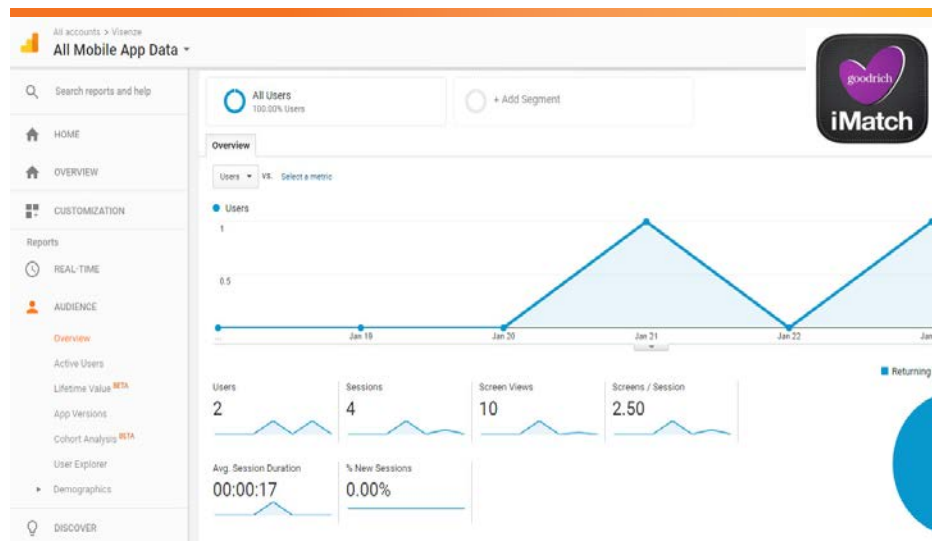
A web application was created to allow staff and patients to retrieve online survey forms and directly complete them within the hospital intranet environment. Survey results are collated automated into a backend database. Reporting dashboards are provided to the hospital staff. In addition, the application provides analytic and visualization tools to analyse patients' feedback so that areas of service improvements can be identified.

STUDENTS

Kenneth Yeo
Ang Cai Ting Celine
Liu Jian Long
Lee Jian Jie

SUPERVISOR

David Leong



Analytics for Image Search App

GOODRICH Global Pte Ltd is a supplier of wallcoverings, fabrics, carpets and flooring materials. It provides clients and business associates with a mobile application (iMatch) that performs searches on interior furnishing products using keywords, patterns, colours and images. In its current form, there is no available feature that allows the company to study the users' behaviours, search trends and the usage rate of the app. Such capabilities are identified to be necessary for Goodrich Global to better understand the needs of its customer and to get better insight to evolve its range of products.

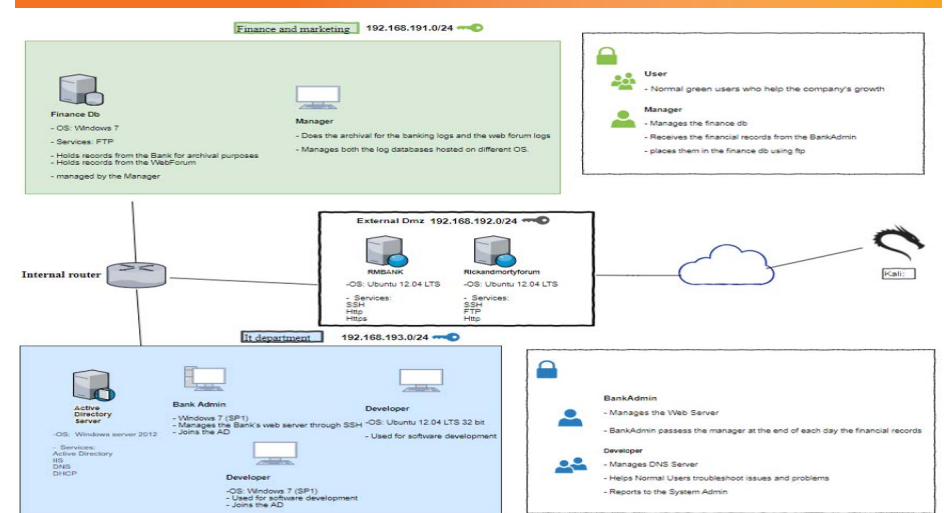
The students undertook a project to upgrade the iMatch application with analytics capabilities. Modifications were made to the proprietary application using Google Analytics SDK libraries and APIs which enable tracking of user activities such as login frequency, duration of use, type of searches, trail of search history and duration of searches.

STUDENTS

Xue Ting
Pei Ying
Pavithra
Wee Yong

SUPERVISOR

Balasubramanian



Penetration Test Lab

RECENTLY companies and governments alike have gone through a wave of cyber attacks through different avenues (e.g. network, websites, malicious insiders, etc.). In order to defeat the hackers, IT professionals will need to know how to think like one. This project will equip students the skill set to set up a penetration-testing laboratory for the purpose of ethical hacking training. The end product/infrastructure can be used to train IT security practitioners to harness their ethical hacking skills with cyber defence in mind.

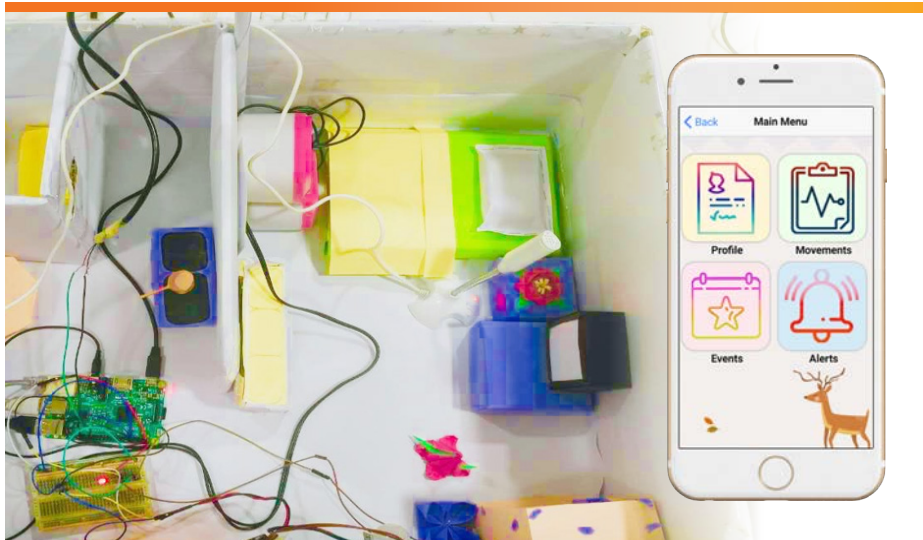
The lab was built using various OS in Virtual machines, these OS contained vulnerabilities ranging from popular ones such as Heartbleed, Eternalblue and Web server/application vulnerabilities that range from low to high difficulties. Furthermore, to illustrate industry-like realism, the implementation included network pivoting and compromising techniques involving resources from SANS Institute and buffer overflow as a form of post exploitation.

STUDENTS

Johnny Pan
Ryan Yu

SUPERVISOR

Gibbsen Omar



Personal Assistant for Senior Citizens

SENIOR Activity Centre (SAC) staff has to attend to repeated enquiries by seniors. When an emergency alarm is triggered in the home, the senior citizen or his neighbours may contact the SAC staff to investigate further. However, there is a limit as to how fast the SAC staff can respond. In addition, since the SAC operates during regular business hours, such notifications may be too late especially for unfortunate mishaps.

The team created a prototype system that comprises of three modules:

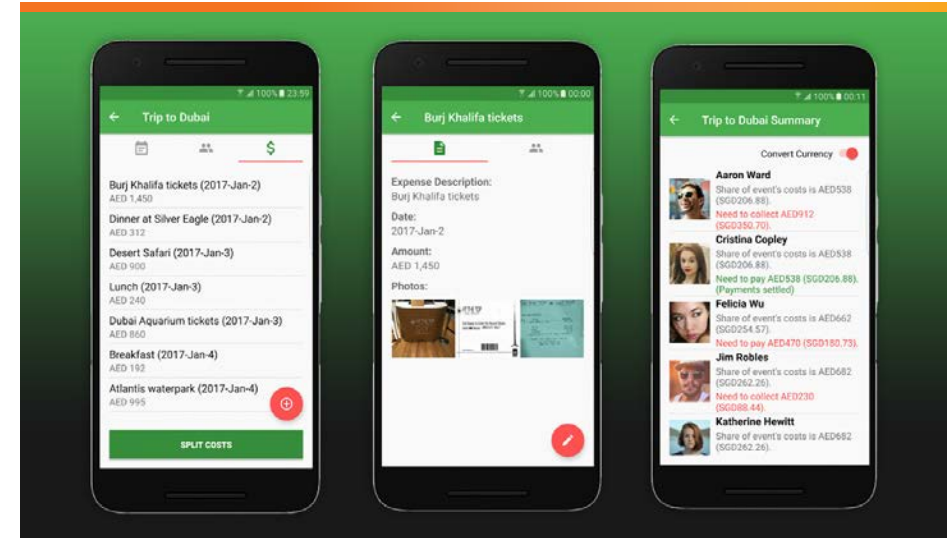
- A Chatbot that understands instructions given in a natural language to play music, retrieve weather information and upcoming events organized by the SAC.
- Real-time voice based conversation between the senior citizens and care takers.
- Sensors at the door and within the house to capture movement and data is recorded regularly for passive monitoring.

STUDENTS

Lin Shuang Shuang
Rennie Yeoh
Xu Ze Ming
Liu Si Jia

SUPERVISOR

Li Yan



MagiSplit

IT is common during group outings for friends to take turns to pay upfront for outing expenses first and then collect the share of payment from the rest at the end of the day. Settlement of payment will result in monies exchange between friends. Tracking such expenses during a prolong event pose some challenges as some expenses are incurred by some parties only. If overseas, expenses may be incurred in foreign currencies whereas the settlement of payment could be in local currency.

MagiSplit is an expense tracking and splitting app that is suited to track expenses incurred in group outings. Expenses tracked are supported by images of receipts. Based on the collective expense incurred per event, MagiSplit calculates each participant's share of the total cost and the amount he needs to pay or collect, taking into account the money he had paid upfront during the outing. The app is published on Google Play and Apple Store.

STUDENT

Lee Hui Huang



Smart Mouse Trap

TRADITIONAL mouse traps require frequent checking after setting it up at the area of interest. In a huge estate that faces rodent issues, such solution is man-power intensive as it requires frequent checking of many mouse traps placed at various location.

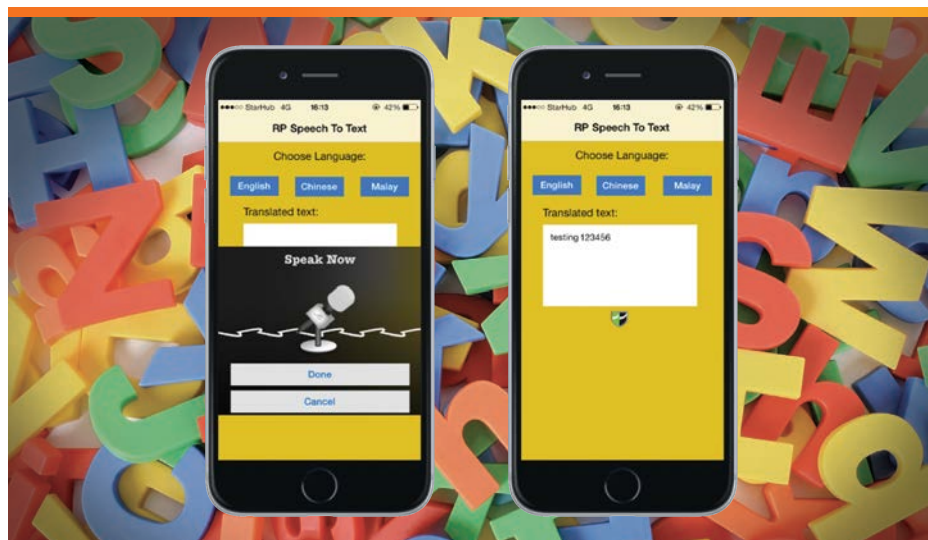
A prototype of a smart mouse trap which can sense the trapping of a mouse was designed. If a mouse or rat is trapped in the device, the user will be triggered to retrieve the trap. By removing the need to check the mouse trap on a scheduled basis and only retrieve the mouse trap after capturing a rat or after a certain deployment days (as the trap is not deployed at an effective area), the amount of man-hours needed to manage the mouse trap can be reduced. The target market for this mouse trap will be the pest control industry as their mouse trap are deployed at their client's work site which will not be near each other.

STUDENT
Ong Chiu Hao

*No animals were harmed during the course of this project.
Any animals that were found trapped were released immediately unharmed.*



STAFF PROJECTS



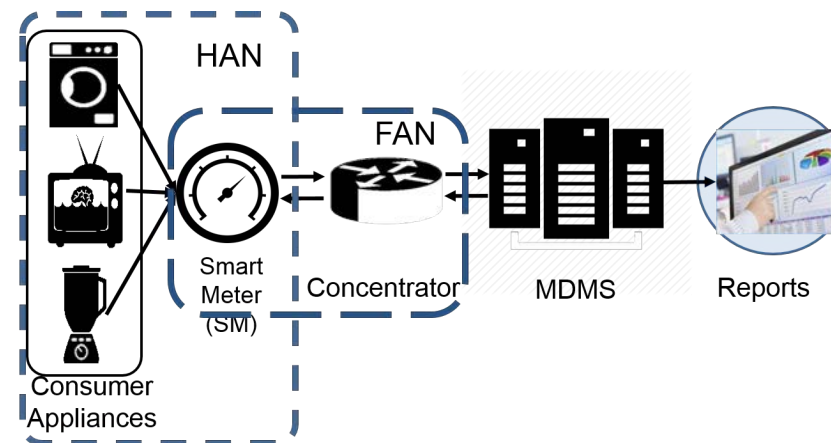
Multi-Language Speech Recognition

THIS is a research project to create a low-cost assistive tool that facilitates the deaf and the elderly to communicate more effectively in public. It supports multi-lingual transcribing which includes English, Chinese, Malay and commonly-used Singapore dialects. It recognises common languages that are spoken in Singapore's multi-ethnic and multi-cultural society and is able to accommodate different accents and surrounding noise. The tool provides a means to improve the quality of life for the deaf and hearing-impaired. The tool works on mobile devices such as phones, sunglasses and other wearables and has API libraries to integrate with other web-enabled devices. The project is led by staff from the Cognitive Systems Technology Centre.

Licenses to use the API for commercial use are available.

STAFF

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Advanced Metering Infrastructure Architecture and Components

Securing IoT Smart Home Metering System

SMART meters are deployed to each household to measure the energy use of electrical appliances that form a Home Area Network (HAN). A Field Area Network (FAN) is a wireless mesh network in which a group of smart meters and concentrators are interconnected so that the collected energy usage data can be aggregated before they are forwarded to the Meter Data Management System (MDMS).

In this deployment, the concentrator can access the energy data obtained from the smart meters before performing the aggregation. Therefore, the concentrator may be compromised to manipulate and tamper with the readings. This could lead to erroneous bills, energy thefts, and possible consumer disputes. These misdemeanours affect the integrity and authenticity of the energy usage to provide trustworthy power generation, distribution and customer billing.

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- **Reflections Design International Pte Ltd**
- **Singapore Chinese Chamber Institute of Commerce**
- **Singapore Management University**
- **Singapore Ruby Union**
- **SMAC Biz Services**
- **ST Electronics (Info-Software Systems) Pte Ltd**
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