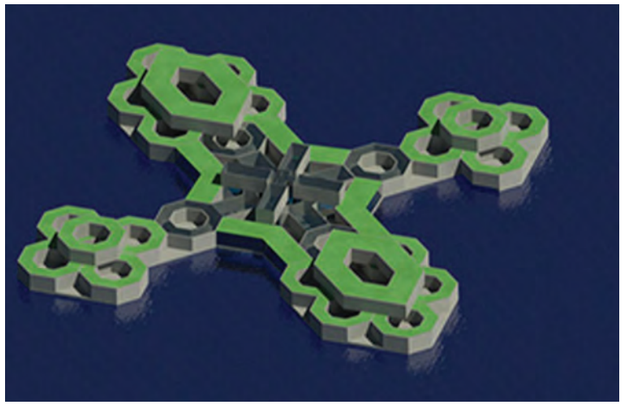
SINGAPORE : A FUTURE CITY – THE CIVIL ENGINEERING PERSPECTIVES

Land-scarce Singapore needs to venture beyond current conventional and conservative construction methods to create more spaces for her residents to work, live and play. This project studies the feasibility of constructing a floating city through the adoption of game-changing, futuristic technologies. The construction will involve the use of sustainable materials, newer and better construction methods and alternative sources of energy. Such a city could shape the future of construction development in Singapore.



Overview of Floating City Concept.

SUPERVISOR
Rudy Ang

TEAM MEMBERS
Chen Yong Han John, Seah En Xian, Muhammad 'Arif Bin Suhaimi, Choo Xiao Yue

INSPECTIONEERING – BUILDING INSPECTION MADE EFFICIENT WITH DRONE AND REALITY MODELING

The aim of this project is to explore how cutting-edge software and technologies can revolutionize the way inspection is carried out in the construction industry. Our aim is to explore how various solutions can be facilitated to benefit local contractors, accelerate project delivery and improve asset performance for the infrastructure.

3D digital model of SP stadium - The grandstand made easy with drone and reality modeling (rendered view).

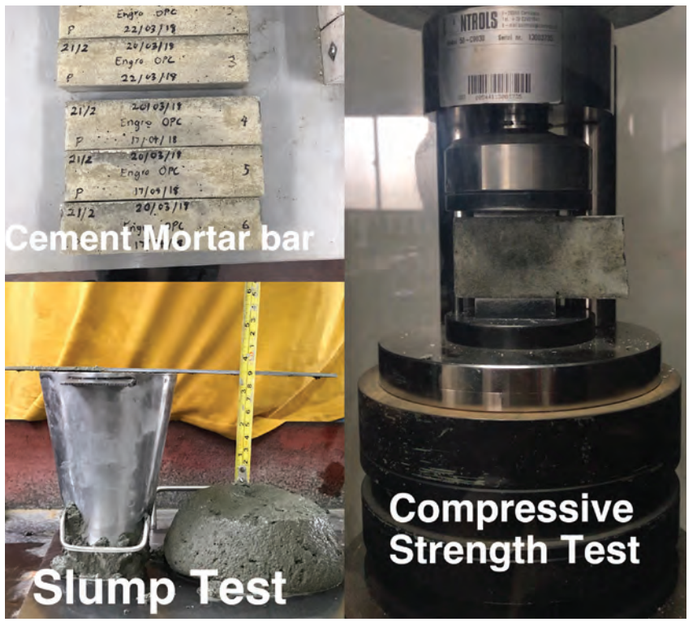
SUPERVISORS
Soo-ng Geok Ling, Tao Nengfu

TEAM MEMBERS
Koo Hao Xu, Loh Zhi Ming Malcolm, Lee Jing Xuan, Teo Wilson

INDUSTRY PARTNERS
Bentley Systems Pte Ltd, GuruRealiti Pte Ltd, TPS Construction Pte Ltd

CLASSIFICATION OF FINE AGGREGATE / EVALUATION OF ROAD-PAVING WARM MIX ASPHALT MIXTURE

Project One: The properties of fine aggregate varies based on their sources. This will affect the performance of the resulting concrete. This project forms a correlation between the fine aggregate properties and the resulting concrete properties. Project Two: Road-paving asphalt mixtures are produced and compacted at high temperatures which result in the production of carbon dioxide and the release of unfavourable smells. Reducing temperatures, however, will affect the strength and properties of asphalt-paving mixtures. Using temperature-reducing agents and strength-enhancing additives helps reduce the emission of greenhouse gases during the production and construction of asphalt roads.



Test on fresh and hardened cement mortar.

SUPERVISOR
Tan Poh Seng

TEAM MEMBERS
S R Darruka, Ong Si Xuan Shermeen, Markus Chin Jun Han, Sim Jun Wei Jason, Syed Fadhil Bin Syed Feroz, Robert Jr Alberto Lingad

INDUSTRY PARTNER
Samwoh Corporation Pte Ltd

CENTRIFUGE TESTING OF EARTHQUAKE INDUCED LANDSLIDE / LIGHTLY CALCINED CLAY WITH CEMENT STABILISATION

Disposal of unwanted clayey soils is challenging. They are usually treated with cement and reused. Lightly calcined clays as a substitute is studied in this project. Another treatment method is consolidation. Model consolidated clay slopes are subjected to in-flight earthquake shaking in a centrifuge and landslide behaviour is investigated.

Project team with NUS Centrifuge Machine and mentor.

SUPERVISORS
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Brendon Clifford Si Han, Nicholas Tay, Siti Zulaikha, Ng Sheng Jie, Chee Wei Hao, Tng Zhong Yi Gabriel, Xiao Yuanzong, Lay Hao

INDUSTRY PARTNER
National University of Singapore

MONITORING GROUND SETTLEMENT WITH REMOTE SENSING

This project is part of an LTA-NUS research collaboration involving the use of photogrammetry as a remote sensing technique to measure ground surface deformation which resulted from underground tunneling. This work involves taking a multitude of photographs at different angles of the surroundings with a camera to create a 3D model.

Use of photogrammetry as a remote sensing technique to measure ground surface deformation.

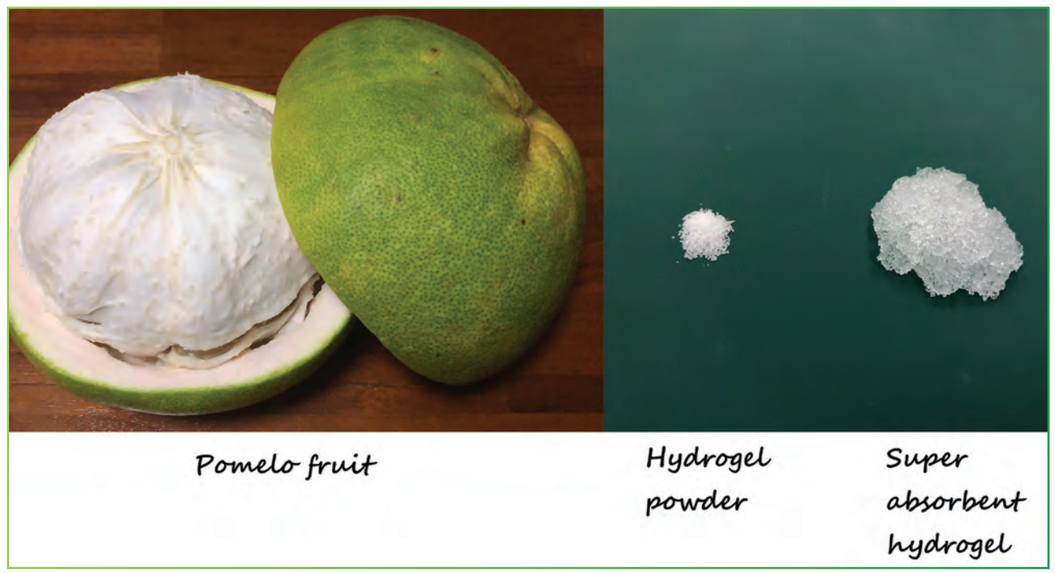
SUPERVISOR
Teo Kian Hun

TEAM MEMBERS
Daniel Lim Yuan Wei, Ng Wei Jie,
Lee Chee Wai, Clarence Ong Jian Loong

INDUSTRY PARTNER
National University of Singapore

SYNTHESIS OF HYDROGEL FROM POMELO PEEL WASTE

Pomelo is a tropical fruit that is widely cultivated and consumed. As such, agricultural solid waste of pomelo peels is produced from households and industry. Pomelo peels are relatively high in cellulose. There is vast potential for cellulose to be employed in many areas, one of which includes the application of hydrogel. Hence, the objective is to develop a hydrogel from pomelo peels.



Pomelo peels converted into hydrogel powder with super absorbent property.

SUPERVISOR
Noel Kristian

TEAM MEMBERS
Teo Rui Ling, Goh Yu En,
Kenneth Chan Huan Yiao,
Goh Yoke Peng

THE FIRST ZERO ENERGY PAVILION (ZEP) @ SP

To promote environmental sustainability, EEE students have designed, developed and constructed a Zero Energy Pavilion, ZEP, at SP, that relies on energy conservation and on-site renewable generation to meet all of its lighting, cooling and electricity needs. The ZEP generates its own power through solar energy and maximizes the power generation through sun tracking of its solar panels. The surplus energy generated can also be used for nearby distribution loads. It uses a simple cost-effecitve modular structural design with an interactive and real-time energy monitoring and management system and a smart PV maintenance system incorporating a drone.

Zero energy.

SUPERVISORS
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Wang Huaqian, Tan Hwee Siang

TEAM MEMBERS
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Carlyn Tan Pei Jun, Izz Danial Bin Selamat,
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Ernest Quek Kar Woon, Delvyn Quek,
Ong Hui Qin, Bryan William Martens Jeyaseelan,
Muhammad Nazari Bin Ramli,
Mohamed Fahiq Hameed S/o Mougamadou,
Heng Zhi Xiong, Liaw Jun Le Andy, Lee Si De

INDUSTRY PARTNER
Sembcorp Industries Ltd,
Singapore Polytechnic Graduates' Guild (SPGG)

SMART FACILITY MANAGEMENT @ SP CLUB HOUSE

Monitoring and managing building conditions have always been time-consuming and backbreaking work for any Facility Management Team. This project aims to design and build an energy monitoring system for single and 3-phase circuits at the SPGG. Readings are sent using existing WiFi to a database at Amazon Web Services and a customised webpage allows the Facility Manager to view the real-time changes. The system will also include features to detect leakages in pipes and monitor and forecast solar radiation levels so as to achieve optimal operation by the PV system.

SUPERVISORS
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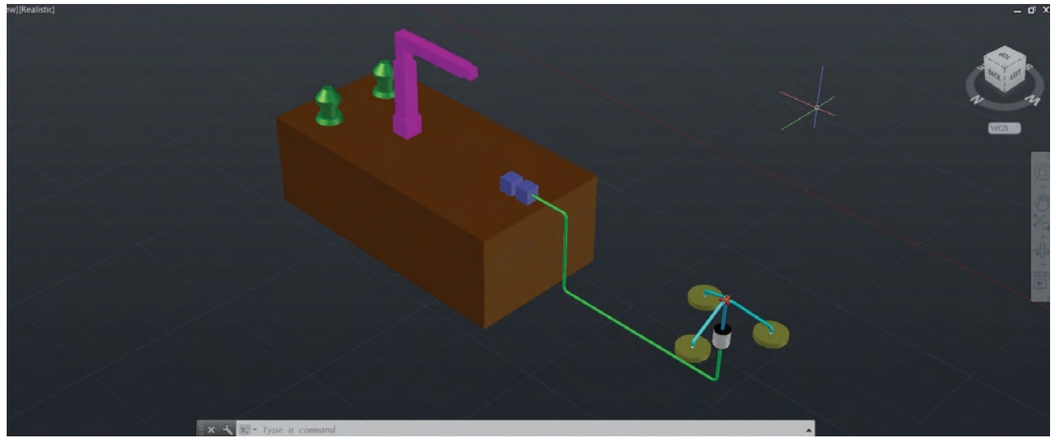
TEAM MEMBERS
Ryan Tan, Nikhil Raghavendra, Ong Jun Wen,
Seah Ming Yang, Lim Sheng Zhe,
Poon Wei Kang

INDUSTRY PARTNER
Singapore Polytechnic Graduates' Guild (SPGG)

Smart Clubhouse.

MARINE OIL SPILL RECOVERY DEVICE

This project highlights the innovative use of oleophilic material to recover oil spillage in the ocean caused by commercial vessels. Our finalised product will involve the creation of a working model to demonstrate the effectiveness of this device in skimming oil from the water surfaces. The purpose of fitting such a device on the work boat is to take up oil as fast and as efficiently as possible during major oil spills to prevent further spread and the formation of oil globules.



An overall auto view of the vessel.

SUPERVISOR
Foo Nan Cho

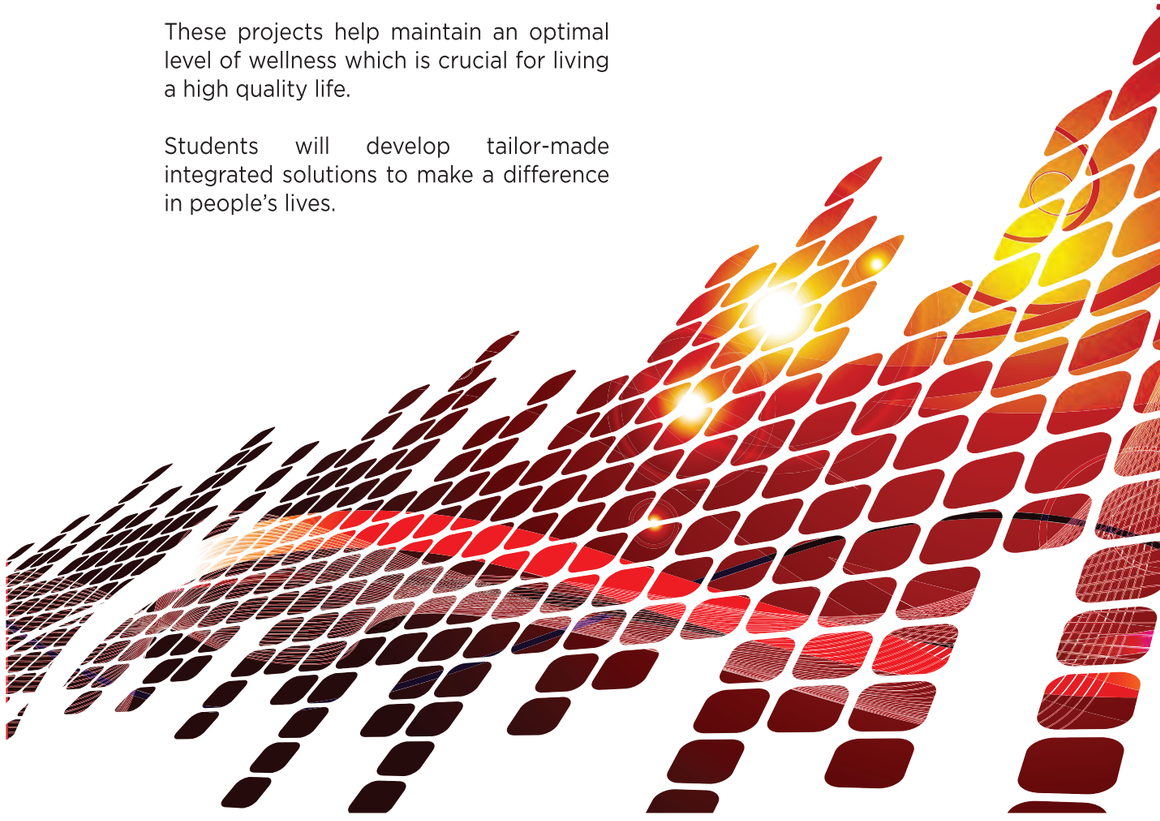
TEAM MEMBERS
Lee Co Shin, Wong Sik Tin Aizaac,
Ahmad Rafiqi Bin Razali,
Muhammad Shameer B,
Danial Hanis Bin Abdul Rashid

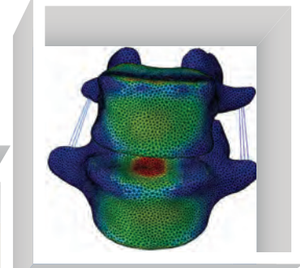
INDUSTRY PARTNER
Tiam San Shipping

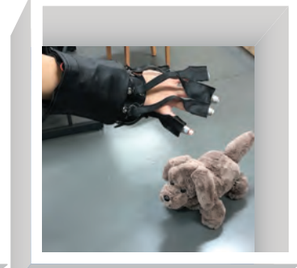
HEALTHCARE & WELLNESS

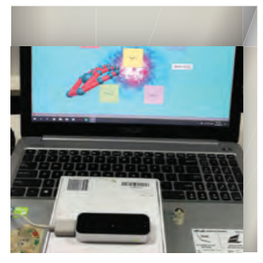
These projects help maintain an optimal level of wellness which is crucial for living a high quality life.

Students will develop tailor-made integrated solutions to make a difference in people's lives.



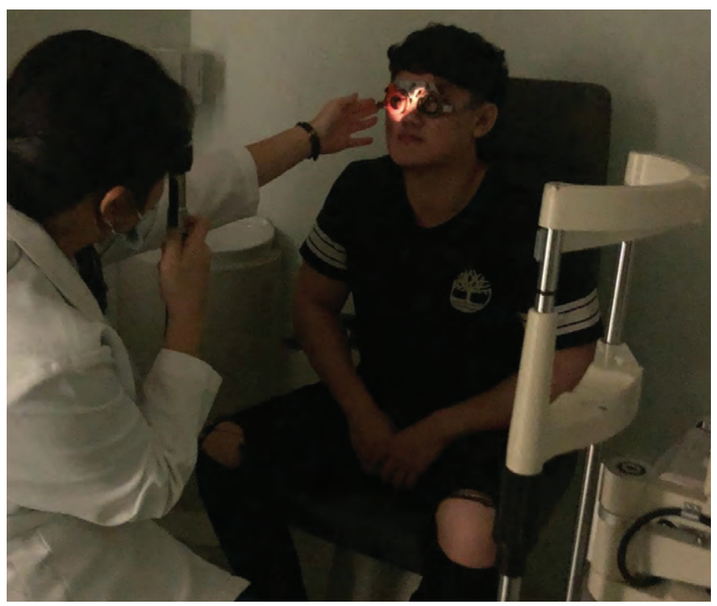






ENVIRONMENTAL FACTORS AND THEIR EFFECT ON REFRACTION

Refraction is part of an eye health examination procedure to determine one's refractive status or "eye power", which is used for the prescription of spectacles or contact lens. The procedure for refraction is usually conducted in the testing room with a recommended distance and lighting condition. However, due to space constraints in most optometric setting - hospitals, clinics, optical stores etc.- testing rooms do not necessarily follow the standards. This project investigates how environment factors affect refraction of both emmetropes ("perfect vision") and low myopes ("short-sighted") at different lighting conditions and target distances.



Student clinician conducting objective refraction using retinoscope in a dim environment.

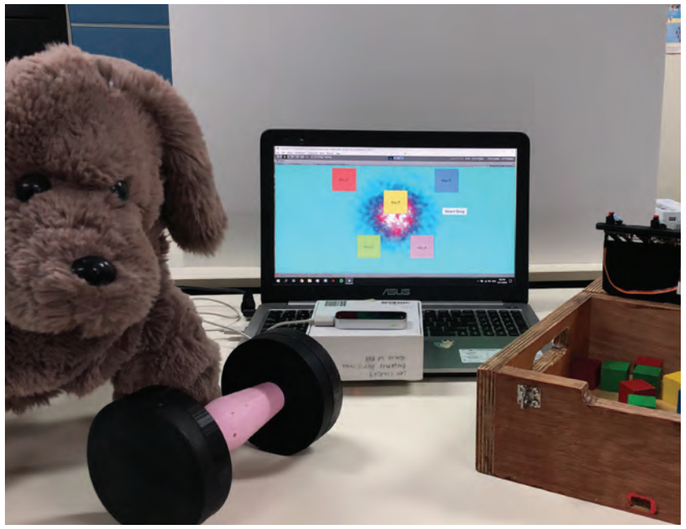
SUPERVISOR
Raja Liyana

TEAM MEMBERS
Samuel Tan Xu En, Siti Nur Amirah,
Loh Wen Ting, Chua Chui Xia

SP PHYSIOTHERAPIST

This project uses innovative tech solutions to motivate and help patients meet their rehabilitation goals such as improving their motor functions, maximizing their ability to move or stimulating their minds. A patient will first undergo an initial assessment using our enhanced version of the Box and Block Test (BBT), and a rehabilitation programme will be designed for the patient based on the results.

The 'Music Therapy' section encourages the patient in his rehabilitation exercises by using music and the company of an enthusiastic robotic pet that is able to respond to the music and also interact with the patient.



SP Physiotherapist SetUp.

SUPERVISORS
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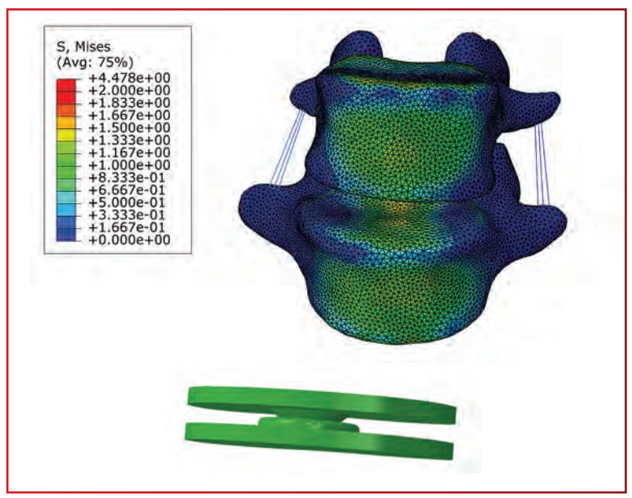
Lee Kah Mein Tracey

TEAM MEMBERS
Aiman Boon Ying Shuang, Wong Jun Heng,
Ramanaan S/o Suresan,
Leong Hee Xian Matheaus,
Numan Harith Bin Norraimi, Ng Chong Yan,
Tan Xin Ping, Mohamed Ali Mohamed Umar,
Neo Yi En, Charles Kok Fang Yi,
Seah Yu Xin David

INDUSTRY PARTNERS
Edamas Medical Pte Ltd,
KK Women's and Children's Hospital

COMPUTATIONAL MODELING OF A PATIENT-SPECIFIC INTERVERTEBRAL DISC PROSTHESIS

This project aims to customize and design a spine intervertebral disc prosthesis for a specific patient based on CT scanned spine data to prove its superiority to a standard disc design using finite element modeling. MIMICS and ABAQUS are used for segmentation of CT data and for modeling, respectively.



Stress distribution on native vertebrae for customized model.

SUPERVISOR
Xiong Fangli

TEAM MEMBERS
Ng Wei Xiang,
Shaun Loh Jingjie