

SET *eDigest*



A CLASS ABOVE

Issue 09 | December 2021

**“Computing is not about
computers any more.
It is about living.”**

Nicholas Negroponte

School of Engineering and Technology

Preface



Dear Colleagues, Partners, Friends, and Guests,

Welcome to the last issue of the School of Engineering and Technology (SET) eDigest in 2021. It has been quite a challenging year with a subjectively slow time flow at the beginning of it and a very fast pace of changes, work problems, tasks, new initiatives, and various activities at the end of the year.

I am very happy to state that SET has performed exceptionally well during all ups and downs we experienced, and despite the very tough operation conditions we faced. Even more important is the fact that we have reached and even exceeded our performance targets in all aspects. The School has achieved very healthy double-digit growth in student numbers. We have introduced new undergraduate and postgraduate programmes and built new laboratory facilities. SET academics have produced an outstanding record of quality research publications exceeding the research output of the entire university just a few years ago. In addition to that, our researchers have secured the majority of the research funding obtained by Sunway University. We have successfully continued developing existing and started new important collaboration projects with local and international partners including organising and playing key roles in many top-quality conferences, symposia, and other events. SET has led the University in terms of the number of the world's top-cited academics as well as significantly improved its reputation, recognition, and professional standing in the country, region, and in the world. And all of that has been backed by the very positive financial results attained in 2021 (for the first time SET has become budget-wise a net donor to the university while carrying also a bulk of research activities). We have preserved our team spirit despite the need to work in isolation and largely online. That has been perhaps our most important professional human moral area achievement. It has been well evident during the year. However, it was most visibly displayed at our very pleasant year-end get together event – please join me in special thanks to the organising team.

There are just a few hours left before we enter the New Year. I hope you will have a minute to reflect on all positive and memorable personal, family, and professional events and accomplishments we had in the coming away 2021 and will happily welcome the year 2022. I wish you and your families to have a great festive time together, to be safe and healthy, happy, prosperous, and successful in achieving all your goals and dreams ahead.

On behalf of the School, I am presenting our very best New Year wishes to the entire Sunway University, Sunway Education Group, and Jeffrey Cheah Foundation who have continuously provided great support and guidance to us.

I would like to finish this message by sincerely thanking every one of you one more time for your very hard and productive work and wish you and your families a very Happy New Year ahead!

With very best regards to you all

Professor Serge Demidenko

Dean

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Successful Organization of Virtual Seminars as a part of COP26@ Lancaster University Festival, 2021

"Research Centre for Carbon Dioxide Capture and Utilisation (CCDCU), School of Engineering and Technology (SET) Sunway University successfully organized the series of virtual seminars on "Mitigating Climate Change Through Carbon Dioxide Capture and Utilization Technologies ". Organized as a part of COP26@ Lancaster University Festival, 2021. Speakers were from India, Malaysia, Pakistan, Qatar, Thailand, Australia, and UK. Over 115 participants from all over the world joined the series of seminars.



SET Town Hall Meeting (August 2021 Semester)

The Town Hall Meeting was held on 5 October 2021 (Tuesday). The Dean shared with the School of Engineering and Technology (SET) team on the new Assistant Head appointment for the Department of Computing and Information Systems (DCIS), a new addition to the SET team, notable achievements from the Academic Departments, student statistics, University strategic objectives to deliver Vision 2025, and other important updates. The session continued with the sharing by the Associate Dean (Engagement and Internationalisation), Professor Lau Sian Lun. Professor Lau shared updates on ways to enhance Engagement and Internationalisation, ideas for 2021

and beyond, future goals, introduced the SET Engagement Team and its main responsibilities and strategies, and shared the SET LinkedIn Page. The Associate Dean (Research and Postgraduate Studies), Professor Mohamed Kheireddine Aroua then shared statistics on SET publications and postgraduate students, research achievements, research events, research grant opportunities, University Research Strategy 2022-2025, and other updates. Last but not least, the Associate Dean (Education), Professor Yau Kok Lim shared updates on the PDTI Renewal Audit, new programmes, dual-mode teaching (or hybrid teaching), best practice sharing, copyright issue, block mode implementation, workload reduction, and 21st Century Skills Framework.



SET Town Hall Meeting August 2021 Semester

SET Conference Seminar Series #4/2021

The SET Conference Seminar Series #4 2021 was held on 7 December 2021 (Tuesday), via MS Teams. A total number of 32 staffs and students (including the 3 presenters) attended the conference seminar.

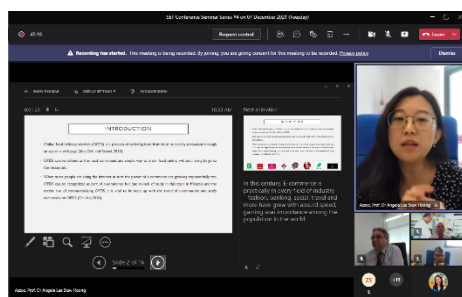
The conference seminar kicked off with the Dean of School of Engineering and Technology, Professor Serge Demidenko giving the welcome speech to welcome the audience. Thereafter, Dr Muhammed Basheer Jasser presented his paper on optimized Dragonfly Algorithm

using hill climbing local search. This is followed by Assoc. Prof. Dr Angela Lee's presentation on extended expectation confirmation model of continuance intention to use online food delivery services. Finally, Lim Woan Ning presented on a virtual piano dynamics enhancement with electromyography and demonstrated how it works using a prototype.

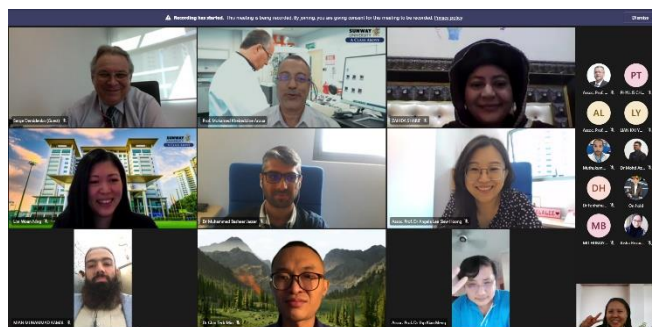
Early Disaster and Weather Monitoring System

A SUNWAYIAN'S PROJECT!

We are proud of the milestone taken by Sunwayians, Kelvin Choo Zhen Hou and Assoc. Prof. Dr Yap Kian Meng, as they collaborated with Research Centre for Human-Machine Collaboration (HUMAC) in the building of an 'Early Disaster and Weather Monitoring System'. This system is aimed to provide weather and climate monitoring as well as alerts for different possible disasters such as fire, smoke, landslide, flash floods.



Assoc. Prof. Dr Angela Lee, one of our presenters, providing the overview of her research paper on MS Teams.



Our customary virtual group photo at the end of the conference seminar together with Professor Serge Demidenko (Dean), Professor Mohamed Kheireddine (Associate Dean), our 3 presenters: Assoc. Prof. Dr Angela Lee, Dr Muhammed Basheer, Lim Woan Ning, with academic staffs and students among others.

“

We are deploying 'Disaster warning system with weather monitoring' for the first time to take our sensory-technology research initiatives to greater heights! ”

-ASSOC PROF DR YAP KIAN MENG



TEST PHASE 1:
Solar Power Supply System
at Sunway University



Source: Sunway University FB; Date: 8 November 2021]

Election to the European Academy for Discerning Sunway Academic

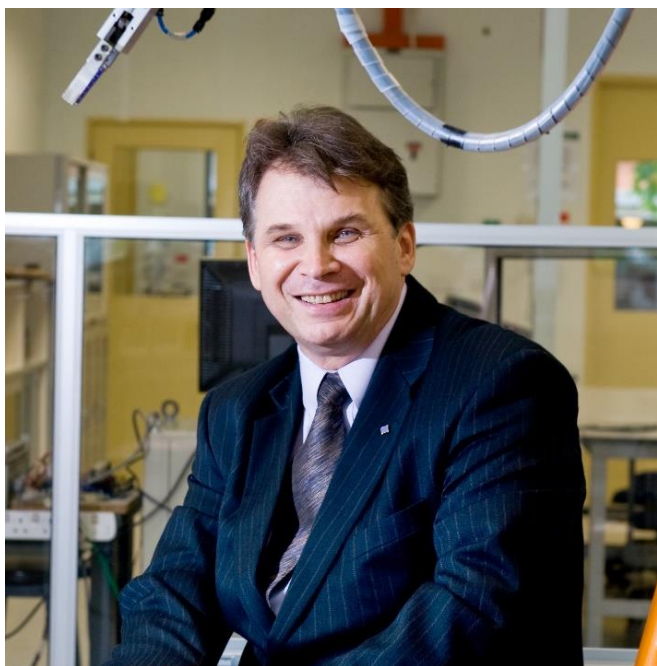
Professor Serge Demidenko of Sunway University has become the first Malaysian representative elected to the European Academy of Sciences and Arts. The Academy is a non-governmental transnational and interdisciplinary learned society that recognises scholars in fields such as Humanities, Medicine, Arts, Natural Sciences, Social Sciences, Law and Economics, Technology and Environmental Sciences, and World Religions. It is connecting leading scientists, artists, and

practitioners of governance, who are dedicated to innovative research, interdisciplinary and transnational collaboration as well as the exchange and dissemination of knowledge. The Academy has been a proud home of 35 Nobel Prize Laureates. This includes one of the most recent recipients - Professor Klaus Hasselmann (member of the Academy since 2004) who became the winner of the Nobel Prize in Physics in 2021 (jointly with Syukuro Manabe and Giorgio Parisi) for ground-breaking contributions to the "physical modelling of earth's climate, quantifying variability and reliably predicting global warming" and "understanding of complex systems").

Professor Demidenko is Dean of the School of Engineering and Technology. Along with the entire Sunway University, the highly productive and fast-growing School has been generously supported by the Jeffrey Cheah Foundation. It has enabled building new advanced research and teaching facilities, initiation and joint development of ground-breaking academic and research initiatives while collaborating with top national and international partner universities and companies such as Massachusetts Institute of Technology, University of California, Berkeley, National University of Singapore, Lancaster University, CISCO Systems, SAS, Hitachi, RSA, and many others. It enables also the ongoing introduction of new undergraduate and postgraduate academic programmes in Engineering, Data Analytics, Advanced Materials, Sustainable Science and Technology with more to follow.

The academic and research specialisations of Professor Demidenko include signal processing, instrumentation and measurement, electronic design and testing, cybernetics and information theory. His professional career encompasses industry and academia in the Asia Pacific region and Europe. During his engineering career, he progressed from Junior Electronics Design Engineer to Head of Joint (Industry-Academy) Test Laboratory of a large computer systems manufacturing company. Since the mid-90s he has held several senior academic positions including Head of School of Engineering and Advanced Technology, Massey University; Head of School of Engineering at Monash University; Vice-President Academic as well as Head of Centre (School) of Technology and Centre of Communication & Design (concurrent appointments) at RMIT International University; Associate Head of Institute of Information Sciences and Technology at Massey University, and several others. He received his first degree (Computer Engineering) from Belarusian State University of Informatics and Radio Electronics, and PhD (Engineering Cybernetics and Information

Theory) from the Institute of Engineering Cybernetics, National Academy of Sciences of Belarus. He holds also two post-doctoral academic qualifications in Control Engineering as well as in Informatics, Control, and Computer Engineering. He has authored 3 books, over 200 archived papers, and 25 engineering patents. Professor Demidenko became the first representative of Malaysia (since 2004) elected Fellow of the world's largest professional society – the Institute of Electrical and Electronics Engineers and has been the only one since to achieve it in the category Research Engineer/Scientist. He is also a Fellow of the Institution of Engineering and Technology (since 1994) and Chartered Engineer (UK Engineering Council).



Professor Serge Demidenko

Appointment as a Member of the Evaluation Panel of the MQA

Assoc. Prof. Dr Yap Kian Meng has been appointed as a member of the Malaysian Qualifications Agency (MQA)'s evaluation panel for a three-year tenure. This is an excellent news marking the recognition of his academic and research expertise in the national agency. He will be a great contributor to the Evaluation Panel of MQA and through it, he would further



promote Sunway University as a prime provider of quality education and research. Dr Yap also heads Sunway University's Research Centre for Human-Machine Collaboration (HUMAC).

Dr Numan Arshid and Professor Mohammad Khalid have successfully filed a patent application for "A METHOD OF SYNTHESIZING MXENE"

Due to the unique structure at the nanoscale and unrivalled physicochemical properties, the application of 2D nanomaterials has revolutionized lifestyle over the last two decades. Among many 2D materials, MXene is the emerging 2D nanomaterials that have dominated every sector of life, including clean energy production and storage, biomedical science, water and air purification, portable and flexible electronics, wearable and implantable sensors devices. The most recent applications of MXene include the development of artificial kidneys, high-capacity batteries, printable micro-antennas and sensors, and thin membranes to purify water and air. However, MXene is typically produced by etching the MAX phase with hazardous chemicals at high temperatures for an extended period of time, which is expensive and harmful to the environment. Therefore, reducing hazardous chemicals during MXene production is critical for its commercialization.

Recently, Graphene and Advanced 2D Materials Research Group (GAMRG), School of Engineering Technology (SET), Sunway University Malaysia filed the first-ever patent on the production of MXene using a greener approach. Dr Numan Arshid and Professor Mohammad Khalid from GAMRG have successfully optimized the synthesis conditions to make the MXene production faster, economical and more environmentally friendly than conventional MXene production methods. They were able to minimize the chemical usage, as well as the production time from 12 hours to 40 minutes, and reaction temperature from 180 °C to 40°C. The quality of the MXene produced by GAMRG is comparable to that of MXene reported in the literature. This production method is an evolutionary

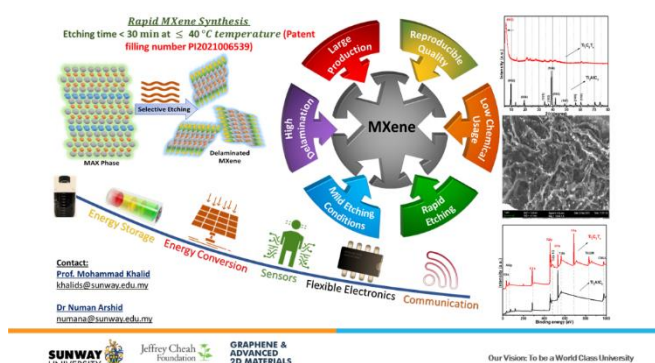
leap in MXene synthesis and could provide countless benefits like high-power energy storage. This timely invention aligns with the recently launched NanoMalaysia Energy Storage Technology Initiative (NESTI) programme, which will aid in the development of new energy storage devices locally.



Professor Mohammad Khalid
Professor & Head, Graphene & Advanced 2D Materials Research Group



Dr. Numan Arshid
Senior research fellow, Graphene & Advanced 2D Materials Research Group



of the Arab world in the world. Following this recognition, Prof Mohamed Kheireddine was invited for a Live interview on Radio Monastir (Tunisia) on 8 December 2021 at 1.45 a.m. (Malaysia time).



Professor Mohamed Kheireddine Aroua is one of the most recognized scientific figures in Malaysia and in the world in the field of chemical engineering, water and material separation. He is the head of the Centre for Carbon Dioxide Capture and Utilisation (CCDCU) at Sunway University, Malaysia. A recipient of several awards as a result of his inventions that benefited society in the field of water uses, he has published more than 180 scientific articles in international journals.

Dr Mohammad Tahir and Team securing RM 88,300 FRGS Grant

Over the years, wireless technologies have seen gradual evolution from 1st generation to 4th generation providing a high data rate. The current demand is not only for the higher data rates to support various applications such as augmented reality, virtual reality, vehicle to vehicle communication but also to support massive machine-to-machine (M2M) type communication. All these factors will result in an exponential increase in traffic volume. It is expected that the demand for monthly global mobile data traffic will be 77 exabytes by 2022, and annual traffic will reach almost one zettabyte. 5G roadmap comprises a broad vision and envisions target that includes 10–100x peak-rate data rate, 1000x network capacity, 10x energy efficiency, and 10–30x lower latency, paving the way towards Gigabit wireless. The utilisation of more bandwidth (Hertz) is a very costly solution. Therefore, to realise the vision of 5G, there is a need to rethink how current cellular networks are deployed because

Professor Mohamed Kheireddine honored at the Opening Ceremony of FIFA Arab Cup for his Achievements

During the opening ceremony of the FIFA Arab Cup being held in Qatar, the photo of Professor Mohamed Kheireddine Aroua was shown with dozens of Arab personalities, including Arab scientists, thinkers, engineers and doctors who have distinguished themselves in their fields and live abroad, with the aim of honoring them for what they have given to the image

designing a new radio access technology and utilising the new spectrum is not enough. One of the key technologies to realise the vision of 5G is the small cells. The goal of using small cells is to increase the number of cells per square kilometre in a given area.

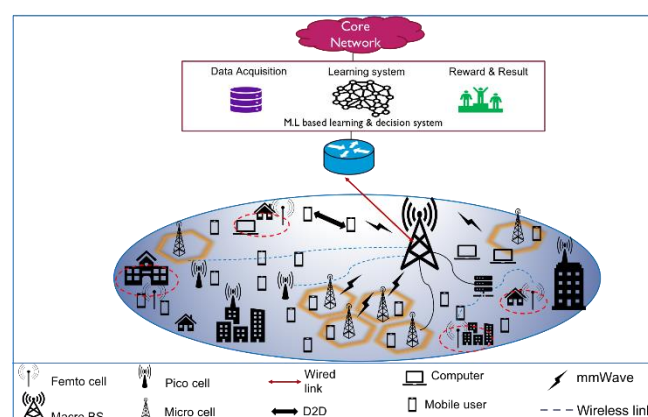
Such ultra-dense networks will create numerous overlapping zones among several cells. Large-scale deployment of small cells cannot be managed efficiently by a centralized entity making resource management and allocation challenging. This is because, in order to make an optimal decision, the centralized entity needs global information. Such global information places additional transmission overhead and results in increased latency. Furthermore, such a complex and hierarchical network design will increase power consumption; therefore, energy efficiency becomes of utmost importance. Although there have been works in the literature for energy reductions in the ultra-dense network, some of the practical problems of small cells, such as selfish behaviour and autonomous decision making, are not considered. The devices are becoming more intelligent and can make decisions autonomously in a distributed and cooperative manner to maximize the performance of the wireless network in terms of reduced interference, data rate, and energy efficiency. However, it is not easy to achieve cooperation and self-organizing features in an ultra-dense network. The device may have conflicting objectives in such a large network, and there is a cost associated with cooperation, for example, the power required for cooperation, battery life, and bandwidth. To model and solve such situations of conflicts and cooperation, game theory is widely used for strategic decision making. Game-theoretic approaches have been proven very effective in the wireless network and allow forming a stable and efficient network in a self-organizing manner. However, due to the highly dynamic nature of the ultra-dense network environment, it becomes challenging to model and solve using game theory. To overcome such limitations, distributed learning algorithms need to be designed, which combines Machine Learning and game theory concepts to achieve optimal energy-efficient outcomes in an unknown and dynamic environment. Hence, formulating a distributed and fair algorithm that adapts based on the dynamics of the environment is highly challenging and critical for the success of future wireless networks.

This research aims to build a fundamental framework using game-theory concepts coupled with machine learning to improve the energy efficiency in ultra-dense 5G networks. The resulting framework will include tools

to facilitate the modelling, analysis, and optimization of wireless networks. This, in turn, will enable a range of novel wireless services with significant societal impacts, ranging from IoT to autonomous systems.



Dr Mohammad Tahir
Senior Lecturer
Department of Computing and
Information Systems



Two Business Analytics students crowned ASEAN Data Science Explorers 2021 Malaysian National Champion and followed by 2nd Runner Up in the Regional Finals

Ryan Liew Kok Lam and Ng Jia Hui, studying a degree in Information Systems (Business Analytics) at Sunway University Malaysia have been crowned the national champions of 2021 ASEAN Data Science Explorers (ASEAN DSE) Malaysian National Finals and 2nd Runner Up in Regional Finals Competition that was held virtually

in Zoom, on the 23 of August and the 6 of October respectively.

Running for the fifth year, ASEAN DSE has a renewed focus on the Sustainable Development Goals (SDGs) that target climate and sustainability.

With the team name of Brain Drain, the duo has created a storyboard that focused on prioritizing Electronic Waste (E-Waste) during this competition. Given this opportunity, their storyboard presented on the alarming current situation of e-waste that not many know of. During the competition, they presented about the e-waste numbers which are continuously rising while not being handled in a proper manner, potentially harming human health.

Their proposed solution, which comprises of the implementation of a cradle-to-cradle technical cycle, as well as a mobile app to bring awareness and educate the public about e-waste, will not only solve the e-waste issue, but will ultimately gain sustainability for the ASEAN countries from the perspective of people, planet and profit.

This topic, as well as their solution that can be adopted by each of the ASEAN countries has caught the attention of ASEAN Foundation, SAP Cloud and the public.

The national finals were a 1-day event where the top 10 teams of Malaysia were up to compete amongst one another to represent Malaysia in the Regional finals. Each team was judged on their ability to present on their creative, feasible and data driven solutions towards solving the ASEAN countries' problems based on SDGs. At the end of the national finals, as the team that took first place at the national finals, Team Brain Drain would go on to the regional finals to compete against the other national winning teams from the other 9 ASEAN countries.

The regional finals were a 3-day virtual event where there was a series of engaging activities held for all the regional finalists to build connections, strengthen their future-ready skills and grow their appreciation for being a citizen of ASEAN. The activities held include networking and team building activities on the first day, and sharing sessions from ASEAN Secretariat, Permanent Mission of Brunei Darussalam to ASEAN, alumni of ASEAN DSE and social enterprises on the third and final day.

The regional finals competition was held on the 2nd day of the event and has caught many of the public eye with a total of 3.2k views on the live video which was

streamed on ASEAN Foundation's Facebook page and YouTube channel. It has brought many people's attention and will soon become a well-known competition across all the ASEAN countries. Ultimately, amongst national winners from the 10 ASEAN countries, Malaysia's Team Brain Drain managed to secure the second runner-up place in the regional finals.

Amidst the ongoing COVID-19 pandemic, ASEAN Foundation has managed to still carry on this ADSE event all the way until this year and is still making a positive impact towards the citizens across the ASEAN countries. They have also managed to continue equipping the students with the essential digital skills.

With that, the duo has managed to make Malaysia and Sunway University proud with their achievements.



Ryan and Jia Hui winning the National Finals in Malaysia





Ryan and Jia Hui securing the second runner-up place in the Regional Finals

Joel Loh Hwei Yung, BSc (Hons) Information Systems (Business Analytics) was selected as Valedictorian in December 2021 Convocation

Joel Loh Hwei Yung, valedictorian from the School of Engineering and Technology, Sunway University gave a captivating speech that exudes all the qualities a leader should possess.

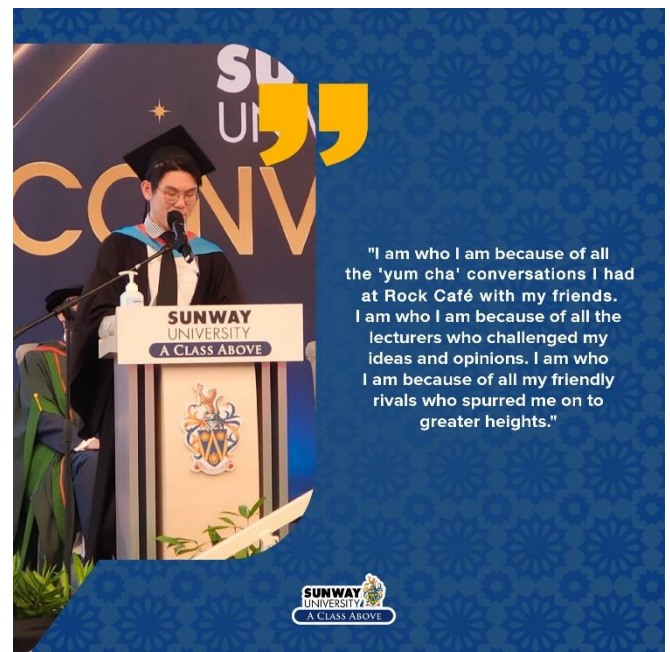
We are in awe of your patience, resilience and leadership as a student and as an individual. Congratulations on your graduation!

[Photo source: Sunway University Facebook, 4 December 2021]

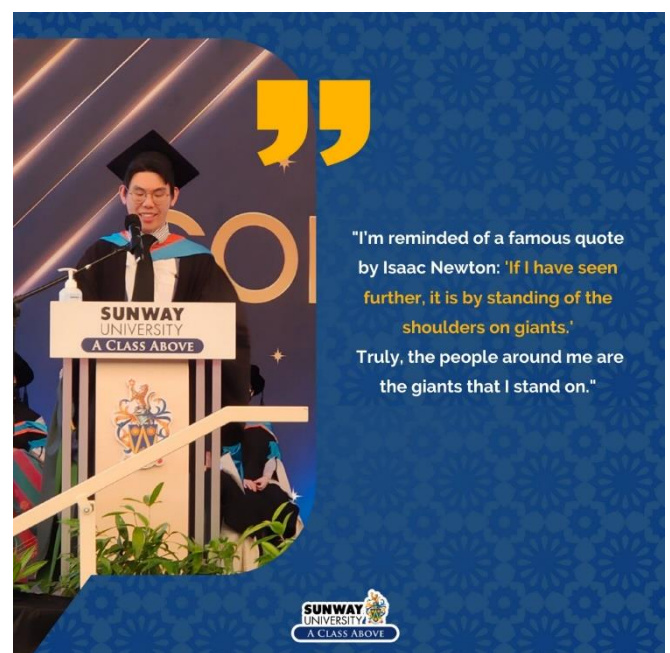


Meet our Valedictorian

Joel Loh Hwei Yung
BSc (Hons) Information Systems
(Business Analytics)
Sunway-Lancaster University



"I am who I am because of all the 'yum cha' conversations I had at Rock Café with my friends. I am who I am because of all the lecturers who challenged my ideas and opinions. I am who I am because of all my friendly rivals who spurred me on to greater heights."



"I'm reminded of a famous quote by Isaac Newton: 'If I have seen further, it is by standing on the shoulders of giants.' Truly, the people around me are the giants that I stand on."

Research Collaboration

Staff Name	Department/Centre/Group	Partner/ Institution	Validity	Purpose of Scope
Assoc. Prof. Dr Adarsh Pandey Kumar	Research Centre for Nano-Materials and Energy Technology (RCNMET)	Technological Institute of the Philippines	3 years	The purpose of this MOU is to strengthen the academic collaboration between the two parties.

Welcome New SET Members



Dr Amr Rady Abdelgaleel Radwan
Research Fellow
Graphene and Advanced 2D Materials Research Group



Athirah Mohd Ramly
Lecturer
Department of Computing and Information Systems