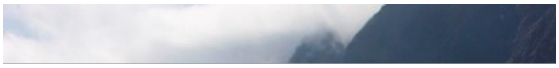
# KASEA Quarterly

## ICT and Cybersecurity



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Korean Academy of Scientists and Engineers in Australasia

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KASEA Quarterly

**KASEA**
**Quarterly Vol.1 Issue 3**

# ICT and Cybersecurity

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## *Greetings from KASEA President*

Dear KASEA members and supporters,

The end of 2022 is fast approaching, and I hope the festive session treats you kindly. On behalf of the KASEA Quarterly editorial board, I sincerely thank you for your incredible resilience and contributions to KASEA amid COVID-19. While we went through somewhat bumpy roads in 2022, there are several congratulatory remarks and collective achievements. A.Prof Dan Kim and Dr Jun Bae successfully completed the next-generation workshops in Brisbane, Sydney and Hobart this year, and Dr Brian Lee won the KOFST special grant for the innovation and network workshop that will be held in Singapore.
In 2023 we will host the international AKC in Sydney, the second AKC conference in Sydney and the first conference since COVID-19. Your continuing support and participation are essential, and the organising committee is working hard to achieve the expected outcomes.

This KASEA Quarterly contains a timely important topic in Australia. Cybersecurity, such as Optus and Medibank data security breaches, has become a national issue. Learning from the cybersecurity workshops, the Quarterly issue brings together various research projects, policies and pedagogical responses to cybersecurity in Australia. I am sure that the invited articles in this volume are of your interest and stimulate your intellectual curiosity.

I wish you all the very best Christmas and a Happy New Year!

Yours sincerely,

Professor Hoon Han
President of KASEA

## *Greetings from The Editor-in-Chief*

As per usual, it has been a hectic year, but this year even more so due to slow recovery from the COVID pandemic while everyone was trying to get back to some semblance of normality. Nevertheless, we have to admit that we are now in a new post-pandemic era and the new norm retains regularly working from home as a substantial mode for many of us, with many collaborations online via seemingly ubiquitous technologies like Zoom. Interactions, the exchange of ideas, and making achievements via electronic media now seems far more important than ever before.

Looking back as 2022 draws to a close, there was also a remarkable achievement through the introduction of KASEA Quarterly. The inaugural issue commenced in March this year with a special article, "The Future of Hydrogen Vehicles" by Prof Shawn Sang Hoon Kook of the University of NSW. KASEA Quarterly Issue 2 introduced new findings around the current progress of research in Nano Science and Quantum Physics.

The third issue includes a special article on how we train, motivate, and inspire ICT graduates while meeting industry demands and academic rigour. Effective cyber security has recently been brought into the public focus due to much-publicised data security events of late, and it is one of the most important topics for our daily lives as we become more and more heavily dependent upon the digital world. Timely workshops were organised by Associate Professor Dan Kim to share the aspects and outcomes of cyber security from different aspects of expertise in three different cities of Australia.

We are looking forward to having valuable and interesting contributions from our KASEA members as well as special invitees in many areas of expertise to our community in 2023. Future issues will feature brilliant research experiences and their outcomes in many and exciting fields of science in 2023!

We, the editorial team, wish all of you and your families a safe and merry Christmas season and we look forward to sharing research achievements with you in the year ahead.

Merry Christmas and a Happy New Year!

Dr Soonja Yeom
Editor-in-chief

# The challenges of providing job-ready ICT graduates when the job keeps evolving

Associate Professor Nicole Herbert
Deputy associate Dean Student Engagement and Retention
College of Science and Engineering
University of Tasmania

**New innovations and technologies are rapidly increasing the richness and complexity of the information and communication technology (ICT) industry. Many other industries have also undergone operational digital transformation as the pandemic changed the economic environment. These changes have created a huge demand for specialised technology employees.**

The ICT industry is one of the fastest-growing economies in Australia, from 2020 to 2021 the industry grew by 8% and it could have been higher if it wasn't for the lack of qualified employees [4]. By 2024, it is predicted that there will be over 1 million technology workers in Australia if sufficiently qualified employees can be recruited [4]. Domestic admissions in Australian ICT degrees have experienced a 9% growth over the last few years, and ICT is now the second highest field of study in Australia [4]. Skilled migration and temporary workers are a major pipeline for the ICT industry in Australia, but Covid-19 and the imposed travel restrictions resulted in a 50% reduction in the pipeline in 2020-21 compared to 2018-19 [4]. The same travel restrictions also impacted international admissions in ICT degrees, with a 15% decline experienced in Australia in 2022 [4].

The ICT industry has developed and evolved at a robust pace due to the rapid advancement of technology. The pandemic spurred a digital transformation of the operational aspects of many industries. Australia's Digital Pulse 2022 [4] identified that as businesses are becoming more reliant on technology, there is huge demand for employees with specialised technological skills especially in the emerging areas of cloud computing, data analytics, internet of things and cybersecurity.

In 2022, the Australian Computing Society (ACS) conducted a survey of the Australian ICT sector landscape and identified the 20 highest in-demand ICT occupations based on advertised positions and identified the fastest growing ICT occupations over the last five years [3]. Traditional roles such as software developer (someone who designs and codes software) and computer systems engineer (someone who creates and maintains computer and data networks) continue to be in very high demand. Over the last five

years there has been over 100% growth in demand for data-related roles such as data scientist (someone who provides actionable recommendations by analysing data using statistical analysis and machine learning techniques) and database architect (someone who builds integrated data systems). Similarly, cybersecurity roles such as cybersecurity analyst (someone who analyses the security of large data systems) and security management specialist (someone who designs and monitors IT security measures and responds to security breaches) have also experienced significant growth over the last five years. To address the changing skills gap, the Australian Department of Home Affairs recently added more ICT-related occupations to its skills priority list which is used for Australian immigration purposes [6].

ICT career outcomes provide a vital connection between the ICT industry, universities, and ICT graduates. ICT curricula designers are required to demonstrate that students will be qualified for the career outcomes available when they graduate. Evolving ICT career outcomes makes it difficult for ICT curricula designers to know what career outcomes to use as a basis for their ICT curricula and makes it difficult for graduates to know what roles they will be qualified for in a rapidly changing industry [7].

Universities are required to regularly review their curricula, typically on a three-to-five yearly basis, to ensure that they are meeting the current needs of all stakeholders [8]. Most ICT curricula – including the traditional computer science, information technology, and information systems curricula but also the more recent cybersecurity, artificial intelligence, and data science curricula – also seek accreditation by the ACS every five years [1]. ICT courses cannot respond quickly enough to technological and industry change. By the time an ICT curriculum is reviewed, redesigned, and then approved for implementation it can be outdated. A recent survey from the Australian Information Industry Association (AIIA) reported that Australian ICT graduates aren't meeting industry standards with many needing on-the-job training to be effective employees [2]. Many employers reported that graduates required additional training.

One complication is that businesses require graduates to have experience with a variety of specific vendor tools and technologies. It is unrealistic for ICT curricula to provide graduates with experience with every programming language and vendor specific tool or technology, particularly in an industry that is constantly evolving. What tertiary education can do is help students develop the ability to self-learn by expanding the way they learn and prepare them for a career that involves life-long learning. When they enter the workforce, graduates might need some specific vendor tool training depending on where they are employed, but tertiary graduates should be able to do that training with minimal supervision and faster than someone without a degree.

Another complication widely reported is the lack

of soft skills such as literacy, numeracy, problem solving, emotional intelligence, leadership, and teamwork. Curricula designers have been investigating opportunities to integrate development of these skills throughout a curriculum for many years with varied levels of success [9].

In response to the growing demand for qualified employees, universities are evolving their qualification delivery approaches. ICT curricula designers are exploring options to shorten the time to get a professional qualification and to provide opportunities for graduates to acquire a qualification for a specific vendor tool. A trimester approach to delivery is being explored by many Australian universities to reduce the time to complete a degree. In response to government changes, many universities are now offering short courses, undergraduate certificates, or micro credentials to provide a range of qualifications that only involve a limited time commitment. Some universities are embedding a variety of industry vendor certifications within these different qualifications.

To truly create job-ready graduates industry needs to effectively engage in the tertiary training as well. For graduates to be job-ready they need to engage with some authentic experiences. Industry can assist by providing authentic business challenges that the students can undertake as projects during their capstone experiences that are required in an accredited ICT course. Alternatively, industry could assist with placements or internship experiences that students can undertake while studying. Industry members could also come into the classroom as guest lecturers or tutors to provide an authentic context to the knowledge and skills that academics are developing within graduates.

Working in partnership industry and universities can provide the qualified workforce that Australia needs.

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Bio: Dr Herbert has been a member of academic staff at the University of Tasmania since 1999. Nicole has received many teaching awards throughout her career culminating in 2016 when she was awarded the only UTAS Vice Chancellor's Teaching Excellence award for that year, which recognised her sustained contribution to learning and teaching in the field of ICT. This was followed in 2017 by an AAUT Citation for Outstanding Contributions to Student Learning for leading the design, development and delivery of an industry-engaged curriculum that integrates professionalism with technical skills to enhance the employability of ICT graduates. In 2014 she was awarded the 2014 IAWARDS Tasmanian ICT Educator of the Year. She was the lead for a comprehensive ICT curriculum renewal throughout 2012-2014. She is currently the Deputy Academic Dean Academic Transformation and Student Retention and Success for the College of Sciences and Engineering and Associate Head Learning and Teaching for the Syndicate of Technology, Environments, and Design. Her research is focused on Science and ICT curriculum design and development and providing an outstanding learning experience for the students.

# Blockchain based renewable energy trading system with smart contract in a small local community

Dr. Soonja Yeom
School of ICT
University of Tasmania

**Abstract**

With the high interest in the peer to peer (P2P) energy trading system, blockchain technology has increased attention as a solution to alleviate the current challenges in the centralised energy system. The study set out to discover how blockchain could be used for microgrid while controlling the scalability to encourage peer-to-peer energy trading with the assumption of the average dwelling density at around 20-30 households. The results showed that there is a scalability challenge in the blockchain as the network grows; however, the blockchain technology can be applied in the community which has a similar size with Hobart as there is no significant difference in the execution time up to 100 nodes while accumulating the transactions. Additionally, the study also found mining time, transaction fee and transactions number in the block are also related to the execution time. Therefore, these parameters should be considered to build a scalable blockchain for a microgrid.

**Energy System and Blockchain**

Blockchain is suggested as a novel solution to build a decentralised energy system and resolve the trust issue between traders and energy trading centre. Blockchain is a shared and distributed database that contains all the transaction that ever executed in the system and their chronological order. Data in the form of transactions are formatted into a block, which is timestamped and cryptographically connected to previous blocks [1]

Blockchain can be categorised into public, private and consortium based on the system architecture [2]. Public blockchain such as Bitcoin, is entirely distributed and opened to any entity as any entity can participate or contribute to validate or initiate the transactions. On the contrary, with a private blockchain, there is a restriction on the user's access to the system. Only authorised members can start or validate the transactions in the network. A consortium blockchain, as known as hybrids, is a partially decentralised system constructed by several organisations as consensus decision will be undertaken by the pre-selected group

The advantages of using blockchain to microgrid are linked to the characteristics of the blockchain. The major benefits of the blockchain are the

decentralisation of trust, increased transparency, increase resilience and increased security. Due to the challenges in the current system with the revolution in the energy sector, blockchain technology has introduced as a powerful method to manage decentralised and distributed complex energy system [3]. Recognising its potential, diverse entities, including industries and academics, have launched ventures to develop blockchain in energy trading.

**Methodology**

The methodology for the research was set up two experiments to evaluate the scalability of the blockchain-based protocol with and without the smart contract interaction.

The experiment was conducted based on the following assumptions: 1)P2P (peer to peer) trading market is competitive, 2) the energy market is formed with a small residential area, and the service charge of the platform is neglected, 3) Smart meters are applied in each of the houses and able to perform accordingly 4) Microgrids are formed within a neighbourhood with negligible social inequality and owned by a community, and 5) small local community is defined as residential size is similar to Hobart in which has the average dwelling density at around 20-30 household. Solidity, which is an object-oriented programming language developed and maintained by Ethereum foundation to implement smart contracts, was used to configure smart contract. Ethereum testnets simulates the Ethereum network which permits developers to test their projects before deploying on the main Ethereum network by providing four main testnets (Ropsten, Kovan, Rinkeby and Goerli). Ropsten is based on PoW consensus algorithm while others are built on PoA consensus algorithm. Smart contract was deployed on two different Ethereum testnets: Ropsten and Rinkeby to collect the comparison data. The rule of energy trading is defined in the smart contract, and it is executed based on the scenario (Figure 1).

**A part of results and discussion: Change in the number of nodes and transaction**

The number of nodes and transaction was increased up to 1,000 and 10,000 respectively to examine whether an increase in the nodes and transaction creates a delay in the transaction process. The result showed a significant correlation of 0.342 ($p < 0.01$) between the number of transactions and the execution time. When the impact of the size of nodes along with accumulating transactions, the correlation between the number of nodes and the execution time was also significant (0.914, $p<0.01$). It can be interpreted that as more nodes are connected to the blockchain and more transactions are occurring in the blockchain, more time is required. Therefore, as the number of nodes and transaction grows, it could cause the latency in the processing time. The correlation coefficient between time and node is higher than those between time and the

transaction; hence it can be suggested that the network size plays a key factor that causes the delay of the execution time in the network than

how many transactions are sent to the network.

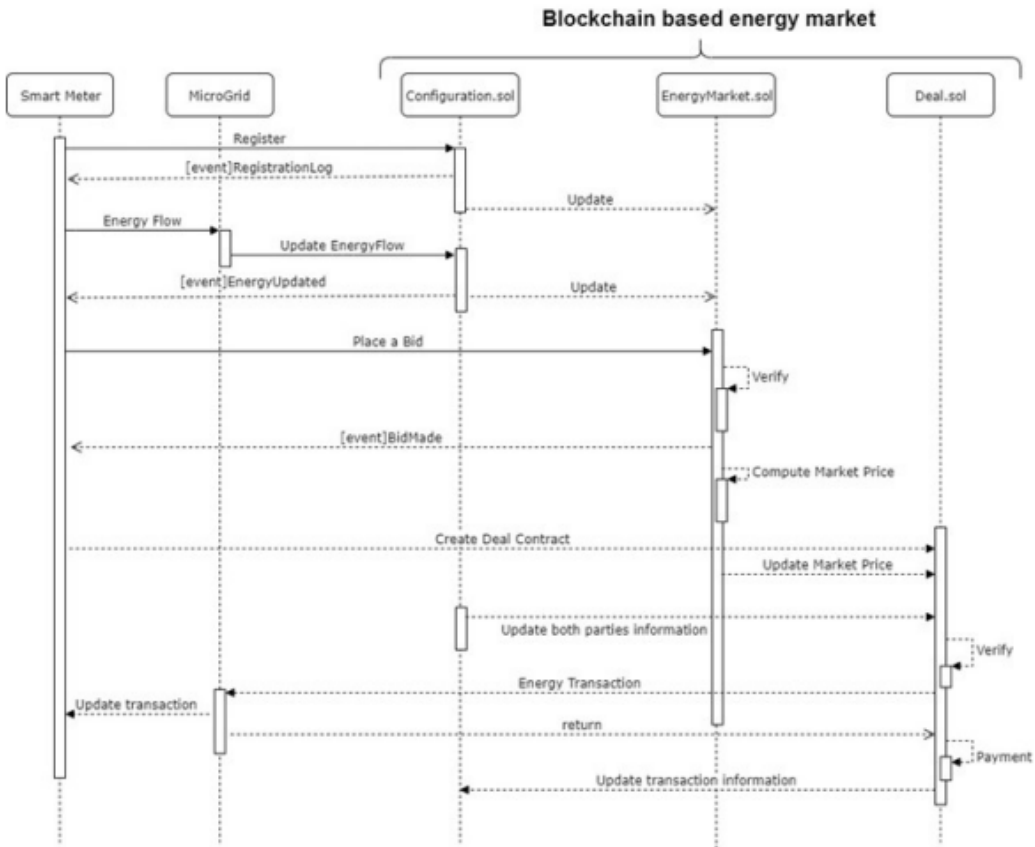


Figure 1: The sequence diagram for blockchain-based energy trading market with a smart contract.

**Conclusion**

The movement toward distributed and decentralised energy systems with microgrid requires the change in the current energy system. Blockchain has come to the fore in the energy system with microgrid to build a secure and transparent distributed energy system [4]. The research was conducted to investigate how blockchain technology could be deployed to settle electricity trade in a microgrid by targeting a small size community. The results from data analysis show that there is a scalability challenge with the increase in the number of nodes. However, the research found that the network can be scalable up to 100 nodes with a high number of transactions. Therefore, the blockchain system is capable of electricity trading for a microgrid in a residential area by allowing the connection of the microgrid up to 100 based on the geographic location. Additionally, a scalable blockchain for microgrid system can be achieved by considering consensus algorithms and other parameters such as the number of transactions included in the block. It proves that blockchain

can be used as the back end for a system in the microgrid.

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Bio: Dr Yeom has been an academic staff member and has held various administrative roles at the University of Tasmania since 1994. Soonja has received many teaching awards throughout her academic career. In more recent years, Dr Yeom has focused more on research, research training and supervision. Her research interests include Natural Language Processing, Big Data, Deep Learning, Affective Computing and Educational Technology. Soonja is a member of Working Group 3.3 (research into educational applications of information technologies) for IFIP/UNESCO.

# KASEA Cybersecurity Workshop

## Cyber education, Authentication, blockchain application

QLD Branch: A/Prof Dan Kim (University of Queensland), Dr. Jun Seok Bae (CSIRO)
TAS Branch: Dr. Soonja Yeom (University of Tasmania)

**How does this sound: Cyber climate change and the impact on Higher education**

Prof. Anna Shillabeer

Abstract: Cybercrime is changing rapidly and new vectors are being exposed constantly. Australia experiences a cyber attack every 10 minutes and has the potential to not only impact business operations but every member of our population. With cyber experts being in low supply and able to attract large salaries in major mainland cities, how can the SME's in Tasmania be sure that they are protected from the impact of cyber crime? This presentation will explore what the University of Tasmania is doing to increase cyber capability across the state.

Bio: Professor Anna Shillabeer is a PhD qualified computer scientist with 20 years experience as a higher education academic. Her research focus is sustainable health solutions, workforce capacity building, higher education renovation and cross-cultural education.

Before joining The University of Tasmania, Anna was a Dean of School and a lecturer in information security and data management at Flinders University following 4 years as Head of School for RMIT in Vietnam. She has also been an international higher education quality assurance consultant and has sat on the TEQSA panel of academic experts since 2011. Her non academic career pathway includes time as an education and health consultant with one of the Big 4 consulting companies and as a self employed IT consultant.

Anna brings a passion for cross-disciplinary teaching and research and thinking outside of the traditional education square

**Cybersecurity Education for Postgraduate Students**

Dr. David Herbert

Abstract: The Master of Information Technology and Systems (MITS) course at the University of Tasmania (UTAS), like many postgraduate degree courses in Australian Universities, accepts students who possess diverse undergraduate degrees from across the globe. Many of the MITS students previous studies were focused in non-ICT courses (such as Arts, Business, Nursing). This presents challenges in the delivery and assessment of a cybersecurity-focused specialisation that produces quality graduates without compromising the pedagogical rigour of a Masters-level course. In this talk I will discuss

the challenges faced while delivering an engaging and authentic learning experience in three subjects that form part of the MITS Cybersecurity specialisation - KIT501 ICT Systems Administration Fundamentals, KIT715 Cybersecurity and Ethical Hacking and KIT726 System Administration and Security Assurance.

Bio: He received the Bachelor of Science degree, in 1991, followed by Honours, in 1992, and the Ph.D. degree in artificial intelligence from the University of Tasmania, Hobart, in 2020. From 1997 to 2016, he was a Senior Technical Officer and is a Lecturer with the School of Computing, University of Tasmania. His research interests include knowledge base systems, natural language processing, embedded systems, robotics, and cyber security.

**Authentication through adaptive multimodal biometric approaches**

Miss Riseul Ryu

Abstract: Biometric authentication has been a focus in both theoretical and applied research recently, with considerable application as an alternative for password-dominated schemes. Despite its huge potential, biometric systems suffer from decreasing recognition performance due to varying environmental conditions and sample ageing, which cause intra-class variability. Adaptive biometric authentication systems have been proposed to address these deficiencies by dynamically changing their sampling and recognition processes in response to changes in the operating environment. The study examines issues of existing adaptive biometric authentication systems and proposes a design for an adaptive biometric authentication system using multiple biometric traits. The system combines the physiological and behavioural characteristics of individual, adapts the biometric template in response to the change due to the time and proposes a user dependent threshold for better recognition performance.

Bio: She is a PhD candidate in University of Tasmania. She is also working as a casual academic staff with the Discipline of ICT, University of Tasmania. Her project title is adaptive multimodal biometric authentication. She is working on how the recognition accuracy can be improved with adaptive approaches. Her research interests are biometric system, cyber security and blockchain.

**Blockchain-based Decentralized Mechanism for Conversation system**

Dr. Wenli Yang

Abstract: Conversation systems play an important role in the research and development of multidomain systems, in which the number of conversations increases rapidly with the number of domains. Multiple experts must maintain these conversation interactions, otherwise experts from different domains are unable to interact properly. For this reason, ensuring secure and efficient cooperation between different experts has become a serious issue that needs to be resolved.

Blockchain has shown its potential for solving and

enhancing traditional solutions with its key features: autonomous and decentralized processing, smart contractual enforcement of goals and traceable trustworthiness in tamper-proof transactions and so on. With the development of blockchain technology, the value of blockchain is not only to hold crypto-currencies but to allow the integration of a huge panoply of systems over the same platform in a decentralized and secure way. Although existing projects opened many doors, but the integration of conversation interaction with the blockchain is still in an early prototype stage, and many essential characteristics need to be conducted and improved. In this study, we aim to provide a novel decentralized and transparent platform for multiple conversation experts to maintain and share conversation contents in a trust and security manner, which can be applied to process multiple conversation interactions from different domains concurrently based on the reputation-driven consensus mechanism.

Bio: Dr Wenli Yang received the B.E. degree in Communication Engineering from Wuhan University, Wuhan, China, in 2007, and got the Ph.D. degree in System Analysis and Integration from Huazhong University of Science and Technology, Wuhan, China, in 2012, during her Ph.D, she also studied in University of California, Davis as a visiting scholar. She was an Associate Professor in China, and now she is a PhD student in the School of Technology, Environments and Design, University of Tasmania. Her research area includes
blockchain, machine learning and expert systems.

# ACT-NSW Joint Branch Meeting

Won Hee Kang (Western Sydney University)

**Bridging science and policy**

Dr. Jong Lee (Murray-Darling Basin Authority)

Abstract: In water resource management, scientific and technical information is a critical part to have robust policy discussions and decisions. Even though best available information is used to derive the scientific and technical data, it is often developed based on different assumptions built for different purposes. Some examples of how modelling results are developed and used to inform policy discussions are presented. Key challenges in bridging technical and scientific information to policy discussions/decisions are also presented.

Bio: Director, Hydrologic Applications
Basin Strategy and Knowledge
Murray-Darling Basin Authority

Jong, after completing his PhD at University at Adelaide, joined Murray-Darling Basin Commission (which became Murray-Darling Basin Authority by the enactment of Water Act 2007) in December 2006 as a hydrologic modeller. Murray-Darling Basin Authority is an independent statutory arm of Department of Climate Change, Energy, Environment and Water, looking after policy development and implementation of water management in Murray-Darling Basin. Over the last 16 years, Jong had led a team to provide specialised technical advice for various water policy implementations including the Basin Plan which is the biggest water reform in Australian history aiming to strike a balance between different water users and environment.

**GA laboratory - capabilities and contribution to National Geoscience programs**

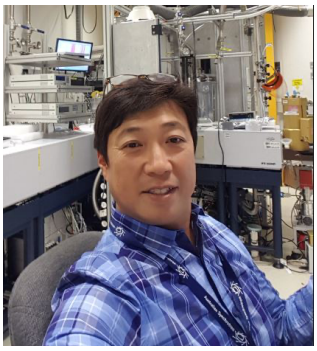
Dr. Jae Ho Sohn (Geoscience Australia)

Abstract: Geochemistry is the study of the chemical processes which form and shape the Earth. It includes the study of the cycles of matter and energy which transport the Earth's chemical components and the interaction of these cycles with the hydrosphere and the atmosphere.

Geoscience Australia maintains a variety of high quality, state-of-the-art facilities for geochemical analysis of natural systems to help discover how and when the various parts of the Australian continent were formed and how these were

shaped by later events such as deformation, alteration, mineralisation and regolith formation. Geochemistry is used also to help understand how petroleum and mineral systems operate and in the study of groundwater, marine and coastal habitats, and other environmental issues.

This talk will guide you through the Geoscience Australia Laboratory, paying particular focus to our core analytical capabilities in Organic Geochemistry. You will hear how the labs are evolving as we build new facilities and build on our capabilities, especially in helping industry and government safely and sustainably discover traditional and future energy resources, whilst accelerating society's transition to carbon neutrality through fundamental and applied research on carbon capture and storage (CCS) and hydrogen energy sources.



Bio: Senior Analytical Geochemist, Geoscience Australia Laboratories
Minerals, Energy and Groundwater Division
Geoscience Australia

Jae Ho is a senior Analytical Geochemist at Geoscience Australia (GA). He received his B.S and M.S. from the Seoul National University in Korea and his Ph.D. in 2005 from the University of Southern Queensland, Australia. After working at Department of Primary Industries in Queensland Government, He joined the Geoscience Australia Laboratories in Minerals, Energy and Groundwater Division of GA in August, 2012.

Jae Ho's research interests are focusing on include helping industry and government sustainably discover traditional and future energy resources, whilst accelerating society's transition to carbon neutrality on carbon capture and storage (CCS) and hydrogen energy.

His particular interest is in instrumental and chemical analysis of oil and gas samples with emphasis on the stable isotope measurements. In his current role, he has been in charge of operating a wide range of isotope ratio mass spectrometers and peripherals such as GC, GC-MS and elemental analysers. These instruments are used to measure isotopic signatures of natural gases, oils, source rocks, marine sediments, water and CCS samples.

**Collaborative Distributed Systems: Enabling Technologies for AI, Cybersecurity, Data Science and Many More**

Dr. Young Choon Lee (Macquarie University)

Abstract: To date, nearly every ICT service is powered by cloud data centres, cloud servers to be precise. Servers, whether they are in a private (cloud) data centre or in a public cloud (e.g., Amazon Web Services, Microsoft Azure or Google Cloud Platform), are typical computing resources for distributed systems. In the meantime, edge computing devices, such as smartphones, smart watches and dash cams are becoming a new breed of distributed computing resources with the power of ubiquity. Edge devices often serve as the low-latency computing platform for Internet of Things (IoT). Collaborative Distributed Computing is an emerging computing paradigm that leverages the seamless access to

heterogeneous resources across edge computing platforms and clouds, and that plays a key role in enabling emerging applications and services of AI, Cyber security, Data Science and many more. In this research, we aim to develop a cross-platform resource management framework that realises collaborative distributed computing. The efficient use of any computing systems heavily depends on their resource management techniques. Collaborative distributed systems are no exception.

Bio: PhD, Senior Lecturer
School of Computing
Macquarie University

Young Choon Lee is a senior lecturer at the School of Computing, Macquarie University, Sydney, Australia. He received his Bachelor of Science (with honour) and PhD from The University of Sydney, Australia, 2004 and 2008, respectively. His research interests include distributed systems and high performance computing.

**Lunar Micro-tunnelling Stab**

A/Prof Joung Oh (UNSW)

Abstract: Applications of tunnels on Earth range from exploration, exploitation, transportation, and infrastructure to human habitation. Similarly, with the increased focus on habitation on the Moon, tunnels will be required to support these operations. Geomechanical properties are key factors in successfully drilling a tunnel. These properties along with excavation dimensions must be appropriate for the tunnel's stability.

The research outlined in this paper aims to determine the stability of small-diameter horizontal tunnels in lunar regolith and conditions using the capability of the Discrete Element Method (DEM). The YADE DEM program was used for the numerical analysis in this paper. Lunar regolith data from various published papers and simulated triaxial testing have been used for model calibration. Results yield a tunnel stability chart showing size and stability increase with sample compaction and decrease with an increase in tunnel diameter. Seismicity tests also show that low-level vibrations destabilise the tunnel with ease.

Bio: Joung is an Associate Professor in the School of Minerals and Energy Resources Engineering experienced, mainly in the United States and Australia, in rock mechanics, tunnelling support systems, and numerical modelling. Currently, he teaches and researches primarily in the area of mining geomechanics. His research interests include tunnelling and underground space development, coupled behaviour of rock discontinuities, ground-structure interaction, and off-earth mining. He completed his PhD in civil engineering with an emphasis on geotechnical engineering at the

University of Illinois at Urbana-Champaign in 2005. Prior to joining UNSW in 2013, he was employed at Parsons Brinckerhoff (PB) in New York City, US as a professional (registered) engineer. Joung is currently leading and participating in several industries- and government-sponsored projects. Currently, he is supervising 12 PhD students, including 9 PhDs and 1 master to completion.

Professional services

Member, International Society for Rock Mechanics (ISRM), Planetary Rock Mechanics Committee

Member, Society of Mining Professors (SOMP), Research, Development & Industry Committee

Member, The Institution of Engineers Australia

Member, Australasian Tunnelling Society

Member, Australian Institute of Mining & Metallurgy (AusIMM)

Member, Australian Geomechanics Society

Professional Engineer (PE), MI, USA

Editor Board Member, International Journal of Mining Science and Technology, Elsevier

Scientific Editor, Journal of Rock Mechanics and Geotechnical Engineering, Elsevier

# Reflection on YGF program

Stella Lee (Bachelor of Science, University of Queensland)

**Why I applied for YGF**

I always wanted to be more part of the Korean community and experience their culture and make more Korean friends who study the same or similar degrees. So, after seeing the advertisement at my university's Korean society about YGF, I applied without much hesitation. Although the thought of 'networking' gave me a little fright, it was more like making friends and having a good time with the other members as everyone became close pretty quickly.

**YGF Highlights**

From morning to dinner, YGF has a structured itinerary about what will happen each day. First two days were spent at the hotel; we did ice-breaking, group work, introducing each country, networking with YPF members as well as talking and listening to science leaders, engineers and startup entrepreneurs. It was an eye-opening experience to listen to the experience of past members who participated at YGF in the last few years to where they have ended up now and gave me a range of careers that I can take onto in the future. The last three days were spent travelling to Daejeon, the DMZ and museums to observe scientific advancements in Korea and Korean culture which was very intriguing and enjoyable. It was well planned out, with buses and restaurants set for each day.

I would say the most exciting part is hanging out with other members of YGF after the set itinerary, such as going out to Hangang at night, exploring Gangnam, having a little drink, going karaoke and playing games at the hotel. Some groups who had time also hung out after YGF program and explored Korea more. It was a really valuable bonding session with fellow students around the globe and I will forever cherish the friendships I have made in these five days.

**My Top Tips**

Apply for YGF! YGF not only helped me academically and career-wise but I had a memorable and fun time. I made many friends from the USA, Canada, France, Netherlands and many more and explored Korea and their science facilities, all planned out by the KOFST members. I would say go out there and even though you might not get enough sleep from hanging out every day, it is really worth the time.

Jaeho Lee (PhD candidate, The University of Queensland)

I participated in YPF to expand my professional network and meet researchers in different fields. The forum was a five-day program including a two-day session for group discussion, keynote speech, introduction of research institutions and networking dinners with YPF/YGF alumni. After these professional events, another two days were spent on tours of science institutions and cultural experience. I visited KARI (Korea Airospace Research Institute), KAERI (Korea Atomic Energy Research Institute), DMZ and National Museum of Korea. Exploring KAERI was a particular interest of mine as Korea is a leading country in nuclear power plant technology and I was privileged to see the actual project the researchers were working on and a Q&A session with the team was also held. One of the most memorable cultural experience activities was engraving my own name stone seal with a cutting knife at the National Museum of Korea. The entire program was well planned with a good balance between professional and cultural experiences for the 2nd generation Korean scientists living abroad. I must say it's a great opportunity for young professionals/graduates who live abroad to expand their global network and explore Korean cultures and research institutions. I want to say big thanks to KASEA and KOFST for organising this great event.

# KASEA Partnership

Korean Federation of Science and Technology Societies

KOFST

Hyundai Motor Company

HYUNDAI

NGV

Korean Scientists and Engineers Association in Singapore

싱가폴 한인과학기술자협회

Korean Scientists and Engineers Association in Singapore

Korean Scientists and Engineers Association in China

KSEACH

재중한인과학기술자협회

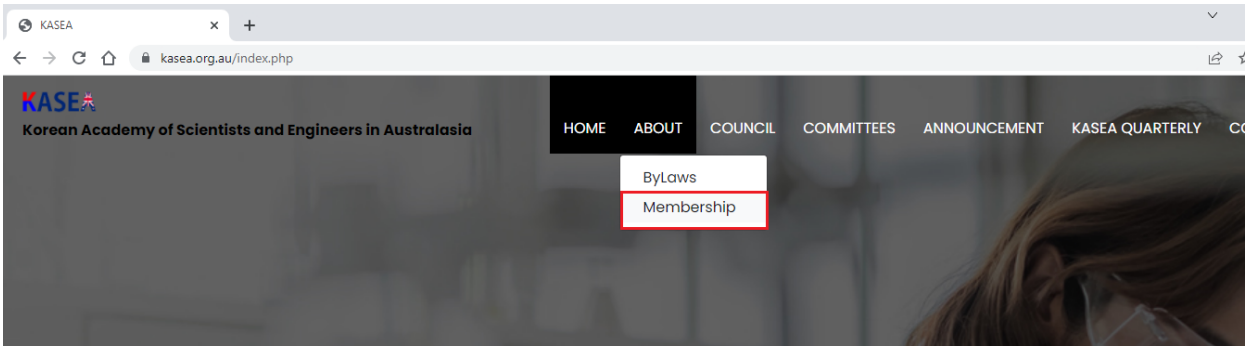
재중한인과학기술자협회

Korean Scientists and Engineers Association in China

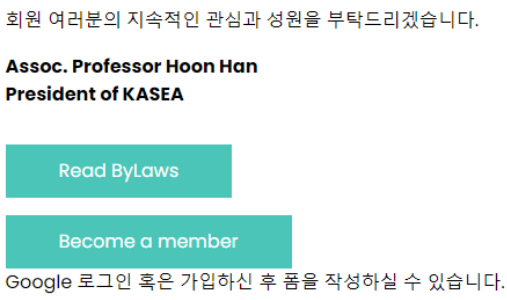
# Guideline to become a member of KASEA

**Step 1:** Go to KASEA homepage (https://kasea.org.au/index.php)

**Step 2:** Place the mouse upon "ABOUT" in the navigation bar, then you will see the "MEMBERSHIP" in the drop box menu.




Or, click ABOUT then click "BECOME A MEMBER" button in the bottom of the page.




**Step 3:** Login with Google account

(If you don't have Google account, please register into Google then you can submit the registration form.

**Step 4:** Submit the registration form to complete the process.

# KASEA Member List

**Appendix: KASEA Member List**

**Australia**

| |
|---|
| Kyeong Kang |
| Byoung Ho Kang |
| Seungha Kang |
| Khang Yeon Suk |
| Woohee Kang |
| Tae Kyoung Kong |
| Tae-Ryang Koo |
| Sanghoon Kook |
| Suhyeon Kwon |
| Jisoo Amy Kwon |
| Daniel Kwon |
| Daeyoung Kim |
| Daechoul Kim |
| Hannah Kim |
| DongSeong (Dan) Kim |
| DongJin Kim |
| Tony Kim |
| Moonyong Kim |
| Min |
| Sunny Kim |
| Sungho Kim |
| Sejeong Kim |
| Kim Sumin |
| Sooji Kim |
| Seung Yun Kim |
| Seungwon Kim |
| Yang Sock Kim |
| Eon (Kyung) Kim |
| Sunny Kim |
| Yeonwoo Kim |
| Young Ki Kim |
| Youngil Kim |
| YoungTae Kim |
| Youngho Kim |
| Woojeong Kim |
| Woojin Kim |
| Yoojin Kim |
| Ilgu Kim |
| JangHyun Kim |
| Jungsoo Kim |

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|---|
| Jungho Kim |
| Jong Won Kim |
| Jinman Kim |
| Jin-Soo Kim |
| Jinu Kim |
| Taekyun Kim |
| Taehwan Kim |
| Taehoon kim |
| Pureum Kim |
| Ho-Sung Kim |
| Howan Kim |
| In Sun Na |
| Jenny Namkoong |
| Jeung Hwan Doh |
| Dongryul Ryu |
| Riseul Ryu |
| Hyeuk Ryu |
| HoKyoung Ryu |
| Kangmin Moon |
| Chun Yong Moon |
| Mira Park |
| Migeong (May) Park |
| Seokchon Park |
| Young Sun Park |
| Yunghaah Park |
| Joo Yeon Park |
| Juyoung Park |
| Hangil Park |
| Hyejune Park |
| Hongjoo Park |
| Jun Seok Bae |
| Seungwoo Paik |
| Jong Min (Joseph) Baek |
| Chun Woo Baek |
| HyeYoung Paik |
| Hyunsin Hedy Sung |
| Sungwook Son |
| Jacob Sohn |
| Jenny Sohn |
| Anna Song |
| Joo Hee Song |
| Tim Song |
| Jason Song |
| Hyejin Song |

| |
|---|
| Hyun Seung Shin |
| Changbeom Shim |
| Euijoon Ahn |
| Ji Hyun Yang |
| In-Young Yeo |
| Soon Ja Yeom |
| Joung Oh |
| Jinhee Woo |
| Changhwan Woo |
| Sunhyung Yoo |
| Jung Hyun Yoo |
| Jung Heum Yoo |
| Taeho Yoo |
| Paul Yoo |
| Doo Man Yoon |
| Mihee Youn |
| SungHee Yoon |
| JungHo Yoon |
| Haena Yoon |
| Hong-Key Yoon |
| Hwan-Jin Yoon |
| HeeGuen Yoon |
| Kyoung Mi Lee |
| Keunwoo Lee |
| John Lee |
| Doowon Lee |
| Mihwa Lee |
| Minchul Lee |
| Bokyung Lee |
| BoRa Lee |
| SangYoung LEE |
| Sangmin Lee |
| Sang Youp Lee |
| Sangyoon Lee |
| SangHee Lee |
| Saemi Lee |
| Sung Une (Sunny) Lee |
| Sehyeong Lee |
| Su Gil Lee |
| Seunghyeon Lee |
| Seung Ho Lee |
| Young Chun Lee |

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| Woojin Lee |
| Woojin Lee |
| Ikje Lee |
| Jaeho Lee |
| Ray Lee |
| Jungah Lee |
| Juhyun Lee |
| Jiwon Lee |
| Jiyoon Lee |
| Jean Lee |
| Brian Lee |
| Hojun Lee |
| Hoyul lee |
| Joon Lim |
| Nam Lim |
| Samsung Lim |
| Sophie Soyeon Lim |
| Sooa Lim |
| Jihoo Lim |
| Taejun Lim |
| Daniel Kyoung-oh Jang |
| Seo-Won Chang |
| Se Eun Jang |
| Eric Won Keun Chang |
| Rachel Yoonkyung Chang |
| Eun Jung (Jang) Holden |
| Ilhan Chang |
| Junhyuk Jang |
| Yujung Jeon |
| Sang Chul Jeong |
| Shin-Ho Chung |
| Yea Won Jung |
| Woncheol Jung |
| Youn Jin CHUNG |
| Younhyun Jung |
| Jisu Jung |
| Hyunsuk Chung |
| Sungsoo Jo |
| Sae Rom (Lucy) Jo |
| Michelle Cho |
| Jaehyang Cho |
| Jun Jo |

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|---|
| HaeWon Jo |
| Yang Il Jin |
| Min Kyung Chae |
| Soryong Chae |
| Wooseong Cheon |
| Duk-Yong Choi |
| Bo Bae Choi |
| Robyn Choi |
| Jane Choi |
| JAEHOON CHOI |
| Jin Woong Choi |
| Jin Choi |
| Hyun Choi |
| Wooseock HA |
| William Ha |
| Soyeon Caren Han |
| Crystal Han |
| Shin-Chan Han |
| Younghee Han |
| Han, Ekyu |
| Jung Hoon Han |
| Kyeongjin Ham |
| Yooun Heo |
| John Heo |
| Jaeyoung Heo |
| Emily Jungmin Her |
| Samuel Hyun |
| Hyeju hyun |
| Seokhee Hong |
| Jin Hong |
| Sunny Hwang |
| Changmin Hwang |

**New Zealand**

| |
|---|
| Kwangsoo Andres Kim |
| Bora Kim |
| Kim, Sally |
| Seoljong Kim |
| Jun Bo Shim |
| Young Mee Yoon |
| Dong-hyun (Don) Lee |

| |
|---|
| Bible Lee |
| Yejin Lee |
| Peter Lee |
| Sunghoon Lim |
| Jihwi Jang |
| Hyunwoo Jun |
| Yisong (Christine) Jin |
| Hansol Cha |
| Peter Choi |
| Sun-Kyeong Han |

**South Korea**

| |
|---|
| Woongsik Kim |
| Seung Jin Lee |

# AKC 2023

## 11TH ASIA-KOREA CONFERENCE 2023

## SCIENCE AND TECHNOLOGY FOR SUSTAINABLE FUTURES

17TH ~ 19TH NOVEMBER 2023
Crowne Plaza Coogee Beach Hotel,
Sydney, Australia

Korean Academy of Scientists and Engineers in Australasia (KASEA)