Item	Details
Background	**i. Name of Academy** Academy of Engineering, Singapore (SAEng) **Point of contact for questions regarding application** Ms ONG Hui Tian (secretariat@saeng.sg), Assistant to Secretary **ii. Date of establishment of the academy** 16 June 2011 **iii. Brief description of motivation for establishment of academy and other relevant background information** SAEng was founded in 2011 by a small group of eminent Singaporean engineers to provide leadership for engineering professionals, advance engineering education, and promote engineering excellence in Singapore. The Academy also aims to strengthen Singapore's skills and knowledge base in engineering in order to support the long-term development of the nation. The Academy has 151 members (also called fellows; the two terms are interchangeable) and has established five expert groups (in water resources, land transportation, environmental protection, the connected city, and cybersecurity) to study key issues in Singapore. These expert groups deliberate and provide recommendations on national policies and issues pertaining to the field of engineering. **iv. Current leadership team** (names, brief paragraph biographies): Please refer to Attachment 1 – SAEng Executive Committee Members. **v. Describe your interest in joining CAETS** CAETS has a strong following of member academies that actively work to create engagement between engineers, engineering, and society. Joining CAETS will allow SAEng to build and broaden our visibility through CAETS's international network. It will also provide SAEng new opportunities for partnerships and collaborations as well as the chance to learn best practices from other member academies. These can then be adapted and adopted in Singapore to help SAEng achieve its goals of engaging the public and young communities in order to generate interest in engineering.

Item	Details
Membership Criterion	**a) Representative of the engineering and technological community of that country** **i. Describe the role of the academy with respect to the broader communities and other professional bodies in your country** SAEng is thoroughly engaged in promoting engineering and providing engineering expertise in Singapore. The Academy conducts studies on key technological and economic developments in the country and provides advice on engineering education, research, development, and innovation. Singapore is a country whose growth has largely been led by engineers, so the Academy strives to ensure that communities remain excited about engineering and to engage more young people in the engineering industry. To achieve this, the Academy taps on larger societies and institutions in Singapore, such as the Institution of Engineers Singapore (IES) and the National Society of Engineers in Singapore. Having members from such organisations, as well as from each university in Singapore and from industry (i.e., outside academia), helps make sure that the Academy is a complete representative of the field and sub-fields of engineering in the country.
	b) Subscribe to the non-political, non-governmental international character of the Council **i. Provide founding documents (e.g., Articles of Incorporation) that demonstrate independence from governmental influence** Refer to Attachment 2 – 1st SAEng Meeting Minutes (12 Aug 2011), and Attachment 3 – SAEng Constitution, Sections 4 and 5 **ii. Describe the role of the academy with regard to the government** The Academy is an independent society which aims to serve as a think tank or forum to deliberate hot-button issues related to the engineering profession. Leveraging on the experience and expertise of its members, the Academy steers initiatives in areas of strategic importance to the Republic of Singapore, contributing to the nation's quest to meet the challenges of the new millennium and to build a vibrant engineering community in Singapore. It is not affiliated with any government entity and maintains total independence in selecting members and appointing the leadership of the Academy.
	c) Peer elected membership with criteria for election based on significant personal contributions to engineering, technological sciences, or related activities **i. Describe membership election criteria (i.e., required qualifications)**

Item	Details
	Members (which are also called "fellows") must: • Be Singaporean citizens, permanent residents, or foreigners residing in Singapore in the preceding three years. • Be prominent engineers, engineering scientists, public officials, or leaders of academic and business communities involved in engineering • Have made significant contributions in a field of engineering and/or have major foreseeable achievements in the next 10 years **ii. Describe the election process (nomination through election)** • Potential members are nominated and supported by two current members of the Academy • Nominations are reviewed every quarter by the Fellow Nomination Committee and brought up for endorsement at ExCo meetings. • To maintain the quality of fellows admitted, with effect from 1 Jan 2023, the Fellow Nomination Committee will review the nominations accumulated over the year and select five potential members to be elected as fellows **iii. Provide relevant Bylaws or Policies** • Refer to Attachment 3 – SAEng Constitution, Sections 4 and 5
	d) Governed by its elected membership **i. Describe the leadership election process (including terms of service)** The term of office of the Committee is two years. For positions which are due for re-election, the Executive Committee (ExCo) members will propose eligible candidates for approval by the rest of the ExCo members. Once the candidates are approved, they will be put up for endorsement to the rest of the members during the Annual General Meeting (AGM). A simple majority vote is needed to endorse each member. The candidates' positions are officialised after the AGM. At any one time, the ExCo needs to consist of: • At least one member from industry, i.e., outside academia • At least one member from each university in Singapore: i. National University of Singapore ii. Nanyang Technological University iii. Singapore Management University iv. Singapore Institute of Technology v. Singapore University of Social Sciences

<table>
<tr><th>Item</th><th>Details</th></tr>
<tr><td></td><td>
vi. Singapore University of Technology and Design

ii. Describe the governance responsibilities of the elected leadership (both individuals and relevant Councils/Committees)

<table>
<tr><th colspan="2">SAEng Executive Committee</th></tr>
<tr><th>Title</th><th>Role</th></tr>
<tr><td>President</td><td>• Chairs all meetings
• Leads the overall direction of the Academy</td></tr>
<tr><td>Secretary</td><td>• Keeps all administrative records except financial records
• Records the minutes of all meetings
• Maintains an up-to-date register of fellows</td></tr>
<tr><td>Treasurer</td><td>• Keeps financial records and collects and disburses all funds</td></tr>
<tr><td>Ex-Officio President IES & Immediate Past President IES</td><td>• Provides knowledge and experience from the Institute of Engineers, Singapore
• Renders administrative support where necessary</td></tr>
<tr><td>Ordinary Committee Member</td><td>• Contributes to discussions on representation from their sector/industry/university
• Plans and leads projects relevant to their fields</td></tr>
</table>
Note: The SAEng constitution includes roles such as vice president and assistant secretary. However, these roles were found to be redundant in practice and were not filled. Therefore, in the August 2023 Annual General Meeting, there will be a vote to remove these roles from the constitution.

iii. Provide relevant Bylaws or Policies

Refer to Attachment 3 – SAEng Constitution, Sections 8 (Management and Committee) and 9 (Duties of Office-bearers)]
</td></tr>
<tr><td></td><td>
e) Engaged in significant activities demonstrating that its objectives are compatible with the objectives of CAETS (Bylaws Article 1):

i. Summarize (brief paragraphs) major activities of the academy over the past 3 years that are related to CAETS Objectives

SAEng strongly supports and initiates projects to help strengthen Singapore's national resilience through engineering.

For instance, Singapore is an island nation. The Academy saw that the government had a conventional view on water production and pollution reduction in water and wastewater treatment. In this traditional "linear" water
</td></tr>
</table>

Item	Details
	economy model, water becomes wastewater, which is then disposed of. Fellows of the Academy began developing new concepts, technologies, processes, designs, and operating principles for a "circular" economic framework to encourage policies and the adoption of a mindset where wastewater can also be considered a resource to manage water and wastewater in a more sustainable way. The aim of this project is to suggest a framework and serve as a guidance for implementing a "circular" economy in the water industry, which will contribute to developing a more sustainable water industry and elevate current practices in the water industry. Another project that SAEng embarked on is setting up a Resource Centre for Clean Energy (RECCE), which aims to serve as a resource databank and an active forum to promote alternative energy sources and energy efficiency to achieve a culture for sustainable living in a city state. Singapore has pledged to achieve net zero emissions by 2050 as a measure of the nation's Long-Term Low-Emissions Development Strategy (LEDS). By aligning with this goal, the Academy hopes to be a platform to showcase innovations and practical solutions and launch programmes to enthuse the community, especially the young, to take an interest in energy efficiency and clean energy, to help seed long-term interest among the youth on environmental concerns and direct them to develop innovative solutions. Apart from promoting sustainable growth through applications of engineering and technology, the Academy also encourages and promotes engineering education, by grooming talented, industry-ready individuals through its Engineering Doctorate (EngD) Programme to Meet Industry Needs. The programme aims to develop motivated young engineers for a career in industrial research and focuses on research of industrial importance, endorsed by a supporting company which hosts the student as an employee for the duration of their EngD candidature. The Programme has been adopted by both the National University of Singapore and the Singapore University of Technology & Design. In 2022, three of the first batch of candidates in the programme completed their EngD studies and research projects and have been awarded a doctorate in engineering which has heralded a new era in higher education for the engineering profession. The Academy is further encouraging the improvement of engineering education by working on another key project, "Study of Policies and Strategies to Revive Students' Interest in Engineering", to attract more students to consider a career in the engineering industry. **ii. Provide most recent Annual Report if available (link to electronic copy is acceptable)** Refer to Attachment 4 – SAEng 12th Annual General Meeting (AGM) Secretary's Report. The next AGM will be held in mid-August 2023. If CAETS would like, we can send the report from this meeting once it is ready. Please also refer to Attachment 5 – SAEng Annual Newsletter (Jun 2023), which shares the latest activities of the Academy.

Item	Details
	f) Financial support to pay the costs of CAETS membership and the costs of participation in CAETS activities **i. Provide copy of most recent audited financials (or equivalent)** Refer Attachment 6 – SAEng Audit Report (FY2021). The audit report for FY 2022 is being drafted and will be ready for the next AGM in mid-August 2023. If CAETS would like, we can send the audit report once it is ready. **ii. Summarize major sources of income** Our major sources of income are donations from our fellows, through donation drives or personal donations. The Academy received S$45,500 in donations during the last financial year. Therefore, the Academy is well positioned to pay the costs of membership and participation in CAETS's activities.
Conclusion	**Applicant's discretion – additional summary comments that could be helpful in evaluation of application** If accepted for membership, the Academy would be the first organisation from Southeast Asia to join CAETS, extending CAETS's network into one of the most dynamic and diverse parts of the world. The Academy is ramping up its activities for 2023 and 2024, including hosting a Distinguished Speaker Series (in partnership with local universities in Singapore) for renowned leaders to discuss grand challenges and opportunities in engineering. This will help to expand SAEng's outreach and recruitment efforts to encourage the public and pre-university students to study engineering and STEM (science, technology, engineering, mathematics) subjects. This series will include a panel featuring women leaders in engineering. By joining CAETS, we hope to expand the scope and scale of activities such as these to attract and encourage a wider audience to take an interest in engineering and engineering-related issues relevant to society.

Updated 10 June 2023

ExCo Member	Biography
Prof. HO Teck Hua, President 	Professor Ho Teck Hua is the fifth president of Nanyang Technological University (NTU), Singapore, where he is a Distinguished University Professor. He is also the founding executive chairman of AI Singapore; president of the Academy of Engineering, Singapore; and an academician of Academia Sinica. Teck has a PhD in decision sciences from the Wharton School of the University of Pennsylvania. In the USA, Teck was the William Halford Jr Family Professor of Marketing at the University of California, Berkeley's Haas School of Business where he was awarded the Williamson Award, the highest faculty award, named in honour of Oliver Williamson, recipient of the 2009 Nobel Memorial Prize in Economic Sciences. Teck was the first awardee of the Singapore National Research Foundation's Returning Singaporean Scientists Scheme and the first non-US citizen to be editor-in-chief of *Management Science*. In Singapore, Teck is on the boards of the Defence Science and Technology Agency, DSO National Laboratories, the Government Technology Agency, and Greenland Linklogis Group Holdings.
Prof. LIU Bin, Treasurer 	Professor Liu Bin, Distinguished Professor, is Deputy President (Research & Technology) at the National University of Singapore (NUS). Liu Bin graduated with a bachelor's and master's degree from Nanjing University, and PhD in Chemistry from NUS. She had postdoctoral training at the University of California at Santa Barbara. She joined NUS as an assistant professor in 2005 and was promoted to full professor in 2016. Liu Bin is a leader in the field of organic functional materials, who has been well-recognised for her contributions in polymer chemistry and applications of organic nanomaterials for biomedical research, environmental monitoring, and energy devices. She is named among the World's Most Influential Scientific Minds and the Top 1% Highly Cited Researchers by Clarivate. She is a prolific researcher with over 450 publications and holds 30 patents with 16 of them licensed to different companies in US, UK, and Asia. In 2014, she co-founded Luminicell, an NUS spin-off company that produces organic luminescent nanoparticles for use in biomedical applications.

Updated 10 June 2023

ExCo Member	Biography
Prof. Aaron THEAN, Secretary 	Prof. Aaron Thean is the Deputy President (Academic Affairs) and Provost of the National University of Singapore. Prior to that, he was dean of the NUS College of Design and Engineering. He is also a Professor in the Department of Electrical and Computer Engineering and a consulting fellow to IMEC, a Nano-electronic Research Center, based in Belgium. Prof. Thean also holds several technical leadership responsibilities at the University; which includes the Director of Singapore Hybrid-Integrated Next-Generation μ-Electronics Centre, Director of Hybrid Integrated Flexible Electronic Systems research program, and Co-Director for A*Star SIMTech-NUS Joint Lab on Hybrid Flexible Electronics. From 2016 to 2018, he had also served under the Deputy President of Research and Technology of NUS as the Director of Industry Engagement & Partnerships. Prior to joining NUS in 2016, Prof Thean served as IMEC's Vice President of Logic Technologies and the Director of the Logic Devices Research. At IMEC, he directed the research and development of advanced device technologies ranging from ultra-scaled FinFETs, Nanowire FETs, to III-V/Ge Channels, Tunnel FETs, to emerging Beyond CMOS logic nano-device architectures based on Spintronics and 2-D materials. He has been involved in Design and Process Technology Co-optimizations (DTCO) of emerging technologies targeting 7nm, 5nm, and beyond. Before 2011, he was with Qualcomm's CDMA technologies in San Diego, California, USA. There, he led the Strategic Silicon Technologies Group responsible for new System-On-Chip technology definition and DTCO for upcoming Qualcomm technologies. From 2007 to 2009, Aaron served as the International Semiconductor Development Alliance (ISDA) FEOL and Device Manager at IBM, where he co-led an eight-company alliance device/process team to develop the 28-nm and 32-nm low-power bulk CMOS technology at IBM East Fishkill, New York. His team developed the industry's first foundry-compatible Gate-First High-k Metal-Gate (HKMG) with novel SiGe channel Low-Power bulk CMOS technologies. It enabled some of today's most successful smart mobile devices in production by the foundry partners.
Mr Dalson CHUNG, Ex-officio President, IES 	Mr Dalson Chung is the 29th President of the Institution of Engineers Singapore (IES), having taken up the position in 2022. He was previously the Deputy President of IES and the Director for Industry Development and Promotion at the National Environment Agency.

Updated 10 June 2023

ExCo Member	Biography
Dr Richard KWOK, Immediate Past President, IES 	Dr Richard Kwok was the 28th President of The Institution of Engineers Singapore. With more than 46 years of experience in various technical and management roles, Dr Kwok has made significant contributions in rail, defence, research, and education to Singapore through engineering. His previous notable appointments include the Executive Vice President and Chief Technology Officer of ST Kinetics, the Chief Executive Officer of Advanced Technology Research Centre, and the chairman of several research laboratories at Institutes of Higher Learning. Dr Kwok is also the recipient of multiple prestigious awards including the Defence Technology Prize 2002 (Individual) from the Ministry of Defence, the Lifelong Learner Award, and the Cheng Fook Choon Gold Award in Engineering Process Innovation & Improvement from Singapore Technologies.
Prof. CHEONG Hee Kiat, Ordinary Member 	Prof. Cheong Hee Kiat is President Emeritus and Founding President of Singapore University of Social Sciences (SUSS). He joined academia in Nanyang Technological University in 1986 and held various academic and administrative appointments including Deputy President and Dean of Civil and Environmental Engineering. He is an advocate of lifelong learning and giving opportunities to people of all ages and socio-economic and educational background to learn to their full potential. He has served on the boards of several tertiary education institutions and statutory boards, and public committees. He has also been active in university accreditation and academic audits in Singapore and internationally. Prof. Cheong graduated from the University of Adelaide and the Imperial College, London. He is a registered Professional Engineer (Civil) and Fellow of the Institution of Engineers Singapore, the Academy of Engineering, Singapore, and the Society of Project Managers.

Updated 10 June 2023

ExCo Member	Biography
Engr. CHONG Kee Sen, Ordinary Member 	Engr. Chong Kee Sen was born in Singapore, in 1958. He graduated from the Nanyang Technological University (NTU), in 1987, with an Honours degree in Civil and Structural Engineering. Er. Chong is a Civil Professional Engineer, specialising in petrochemical, pharmaceutical, power, and other major industrial development projects include marine facilities. He is currently Director, Engineers 9000 Pte Ltd. Engr. Chong was the President of The Institution of Engineers, Singapore (IES) from 2014 to 2016. He served as a board member of the Singapore Professional Engineers Board (PEB). He is also a board member of the Engineering Accreditation Board (EAB). He also serves in the NTU Civil and Environmental Engineering Alumni Association and was awarded the Nanyang Alumni Service Award in 2008. He serves in various government agency committees and was also involved in the drafting of a number of SPRING Singapore Standards. He is the pioneer batch to be registered as ASEAN Chartered Professional Engineer (ACPE). He is also a Registered Foreign Professional Engineer (RFPE) – Malaysia.
Prof. CHONG Tow Chong, Ordinary Member 	Prof. Chong Tow Chong was appointed President of the Singapore University of Technology and Design (SUTD) in April 2018. He had been SUTD's founding Provost since 2010, where he played an instrumental role in steering the strategic development and operationalisation of SUTD. As President, he provides leadership and guidance in the next phase of the University's growth and development, as well as ensuring continuity in the pursuit of SUTD's vision, mission, and strategic goals. Prior to joining SUTD, Prof Chong had been the Executive Director of A*STAR's Science and Engineering Research Council and Data Storage Institute for 15 years. He also had a 30-year academic career with the National University of Singapore as Prof. of Electrical and Computer Engineering. Prof Chong authored and co-authored over 400 publications in international refereed journals, presented over 35 invited talks and registered 25 patents. He was recipient of the President's Science and Technology Medal, the Public Administration Medal (Silver), the ASME ISPS Division Leadership in Research and Development Award and the Teaching Excellence Award from NUS.

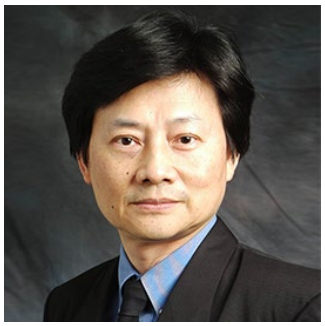
Updated 10 June 2023

ExCo Member	Biography
Prof. CHOU Siaw Kiang, Ordinary Member 	Prof. S.K. Chou obtained a B.Eng. in Mechanical Engineering from the University of Singapore, and a D.E.A. and Dr-Ing. from the Ecole Nationale Superieure d'Arts et Metiers, Paris, under a French government scholarship. He joined the Department of Mechanical Engineering, National University of Singapore, as a lecturer, in 1980. From 1990 to 1992, he was seconded to the Science Council of Singapore as its executive director and then to the National Science and Technology Board, the predecessor agency of A*STAR, as its founding executive director. In 1991, NSTB launched Singapore's first national technology plan. In 1992, he helped establish the NUS Industry and Technology Relations Office (INTRO) and was its director from 1992 to 2000. In 1995, he helped found the NUS Technology Holdings Pte Ltd (NUSH), a wholly owned NUS company responsible for seeding new technology start-ups from university research and inventions. He held the position of managing director of NUSH from 1995 to 2001. He was Head of the Department of Mechanical Engineering, NUS, from 1998 to 2003, and Vice-Dean (External and Industry Relations) of the Faculty of Engineering from 2003 to 2008. Between 2007 and 2017, he was the founding executive director of the NUS Energy Studies Institute. S.K. Chou is an Honorary Fellow and President Emeritus of the Institution of Engineers, Singapore, and a Fellow of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, the Singapore Academy of Engineering, the ASEAN Academy of Engineering and Technology, the Energy Institute, UK, and the ASEAN Federation of Engineering Organisations. Prof Chou is credited with designing the Envelope Thermal Transfer Value (ETTV) and the Residential Envelope Transmittance Value (RETV) energy standards used today in the Singapore Green Mark building certification scheme. He is an editor of the Elsevier published journal, Applied Energy, and serves on the editorial board of Advances in Applied Energy.
Prof. ER Meng Hwa, Ordinary Member 	Prof. Er Meng Hwa has had a long and distinguished history of academic and administrative service to Nanyang Technological University (NTU), Singapore in various high level positions, including Assistant to President, founding Director of Centre for Signal Processing, founding Director of NTU Satellite Engineering Programme, Dean of School of Electrical and Electronic Engineering, founding Dean of College of Engineering, Acting Dean (Graduate Studies), Deputy President, founding Acting Provost, Senior Associate Provost, founding Vice President (International Affairs) and Senior Advisor. He has made immense contributions to engineering education and research, NTU and Singapore education as a whole. Currently, he is Prof. of electrical and electronic engineering and Director of Centre for Information Sciences and Systems (CISS) in the School of Electrical and Electronic Engineering. He is a member of the Advisory Board, NTU Academic Council and a Senator of NTU Senate. He serves on NTU Senate Education Committee and NTU Teaching Council.

Updated 10 June 2023

ExCo Member	Biography
Prof. HANG Chang Chieh, Ordinary Member 	Prof. Hang Chang Chieh is currently the Founding Director of Institute of Engineering Leadership at National University of Singapore (NUS). He is also a Professor at NUS College of Design and Engineering, Department of Electrical and Computer Engineering and Department of Industrial Systems and Engineering (courtesy appointment). Prof. Hang received his PhD degree in Control Engineering from the University of Warwick, England, in 1973. From 1974 to 1977, he worked as a Computer and Systems Technologist in the Shell Eastern Petroleum Company (Singapore) and the Shell International Petroleum Company (The Netherlands). Since 1977, he has been with the National University of Singapore, serving in various positions including being the Head of the Department of Electrical Engineering. From 1994 to 2000, he served as the Deputy Vice-Chancellor of the University in charge of research. From 2001 to 2003, he was seconded to Agency for Science, Technology and Research (A*STAR) to serve as its Executive Deputy Chairman. Since 2004, he has resumed his academic career in the National University of Singapore. He served as the founding Head of Division of Engineering and Technology Management, Faculty of Engineering from 2007 to 2016. His current appointment since 2011 is Executive Director, Institute for Engineering Leadership. His current research interest is in Innovation Policy & Strategy, and Engineering Leadership. Since 2014, he has served as an International Advisor, Research Centre for Technological Innovation, School of Economics & Management, Tsinghua University, China.
Prof. LEE Der-Horng, Ordinary Member 	Prof. Lee Der-Horng is currently the Dean of Zhejiang University-University of Illinois Urbana Champaign (ZJU-UIUC) Institute.He is also a Fellow (FIES) of Institution of Engineers Singapore (IES) and the inaugural batch of Chartered Engineer (CEng) of Transportation Engineering in Singapore. Prof. Lee is currently the Director of NUS-LTA (Land Transport Authority Singapore) Transport Research Centre (TRC@NUS). Prof. Lee graduated with his PhD degree from the University of Illinois at Chicago (UIC) in 1996 under the supervision of Prof. David Boyce. Prof. Lee's professional expertise includes Transportation Policy, Intelligent Transportation Systems (ITS), Urban and Regional Travel Demand Forecasting, Public Transportation, Emerging Urban Mobility Systems, Container Port Operations, Aviation Management, etc. Prof. Lee has published more than 400 referred journal papers, book chapters, books, and conference papers detailing his research activities.

Updated 10 June 2023

ExCo Member	Biography
Dr LEE Shiang Long, Ordinary Member 	Dr Lee Shiang Long is the Group Chief Technology & Digital Officer of ST Engineering, a global technology, defence, and engineering group with a diverse portfolio of businesses across the aerospace, smart city, defence, and public security segments. He is also Chief Technology Officer of the Group's Defence & Public Security cluster. Appointed on 1 January 2021, he provides leadership to drive advanced technology development, research partnerships and engineering applications across the Group. He is also responsible for accelerating the Group's digital transformation and oversees digital innovation for its products and solutions. Prior to being the Group CTO, Shiang Long was the President, Land Systems at ST Engineering since 2017. Before joining ST Engineering, he was SAF Chief Information Officer for 7 years, and Executive Director for A*STAR-I2R for 3 years, where he led I2R to support the former IDA and government agencies in Smart Nation initiatives.
Prof. Andrew NEE, Ordinary Member 	Andrew Y C Nee is currently Professor Emeritus, Department of Mechanical Engineering, National University of Singapore. He received his PhD and DEng from University of Manchester in 1973 and 2002 respectively. He is Fellow CIRP (1990), Fellow SME (1990) and Fellow Academy of Engineering Singapore (2012). He was President of CIRP in 2012, and Gold Medal Recipient of SME in 2014. Awards include: IEEE Kayamori Award (1999), Norman A Dudley Award, International Journal of Production Research (2003), Joseph Whitworth Prize, the Institution of Mechanical Engineers (2009). He was elected Asia's top 100 Scientist, Asian Scientist Magazine, 2016. Research interests include: Tool, die and fixture design, augmented reality applications, digital twin, remanufacturing. He has graduated 53 PhD students, published over 500 papers and 25 books, GS citation of 26,500 and H-Index 79. He is Editor-in-Chief of International Journal of Advanced Manufacturing Technology (Springer), and Executive Editor-in-Chief of Advances in Manufacturing (Shanghai and Springer), honorary professor of BUAA, NUAA, Shanghai, Tianjin, and HUST.

Updated 10 June 2023

ExCo Member	Biography
Mr SEAH Moon Ming, Ordinary Member 	Mr Seah Moon Ming is the Chairman of SMRT Corporation Ltd, SMRT Trains Ltd., SMRT TEL Pte. Ltd., SMRT Buses Ltd. and Strides Holdings Ltd. Mr Seah is also Chairman of National University Singapore High School of Mathematics and Science. He was Chairman of International Enterprise Singapore (from 2013 to 2018), Chairman of Singapore Cooperation Enterprise (from 2012 to 2020), and Chairman of Temasek Polytechnic (from 2006 to 2014). He was President of Singapore Technologies Electronics Ltd (from 1997 to 2009), Deputy CEO & President (Defence) of Singapore Technologies Engineering Ltd (from 2009 to 2013), and Group CEO of Pavilion Energy (from 2013 to 2018). In 2022, Mr Seah was conferred the Meritorious Service Medal at the National Day Awards for his outstanding service to Public Transportation and Education. He was also awarded the Public Service Star [BBM] at 2014's National Day. Mr Seah was conferred the IES Lifetime Engineering Award by The Institution of Engineers, Singapore (IES) in recognition of his positive influence and achievements to the engineering community in January 2023. He was also conferred the Honorary Fellowship by IES in 2003 and the IES/IEEE Joint Medal of Excellence Award 2008 by IES and the Institute of Electrical and Electronics Engineers (IEEE). Mr Seah was conferred the Medal of Commendation (Gold) at 2020's May Day for his contributions towards improving workers' wages, welfare, and work prospects. He is a member of Eta Kappa Nu, senior member of IEEE, a Fellow of the Academy of Engineering Singapore, an Honorary Fellow of the ASEAN Federation of Engineering Organisations Singapore, and a member of Ministry of Finance's ICT Projects Advisory Panel. He is also Honorary President of Singapore Table Tennis Association.
Prof. YEOH Lean Weng, Ordinary Member 	Prof. Yeoh Lean Weng was the 27th President of IES. He has been at the forefront of Singapore's Research and Development (R&D) advancement for the past 30 years. As the Director of Urban Solutions and Sustainability at NRF, he leads the planning of Singapore's R&D strategy; manages national R&D programmes in urban solutions; and fosters innovations to address the nation's long-term energy, water, and environmental challenges. He also sits on the board of various institutes of research in energy, solar energy, and environment technology. An electrical engineer by training, Prof Yeoh has contributed actively to IES since 2007 in various roles. He has been Deputy Chairman of IES Chartered Engineer Board (Systems Engineering) since 2015, founding Chairman of the IES Certified Systems Engineering Professional and Vice President of IES from 2008 to 2011.

ACADEMY OF ENGINEERING SINGAPORE

MINUTES OF THE 1st ANNUAL GENERAL MEETING OF THE ACADEMY OF ENGINEERING SINGAPORE (SAENG) FRIDAY 12th AUGUST 2011, 1530 HOURS VENUE: THE INSTIUTION OF ENGINEERS, SINGAPORE (IES)

Present:

Prof Cham Tao Soon	- President
Prof Low Teck Seng	- Vice President
Prof Freddy Boey	- Secretary
Prof Chan Eng Soon	- Treasurer
Er Ho Siong Hin	- Ex-officio – President, Institution of Engineers, Singapore (IES)
Prof Miranda Yap Gek Sim	- Ordinary Committee Members
Prof Andrew Yeh-Ching Nee	- Ordinary Committee Members
Prof Su Guaning	- Ordinary Members
Prof Goh Thong Ngee	- Ordinary Members

Absent with apologies:

Prof Hang Chang Chieh	- Ordinary Committee Members

ITEM	Action By
The meeting commenced at 1530hrs. Dr Cham shared with the members how the initial discussion a year ago with the President of IES resulted in the formation of SAEng today. He announced that the Academy is formally registered and legally constituted at this AGM.	

ACADEMY OF ENGINEERING SINGAPORE

ITEM	Action By
1 Formal adoption of a Constitution, Election of an Executive Committee and an Honorary Auditor 1.1 All members voted by show of hands to unanimously adopt the Constitution. 1.2 The following Executive Committee members were proposed, unanimously elected, and accepted their positions as: President - Prof Cham Tao Soon Vice President - Prof Low Teck Seng Secretary - Prof Freddy Boey Treasurer - Prof Chan Eng Soon Ex-officio – President IES - Er Ho Siong Hin Ordinary Committee Members - Prof Miranda Yap Gek Sim Ordinary Committee Members - Prof Andrew Yeh-Ching Nee Ordinary Committee Members - Prof Hang Chang Chieh President noted that each member represents a strategic stakeholder; the Executive Committee will meet at least once every 3 months. 1.3 Prof Goh Thong Ngee was proposed, unanimously elected, and accepted his position as the Honorary Auditor for SAEng.	
2 Founding members 2.1 Andrew Nee reported that there are now a total of 10 founding members, whose names have submitted to the Registry of Society (ROS). A name list will be sent to the Secretary for record. 2.2 President suggested that SAEng will need to elect at least 50 Fellows (or members) in the first year, with approximately half coming from academia. He also highlighted that Fellows from industry should have contributed in their sectors at the national level. 2.3 President further added that these 50 Fellows should be added by invitation. A suggested list of names should be compiled from the Founding Fellows, out of which the 50 will be mutually agreed on. 2.4 President also noted that Mr Teo Chee Hean (Deputy Prime Minister, Coordinating Minister for National Security, and Minister for Home Affairs) has consented to serve as Patron. A letter of invitation	Andrew Nee Freddy Boey Cham TS

ACADEMY OF ENGINEERING SINGAPORE

ITEM	Action By
will be sent shortly.	
MoU signing, SAEng Launch, Domains registration and Identity 2.5 President also mentioned that SAEng needs to have a formal memorandum of understanding signed with IES. 2.6 All members agreed that it would be opportune to launch SAEng at IES's 45th Sapphire Anniversary Dinner on 9th September 2011. Treasurer will help arrange a table for SAEng at the dinner. 2.7 Members also agreed that the following online domains will be registered: - SAEng.sg - AcademyofEngineeringSingapore.sg 2.8 President said he will look into giving IES the SAEng logo to have it ready for the 9 September 2011 launch. 2.9 President also indicated that it would be good to get the *Straits Times* to write an article on the launch of SAEng on 9 September 2011.	President IES Chan ES Freddy Boey Cham TS Cham TS
3 Any Other Business 3.1 IES President has agreed that IES will help keep a separate account for SAEng. 3.2 SAEng could consider applying for charity status, so that donors can get a tax deduction for their contributions. The Secretary will look into this matter.	Freddy Boey
The meeting was adjourned at 5 PM.	

Prepared by: Prof Freddy Boey, Secretary
Approved by: Prof Cham Tao Soon, President
Date: 22 August 2011

CONSTITUTION OF

Academy of Engineering, Singapore

NAME

1.1 This Society shall be known as the "Academy of Engineering, Singapore", hereinafter referred to as the "Academy".

PLACE OF BUSINESS

2.1 Its place of business shall be at "c/o Institution of Engineers, 70 Bukit Tinggi Road, Singapore 289758" or such other address as may subsequently be decided upon by the Committee and approved by the Registrar of Societies.

OBJECTS

3.1 Its objects are:

a) Advance and promote excellence in engineering
b) Work to improve public awareness and understanding of engineering
c) To use international partnerships to ensure that Singapore benefits from international networks, expertise and investment.
d) helping to strengthen Singapore's skills and knowledge base in order to support the long-term development of industry and society,

3.2 The Academy will bring further benefits to Singapore, including

a) access to influential people in other countries through the International Network of Academies
b) opportunity to participate in international activities and joint projects with academies in Asia and elsewhere
c) enhancing the prestige of engineering locally and internationally
d) providing an independent source of advice for national development

3.3 In furtherance of the above subjects, the Academy may do all such things which are incidental or conducive to the attainment of the objects, and particularly as follows:

a) monitoring, analyzing and evaluating technological / economic developments and potentials in Singapore and globally,
b) initiating and conducting studies of technical and economic issues,
c) advising on engineering education, research, development and innovation,
d) developing and maintaining effective relations with other professional engineering organizations, academies and learned societies in Singapore, and abroad,
e) recognizing excellence in engineering contributions to the Singapore economy.

STATEMENT OF FAITH✞

Please attach the statement of faith of the Society as an Annex.

✞ Compulsory for Churches. Please delete where inapplicable.
☆ Compulsory for Religious Bodies. Please delete where inapplicable.

MEMBERSHIP QUALIFICATION AND RIGHTS

4.1 Membership (Fellow) is open to Singaporeans and foreigners residing in Singapore subject to rigorous peer review and sponsorship by the existing Fellows of the Academy. Fellows shall be prominent engineers, engineering scientists, public officials and leaders of the academic and business communities involved with engineering. At any time, there should be no more than 100 Fellows who are below the age of 70.

4.2 The Academy may elect no more than 10 Honorary Fellows. The Academy may also elect Foreign Fellows. Elected Fellows who no longer reside in Singapore shall be transferred tbe the category of Foreign Fellows.

4.3 All Fellows shall have the right to vote and to hold office in the Academy.

4.4 Fellows of the Academy are entitled to use FSEng after their names.

NOMINATION FOR MEMBERSHIP

5.1 A person must be nominated by his peers to join the Academy through a nomination process defined in the Bye-laws.

5.2 A Review Panel will be formed to assess every new nomination. The nominee may also be required to attend an interview by the Panel Members.

5.3 A copy of the Academy Constitution shall be furnished to every Fellow.

ENTRANCE FEES, SUBSCRIPTIONS AND OTHER DUES

6.1 There shall be no entrance fee payable for all Fellows admitted.

6.2 There shall be no subscriptions payable by the Fellows. The funds of the Academy shall be derived from free-will offerings.

6.3 The income and property of the Academy whensoever derived shall be applied towards the promotion of the objects of the Academy as set forth in this Constitution and no portion thereof shall be paid or transferred directly or indirectly by way of dividend or bonus or otherwise howsoever by way of profit to the persons who at any time are or have been members of the Academy or to any of them or to any person claiming through any of them.

SUPREME AUTHORITY AND GENERAL MEETINGS

7.1 The supreme authority of the Academy is vested in a General Meeting of the Fellows.

7.2 An Annual General Meeting (AGM) shall be held within 3 months after the close of the financial year.

7.3 At other times, an Extraordinary General Meeting must be called by the President on the request in writing of not less than 25% of the total voting membership or thirty (30) voting members, whichever is the lesser, and may be called at anytime by order of the Committee. The notice in writing shall be given to the Secretary setting forth the business that is to be transacted. The Extraordinary General Meeting shall be convened within two (2) months from receiving this request to convene the Extraordinary General Meeting.

7.4 If the Committee does not within two (2) months after the date of the receipt of the written request proceed to convene an Extraordinary General Meeting, the Fellows who requested for the Extraordinary General Meeting shall convene the Extraordinary General Meeting by giving ten (10) days' notice to voting Fellows setting forth the business to be transacted and simultaneously posting the agenda on the Academy's notice board.

7.5 At least two (2) weeks' notice shall be given of an Annual General Meeting and at least ten (10) days' notice of an Extraordinary General Meeting. Notice of meeting stating the date, time and place of meeting shall be sent by the Secretary to all voting Fellows. The particulars of the agenda shall be posted on the Academy’s notice board four (4) days in advance of the meeting.

7.6 Unless otherwise stated in this Constitution, voting by proxy shall not be allowed at all General Meetings.

7.7 The following points will be considered at the Annual General Meeting:

a) The previous financial year's accounts and annual report of the Committee.

b) Where applicable, the election of office-bearers and Honorary Auditors for the following term.

Any Fellow who wishes to place an item on the agenda of a General Meeting may do so provided he gives notice to the Secretary one (1) week before the meeting is due to be held.

7.8 At least 25% of the total voting membership or thirty (30) voting Fellows, whichever is the lesser, present at a General Meeting shall form a quorum. Proxies shall not be constituted as part of the quorum.

7.9 In the event of there being no quorum at the commencement of a General Meeting, the meeting shall be adjourned for half an hour and should the number then present be insufficient to form a quorum, those present shall be considered a quorum, but they shall have no power to amend any part of the existing Constitution.

MANAGEMENT AND COMMITTEE

8.1 The administration of the Academy shall be entrusted to a Committee consisting of the following to be elected at alternate Annual General Meeting:

A President

A Vice-President

A Secretary

An Assistant Secretary

A Treasurer

An Ex-officio – President IES

Ordinary Member 1

Ordinary Member 2

Ordinary Member 3

8.2 Names for the above offices shall be proposed and seconded at the Annual General Meeting and election will follow on a simple majority vote of the members. All office-bearers, except the Treasurer may be re-elected to the same or related post for a consecutive term of office. The term of office of the Committee is two years.

8.3 Election will be either by show of hands or, subject to the agreement of the majority of the voting members present, by a secret ballot.

8.4 A Committee Meeting shall be held at least once every three months after giving seven (7) days' notice to Committee Members. The President may call a Committee Meeting at any time by giving five (5) days' notice. Majority of the Committee Members must be present for its proceedings to be valid.

8.5 Any member of the Committee absenting himself from three (3) meetings consecutively without satisfactory explanations shall be deemed to have withdrawn from the Committee and a successor may be co-opted by the Committee to serve until the next Annual General Meeting. Any changes in the Committee shall be notified to the Registrar of Societies and the Commissioner of Charities within two (2) weeks of the change.

8.6 The duty of the Committee is to organise and supervise the daily activities of the Academy. The Committee may not act contrary to the expressed wishes of the General Meeting without prior reference to it and shall always remain subordinate to the General Meetings.

a) Whenever a member of the Committee is in any way, directly or indirectly, has an interest in a transaction or a project or other matter to be discussed at a meeting, the member shall disclose the nature of his interest before the discussion on the matter begins.

b) The member concerned should not participate in the discussion or vote on the matter, and should also offer to withdraw from the meeting and Committee shall decide if this should be accepted.

DUTIES OF OFFICE-BEARERS

9.1 The President shall chair all General and Committee meetings. He shall also represent the Academy in its dealings with outside persons.

9.2 The Vice-President shall assist the President and deputise for him in his absence.

9.3 The Secretary shall keep all records, except financial, of the Academy and shall be responsible for their correctness. He will keep minutes of all General and Committee meetings. He shall maintain an up-to-date Register of Fellows at all times.

9.4 The Treasurer shall keep all funds and collect and disburse all moneys on behalf of the Academy and shall keep an account of all monetary transactions and shall be responsible for their correctness. He is authorised to expend up to $2,000 per month for petty expenses on behalf of the Academy. He will not keep more than $1,000 in the form of cash and money in excess of this will be deposited in a bank to be named by the Committee. Cheques, etc. for withdrawals from the bank will be signed by the Treasurer and either the President or the Vice-President or the Academy.

AUDIT AND FINANCIAL YEAR

10.1 Two (2) voting Fellows, not being members of the Committee, shall be elected as Honorary Auditors at alternate Annual General Meeting and will hold office for a term of two years only and shall not be re-elected for a consecutive term. The accounts of the Academy shall be audited by a firm of Certified Public Accountants if the gross income or expenditure of the Academy exceeds $500,000 in that financial year, in accordance with Section 4 of the Societies Regulations.

10.2 They:

a) Will be required to audit each year's accounts and present a report upon them to the Annual General Meeting.

b) May be required by the President to audit the Academy's accounts for any period within their tenure of office at any date and make a report to the Committee.

10.3 The financial year shall be from 1st January to 31st December.

TRUSTEES

11.1 If the Academy at any time acquires any immovable property, such property shall be vested in trustees subject to a declaration of trust.

11.2 The trustees of the Academy shall:

a) Not be more than four (4) and not less than two (2) in number.

b) Be elected by a General Meeting of Fellows.

c) Not effect any sale or mortgage of property without the prior approval of the General Meeting of Fellows.

11.3 The office of the trustee shall be vacated:

a) If the trustee dies or becomes a lunatic or of unsound mind.

b) If he is absent from the Republic of Singapore for a period of more than one (1) year.

c) If he is guilty of misconduct of such a kind as to render it undesirable that he continues as a trustee.

d) If he submits notice of resignation from his trusteeship.

11.4 Notice of any proposal to remove a trustee from his trusteeship or to appoint a new trustee to fill a vacancy must be given by posting it on the notice board in the Academy's premises at least two (2) weeks before the General Meeting at which the proposal is to be discussed. The result of such General

Meeting shall then be notified to the Registrar of Societies and the Commissioner of Charities.

11.5 The address of each immovable property, name of each trustee and any subsequent change must be notified to the Registrar of Societies and the Commissioner of Charities.

PROHIBITIONS[#]

12.1 Gambling of any kind, excluding the promotion or conduct of a private lottery which has been permitted under the Private Lotteries Act Cap 250, is forbidden on the Academy's premises. The introduction of materials for gambling or drug taking and of bad characters into the premises is prohibited.

12.2 The funds of the Academy shall not be used to pay the fines of Fellows who have been convicted in court of law.

12.3 The Academy shall not engage in any trade union activity as defined in any written law relating to trade unions for the time being in force in Singapore.

12.4 The Academy shall not indulge in any political activity or allow its funds and/or premises to be used for political purposes.

12.5 The Academy shall not hold any lottery, whether confined to its Fellows or not, in the name of the Academy or its office-bearers, Committee or members unless with the prior approval of the relevant authorities.

12.6 The Academy shall not raise funds from the public for whatever purposes without the prior approval in writing of the Assistant Director Operations, Licensing Division, Singapore Police Force and other relevant authorities.

AMENDMENTS TO CONSTITUTION

13.1 The Academy shall not amend its Constitution without the prior approval in writing of the Registrar of Societies and the Commissioner of Charities. No alteration or addition/deletion to this Constitution shall be passed except at a general meeting and with the consent of two-thirds (2/3) of the voting Fellows present at the General Meeting.

INTERPRETATION

14.1 In the event of any question or matter pertaining to day-to-day administration which is not expressly provided for in this Constitution, the Committee shall have power to use their own discretion. The decision of the Committee shall be final unless it is reversed at a General Meeting of members.

DISPUTES

15.1 In the event of any dispute arising amongst Fellows, they shall attempt to resolve the matter at an Extraordinary General Meeting in accordance with this Constitution. Should the Fellows fail to resolve the matter, they may bring the matter to a court of law for settlement.

CESSATION OF CHARITY STATUS

16.1 In the event that the Society ceases to be a registered charity under the Charities Act, all debts, liabilities legally incurred on behalf of the Society shall be fully discharged, and the remaining funds will be contributed to charitable organizations with similar objectives in Singapore which are registered under the Charities Act as the members of the Society may determine at the general meeting, unless otherwise allowed by the Commissioner of Charities.

DISSOLUTION

17.1 The Academy shall not be dissolved, except with the consent of not less than three-fifths ($^3/_5$) of the total voting membership of the Academy for the time being resident in Singapore expressed, either in person or by proxy, at a General Meeting convened for the purpose.

17.2 In the event of the Academy being dissolved as provided above, all debts and liabilities legally incurred on behalf of the Society shall be fully discharged, and the remaining funds will be donated to charitable organizations with similar objectives in Singapore which are registered under the Charities Act as the General Meeting of members may determine.

17.3 A Certificate of Dissolution shall be given within seven (7) days of the dissolution to the Registrar of Societies and the Commissioner of Charities.

- END -

ACADEMY OF ENGINEERING SINGAPORE

12th Annual General Meeting
Academy of Engineering, Singapore

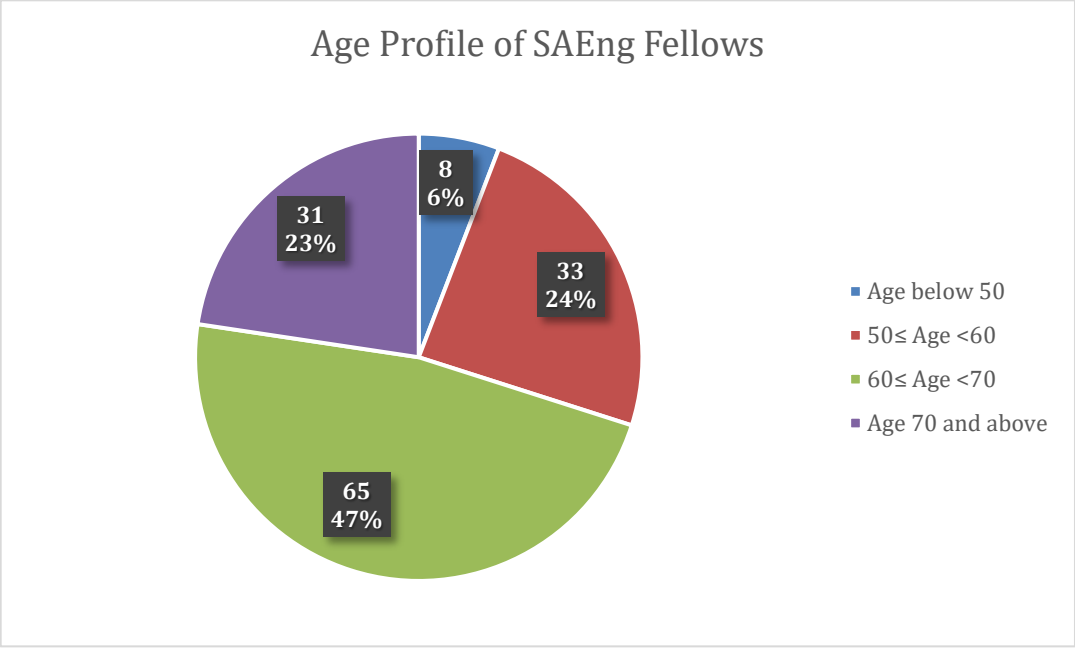
Secretary's Report

Introduction

Welcome to the 12th Annual General Meeting (AGM) of the Academy of Engineering, Singapore. Since the last AGM which was held online on July 2021, the Academy has continued its work and mandate to serve as a think tank to deliberate on national agenda and issues related to the engineering profession by leveraging on the experience and expertise of its fellow members.

Membership

The network of Fellows has grown to 137 strong during the past year and the age profile of the fellows as of 6 June 2022 is shown below.



In the past year, the Academy is pleased to welcome 11 new Fellows who represent a range of academic and industry interests.

1) Prof Zhang Rui
   Department of Electrical and Computer Engineering

College of Design and Engineering
National University of Singapore

2) Dr Yang Yi Yan
Covering Executive Director, Institute of Bioengineering and Bioimaging (IBB)
Agency for Science, Technology and Research

3) Prof Liu Ai Qun
Quantum Science and Engineering Centre (QSec)
Nanyang Technological University

4) Prof Guo Yongxin
Department of Electrical and Computer Engineering
College of Design and Engineering
National University of Singapore

5) Prof Li Haizhou
Department of Electrical and Computer Engineering
College of Design and Engineering
National University of Singapore

6) Prof Yeo Kiat Seng
Engineering Product Development
Singapore University of Technology and Design

7) Prof John Wang
Department of Materials Science and Engineering
College of Design and Engineering
National University of Singapore

8) Prof Soh Yeng Chai
School of Electrical & Electronic Engineering
College of Engineering
Nanyang Technological University

9) Prof Wang Xin
School of Chemical and Biomedical Engineering
College of Engineering
Nanyang Technological University

10) Prof Wen Yonggang

College of Engineering
Nanyang Technological University

11) Prof Guan Cuntai
School of Computer Science and Engineering
College of Engineering
Nanyang Technological University

Activities

Academy Project Initiatives

As part of the strategic plan, the Academy has previously established multiple project groups to address issues of national interest and challenges. They are:

(1) Singapore as a Connected City
(2) Engineers for the Future
(3) Improving Sustainability in Transport Systems for Singapore
(4) Enhancing the Role of Science Centre Singapore in Engineering Innovation
(5) Study of Policies and Strategies to Revive Students' Interest in Engineering
(6) Renewable Energy Alternatives for Singapore
(7) Revival of the Prestige of Engineering and Engineers in Singapore
(8) Engineering Doctorate Programme to Meet Industry Needs
(9) Singapore's Cybersecurity Landscape

These studies are also publicised on the Academy's website (https://www.saeng.sg/key-projects/). All Fellows are encouraged to contribute to these projects and activities in the upcoming year.

Engineering Doctorate (EngD) Programme

On the eighth project, the Academy is happy to announce that three out of the first batch candidates of the Engineering Doctorate (EngD) Programme have completed their EngD study/research successfully and they have been awarded the Engineering Doctorate degrees: one from NUS and two from SUTD.

The Academy is a strong supporter of boosting Singapore's competitive edge in training the next generation of engineer-leaders. In the past few years, the Academy has been supporting the growth of the EngD programme which develops motivated young engineers for professional growth and a career in industrial research. The EngD focuses on research of industrial importance, endorsed by a supporting company which hosts the student as an employee for the duration of the EngD candidature. The student is jointly supervised by a University academic and a technology expert in the company to provide sufficient depth in scientific theory and a first-hand

ACADEMY OF ENGINEERING SINGAPORE

understanding of industry-relevant needs. Intended for working professionals, the EngD programme requires candidates to undertake coursework in technology management.

The National University of Singapore (NUS) and Singapore University of Technology and Design (SUTD) were the first two local Universities to approve the EngD programme in 2017 and started admitting the first batch of EngD students in 2018.

To date, NUS and SUTD have admitted a total of 29 EngD candidates from MNCs (e.g. Advanced Materials, AMD, Panasonic, Halliburton, Nippon Paint, Dyson, etc.), A*STAR, DSO, AISG, LLE/SME and start-ups (Engro, One Smart Engineering, ANOR Tech, etc.). The Economic Development Board (EDB) has supported a number of EngD candidates from the abovementioned companies through the Industrial Postgraduate Programme (IPP) and is pleased to continue supporting companies to train industry relevant talent through the IPP. The EngD programme's dual focus on industry and academia makes it an excellent programme for training talent for industry.

The SAEng is pleased that it has played a pivotal role in nudging the universities in Singapore to pioneer the development of EngD programmes to serve as a timely addition to the advanced manpower education programme for the future needs of Singapore's high-tech industry. It is interesting to note that out of the first 3 EngD graduates, two are females. The Academy is looking forward to supporting more high potential young individuals to pursue professional growth in Engineering industries.

Awards and Honors

Prof Chen Xiaodong

- **President's Science Award 2021** for his outstanding contribution to advanced materials research for soft bioelectronics capable of digitising biological senses and extending human sensing capabilities, and their application to advanced manufacturing and healthcare wearables.

Prof Chen Zhi Ning

- **2021 John Kraus Antenna Award** by the IEEE Antennas and Propagation Society (APS) for his outstanding contributions to translational research of electromagnetic metamaterials for antenna engineering.

Er. Chong Kee Sen

- **The Federation of Engineering Institutions of Asia and Pacific (FEIAP) Engineer of the Year Award 2021** for his outstanding leadership and services to advance engineering in the Asia Pacific region and his exemplary contributions to the engineering profession, IES and the society.
- **Honorary Fellow Award 2021** by the Institution of Engineers, Singapore (IES) in recognition of his outstanding leadership and services to IES and his notable contributions to the engineering profession and the society.

Prof Er Meng Hwa

- **Distinguished Engineering Alumni Award 2021** by NUS Faculty of Engineering for outstanding contributions to the engineering profession.

Mr Koh Boon Hwee

- **Honorary Degree of Doctor of Letters** by Nanyang Technological University (NTU) for his enormous contributions that transformed NTU and the lives of many of its students.

ACADEMY OF ENGINEERING SINGAPORE

Mr Lau Joo Ming

- **MND Medallion 2021** by Ministry of National Development in recognition of his continuous contributions to Professional Engineers Board (PEB) and other MND family of agencies.

Prof Lim Chwee Teck

- **Highly Cited Researcher 2021** by Clarivate Analytics for ranking in the top 1% by citations for field and publication year in Clarivate's Web of Science database.
- **Asia's Most Influential Scientist Award 2021** by business magazine Fortune Times for his distinguished academic achievements, independence of thought, originality, significance of discovery, overall impact of his research, being a good and inspiring role model.
- **IES Prestigious Engineering Achievement Award 2021** by Institution of Engineers, Singapore for engineering achievements that demonstrate outstanding engineering skills and which have made a significant contribution to the engineering progress and the quality of life in Singapore.
- **Fellow of the ASEAN Academy of Engineering and Technology** in recognition of eminent individuals from academia, research institutes, industry and government who have demonstrated successful leadership or outstanding contributions to engineering and technology, and played an important role in the overall development of the ASEAN region.

Mr Vincent Chong

- **Distinguished Engineering Alumni Award 2021** by NUS Faculty of Engineering for outstanding contributions to the engineering profession.

Prof Wang Rong

- **SG100WIT 2021** by Singapore Computer Society and Infocomm Media Development Authority in recognition of her over 30 years of experience in chemical and environmental engineering, water and energy related research and innovation.

Dr Yan Shuicheng

- **AAAI Fellow 2022** by the Association for the Advancement of Artificial Intelligence (AAAI) in recognition of the top individuals who have made significant, sustained contributions to the field of artificial intelligence.
- **Highly Cited Researcher 2021** by Clarivate Analytics for ranking in the top 1% by citations for the field and publication year in Clarivate's Web of Science database.

Prof Soh Chee Kiong

- **Lifetime Achievement Award** conferred by the International Conference on Futuristic Technologies (FT21) for his exemplary dedication and research contributions in Futuristic Technologies.

Dr Yang Yi Yan

- **Stanford's Top 2% Scientists Worldwide 2021** by Stanford University for outstanding contributions to the field of Biomedical Engineering.
- **A*STAR's Top 10 Creators (Patents) in 2014 - 2021** for outstanding contribution in patent filings to the fields of Bioengineering, Antimicrobial, Biomaterials and Nano-medicine patent applications between 2014 to 2021 in A*STAR.

SAEng Newsletter

The 9th issue of the SAEng newsletter was circulated to all Fellows in May 2022 to keep members informed on the new elected Fellows, and the latest updates on the activities and projects championed by our distinguished Fellows.

Thanks and Acknowledgements

On behalf of the Academy, I would like to extend my appreciation and thanks to our Fellows for their support and contributions as Executive Committee Members and the project groups who have dedicated precious time and hard work in pursuing the Academy's mission and objectives for the past year.

I would also like to put on record my thanks to the Institution of Engineers, Singapore (IES) for their continuing valuable and generous support towards the Academy's activities.

ACADEMY OF ENGINEERING SINGAPORE

Finally, I would like to thank all of you who are attending the meeting today and to all Fellows who have contributed generously towards the Academy.

I look forward to seeing more Fellows playing an active role in the Academy in the coming year.

ACADEMY OF ENGINEERING SINGAPORE

Newsletter

June 2023

President's Foreword

The beginning of 2023 marks the first period in which life in Singapore has returned to normal since the pandemic started. This is also the first issue of the newsletter since I was very elected to serve as president of SAEng, for which I am deeply honoured.

I would like to thank Prof. Cham for his able stewardship of the academy since it was started in 2014. During his tenure, the academy went from strength to strength. Some of the fellows who joined during this period include Mdm Ho Ching, Mr Peter Ho, Prof. Khoo Teng Chye, Prof. Lee Seng Lip, Prof. Lui Pao Chuen, Mr J. Y. Pillay, Er. Tan Gee Paw, and Mr Philip Yeo. Prof. Cham was also successful in recruiting Senior Minister Mr Teo Chee Hean to be the academy's patron.

Prof. Cham's presidency also saw the creation of the five expert groups that serve as pillars supporting the academy's work -- in water resources, land transportation, environmental preservation, the connected city, and cybersecurity. These groups were created to ensure that SAEng is understanding and addressing Singapore's engineering needs. We as a nation have benefitted enormously from having generations of eminent engineers since independence. It is our duty as a professional body to pass a tradition of excellence on to future generations of engineers and ensure that engineering remains a profession of choice in Singapore.

To help make this happen, we have several initiatives planned. The most important of these is the creation of a permanent and sustainable funding model, which is needed for long-term growth. It will allow us to host initiatives, such as quarterly outreach programmes and activities to encourage young people to become engineers, as well as nurture existing engineers and help them upskill. It will also allow us to prepare annual reports to cement our place as thought leaders on engineering in Singapore. This initiative will be done in collaboration with our partners and stakeholders in the government and local educational institutions like the National University of Singapore and Nanyang Technological University.

I look forward to working with all of you on developing this initiative, and others, to take SAEng to greater heights in the months and years to come.

AI and Engineering

Few topics have captured the imagination recently as much as artificial intelligence (AI) thanks to tools such as ChatGPT and Dall-E becoming publicly available. AI has the potential to be a game changer, radically changing the way we live, work, and play. The impact on human life may be greater than the combined effect of the mass adoption of the Internet in the 1990s and mobile phones in the early 2000s.

The integration of AI into various engineering domains has paved the way for significant advancements. For example, in design, AI algorithms analyse large amounts of data to generate design solutions in a faster, more efficient, and more cost-effective manner than traditional design methods.

Meanwhile, in manufacturing, AI uses production data to identify areas where improvements can be made to reduce waste and increase productivity. AI is also used to predict when a piece of machinery or equipment is likely to fail so that it can be repaired or replaced in time, reducing maintenance costs.

AI can also contribute to education. With the help of algorithms, students can learn and practice engineering concepts interactively, with instant feedback helping students identify areas where they need improvement. This leads to more efficient and effective learning, and can help students develop a better understanding of complex concepts.

At the same time, engineering has an important role to play in advancing AI. The development of new hardware is essential to enabling AI algorithms to run faster and more efficiently. The development of graphics processing units and chips designed specifically for AI have made it possible to train and deploy larger and more complex AI models. Advancements in sensors and materials have also enabled the collection of high-quality data which can be used to train more precise and sophisticated AI systems. Engineering innovations will also lead to the creation of new AI applications in the near-term, such as autonomous robots and self-driving cars.

In summary, developments in AI and engineering are intertwined and will continue to be so in the years to come. By embracing AI in our research and practice, we can make sure that we as engineers are at the forefront of teaching, learning, and practical applications, regardless of our specialisation.

Professor Ho Teck Hua

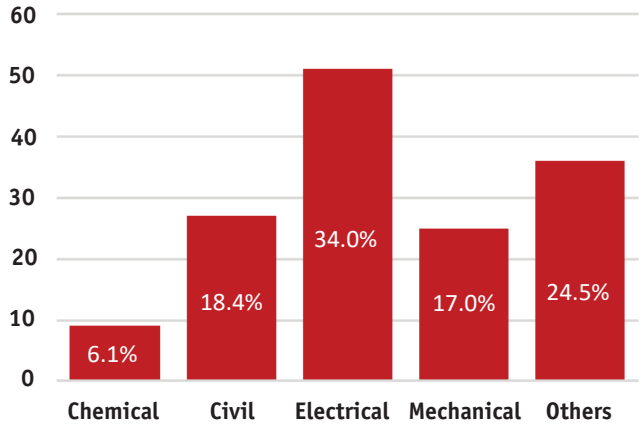
In This Issue

About the Academy

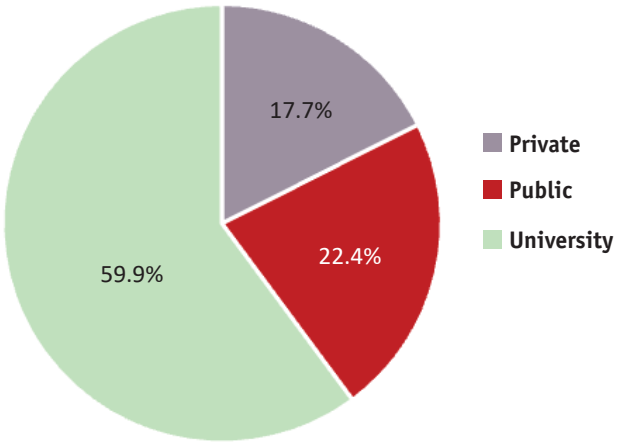
The academy's fellowship currently stands at 147 strong with the election of 17 new fellows in 2022. The new fellows are featured below and in the following pages in green.

Here are the statistics of the fellows at present.

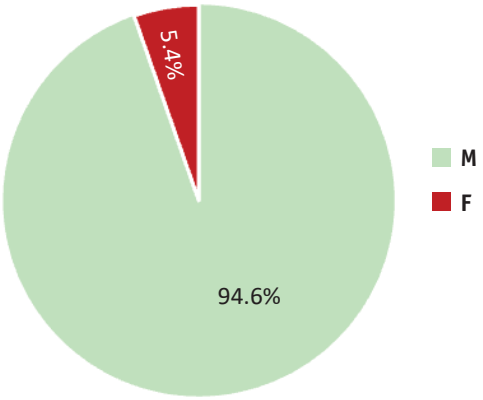
Disciplinary Field



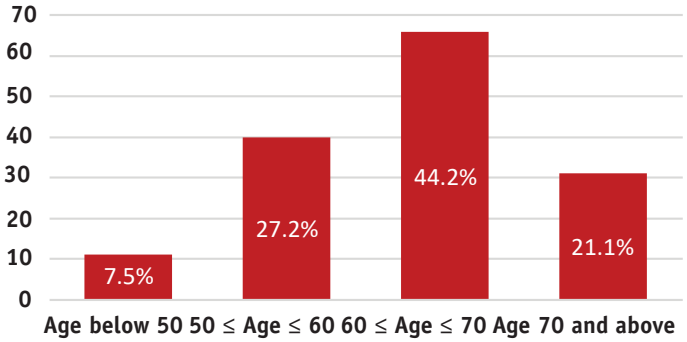
Sector



Gender Distribution



Age Profile



New Fellows

We are pleased to welcome the following new fellows to the academy.

Mr Dalson Chung
Senior Specialist, National Environment Agency
President and Fellow, Institute of Engineers Singapore

Mr Chung was previously the Director of NEA's Industry Development and Promotion Division and Managing Director of the CleanEnviro Summit Singapore where he spearheaded NEA's efforts in developing the environmental industry in Singapore to meet local needs and help environmental companies globalise, especially in the waste management and the cleaning industry sectors. He is also the Chair of the Chartered Engineer Singapore for the environment and water sector, and a member of the IES Chartered Engineer Board and the Engineering Accreditation Board.

Professor Guan Cuntai
President's Chair Professor, School of Computer Science and Engineering
Director, Artificial Intelligence Research Institute
Director, Centre for Brain Computing Institute
Nanyang Technological University

Prof. Guan's research interests include brain-computer interfaces, machine learning, medical signal and image processing, artificial intelligence, and neural and cognitive rehabilitation. He has received the Annual BCI Research Award (first prize), the IES Prestigious Engineering Achievement Award, and the Achiever of the Year (Research) Award, and the Finalist of President Technology Award. He is an elected fellow of IEEE, AIMBE, and the US National Academy of Inventors.

Dr Li Erping
Qiushi Distinguished Professor, School of Information and Electronic Engineering
Zhejiang University
Principal Scientist at Pensees (S) Pte Ltd

Dr Li has been a pioneer in electromagnetic modelling and design in artificial intelligence, for 3D heterogenous integrated circuits, neuromorphic computing chips, and 5G/6G communication electromagnetic compatibility. He has had 400 journal papers and two books published and is a fellow of IEEE, AAIA, and the USA Electromagnetics Academy. He has received the IEEE EMC Technical Achievement Award, the IES Prestigious Engineering Achievement Award, the Changjiang Chair Professorship Award, the IEEE EMC Richard Stoddard Award and the IEEE Laurence G. Cumming Award.

Professor Lou Xiong Wen (David)
Chair Professor, Department of Chemistry
City University of Hong Kong

Prof. Lou's current research is focused on design and synthesis of novel nanostructured materials for next-generation electrochemical energy storage and conversion technologies. He has had over 380 papers published, with total citations of more than 122,000 and an H-index of 206. Prof. Lou was listed as a Highly Cited Researcher by Thomson Reuters/Clarivate Analytics from 2014 to 2022 in multiple categories including Materials Science, Chemistry, Environment, and Physics. Prof. Lou is also a fellow of Singapore National Academy of Science.

Professor Meng Qiang
Professor, Department of Civil and Environmental Engineering
National University of Singapore

Prof. Meng focuses on three research areas: (i) transportation network modelling and optimisation, (ii) shipping and intermodal freight transportation analysis, and (iii) the quantitative risk assessment of transport operations. He has distinguished himself through his research on urban mobility, maritime transportation, and inter-modal freight transportation analysis, modelling, and optimisation.

Mr Ngien Hoon Ping
Group Chief Executive Officer and Executive Director
SMRT Corporation Ltd

Mr Ngien graduated with first class honours in electronics and electrical engineering from the University of Manchester in the UK, and a MSc in industrial engineering from NUS. He was conferred the Public Administration Medal (Silver) (Military) in 2007 and was awarded the Public Administration Medal (Silver) in 2015.

Professor Ooi Beng Chin
Professor, Department of Computer Science
Lee Kong Chian Centennial Professor
National University of Singapore

Prof. Ooi is a fellow of the ACM 2011, IEEE 2009, Singapore National Academy of Science 2016, and a foreign member of Academia Europaea 2022.He was the recipient of ACM SIGMOD 2009 Contributions award, co-recipient of the Singapore President's Science Award, the recipient of 2012 IEEE Computer Society Kanai award, 2013 NUS Outstanding Researcher Award, 2014 IEEE TCDE CSEE Impact Award, 2016 China Computer Federation Overseas Outstanding Contributions Award, 2020 ACM SIGMOD EF Codd Innovations Award, and 2021 NUS University Research Recognition Award.

Professor Tony Quek Quee Seng
Director, Future Communications R&D Programme, Singapore
Head of the Information Systems Technology and Design Pillar
Cheng Tsang Man Chair Professor
Singapore University of Technology and Design

Prof. Quek has been one of the strongest contributors to SUTD's rise in research in wireless communications over the past decade, specifically in the core sub-discipline of telecommunications. SUTD's growth in this sub-discipline resulted in it being ranking the fifth most influential scientific research institution in telecommunications research in Clarivate Analytics' State of Innovation Report 2017.

Professor Soh Yeng Chai
Professor, School of Electrical and Electronic Engineering
Associate Dean for Research, College of Engineering
Nanyang Technological University

Prof. Soh's current research interests are robust system theory and applications, estimation and filtering, signal and information processing, hybrid systems and applications, and optical signal processing. He has had 200 refereed papers published in international journals and holds four published patents.

Professor Tang Loon Ching
Professor, Department of Industrial Systems Engineering and Management
National University of Singapore

Prof. Tang was awarded the IISE Transactions 2010 Best Application Paper Award and the prestigious Ralph A. Evans - P. K. McElroy Award for the best paper presented at the 2011 Reliability and Maintainability Symposium. He is a leading researcher in reliability and resilience and has been working with organisations on systems design and improvement for many years.

Professor John Wang
Professor, Department of Materials Science and Engineering
National University of Singapore
Principal Scientist II, Institute of Materials Research and Engineering
A*STAR, Singapore

Prof. Wang is an internationally eminent scholar, who has championed applications of advanced materials in engineering, in the key areas of energy, manufacturing, environment, electronics, and defence in Singapore. He served as the head of the Department of Materials Science and Engineering at NUS for two terms. Professor Wang has had more than 500 papers published in top international journals, has received more than 35,000 citations, and has an H-index of 98. Professor Wang is Clarivate Highly Cited Researcher for the past three consecutive years (2020, 2021, and 2022).

Professor Wang Xin
Professor, School of Chemistry, Chemical Engineering and Biotechnology
Cheng Tsang Man Chair Professor in Energy
Nanyang Technological University

Prof. Wang is a leader in electrocatalysis for energy and environmental applications. He has been on Clarivate Web of Science's Highly Cited Researcher list since 2018. He is a fellow of the Royal Society of Chemistry and a recipient of the 2021 Nanyang Research Award.

Professor Wen Changyun
Professor, School of Electrical and Electronic Engineering
Nanyang Technological University

Prof. Wen has been working for more than 35 years on automatic control theory with applications in practical systems, including autonomous systems, cyber-physical systems, and power/energy systems. He received the IES Prestigious Engineering Achievement Award from the Institution of Engineers, Singapore, in 2005 and became an IEEE fellow in 2010.

Professor Wen Yonggang
Professor and President's Chair, School of Computer Science and Engineering
Nanyang Technological University

Prof. Wen's main area of research is data-driven system development and performance optimization for large-scale and industry-grade digital twin systems. He was awarded the 2019 Nanyang Research Award and the 2017 Nanyang Award in Innovation and Entrepreneurship.

Professor Jason Xu Zhichuan
Professor, School of Materials Science and Engineering
Nanyang Technological University

Prof. Xu's work is characterised by a bottom-up, rigorous approach to electrocatalysis science and engineering, where he has made an outstanding impact in a highly competitive area. His work has been published in top quality journals and is widely followed within the community as evidenced by his appearance in Clarivate Analytics' list of Highly Cited Researchers for 2018-2022.

Professor Zhang Daohua
Professor, School of Electrical and Electronic Engineering
Nanyang Technological University

Prof. Zhang has worked on semiconductor materials and devices for over 30 years and is a one of the leaders in photodetection from mid-infrared to millimetre waves. He has completed over 30 research projects, including the first $10 million competitive research programme at NTU as the lead principal investigator. The programme was assessed as having made "outstanding, world class research progress" by an international evaluation committee, which included a Nobel Laureate.

Professor Zhang Yong
Professor, School of Electrical and Electronic Engineering
Nanyang Technological University

Prof. Zhang is a world-renowned biomedical engineering researcher who has developed several new technologies for bioimaging, point-of-care diagnostics, and phototherapy based on nanomaterials and implantable devices, some of which have been commercialized and licensed to Singaporean companies. He has had 250 papers published in top-tier journals and has a h-index of 81 with 29,692 total citations in Google Scholar.

SAEng is actively seeking candidates to be fellows of the academy.

Nomination Criteria

Candidates are nominated by two existing members of the academy and must reside in Singapore.

In addition, candidates should have:

1. Made impactful contributions to engineering practice, research, and/or education; or
2. Demonstrated outstanding entrepreneurship and leadership; or
3. Created innovations that have been successfully translated into practice; or
4. Shown leadership in the management and professional growth of the engineering industry, educational institutions, or research organisations.

These accomplishments should be at the national or international level. Some examples are:

- **National level**
  - National contributions in various high-level technical committees, government statutory boards, and professional societies.

- **International level**
  - Served on international scientific and advisory committees or judging panels at major scientific and academic events, etc.
  - Contributions have brought the nation to international prominence in a particular field

SAEng also welcomes candidates who are early in their careers and are expected to make major contributions in the years to come.

The Fellowship Process

Nominations will be reviewed on a yearly basis in December. To be considered for assessment, nominations must be received by 30 October in the same year. Nominations received after 30 October will be included in the following year's discussions.

Successful candidates will be notified in February of the subsequent year.

To submit a nomination, please write to **secretariat@saeng.sg**.

Singapore's Engineering Doctorate (EngD) Pioneers

Three graduates from NUS & SUTD's EngD Programme

The engineering doctorate (EngD) programme, which was initiated and endorsed by the Academy of Engineering Singapore (SAEng) in July 2015, heralded a new era in higher education for the engineering profession. With its focus on research with industrial importance, projects must be approved by a supporting company. The programme was created to boost Singapore's competitive edge in training the next generation of engineer-leaders and ensure that they have depth of training in scientific theory as well as first-hand understanding of the needs of industry. Intended for working professionals, the EngD programme requires candidates to undertake coursework in technology management.

The National University of Singapore (NUS) and the Singapore University of Technology and Design (SUTD) were the first two local universities to approve the EngD programme, in 2017. They admitted the first batch of EngD students in 2018.

To date, NUS and SUTD have admitted a total of 29 EngD candidates from multi-national companies (e.g., AMAT, AMD, Panasonic, Halliburton, Nippon Paint, and Dyson), A*STAR, DSO, AISG, LLE/SME, and start-ups (e.g., Engro, One Smart Engineering, and ANOR Tech). The Economic Development Board has supported a number of EngD candidates from the abovementioned companies through the Industrial Postgraduate Programme (IPP). The EngD programme's dual focus on industry and academia makes it an excellent programme to train talent for industry.

SAEng is proud to have played a pivotal role in nudging universities in Singapore to pioneer the development of EngD programmes to serve as timely additions to the advanced manpower education programme for the future needs of Singapore's high-tech industry.

Three students from the first batch have completed their EngD study/research successfully and have been awarded engineering doctorate degrees; one was from NUS and two were from SUTD. SAEng is proud to spotlight two of the EngD pioneers, both women, below.

Dr Ariane Wu Yunshan
National University of Singapore
Project: Investigation of Corrosion Issues in the Oil and Gas Sector

How has the EngD programme benefitted you?

I've learnt a new research area and how to develop innovative technology. I've picked up new software skill sets and deepened soft skills abilities such as project management, critical thinking, public speaking and many more.

I've also learnt how to bridge between experimental and actual operational technologies. These soft skills are essential in developing new technologies and product development.

Tips for future candidates:

Have a passion to create new technologies to solve problems and create a plan on how to achieve solutions. Although there is no guarantee of success, the learning path is never halted by failure.

Final reflection:

The EngD programme requires self-motivated, and goal-orientated individuals to carry out research work under supervisors' guidance. The combined efforts of academia and industry provide more resources to achieve the desired outcome.

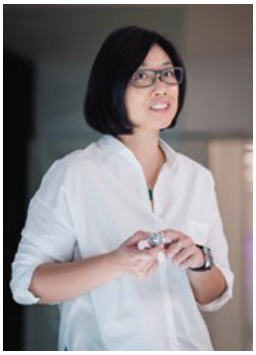
Comments from academic supervisor:

"The programme certainly helps to link the academic supervisor with industry as the two parties work together for almost four years while supervising the candidate. The supervision involved regular meetings and site visits. Personal contacts were made, and they learnt about our (academic supervisor's) capabilities and we found out in more detail what problems they (industry) were facing. In the long run, this may lead to more meaningful collaborations or consultancy."

Comments from industry supervisor:

"The EngD candidate did work on a new process; when implemented, it will increase the product life without adding significant cost. In addition, she filed a patent which adds to the company's IP platform."

Engineering Doctorate (EngD) Pioneers



Dr Yvonne Tan
Singapore University of Technology and Design
Project: Precision Design, Advanced Analysis & Modelling of High-Speed Motor Components

How has the EngD programme benefitted you?

Without a doubt it has trained in me the ability to perform in-depth research within a challenging time frame. The experience has granted me exposure to different research methodologies and technical white papers and honed my ability to distil the essence of the work within a short span of time.

The professional modules have refreshed and updated my understanding of information and key concepts that I felt I was familiar with. For example, the modules gave me new insights into patents, which is a big part of my work.

Tips for future candidates:

It is important to define your topics and area of research with your academic and industry supervisor. Do also ensure regular meetings are set up with both parties – separately, as well as altogether.

Final reflection:

Learning is a life-long journey. The adrenaline rush of getting an EngD has deepened my urge to learn more and increased my curiosity for engineering. This journey has also equipped me with an appreciation of, and the capability to conduct applied research.

Comments from academic supervisor:

"The linkage to industry via this EngD programme has benefits to both research and teaching. This programme has enabled more applied research work which benefits industry directly. In parallel, the experience with industry is looped back into teaching to benefit undergraduate students."

Comments from industry supervisor:

"Our company is already seeing rewards from this programme. Benefits include exposure to untapped talent in Singapore, parallel resourcing of R&D activities from offerings for more expedient time-to-market, gaining insights to the facilities within the research programmes in Singapore, as well as the opportunity to influence the technological direction of the research topics of our candidates."

Awards & Honours

Our heartiest congratulations to the following fellows who have recieved the honours and awards mentioned below.

Prof. Chen Xiaodong

- Named a fellow of the Singapore National Academy of Science (SNAS) (link: https://snas.org.sg/fellowship-fellows).
- Placed on the Asian Scientist 100 list, by Asian Scientist Magazine (link: https://www.asianscientist.com/as100/).
- Won an award for Solid State Chemistry & Materials, by the Singapore National Institute of Chemistry (SNIC) (link: https://snic.org.sg/index.php/awards/2020-07-20-06-34-52/solid-state-chemistry).
- Won the IUMRS Frontier Materials Scientists Award (link: https://iumrs.org/recipients-of-iumrs-fmsa-fmysa-2022/).

Prof. Chung Tai-Shung Neal

- His lifetime achievements were honoured at a special symposium at the 13th Conference of the Aseanian Membrane Society (AMS 13) on 4-6 July 2022.

Prof. Guan Cuntai

- Won the King Salman Award for Disability Research (Technical Branch) 2022, for his dedicated research on brain-computer interface technologies and his significant contributions to several medical applications using brain-computer interfaces, such as stroke rehabilitation, ADHD treatment, cognition training, and mental health.
- Named a fellow of the National Academy of Inventors (NAI)'s Class of 2022, in the USA. The fellowship is the highest professional distinction accorded solely to academic inventors across the world. The NAI Fellows Program was established to highlight academic inventors who have demonstrated a prolific spirit of innovation in creating or facilitating outstanding inventions that have made a tangible impact on the quality of life, economic development, and the welfare of society.

Dr Richard Kwok

- Named a Friend of Land Transport, by the Land Transport Authority, to recognise his contributions to the holistic improvement of Singapore's land transport system through various nation-wide initiatives that focus on manpower development, community development and standards development.

Dr Li Er Ping

- Won the 2022 Zhejiang Province Natural Science Award, first class, for outstanding contributions to the discovery of inverse Cerenkov radiation in artificial electromagnetic materials.

Prof. Lim Chwee Teck

- Won the IES Prestigious Engineering Achievement Award 2022, from the Institution of Engineers, Singapore, for engineering achievements that demonstrate outstanding engineering skills and which have made a significant contribution to the engineering progress and the quality of life in Singapore.
- Named a IUPESM fellow 2022 by the International Union for Physical and Engineering Sciences in Medicine. The fellowship recognises outstanding contributions to the international development of Physical and Engineering Sciences in Medicine.

Prof. Lock Kai Sang

- Co-winner of the 2022 Medal for Excellence in Engineering Education from the World Federation of Engineering Organizations (WFEO)

Prof. Phee Soo Jay Louis

- Awarded the Public Administration Medal (Silver) at the National Day Awards 2022, for his contributions to the education sector as Dean of the College of Engineering at Nanyang Technological University, Singapore.

Prof. Tony Quek

- Named in Stanford University's "Top 2% of Scientists Worldwide 2022", for outstanding contributions to networking and telecommunications.
- Winner of the 2022 IEEE Signal Processing Society Best Paper Award for "Federated Learning With Differential Privacy: Algorithms and Performance Analysis". The paper was published in IEEE Transactions on Information Forensics and Security, April 2020, and was co-authored by Kang Wei, Jun Li, Ming Ding, Chuan Ma, Howard H. Yang, Farokhi Farhad, Shi Jin, Tony Q. S. Quek, and H. Vincent Poor.
- Selected as a finalist for the Falling Walls Science Breakthroughs of the Year 2022 in the category Science and Innovation Management.
- Named a ST Engineering Distinguished Professor for contributions in accelerating the translation of research in wireless communications.

Mr Seah Moon Ming

- Winner of the Meritorious Service Medal at the 2022 National Day Awards, for his significant contributions to the public transport and education sectors.
- As chairman of SMRT since 2017, Mr Seah Moon Ming has been instrumental in achieving a best-in-class standard of reliability. He helped to deepen SMRT's rail engineering capabilities, enhanced its operations and maintenance, and introduced innovations which improved station services. He also contributed significantly to the Johor Bahru-Singapore Rapid Transit System project.
- As chairman of the board of governors of NUS High School, Mr Seah led the school to nurture an international outlook in its students. He helped the school establish partnerships with industry, which enabled students to gain authentic professional experiences.

Prof. Wang Rong

- Awarded the Public Administration Medal (Silver) at the 2022 National Day Awards.
- Winner of the 2022 President's Technology Award for "outstanding contributions to the field of membrane science and technology, leading to more energy-efficient liquid purification and desalination to support Singapore's sustainability goals".

Dr Yang Yi Yan

- Highly Cited Researcher 2022 awarded by Clarivate as the world's most influential scientific minds, demonstrated by the production of multiple highly-cited papers that rank in the top 1% by citations for field and year in the Web of Science™
- The Commendation Medal (COVID-19) awarded by the Republic of Singapore for displaying great courage and dedication beyond the call of duty while maintaining a high level of professionalism in her role during the COVID-19 pandemic.

Prof. Yeo Kiat Seng

- Won a 2022 Singapore National Academy of Science (SNAS) Fellowship for his pioneering work and leadership in radio frequency millimetre-wave integrated circuit design and the promotion of STEM education in Singapore.
- Named in Stanford University's "Top 2% of Scientists Worldwide 2022", for outstanding contributions to the field of engineering and integrated circuit design.

The Academy of Engineering, Singapore held its twelfth Annual General Meeting (AGM) via Zoom on 7 June 2022.

Then-President Professor Cham Tao Soon extended a warm welcome to all the fellows present at the meeting. Secretary Professor Aaron Thean presented the Secretary's Report which highlights brief statistics on the academy's fellows as well as key activities over the past year.

Professor Hang Chang Chieh, a fellow and member of SAEng's executive committee, informed the attendees about the engineering doctorate programme, which exposes students to research translation projects in industry while teaching them industry-relevant skillsets in their course of study. Professor Hang encouraged the members to contact him if they are interested in learning more about the programme.

Then-treasurer Professor Cheong Hee Kiat presented the treasurer's report on the academy's financial status for the year ending 31 December 2021.

During the meeting, Professor Cham proposed the following nominees for election to the executive committee. The nominations were supported and approved.

Professor Ho Teck Hua
President

Professor Aaron Thean
Secretary

Professor Liu Bin
Treasurer

Mr Dalson Chung
Ex-Officio-President IES

Dr Richard Kwok
Immediate Past President IES

Professor Chong Hee Kiat
Ordinary Member

Professor Chong Kee Sen
Ordinary Member

Professor Chong Tow Chong
Ordinary Member

Professor Chou Siaw Kiang
Ordinary Member

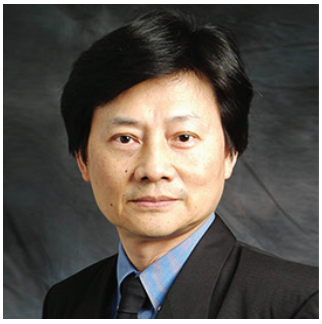
Professor Er Meng Hwa
Ordinary Member

Hang Chang Chieh
Ordinary Member

Professor Lee Der-Horng
Ordinary Member

Professor Lee Shiang Long
Ordinary Member

Mr Seah Moon Ming
Ordinary Member



Professor Andrew Nee
Ordinary Member

Yeoh Lean Weng
Ordinary Member

President Professor Ho Teck Hua expressed his gratitude for being elected to serve as the next president of SAEng and thanked Professor Cham for his leadership over the past twelve years. Professor Cham was named president emeritus of SAEng.

Prof. Cham Tao Soon

"It was a pleasure and honour to have led the academy for more than 10 years. I would like to thank all the fellows and ExCo members who were very supportive of my role.

The role of the academy is to promote the work of the engineers, be it in institutions of higher learning, government departments or the private sectors. Their work and achievements are good role models for the young. I hope increasingly more graduates will be interested to study engineering.

I would also like to encourage our fellows to provide suggestions and inputs from an engineer's perspective to the academy as well as policymakers for a greater good.

Finally, please join me in welcoming the new president, Professor Ho Teck Hua, to lead the academy. I am confident that he will provide the academy with new insights, leading it to greater heights."

In closing, President Professor Ho shared his three key goals for the academy in the coming years:

1. To continue to attract more fellows from diverse backgrounds.
2. To amplify influence in the engineering industry through efforts such as the President's Technology Award and create deeper engagements with NRF.
3. To encourage the academy to take on new projects that will energise the engineering profession.

President Professor Ho added that he looks forward to having face-to-face meetings with the members of the academy and encouraged fellows to share ideas for interesting projects at the next AGM.

Making a Donation

The Academy of Engineering, Singapore (SAEng) is a not-for-profit entity registered in Singapore, funded by contributions from individuals and private organisations. Your donations will enable the academy to develop and sustain projects to attract aspiring engineers, encourage innovation, and provide support to advance and promote excellence in engineering, and also improve the public awareness and understanding of engineering in Singapore.

To make a contribution to the academy, please contact **secretariat@saeng.sg**

Our Donors

The academy has received a total of $207,070 from organisations and individual donors thus far. We would like to express our sincere gratitude to all generous individuals and organisations that have supported the academy over the past ten years. Here is our 2011-2022 Honour Roll of Donors:

Organisations ($10,000 and above)

- Mellford Pte Ltd
- Squire Mech Pte Ltd

Individuals ($10,000 and above)

- Ho Ching*

Individuals ($5,000 to $9,999)

- Cham Tao Soon
- Chang Meng Teng
- Choo Chiau Beng
- Vincent Chong
- Kwa Chong Seng
- Lee Ek Tieng
- Seah Moon Ming
- Tan Thiam Soon

Organisations (up to $4,999)

- The Tan Chin Tuan Foundation

Individuals (up to $4,999)

- Anonymous Donor
- Freddy Boey
- Chan Eng Soon
- Chen Benmei
- Chen Charng Ning
- Cheong Hee Kiat
- Chew Yong Tian
- Chou Siaw Kiang
- Chua Kee Chaing
- Er Meng Hwa
- Sam Ge Shuzhi
- Angela Goh Eck Soong
- Hang Chang Chieh
- Peter Ho Hak Ean
- Ho Siong Hin
- Hong Minghui
- Lam Khin Yong
- Lam Yee Cheong
- Li Haizhou*
- Brian Lee Chang Leng
- Lee Seng Yip
- Leung Chun Fai
- Richard Liew Jat Yuen
- Low Teck Seng
- Louis Phee
- J. Y. Pillay
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- Susanto Rahardja
- William Tan Seng Koon
- Teoh Swee Hin
- Wang Rong
- Raj Thampuran
- Yang Yi Yan
- Yeo Kiat Seng*
- Yue Chee Yoon
- Zhang Daohua*
- Zhou Yingxin

*2022 Donors

ACADEMY OF ENGINEERING SINGAPORE

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Singapore 289758.
http://www.saeng.sg/

Academy of Engineering, Singapore

UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

FINANCIAL STATEMENTS

For the financial year ended 31 December 2021

KUDOS CAS PUBLIC ACCOUNTING CORPORATION
Public Accountants and Chartered Accountants

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

GENERAL INFORMATION
For the financial year ended 31 December 2021

Council members

Professor Cham Tao Soon	President
Professor Aaron Thean Voon Yew	Secretary
Cheong Hee Kiat	Treasurer

Registered Office

70 Bukit Tinggi Road
C/O Institution of Engineers
Singapore 289758

Auditors

Kudos CAS Public Accounting Corporation

Index

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

STATEMENT BY THE COUNCIL
For the financial year ended 31 December 2021

We, the President and Treasurer, on behalf of the Council of Academy of Engineering, Singapore (the Association), do hereby certify that in our opinion,

(a) the financial statements of the Association are drawn up in accordance with the Societies Act, Chapter 311 (the Societies Act) and the Charities Act, Chapter 37 and other relevant regulations (the Charities Act and Regulations) and Financial Reporting Standards in Singapore (FRSs), so as to give a true and fair view of the state of affairs of the Association as at 31 December 2021 and the financial performance, changes in funds and cash flows of the Association for the year then ended; and

(b) at the date of this statement, on the basis that the Council is of the opinion that the Covid-19 global pandemic will not have significant impact on the operation and liquidity of the Association, there are reasonable grounds to believe that the Association will be able to pay its debts as and when they fall due.

On behalf of the Council,

Professor Cham Tao Soon
President

Professor Cheong Hee Kiat
Treasurer

Singapore

Date:

Kudos CAS Public Accounting Corporation
UEN No. 201500907H

60 Paya Lebar Road, #10-03 Paya Lebar Square, Singapore 409051
Tel: (+65) 6225 5515

INDEPENDENT AUDITOR'S REPORT TO THE MEMBERS OF ACADEMY OF ENGINEERING, SINGAPORE FOR THE FINANCIAL YEAR ENDED 31 DECEMBER 2021

UEN No.: T11SS0118B

Report on the Audit of the Financial Statements

Opinion

We have audited the financial statements of **Academy of Engineering, Singapore** (the Association), which comprise the statement of financial position as at 31 December 2021, and the statement of profit or loss and other comprehensive income, statement of changes in funds and statement of cash flows for the year then ended, and notes to the financial statements, including a summary of significant accounting policies.

In our opinion, the accompanying financial statements are properly drawn up in accordance with the provisions of the Societies Act, Chapter 311 (the Societies Act) and Charities Act, Chapter 37 and other relevant regulations (the Charities Act and Regulations) and Financial Reporting Standards in Singapore (FRSs) so as to give a true and fair view of the financial position of the Association as at 31 December 2021 and of the financial performance, changes in funds and cash flows of the Association for the year ended on that date.

Basis for Opinion

We conducted our audit in accordance with Singapore Standards on Auditing (SSAs). Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the Financial Statements section of our report. We are independent of the Association in accordance with the Accounting and Corporate Regulatory Authority (ACRA) Code of Professional Conduct and Ethics for Public Accountants and Accounting Entities (ACRA Code) together with the ethical requirements that are relevant to our audit of the financial statements in Singapore, and we have fulfilled our other ethical responsibilities in accordance with these requirements and the ACRA Code. We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

The Council is responsible for the other information. The other information comprises the Council's statement.

Our opinion on the financial statements does not cover the other information and we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Kudos CAS Public Accounting Corporation
UEN No. 201500907H

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INDEPENDENT AUDITOR'S REPORT TO THE MEMBERS OF ACADEMY OF ENGINEERING, SINGAPORE FOR THE FINANCIAL YEAR ENDED 31 DECEMBER 2021

UEN No.: T11SS0118B

Responsibilities of the Council for the Financial Statements

The Council is responsible for the preparation of financial statements that give a true and fair view in accordance with the provisions of the Act and FRSs, and for devising and maintaining a system of internal accounting controls sufficient to provide a reasonable assurance that assets are safeguarded against loss from unauthorised use or disposition; and transactions are properly authorised and that they are recorded as necessary to permit the preparation of true and fair financial statements and to maintain accountability of assets.

In preparing the financial statements, the Council is responsible for assessing the Association's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the Council either intends to liquidate the Association or to cease operations, or has no realistic alternative but to do so.

The Council's responsibilities include overseeing the Association's financial reporting process.

Auditor's Responsibilities for the Audit of the Financial Statements

Our objectives are to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SSAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

As part of an audit in accordance with SSAs, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.

- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the Association's internal control.

- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the Council.

Kudos CAS Public Accounting Corporation
UEN No. 201500907H

60 Paya Lebar Road, #10-03 Paya Lebar Square, Singapore 409051
Tel: (+65) 6225 5515

INDEPENDENT AUDITOR'S REPORT TO THE MEMBERS OF ACADEMY OF ENGINEERING, SINGAPORE FOR THE FINANCIAL YEAR ENDED 31 DECEMBER 2021
UEN No.: T11SS0118B

Auditor's Responsibilities for the Audit of the Financial Statements (continued)

- Conclude on the appropriateness of the Council's use of the going concern basis of accounting and, based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the Association's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the Association to cease to continue as a going concern.

- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the Council regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Report on Other Legal and Regulatory Requirements

In our opinion, the accounting and other records required by the Act to be kept by the Association have been properly kept in accordance with the provisions of the Societies Regulations enacted under the Societies Act and the Charities Act and Regulations.

During the financial year ended 31 December 2021, the Association had not conducted any fund-raising appeals for which proper accounts and other records of fund-raising appeals are required to be maintained in accordance with the requirements of Regulation 6 of the Societies Regulations issued under the Societies Act and Regulation 7 of the Charities (Fund-Raising Appeals for Local and Foreign Charitable Purposes) Regulations 2012.

KUDOS CAS PUBLIC ACCOUNTING CORPORATION
Public Accountants and
Chartered Accountants

Singapore

Date:

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

STATEMENT OF PROFIT OR LOSS AND OTHER COMPREHENSIVE INCOME
For the financial year ended 31 December 2021

	Note	2021 $	2020 $
Income			
General donations		**29,000**	1,000
Expenditure			
General expenses		**(10,006)**	(9,865)
Surplus/ (Deficit) before income tax	4	**18,994**	(8,865)
Income tax expense	8	**-**	-
Surplus/ (Deficit) after income tax		**18,994**	(8,865)
Other comprehensive income		**-**	-
Total comprehensive income/ (loss) for the financial year		**18,994**	(8,865)

The accompanying notes form an integral part of these financial statements.

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

STATEMENT OF FINANCIAL POSITION
As at 31 December 2021

	Note	2021	2020
		$	$
ASSETS			
Current assets			
Cash and cash equivalents	5	**66,088**	57,259
Total current assets		**66,088**	57,259
LIABILITIES			
Current liabilities			
Other payables and accrued operating expenses	6	**2,600**	12,765
Total current liabilities		**2,600**	12,765
NET CURRENT ASSET		**63,488**	44,494
UNRESTRICTED FUND			
General fund		**63,488**	44,494
TOTAL FUNDS		**63,488**	44,494

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

STATEMENT OF CHANGES IN FUNDS
For the financial year ended 31 December 2021

	General fund $	Total $
Balance at 1 January 2020	53,359	53,359
(Deficit) for the financial year	(8,865)	(8,865)
Other comprehensive income for the financial year	-	-
Total comprehensive (loss) for the financial year	(8,865)	(8,865)
Balance at 31 December 2020	44,494	44,494
Surplus for the financial year	**18,994**	**18,994**
Other comprehensive income for the financial year	-	-
Total comprehensive surplus for the financial year	**18,994**	**18,994**
Balance as at 31 December 2021	**63,488**	**63,488**

The accompanying notes form an integral part of these financial statements.

Academy of Engineering, Singapore
UEN No.: T11SS0118B
(Incorporated in the Republic of Singapore)

STATEMENT OF CASH FLOWS
For the financial year ended 31 December 2021

	Note	2021	2020
		$	$
Cash flows from operating activities			
Surplus/ (Deficit) from operating activities		**18,994**	(8,865)
Operating surplus/ (deficit) before working capital changes		**18,994**	(8,865)
Changes in working capital:			
Other payables and accrued operating expenses		**(10,165)**	9,765
Net cash generated from operating activities		**8,829**	900
Net increase in cash and cash equivalents		**8,829**	900
Cash and cash equivalents at beginning of the financial year		**57,259**	56,359
Cash and cash equivalents at end of the financial year	5	**66,088**	57,259

The accompanying notes form an integral part of these financial statements.

These notes form an integral part of and should be read in conjunction with the accompanying financial statements.

1. Domicile and activities

Academy of Engineering, Singapore (the Association) is registered with the Registry of Societies in Singapore, on 16 June 2011. It is an approved charitable organisation under the Charities Act, Cap. 37, with effect from 15 November 2012.

The Association is domiciled in Singapore with its registered office address at 70 Bukit Tinggi Road, C/O Institution of Engineers, Singapore 289758.

The principal activities of the Association are to promote, assist, and coordinate the activities to advance and promote excellence in Engineering in Singapore. There have been no significant changes in the nature of these activities during the financial year.

The Council members are as follows:

President	Professor Cham Tao Soon
Secretary	Professor Thean Voon Yew, Aaron
Treasurer	Professor Cheong Hee Kiat

2. Summary of significant accounting policies

2.1 Basis of preparation

The financial statements of the Association have been drawn up in accordance with Financial Reporting Standards in Singapore (FRSs).

The financial statements have been prepared on the historical cost basis except as disclosed in the accounting policies below.

The financial statements are presented in Singapore Dollars, which is the Association's functional currency.

2.2 Adoption of new and amended standards and interpretations

The accounting policies adopted are consistent with those of the previous financial year except that in the current financial year, the Association has adopted all the new and amended standards which are relevant to the Association and are effective for annual financial periods beginning on or after 1 January 2021. The adoption of these standards did not have any material effect on the financial performance or position of the Association.

2. Summary of significant accounting policies (continued)

2.3 Standards issued but not yet effective

The Association has not adopted the following standards applicable to the Association that have been issued but not yet effective:

Description	Effective for annual periods beginning on or after
Annual Improvements to FRSs 2018-2020	1 January 2022
Amendments to FRS 1 Presentation of Financial Statements: Classification of Liabilities as Current or Non-current	1 January 2023
Amendments to FRS 1 Presentation of Financial Statements and FRS Practice Statement 2: Disclosure of Accounting Policies	1 January 2023

The Council expects that the adoption of the standards above will have no material impact on the financial statements in the year of initial application.

2.4 Financial instruments

(a) Financial assets

Initial recognition and measurement

Financial assets are recognised when, and only when the Association becomes party to the contractual provisions of the instruments.

At initial recognition, the Association measures a financial asset at its fair value plus, in the case of a financial asset not at fair value through profit or loss (FVPL), transaction costs that are directly attributable to the acquisition of the financial asset. Transaction costs of financial assets carried at FVPL are expensed in profit or loss.

Trade receivables are measured at the amount of consideration to which the Association expects to be entitled in exchange for transferring promised goods or services to a customer, excluding amounts collected on behalf of third party, if the trade receivables do not contain a significant financing component at initial recognition.

2. Summary of significant accounting policies (continued)

2.4 Financial instruments (continued)

(a) Financial assets (continued)

Subsequent measurement

Investments in debt instruments

Subsequent measurement of debt instruments depends on the Association's business model for managing the asset and the contractual cash flow characteristics of the asset. The three measurement categories for classification of debt instruments are:

i) Amortised cost

Financial assets that are held for the collection of contractual cash flows where those cash flows represent solely payments of principal and interest are measured at amortised cost. Financial assets are measured at amortised cost using the effective interest method, less impairment. Gains and losses are recognised in profit or loss when the assets are derecognised or impaired, and through amortisation process.

ii) Fair value through other comprehensive income (FVOCI)

Financial assets that are held for collection of contractual cash flows and for selling the financial assets, where the assets' cash flows represent solely payments of principal and interest, are measured at FVOCI. Financial assets measured at FVOCI are subsequently measured at fair value. Any gains or losses from changes in fair value of the financial assets are recognised in other comprehensive income, except for impairment losses, foreign exchange gains and losses and interest calculated using the effective interest method are recognised in profit or loss. The cumulative gain or loss previously recognised in other comprehensive income is reclassified from equity to profit or loss as a reclassification adjustment when the financial asset is de-recognised.

iii) Fair value through profit or loss

Assets that do not meet the criteria for amortised cost or FVOCI are measured at FVPL. A gain or loss on a debt instrument that is subsequently measured at FVPL and is not part of a hedging relationship is recognised in profit or loss in the period in which it arises.

2. Summary of significant accounting policies (continued)

2.4 Financial instruments (continued)

(a) Financial assets (continued)

Investments in equity instruments

On initial recognition of an investment in equity instrument that is not held for trading, the Association may irrevocably elect to present subsequent changes in fair value in other comprehensive income which will not be reclassified subsequently to profit or loss. Dividends from such investments are to be recognised in profit or loss when the Association's right to receive payments is established. For investments in equity instruments which the Association has not elected to present subsequent changes in fair value in other comprehensive income, changes in fair value are recognised in profit or loss.

Derivatives

Derivatives are initially recognised at fair value on the date a derivative contract is entered into and are subsequently remeasured to their fair value at the end of each reporting period. Changes in fair value of derivatives are recognised in profit or loss.

Derecognition

A financial asset is derecognised where the contractual right to receive cash flows from the asset has expired. On derecognition of a financial asset in its entirety, the difference between the carrying amount and the sum of the consideration received and any cumulative gain or loss that had been recognised in other comprehensive income for debt instruments is recognised in profit or loss.

b) Financial liabilities

Initial recognition and measurement

Financial liabilities are recognised when, and only when, the Association becomes a party to the contractual provisions of the financial instrument. The Association determines the classification of its financial liabilities at initial recognition.

All financial liabilities are recognised initially at fair value plus in the case of financial liabilities not at FVPL, directly attributable transaction costs.

Subsequent measurement

After initial recognition, financial liabilities that are not carried at FVPL are subsequently measured at amortised cost using the effective interest method. Gains and losses are recognised in profit or loss when the liabilities are derecognised, and through the amortisation process.

2. Summary of significant accounting policies (continued)

2.4 Financial instruments (continued)

b) Financial liabilities

De-recognition

A financial liability is de-recognised when the obligation under the liability is discharged or cancelled or expires. On derecognition, the difference between the carrying amounts and the consideration paid is recognised in profit or loss.

2.5 Impairment of financial assets

The Association recognises an allowance for expected credit losses (ECLs) for all debt instruments not held at FVPL. ECLs are based on the difference between the contractual cash flows due in accordance with the contract and all the cash flows that the Association expects to receive, discounted at an approximation of the original effective interest rate. The expected cash flows will include cash flows from the sale of collateral held or other credit enhancements that are integral to the contractual terms.

ECLs are recognised in two stages. For credit exposures for which there has not been a significant increase in credit risk since initial recognition, ECLs are provided for credit losses that result from default events that are possible within the next 12-months (a 12-month ECL). For those credit exposures for which there has been a significant increase in credit risk since initial recognition, a loss allowance is recognised for credit losses expected over the remaining life of the exposure, irrespective of timing of the default (a lifetime ECL).

For trade receivables, the Association applies a simplified approach in calculating ECLs. Therefore, the Association does not track changes in credit risk, but instead recognises a loss allowance based on lifetime ECLs at each reporting date. The Association has established a provision matrix that is based on its historical credit loss experience, adjusted for forward-looking factors specific to the debtors and the economic environment which could affect debtors' ability to pay.

For debt instruments at FVOCI, the Association applies the low credit risk simplification. At every reporting date, the Association evaluates whether the debt instrument is considered to have low credit risk using all reasonable and supportable information that is available without undue cost or effort. In making that evaluation, the Association reassesses the internal credit rating of the debt instrument. In addition, the Association considers that there has been a significant increase in credit risk when the contractual payments are more than 30 days past due.

2. Summary of significant accounting policies (continued)

2.5 Impairment of financial assets (continued)

The Association considers a financial asset in default when contractual payments are 90 days past due. However, in certain cases, the Association may also consider a financial asset to be in default when internal or external information indicates that the Association is unlikely to receive the outstanding contractual amounts in full before taking into account any credit enhancements held by the Association. A financial asset is written off when there is no reasonable expectation of recovering the contractual cash flows.

2.6 Cash and cash equivalents

Cash and cash equivalents comprise cash at bank and on hand which is subject to an insignificant risk of changes in value.

2.7 Revenue

Revenue is measured based on the consideration to which the Association expects to be entitled in exchange for transferring promised goods or services to a customer, excluding amounts collected on behalf of third parties.

Revenue is recognised when the Association satisfies a performance obligation by transferring a promised good or service to the customer, which is when the customer obtains control of the good or service. A performance obligation may be satisfied at a point in time or over time. The amount of revenue recognised is the amount allocated to the satisfied performance obligation.

The amount of revenue recognised is the amount allocated to the satisfied performance obligation.

(a) Donation income - recognised as income on receipt basis.

2.8 Provisions

General

Provisions are recognised when the Association has a present obligation (legal or constructive) as a result of a past event, it is probable that an outflow of resources embodying economic benefits will be required to settle the obligation and the amount of the obligation can be estimated reliably.

Provisions are reviewed at the end of each reporting period and adjusted to reflect the current best estimate. If it is no longer probable that an outflow of economic resources will be required to settle the obligation, the provision is reversed. If the effect of the time value of money is material, provisions are discounted using a current pre-tax rate that reflects, where appropriate, the risks specific to the liability. When discounting is used, the increase in the provision due to the passage of time is recognised as a finance cost.

3. Significant accounting judgements and estimates

There were no critical judgements made in the process of applying accounting estimates and policies that have the most significant effect on the amounts recognised in the financial statements. There were no key assumptions concerning the future, and other key sources of estimation uncertainty at the end of the reporting year, that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year.

4. Surplus / (Deficit) before income tax

	2021	2020
	$	$
Website development	**(1,370)**	(1,370)
Printing of newsletter	**(5,350)**	(5,136)
Honorarium	**(250)**	(500)

5. Cash and cash equivalents

	2021	2020
	$	$
Cash at bank	**66,088**	57,259

6. Other payables and accrued operating expenses

	2021	2020
	$	$
Other payables	**-**	9,665
Accrued operating expenses	**2,600**	3,100
	2,600	12,765

7. Tax exempt receipts

The Association was granted the Institute of Public Character (IPC) status and is qualified to issue tax deductible receipts for outright donations designated for its engineering related programmes as stated in its objects of Constitution. This status was granted from 14 February 2013 to 13 February 2015. The Association's IPC was not renewed since its expiry.

8. Income tax expense

The Association is recognised as a charitable institution under the Charities Act, Chapter 137. No provision has been made in the financial statements of the Association. Its income is exempted from income tax of the Singapore Income Tax Act, Cap. 134.

9. Financial risk management objectives and policies

The Association is exposed to financial risks arising from its operations. The key financial risk is liquidity risk. The Association's overall risk management objective is to focus on the unpredictability of financial markets and seeks to minimise potential adverse effects on the financial performance of the Association. The Association does not have a formal risk management policies and guidelines.

a. Liquidity risk

Liquidity risk refers to the risk that the Association will encounter difficulties in meeting its short-term obligations due to shortage of funds. The Association's exposure to liquidity risk arises primarily from mismatches of the maturities of financial assets and liabilities. It is managed by matching the payment and receipt cycles.

The Association manages its liquidity risk by monitoring and maintaining an adequate level of cash and cash equivalents deemed adequate by the Council members to finance its activities and to mitigate the effects of fluctuations in cash flows. At the statement of financial position date, assets held by the Association for managing liquidity risk included cash and fixed deposits as disclosed in Note 5.

10. Authorisation of financial statements

The financial statements for the financial year ended 31 December 2021 were authorised for issue in accordance with a resolution of the Council members of **Academy of Engineering, Singapore** on