

President's Foreword



Since I penned the Foreword in March last year, the coronavirus pandemic which was tracked beginning in late 2019 has reached almost every country in the world. Worldwide, Covid-19 has caused more than 105.7 million infections and 2.3 million deaths. Its virulence has stressed healthcare systems, affected education systems worldwide, leading to the near-total closures of schools, colleges and universities, and also devastated many sectors of the global economy. Tighter border controls and travel restrictions have led to plunging fortunes for the aviation and hospitality industries. Lockdown measures imposed by various governments all over the world have shuttered retail and food and beverage businesses. Many people have lost their jobs and seen their incomes cut. Majority of countries were in recession. The IMF estimated that the global economy shrunk by 4.4% in 2020, the worst decline since the Great Depression of the 1930s. Covid-19 has also spurred unprecedented government relief measures worldwide to counter the impact of the virus.

Back home, the Covid-19 pandemic has led to both demand and supply sides shocks to the Singapore economy. The Singapore Government has put aside almost \$100 billion (about 20% of its GDP) to support workers and businesses.

In response to school closures, many schools and teachers worldwide have adopted the recommendations of UNESCO to using distance learning programmes and open educational applications and platforms to reach learners remotely and limit the disruption of education. Colleges and universities have moved quickly to find creative and innovative solutions to teaching students online or using hybrid-mode subject to socially distant. Those which have invested in digital technology in eLearning are more ready

and responsive to implement such online programmes and minimise the disruption of education.

According to a new McKinsey Global Survey of executives, the Covid-19 crisis has accelerated the digitisation of their customer and supply-chain interactions and their internal operations by three to four years. The share of digital products in their company's portfolios has accelerated by seven years. The funding for digital initiatives has increased more than anything else. It is more than increase in costs but also the number of people in technology roles, and the number of customers. The crisis has brought about a sea change in executive mindsets on the role of technology in business. The extent of technology's differentiating role in this crisis is stark.

At the same time, technology has proved a necessary tool to help governments on the frontline of the emergency continue to provide essential public service during the Covid-19 crisis. Technology can have a profound effect on citizen's daily lives and ensure them access to health services, information, and communication with the relevant authorities.

The Covid-19 crisis and the various responses by governments, educational institutions and firms have led to an inevitable surge in the use of digital technologies. It has reinforced the role and importance of engineering and technology in society. I foresee the Academy will continue to play the critical role by encouraging more bright next generation to take up engineering and is in the right place to ensure Singapore will be ready.

The Covid-19 will not end soon especially with the appearance of new strains and likely more to come. I would like to urge Fellows and their families to take precaution of wearing masks and avoiding crowds and be vaccinated to set an example to the engineering community.

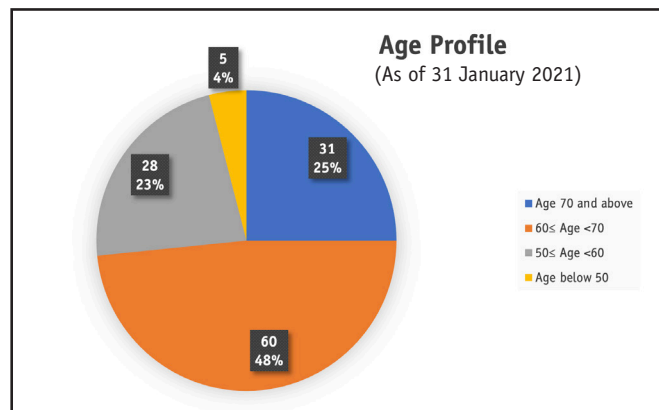
Experts think that it would be a stable situation if at least 60% of the population have been vaccinated. With the supply problem and some reluctance of certain population, it will take some time, may be years before this target is reached. Meantime, we have to be cautious to be safe.

Professor Cham Tao Soon

New Fellows

The Academy's fellowship currently stands at 124 strong with the election of 10 new fellows in 2020.

We are pleased to welcome the following new Fellows to the Academy.



Professor Chan Siew Hwa

President's Chair in Energy
Nanyang Technological University, Singapore (NTU Singapore)
Co-Director, Energy Research Institute @ NTU
Vice-Director, China-Singapore International Joint Research Institute
Deputy Director, Maritime Institute (MI@NTU)

Prof Chan Siew Hwa obtained his PhD from Imperial College London and is a Professor in the School of Mechanical and Aerospace Engineering at Nanyang Technological University, Singapore and President's Chair in Energy, NTU. He is a founding member and a Co-Director of the Energy Research Institute @ NTU and the Vice Director of China-Singapore International Joint Research Institute in Guangzhou Knowledge City (GKC), Guangzhou. His research includes internal combustion engines, fuel cell and hydrogen technologies. He founded Xin Xiang (Guangzhou) Hydrogen Technologies with key business in manufacturing key components for PEM fuel cells. Prof Chan has received numerous awards including the outstanding scientific award from International Association of Hydrogen Energy, USA.



Professor Chen Xiaodong

President's Chair in Materials Science and Engineering
Nanyang Technological University, Singapore (NTU Singapore)
Director, Innovative Centre for Flexible Devices at NTU
Director, Max Planck-NTU Joint Lab for Artificial Senses

Prof Chen Xiaodong is the President's Chair in Materials Science and Engineering, Professor of Chemistry and Medicine (by courtesy) at Nanyang Technological University, Singapore. Currently, he is the Director of Innovative Centre for Flexible Devices at NTU and the Director of Max Planck – NTU Joint Lab for Artificial Senses. His research interests include mechano-materials and devices, integrated nano-bio interface, and cyber-human interfaces. He has received multiple prestigious awards and honours including Singapore NRF Investigatorship, Small Young Innovator Award, Singapore NRF Fellowship, Nanyang Research Award, Mitsui Chemicals-SNIC Industry Award in Materials and Nano-chemistry, and Friedrich Wilhelm Bessel Research Award.



Professor Ben M. Chen

Professor, Department of Electrical and Computer Engineering
National University of Singapore (NUS)

Prof Chen is a Professor of Electrical and Computer Engineering at National University of Singapore (NUS) and a Professor of Mechanical and Automation Engineering at Chinese University of Hong Kong (CUHK). He was a Provost's Chair Professor at NUS and Assistant Professor at State University of New York at Stony Brook, from 1992 to 1993. His current research interests are in unmanned systems, control theory and applications. He has published more than 450 journal and conference articles, and 10 research monographs. He had served on the editorial boards of several international journals including *Automatica* and *IEEE Transactions on Automatic Control*. He currently serves as an Editor-in-Chief of Unmanned Systems. Prof Chen is an IEEE Fellow.



Professor Ong Say Leong

Emeritus Professor, Department of Civil and Environmental Engineering
National University of Singapore (NUS)
Deputy Director, Environmental Research Institute

Prof Ong Say Leong is Emeritus Professor in the Department of Civil and Environmental Engineering and Deputy Director of Environmental Research Institute at NUS. He has made significant contributions towards building a world class environmental science and engineering programme at NUS and enhanced its international visibility in water quality enhancement, reclamation, and reuse research. In addition, Prof Ong has contributed extensively to his professional communities at local and international levels. He is a co-recipient of the Top 50 Engineering Feast@IES-SG50: NEWater and a recipient of the Public Service Star Award from the President of the Republic of Singapore in 2016.



Dr Susanto Rahardja

Director, 5G and Beyond Programme
Institute for Infocomm Research
Agency for Science, Technology and Research,
Singapore

Dr Rahardja is the Director of 5G and Beyond Programme at the Institute for Infocomm Research. His research interests are multimedia signal processing and wireless communications. He contributed to various audio technologies such as ISO/IEC14496-3:2005/Amd.3:2006 which have been licensed worldwide. He has been serving on the editorial boards of various IEEE Transactions and as the General Chair/Co-Chair of more than 10 ACM/APSIPA/IEEE/SPIE conferences. He is a recipient of several honours including Tan Kah Kee Young Inventors' Open Category Gold, Singapore National Technology Award, 2010 World Technology & Summit Finalist, Nokia Foundation Visiting Professor Award and was elevated to IEEE Fellow in 2011.



Dr Shi Xu

Executive Chairman
Nanofilm Technologies International Private
Limited

Dr Shi received his BSc and PhD degrees in Physics from Tongji University, China in 1986 and University of Reading, United Kingdom in 1990 respectively. In 1999, he founded Nanofilm Technologies International Pte Ltd as a tech start-up spun off from Nanyang Technological University. Under his leadership and continued innovation, Nanofilm has achieved remarkable commercial success. In October 2020, Nanofilm had a successful debut on the mainboard of Singapore Exchange as the first home-grown unicorn deep-tech company. Dr Shi has published over 100 research papers and filed 34 key inventive patents. He received the ASEAN Outstanding Engineering Achievement Award in 1997, National Technology Award in 2000 and is the recipient of EY Entrepreneur of The Year 2017.



Mr Mervyn Sirisena

Chairman
SIA Engineering (Philippines) Corporation (SIAEP)
Director
Boeing Asia Pacific Aviation Services (BAPAS)

Mr Sirisena has been in the SIA Group since 1975 and has served various appointments in SIA and SIA Engineering Company (SIAEC). He was appointed as President and Chief Operating Officer in March 2000. He saw the Company through its first IPO when SIAEC was listed on 12 May 2000. In April 2001, he returned to SIA as its Senior Vice President Engineering, heading the Engineering Division before his retirement in 2015. After his retirement, he continues to be involved in aviation, while volunteering in the Institution of Engineers, Singapore, and Cerebral Palsy Alliance of Singapore. Mr Sirisena holds a BE Hons (Aeronautical) from the University of Sydney and a Master of Business

Administration from the National University of Singapore. He is a Fellow of the Institution of Engineers, Singapore and the Singapore Institute of Aerospace Engineers.



Professor Xie Lihua

Professor, School of Electrical and Electronic
Engineering
Nanyang Technological University, Singapore (NTU
Singapore)
Director, Delta-NTU Corporate Laboratory for
Cyber-Physical Systems

Prof Xie received his PhD degree from the University of Newcastle, Australia, in 1992. He is currently a professor in the School of Electrical and Electronic Engineering at Nanyang Technological University, Singapore and the director of Delta-NTU Corporate Laboratory for Cyber-Physical Systems. He was the Head of Division of Control and Instrumentation from 2011 to 2014. His research areas include robust control, networked control, and unmanned systems. He has been listed as a highly-cited researcher by Thomson Reuters and Clarivate Analytics since 2014. He was elected to Fellow of IEEE in 2007 and Fellow of IFAC in 2011 for his contribution to robust control and filtering.



Dr Yan Shuicheng

Group Chief Scientist
Sea Ltd
Director at Sea AI Labs

Dr Yan is Group Chief Scientist at Sea Ltd and Director at Sea AI Labs. He was a tenured Associate Professor in the Department of Electrical and Computer Engineering at the National University of Singapore. He is an ACM Fellow, IEEE Fellow and IAPR Fellow. His research areas include computer vision, machine learning, and multimedia analysis. To date, he has authored/co-authored over 600 technical papers, with Google Scholar citation over 50,000 times and H-index 115. He was listed as a highly-cited researcher by Thomson Reuters and Clarivate Analytics from 2014 to 2016 and from 2018 to 2020.



Dr Zhou Yingxin

Head Engineering (Underground Facilities),
Defence Science and Technology Agency

Dr Zhou is Head Engineering (Underground Facilities) with the Defence Science and Technology Agency. He played key roles in rock engineering and technology development for the Underground Ammunition Facility and has been involved in several major national initiatives in underground space. He has served in various leadership positions in local and international societies related to rock engineering and underground space. He is a member of the Editorial Board for the International Journal of Tunnelling & Underground Space Technology, and Fellow of the International Society for Rock Mechanics & Engineering. Dr Zhou received the Defence Technology Prize Individual (Engineering) Award in 2018.

Fellows aged 50 and Below

The Academy of Engineering, Singapore (SAEng) elects Fellows annually through a rigorous peer-review process that evaluates individuals based on their stellar leadership and career achievements in the field of engineering across all disciplines. SAEng is proud to present the following 5 young and accomplished Fellows who are aged 50 and below, as of 31 January 2021.

As part of the succession planning of the Academy, SAEng looks forward to welcoming more young eminent engineers, engineering scientists, public officials and distinguished leaders of the academic and business communities to be elected as Fellows of the Academy.



Professor Chen Xiaodong



Professor Liu Bin



Professor Ng How Yong



Professor Louis Phee



Dr Yan Shuicheng

► Awards & Honours

Our heartiest congratulations to the following Fellows who had been bestowed with various prestigious honours and awards by the respective professional institutions and organisations in 2020.

Professor Cheong Hee Kiat

- **The Public Administration Medal (Gold), National Day Awards 2020** conferred by the President of the Republic of Singapore.

Professor Lock Kai Sang

- **The Public Service Star, National Day Awards 2020** conferred by the President of the Republic of Singapore.

Professor Phoon Kok Kwang

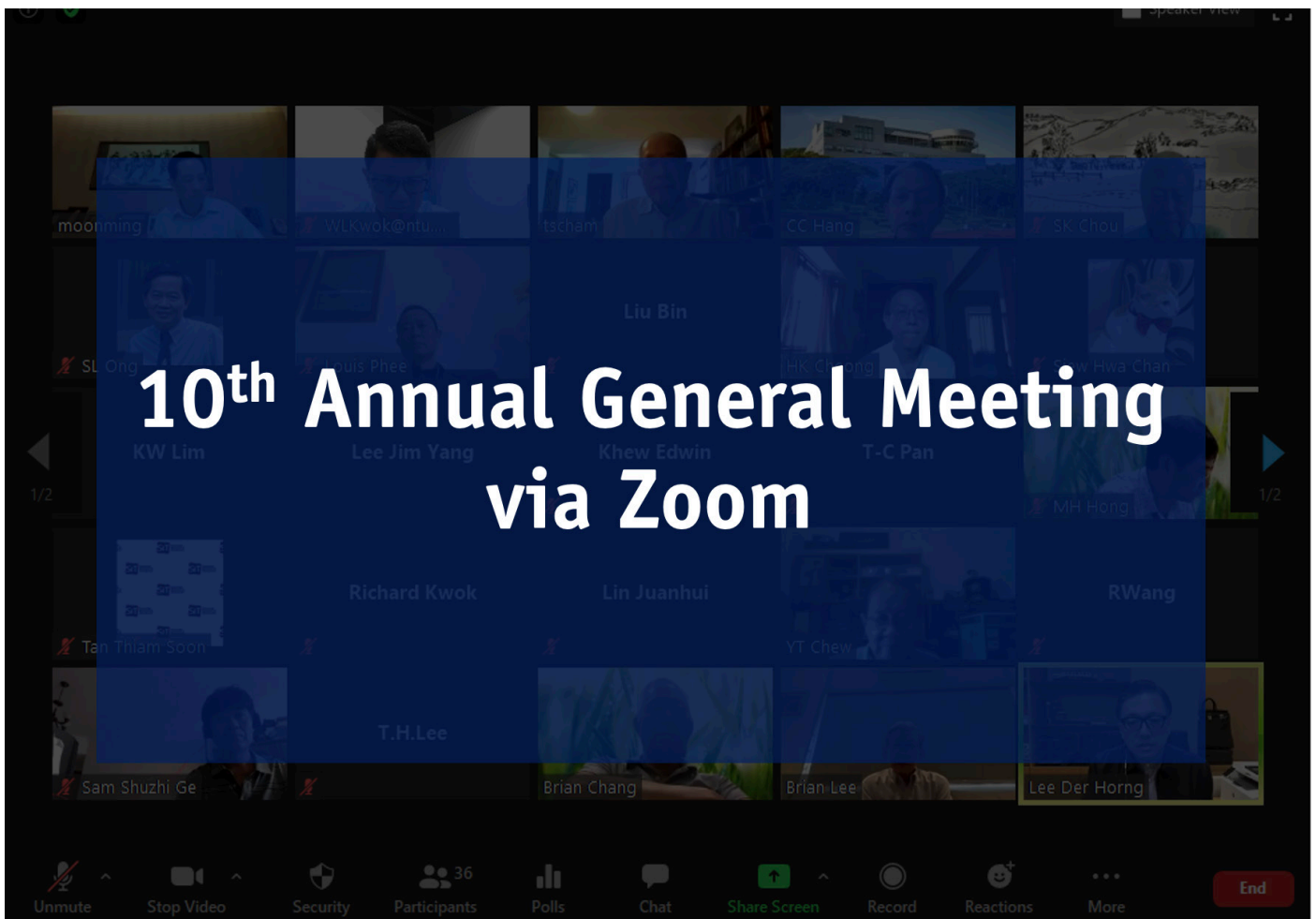
- **The Norman Medal 2020** by the American Society of Civil Engineers for co-authoring of a paper that is judged worthy of special commendation for its merit as a contribution to engineering science.

Mr Seah Moon Ming

- **Medal of Commendation (Gold), The May Day Awards 2020** by National Trades Union Congress (NTUC).

Dr Yan Shuicheng

- **ACM Fellow** by the Association for Computing Machinery (ACM) in recognition of the top 1% of ACM Members for their outstanding accomplishments in computing and information technology and/or outstanding service to ACM and the larger computing community.
- **Highly Cited Researcher 2020** by Clarivate Analytics for ranking in the top 1% by citations for field and publication year in Clarivate's Web of Science database.



Tenth Annual General Meeting

Due to COVID-19 situation, the Academy of Engineering, Singapore held its tenth Annual General Meeting (AGM) via Zoom meeting on 8 September 2020.

Academy President Professor Cham welcomed all Fellows before Professor Louis Phee presented the Secretary's report to the meeting. President Cham requested that Fellows continue nominating young actors in the academia and industry for SAEng Fellowship. He also encouraged all Fellows to take time out to contribute to the Academy's projects and activities, and suggested to share findings to public through online webinars. He also encouraged Fellows to form groups to study into important topics of public interests. In this regard, Fellows can either self-organise or be facilitated by the Academy into such collaborative study groups in accordance with their interest and/or disciplines. The Secretary's report was endorsed by Fellows without any amendment.

Professor Cheong Hee Kiat presented the Treasurer's report on the

Academy's financial status for year ending 31 December 2019 to the meeting for comments. The Treasurer's report was endorsed without any amendment.

In closing, the President expressed his appreciation and thanks to the 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 and thanked IES and Fellows for their valuable and generous support towards the Academy's activities.

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 saeng@ntu.edu.sg.

Our Donors

The Academy has received a total of S\$132,570 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 nine years. Here is our 2011-2020 Honour Roll of Donors:

Patron
DPM Teo Chee Hean

Executive Committee

President
Cham Tao Soon

Secretary
Louis Phee

Treasurer
Cheong Hee Kiat

Ex-officio - President IES
Richard Kwok

Ex-officio - Immediate Past President IES

Yeoh Lean Weng

Ordinary Member

Chong Kee Sen
Chong Tow Chong
Chou Siaw Kiang
Hang Chang Chieh
Lee Der-Horng
Lee Shiang Long
Liu Bin
Andrew Nee Yeh Ching
Seah Moon Ming
Tan Thiam Soon

Editor
Er Meng Hwa

Honorary Auditor
Gan Boon Jin
Lock Kai Sang



ISSN 2345-7589

While every care has been exercised in compiling this publication, we assume no responsibility for the effects arising there from. Information provided is considered to be true and correct at the time of publication.

Feedback on the Newsletter is welcome as well as all communications that you may wish to make and which we may publish. To contribute an article/give us your feedback, email us at secretariat@saeng.sg
© Copyright 2021. All rights reserved. Permission from the publisher is required for reproduction by any means in whole or in part.

This newsletter is published for The Academy of Engineering, Singapore (SAEng) by World Scientific Publishing Co Pte Ltd.



Printed on FSC™ certified paper in support of responsible earth.

The Academy of Engineering, Singapore

c/o Institution of Engineers
70 Bukit Tinggi Road,
Singapore 289758.
<http://www.saeng.sg/>

Organisations (\$10,000 and above)

Mellford Pte Ltd
Squire Mech Pte Ltd

Organisations (up to \$4,999)

The Tan Chin Tuan
Foundation

Individuals (up to \$4,999)

Anonymous Donor
Freddy Boey
Chan Eng Soon
Chen Charng Ning
Cheong Hee Kiat
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

Individuals (\$10,000 and above)

Ho Ching

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

Cham Tao Soon
Chang Meng Teng
Choo Chiau Beng
Lee Ek Tieng
Seah Moon Ming
Tan Thiam Soon

Hong Minghui
Lam Khin Yong
Brian Lee Chang Leng
Lee Seng Lip
Richard Liew Jat Yuen
Low Teck Seng
Louis Phee
J. Y. Pillay
Seah Hock Soon
Soh Chee Kiong
Su Guanng
William Tan Seng Koon
Teoh Swee Hin

Raj Thampuran
Yue Chee Yoon
Zhou Yingxin