

## 1.6 School of Mechanical and Aerospace Engineering

### Overview

#### Vision

A global leader in quality education and research favoured by industry and the preferred School of parents and students as well as a dynamic and vibrant place to work and learn.

#### Mission

To provide world-class education and achieve international eminence and technological advancement for the well-being of the nation.

#### Background

Mechanical and aerospace engineers design and produce systems that extend our physical abilities and enhance our quality of life. These systems include every mode of transportation; robots and intelligent systems for new age manufacturing; biomedical sensors, actuators and other life-saving systems; micro-electromechanical systems; information storage systems; microprocessor-driven consumer products and environmentally responsible energy systems. With phenomenal advances in computing power, nanotechnology, aerospace and the life sciences, the design of systems and their effective realisation have been rapidly transformed. This necessitates a pool of versatile and highly skilled engineers that can match the industry's need for critical skills in manufacturing, aviation, design, biomedical and informatics applications and in other strategic sectors.

The School of Mechanical and Aerospace Engineering aims to train and develop individuals with a broad engineering foundation as well as bespoke knowledge and skills in some relevant leading edge technologies. By providing a stimulating environment in which diverse ideas and talents are exchanged and harnessed, the School seeks to create innovative, cross-disciplinary mechanical and aerospace engineering graduates who can function effectively as professionals in high demand in the 21st century.

The student-oriented focus of the School offers students more flexibility and choices in their course of study. Some students may choose to further their interests and aptitudes in design or mechatronics by opting for an in-depth specialisation in either of these streams from the start of their second year. Within each of these streams, students study the core mechanical engineering courses, together with courses in their specific area of specialisation.

The School keeps abreast of advanced technological developments in industry and in research. For this purpose, the School is divided administratively into six divisions:

- 1) Engineering Mechanics
- 2) Manufacturing Engineering
- 3) Systems and Engineering Management
- 4) Thermal and Fluids Engineering
- 5) Mechatronics and Design
- 6) Aerospace Engineering

#### Faculty Members

##### Professor

Lam Khin Yong, Ph.D. (Massachusetts Institute of Technology), Chair  
Lim Enk Ng, Lennie, Ph.D. (University of Surrey), Associate Chair (Curriculum and Graduate Studies)  
Lye Sun Woh, Ph.D. (University of Bath), Associate Chair (Research)

##### Associate Professor

Leong Kai Choong, Ph.D. (University of Queensland), Associate Chair (Academic)  
Hoon Kay Hiang, Ph.D. (University of Strathclyde), Associate Chair (Administration)  
Yeo Song Huat, Ph.D. (University of Birmingham), Assistant Chair (Student Matters)

## **Divisions**

### **Engineering Mechanics**

The Engineering Mechanics Division is dedicated to excellence in teaching and research.

We provide fundamental and specialised courses in mechanics and engineering design and educate students in mechanics and design concepts for engineering practices, research and development and technological innovations. Our curriculum covers a spectrum of basic to advanced courses essential for analysis and design. We nurture an understanding of the purpose and operational aspects of mechanical systems and components. The basic philosophy is to broaden the skills and knowledge base of students so they may solve a broad spectrum of physical problems and are prepared for the challenges ahead in the global industry.

The Division has in place both fundamental and strategic research programmes through which faculty staff, research fellows and assistants, and graduate students work together to build research capabilities that advance research and technology innovation. We currently pursue research in Applied Mechanics & Computational Engineering; Dynamics and MicroSystems; and MEMs and Bio/Nano-mechanics.

#### **Associate Professor**

Pang Hock Lye John, Ph.D. (University of Strathclyde), Division Head

#### **Professor**

Anand Krishna Asundi, Ph.D.  
(State University of New York)  
Lam Khin Yong, Ph.D. (Massachusetts Institute of Technology)  
Lim Mong King, Dr-en-Sc (University De Maine), France  
Ling Shih Fu, Ph.D. (Purdue University)  
Shang Huai Min, Ph.D. (University of Aston)

#### **Associate Professor**

Ang Hock Eng, DIC M.Sc. (University of London)  
Ang Whye Teong, Ph.D. (University of Adelaide)  
Chai Gin Boay, Ph.D. (University of Strathclyde)  
Chou Siaw Meng, Ph.D. (University of Strathclyde)  
Du Hejun, DIC Ph.D. (University of London)  
Fan Hui, Ph.D. (University of Illinois)  
Guo Ningqun, DIC Ph.D. (University of London)  
Hoon Kay Hiang, Ph.D. (University of Strathclyde)  
Lim Geok Hian, Ph.D. (University of Aston)  
Lu Guoxing, Ph.D. (University of Cambridge)  
Miao Jianmin, Dr.-Ing (Technical University of Darmstadt)  
Nader Vahdati, Ph.D. (University of California, Daris)  
Ng Heong Wah, Ph.D. (University of Liverpool)  
Ong Jor Huat, Ph.D. (University of Nottingham)  
Ong Lin Seng, Ph.D. (University of Strathclyde)  
Seah Leong Keey, Ph.D. (University of Strathclyde)  
Shu Dong Wei, Ph.D. (University of Cambridge)  
Tai Kang, DIC Ph.D. (University of London)  
Tan Soon Huat, Ph.D. (University of Strathclyde)  
Teo Ee Chon, Ph.D. (University of Strathclyde)  
Wu Mao See, Ph.D. (Massachusetts Institute of Technology)  
Xiao Zhongmin, Ph.D. (Rutgers University)  
Xu Daolin, Ph.D. (University of London)  
Chollet Franck, DrSPI (University of Franche-Comte)  
Huang Weimin, Ph.D. (Cambridge University)  
Li Chuan, Ph.D. (University of Michigan)  
Sellakkutti Rajendran, Ph.D. (Indian Institute of Science)

#### **Assistant Professor**

Li Hua, Ph.D. (National University of Singapore)

Lau Gih Keong, Ph.D. (Delft University of Technology)  
Zheng Lianzxi, Ph.D (The University of Hong Kong)

**Adjunct Professor**

Kamal Bose, MCH (University of Liverpool)

**Adjunct Associate Professor**

Fong Saik Hay, MS.c (University of Michigan)  
Lie Tjiauw Tjoen.Widjojo Denny, Ph.D (Imperial College, London)  
Lu Chun, Ph.D (National University of Singapore)  
See Chong Wee Simon, Ph.D (University of Salford)

**Adjunct Assistant Professor**

Li King Ho, Holden, Ph.D (Stanford University)  
Liu Ping, Ph.D (Northwestern Polytechnical University, Xian)

**Manufacturing Engineering**

Manufacturing translates ideas, concepts and design into tangible products and services that meet the needs of society. Manufacturing engineering is multidisciplinary in nature involving the science and engineering of materials, processes and process planning, computational modeling, inspection and measurement, to name a few.

The teaching and research in the division covers the fundamentals and applications of metals, polymers, ceramics, composites and semiconductor materials, ultra-precision engineering and micro/nano fabrication, surface engineering, advanced measurement and inspection, tissue engineering and design and manufacturing informatics. Besides technology, modern manufacturing deals with the economic and organisational impact of product and process design, as well as marketing, production, distribution and product service support.

Contrary to popular belief, manufacturing in Singapore has not diminished but rather morphed into high end manufacturing. Manufacturing remains one of the pillars of the Singapore economy, with the EDB targeting its contribution at between 25 - 27% of the GDP. The Division therefore strives to help the local industry maintain a competitive edge and leadership position by researching into the Next Generation Manufacturing technologies such as advanced materials and materials processing, multi-scale modelling, rapid tooling and prototyping, concurrent engineering, green design and manufacturing, precision engineering, advanced manufacturing processing and CAD/CAM/CAE.

**Associate Professor**

Lee Siang Guan, Stephen, Ph.D. (Nanyang Technological University), Division Head

**Professor**

Khor Khiam Aik, Ph.D. Monash University  
Lam Yee Cheong, Ph.D. (University of Melbourne)  
Lim Enk Ng, Lennie, Ph.D. (University of Surrey)  
Lye Sun Woh, Ph.D. (University of Bath)  
Yue Chee Yoon, Ph.D. (Monash University)  
Zhang Shanyong, Sam, Ph.D. (University of Wisconsin)

**Associate Professor**

Chian Kerm Sin, Sandy, Ph.D. (UMIST)  
Jiang San-Ping, Ph.D. (The City University)  
Li Lin, Ph.D. (Kyoto University)  
Liu Erjia, Ph.D. (Catholic University of Leuven)  
Loh Nee Lam, Ph.D. (University of Liverpool)  
Loh Ngiap Hiang, Ph.D. (University of Aston)  
V Matham Murukeshan, Ph.D. (IIT)  
Ong Nan Shing, Ph.D. (Nanyang Technological University)  
Sivashanker Sathiamoorthy, Ph.D. (University of Cambridge)  
Christopher Shearwood, Ph.D. (University of Leeds)  
Tan Ming Jen, DIC Ph.D. (University of London)

Tay Meng Leong, DIC M.Sc. (University of London)  
Tor Shu Beng, Ph.D. (Poly of Central London)  
Yeo Swee Hock, Ph.D. (National University of Singapore)  
Zhou Wei, Ph.D. (University of Cambridge)

**Assistant Professor**

David Lee Butler, Ph.D. (University of Birmingham)  
Sridhar Idapalapati, Ph.D. (University of Cambridge)  
Choi Hae-Jin, Ph.D. (Georgia Institute of Technology)  
S Subbiah, Ph.D. (Georgia Institute of Technology)  
Sylvie Castagne, Ph.D. (University of Leige)

**Visiting Professor**

Buddy Dennis Ratner, Ph.D (Polytechnic Institute of Brooklyn. Brooklyn, NY)

**Adjunct Associate Professor**

Lim Gnian Cher, Ph.D (Imperial College)

**Adjunct Assistant Professor**

Maria Isabel Rodriguez, Ph.D (National University of Singapore)

**Systems and Engineering Management**

The Division embodies the very essential concept of system. It comprises staff members from different disciplines in engineering management, human factors in product design, logistics and supply chain management and biomedical systems. Such diversity is the strength of the Division, which emphasises the systems approach in the analysis, design and management of technology-related industries at all levels.

The strategy of the Division is to ensure that our work, both in teaching and research, always remains relevant to the goals of the School, the University and the nation.

Its staff members contribute to coordinating and teaching in key programmes of Design Specialisation and Engineering Management programmes in the undergraduate studies. In graduate studies, the staff members teach in programmes related to Smart Product Design, Computer Integrated Manufacturing, Human Factors Engineering, Logistics and Biomedical Engineering. The Division also provides staff members to the teaching of a number of general electives and the minor in Systems Management.

In research, the Division covers Modelling of Intelligent Manufacturing Systems and Supply Chain Management, Human Factors Engineering, Biomedical Systems, application of IT and AI to solve industrial problems and Strategic Studies in Manufacturing. Staff members are recipients of industrial research funding, University funding, and a number of awards for their contributions made in their respective areas. It has also attracted a good number of research students and research engineers and fellows from various countries.

**Professor**

Erik Gustav Martin Helander, Ph.D. (Chalmers University of Technology), Division Head

**Associate Professor**

Chua Chee Kai, Ph.D. (Nanyang Technological University)  
Appa Iyer Sivakumar, Ph.D. (University of Bradford)  
Foo Check Teck, Ph.D. (University of St. Andrews)  
Khong Poh Wah, Ph.D. (University of Strathclyde)  
Arun Kumar, Ph.D. (Virginia Tech)  
Lim Choon Seng, Ph.D. (University of Manchester)  
Lim Kee Yong, Ph.D. (University of London)  
Lim Yoke Eng, Samuel, Ph.D. (University of Strathclyde)  
Shaligram Pokharel, Ph.D. (University of Waterloo)  
Rajesh Piplani, Ph.D. (Purdue University)  
Sim Siang Kok, Ph.D. (University of Strathclyde)  
Wu Zhang, Ph.D. (McMaster University)  
Yeo Khim Teck, Ph.D. (UMIST)

Lew Sin Chye, M.Sc. DIC (University of London)

**Assistant Professor**

Chang Seok Ho, Ph.D. (Korea Advanced Institute of Science and Technology)  
Jiao Jianxin, Roger, Ph.D. (Hong Kong University of Science and Technology)  
Alastair C Ritchie, Ph.D. (University of Strathclyde)  
Lee Ka Man, Carmen, Ph.D. (Hong Kong Polytechnic University)

**Associate Professorial Fellow**

Kam Booi Chung, M.B.A. (University of British Columbia)

**Thermal and Fluids Engineering**

Rapid advances in technologies in the last decade have brought forth new challenges in thermal sciences and fluid mechanics. For instance, thermal management of electronic packaging is critical as we approach the sub-micron and even nano-scale feature sizes on a chip. The realms of bioengineering and nanotechnology have opened up a myriad of opportunities for engineers working in the thermal and fluids engineering. Increasingly, we find that existing knowledge is insufficient to deal with such complex systems.

Staff in the Thermal and Fluids Engineering Division has responded to these challenges by undertaking research projects which attempt to breach the boundaries such as computational modelling of the physiological systems, DNA modelling, biomedical engineering, transport phenomena in micro-channels and micro-fluidics, unmanned micro aerial vehicles, thermal management of advanced electronic packages, fuel reforming, life cycle analysis of power generation systems and particle behavior in indoor environments.

The division is involved in the teaching of the fundamentals of thermodynamics, fluid mechanics and heat transfer. The expertise within the division is manifested in the final year options that are offered by the division, namely, aeronautical engineering, biomedical and biochemical engineering and energy and the environment. In addition, staff in the division is also involved in several postgraduate courses offered by the school. Teaching and research in the division is supported by several well-equipped laboratories providing all the essential facilities.

**Professor**

Lua Aik Chong, Ph.D. (University of Sheffield), Division Head

**Associate Professor**

Chan Siew Hwa, DIC Ph.D. (University of London)  
Chan Weng Kong, Dr. Ing, (Ecole Nat., Sup.d'Arts et Métiers), Paris  
Chua Leok Poh, Ph.D. (University of Newcastle)  
Damodaran Murali, Ph.D. (Cornell University)  
Gong Haiqing, Thomas, Ph.D. (University of Delaware), PGDipTHE (Nanyang Technological University)  
Ho Hiang Kwee, SM (Massachusetts Institute of Technology)  
Huang XiaoYang, Ph.D. (Cambridge University)  
Kulish Vladimir Vladimirovich, Ph.D. (Southern Methodist University)  
Lam Chung Yau, Ph.D. (University of London)  
Leong Kai Choong, Ph.D. (University of Queensland)  
Low Seow Chay, Ph.D. Assoc. (University of Manchester)  
Ng Yin Kwee, Eddie, Ph.D. (University of Cambridge), PGDipTHE (Nanyang Technological University)  
Nguyen Nam Trung, Dr.-Ing habil. (Chemnitz University of Technology)  
Ooi Kim Tiow, Ph.D. (University of Strathclyde)  
Shu Jian Jun, Ph.D. (Keele University)  
Tan Fock Lai, MSME (Rensselaer Polytechnic Institute)  
Toh Kok Chuan, MSME (Stanford University)  
Wong Teck Neng, Ph.D. (University of Strathclyde)  
Wong Yew Wah, M.Sc. (University of Singapore)  
Yang Chun, Charles, Ph.D. (University of Alberta)  
Yeo Joon Hock, DIC Ph.D. (University of London)  
Yu Ching Man, Simon, DIC Ph.D. (University of London)  
Yeung Wai Hung, William, Ph.D. (University of British Columbia)  
Zhao Yong, Ph.D. (University of Manchester)

**Assistant Professor**

Sutthiphong Srigrarom, Ph.D. (University of Washington)

**Associate Professorial Fellow**

Ramli Osman, M.Sc. (National University of Singapore)

**Mechatronics and Design**

The Mechatronics and Design Division's core competencies lies in Mechatronics, Design, Dynamics and Informatics. Its focus is on the synergistic integration of mechanical engineering with electronics, intelligent computer control and design which is vital in the realisation of innovative products and systems. The Division aims to train and nurture engineers and researchers who can conceptualise and design world-class products and systems in support of the Singapore's new economy.

In teaching, the Division is responsible for the core curricula of the undergraduate Mechatronics and Design Specialisation streams, and hosts two Master of Science programmes, namely Computer Integrated Manufacturing and Smart Product Design. The Division endeavours to match core competence of academic staff to the expected learning outcomes of the courses. It strives to support the School's initiative in maximising students' potential.

Staff members of the Division are active in research in strategic areas endorsed by the School. Research in the Division is organised under Mechatronics and Control, Dynamics and Vibration, Design, and Informatics. Staff members undertake research into, among others, Mechanics of Micro-systems, Biomedical Robotics and Biomechatronics, Mobile Robots, Modular Re-configurable Robots, Underwater Robotic Vehicles, Artificial Intelligence, Innovative Product Design, Affective Design, Design & Manufacturing, Informatics, Medical and Bio Informatics, and Virtual Reality. Staff members have been awarded research funds from the industry, the University and agencies such as A\*STAR. Staff members are recognised internationally for their contributions to research, some having received citations for best papers awards in renowned International Conferences. A staff member has been honoured with the Singapore National Academy of Science Young Scientist Award (2006).

Apart from research, academic staff members have been actively transferring the outcomes of their research to industry. Internationally, they continue to explore strategic alliances with colleagues from renowned overseas universities and research institutes.

**Associate Professor**

Seet Gim Lee, Gerald, Ph.D. (University of Aston), Division Head

**Professor**

Khoo Li Pheng, Ph.D. (University of Wales)

**Associate Professor**

Cai Yi Yu, Ph.D. (National University of Singapore)  
Chen Chun-Hsien, Ph.D. (University of Missouri-Columbia)  
Chen I Ming, Ph.D. (California Institute of Technology)  
Gan Gah Kok, Jacob, Ph.D. (University of Michigan)  
Lau Wai Shing, Michael, Ph.D. (University of Aston)  
Lee Yong Tsui, Ph.D. (University of Leeds)  
Leong Kah Fai, MSME (Stanford University)  
Lim Tau Meng, Ph.D. (University of Strathclyde)  
Low Kin Huat, Ph.D. (University of Waterloo)  
Ng Wan Sing, DIC Ph.D. (University of London)  
Phung Viet, M.Eng.Sc. (Monash University)  
Sunita Chauhan, Ph.D. (University of London)  
Xie Ming, Ph.D. (University of Rennes)  
Yap Fook Fah, Ph.D. (University of Cambridge)  
Yeo Song Huat, Ph.D. (University of Birmingham)  
Zhong Zhaowei, Ph.D. (Tohoku University)

**Assistant Professor**

Ang Wei Tech, Ph.D. (Carnegie Mellon University)

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Au Chi Kit, Ph.D. (Hong Kong University of Science and Technology)  
Chen Yan, Ph.D. (University of Oxford)  
Heng Kok Hui, John Gerard, Ph.D. (University of Strathclyde)  
Meena Kishore Sakharkar, Ph.D. (National University of Singapore)  
Phee Soo Jay Louis, Ph.D. (Scuola Superiore Sant' Anna)  
Georg Lothar Thimm, Ph.D. (Ecole Polytechnique Fédérale de Lausanne)

**Visiting Professor**

Steven Danyluk, Ph.D. (Cornell University)

**Adjunct Associate Professor**

Lin Wei, Ph.D. (University of Florida)

**Adjunct Assistant Professor**

Choong Swee Neo Cleo, Ph.D. (University of Oxford)

**Aerospace Engineering**

Aerospace Engineering is the application of advanced science and engineering principles in the design, assembly, manufacturing, optimisation and implementation of flight vehicles and their propulsion systems. These vehicles include a variety of aircraft and spacecraft. It is often called aeronautical engineering when referring solely to aircraft and astronautical engineering when referring to spacecraft. Aerospace engineering encompasses both.

The division has its vision set on placing MAE's Aerospace Engineering at the forefront of aerospace engineering education, research and outreach programmes in Asia and the Asia-Pacific region.

Students undergo rigorous training that includes courses that addresses the appropriate core competencies and integrated system view of aircraft design, manufacturing, assembly and maintenance, repair and overhaul. Our staff also adopt a holistic approach when it comes to teaching through the introduction of problem-based learning as well as the provision of industrial mentors to give our students the vital practical link to the growing aviation industry and defence organisations which are very supportive of our aerospace degree programme through the provision of scholarships and research funds.

In research, the Division covers Aerodynamics; Propulsion, Combustion and Gas Turbine Engine; Noise and Vibration; Manufacturing and Processing; Mechanics, Structures and Materials; Aircraft Dynamics, Stability and Control; Aircraft Support Systems; and Maintenance, Repair and Overhaul of Airframe and Engine. The growing number of academic staff supporting the aerospace engineering degree programme provides varied expertise. To support teaching and research, 18 specialised aerospace engineering laboratories are housed in the Main Aircraft Laboratory (MAL). Fighter jet, helicopters, flight simulator, water tunnel as well as numerous other facilities to support teaching and research are available in this laboratory. A large wind tunnel will be available in the near future. A Hall of Fame/Aviation Gallery is also housed in the MAL and its objective is to inspire visitors on the wonders of flight, aviation milestones and the future of aerospace engineering.

**Professor**

Shang Huai Min, Ph.D. (University of Aston),  
Acting Division Head

**Associate Professor**

Chua Soon Keong, Patrick, Ph.D. (University of Liverpool)  
Lin Rongming, Ph.D. DIC (University of London )  
Liu Yong, Ph.D. (Catholic University of Leuven)  
Low Eicher, Ph.D. (University of Minnesota)  
Ng Teng Yong, Ph.D. (National University of Singapore)  
Brian Stephen Wong, Ph.D. (UMIST)

**Assistant Professor**

Kuan Tek Seang, Ph.D. DIC (Imperial College)  
Sunil Chandrakant Joshi, Ph.D. (Monash University)  
Yongki Go Tiau Hiong, Sc.D. (Massachusetts Institute of Technology)

COLLEGE OF ENGINEERING:  
SCHOOL OF MECHANICAL & AEROSPACE ENGINEERING

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Jorg Uwe Schluter, Ph.D. [Ecole Nationale Supérieure d'Electrotechnique, d'Electronique, d'Informatique, d'Hydraulique et des Télécommunications (ENSEEIH), Toulouse]  
Roxana Vasilescu, Ph.D. (Georgia Institute of Technology)

**Associate Professorial Fellow**

Low Chew Fong, Jeffrey, M.Sc. (University of Newcastle upon Tyne)

**Adjunct Assistant Professor**

Dr. Chen Chang, Ph.D. (Georgia Institute of Technology)

**Senior Fellow**

Dr. Rajendra Kumar Sullerey, Ph.D. (Indian Institute of Technology, Kanpur)