



## **Joint News Release**

**Singapore, 16 Jun 2016**

### **NTU and Delta Electronics set up S\$45 million joint lab for smart technologies**

*Delta is NTU's fourth partner under the Corporate Laboratory@University Scheme by the National Research Foundation*

**Nanyang Technological University (NTU Singapore)** and **Delta Electronics** have established a joint laboratory to develop smart technologies that will enhance everyday lives, enable better learning and advance manufacturing processes.

The **Delta – NTU Corporate Laboratory for Cyber-Physical Systems** was officially launched today by Deputy Prime Minister and Coordinating Minister for Economic and Social Policies, Mr Tharman Shanmugaratnam.

The S\$45 million joint lab will work on developing cyber-physical systems, ranging from large infrastructure systems such as water and power distribution to emerging consumer systems such as the Internet-of-Things (IoT), an ever-growing network of physical objects and systems connected to the Internet.

The new joint lab is supported by the **National Research Foundation (NRF) Singapore** under its Corporate Laboratory@University Scheme, which funds key corporate laboratories set up through public-private partnerships.

At its full capacity, the lab will have more than 80 researchers and staff, including NTU PhD students.

Together with scientists from both Delta Research Center and NTU, the new lab will develop innovations in four key research areas in cyber-physical systems: Smart Manufacturing, Smart Learning, Smart Living, and Smart Commercialisation.

Cyber-physical systems are important in our everyday lives. They include electronic devices such as mobile phones, temperature and humidity sensors connected

through networks for monitoring and control of physical systems like air-conditioning and lighting.

This is Delta's third laboratory in Singapore, and NTU's fourth Corporate Laboratory, with three labs already set up with leading industry partners Rolls Royce, ST Engineering and SMRT. Delta launched two other labs last year, the Life Science and Diagnostics Lab in partnership with A\*STAR's Institute of Bioengineering and Nanotechnology and the joint laboratory on the Internet-of-Things with NTU.

**NTU President Professor Bertil Andersson** said, "The joint lab brings together NTU's strong interdisciplinary research expertise with Delta's core competences in power electronics and smart energy management to create a unique research ecosystem.

"With the phenomenal growth of the Internet of Things worldwide and with Singapore moving towards being an interconnected Smart Nation, more advanced infocomm and electronics research are needed to develop cutting-edge technologies that will keep Singapore at the forefront of smart nations."

**Delta Electronics Chairman Mr Yancey Hai** said, "We are deeply honored to strengthen our long-lasting relationship with NTU and the National Research Foundation, two entities that value and support innovation and R&D as much as we have for decades. On behalf of Delta, I also express our deep admiration to the Singapore Government's vision in developing the Smart Nation programme. Delta's commitment to innovation, reflected in its average 6-7 percent annual R&D investment ratio, has been a major pillar of its transformation into a world-class provider of energy-saving solutions that are becoming the backbone of smart sustainable cities."

**NRF's Chief Executive Officer Professor Low Teck Seng** said, "We are glad that the NRF Corporate Laboratory@University Scheme enables NTU researchers, PhD and Master's students to work alongside Delta Electronics to translate research outcomes in cyber-physical systems into new products and services. These cyber-physical system technologies, which will be useful for the Smart Nation initiative, can transform our lives as well as move our industries up the value chain to develop new products and innovative solutions."

The NRF Corporate Laboratory@University Scheme seeks to strengthen Singapore's innovation eco-system by encouraging public-private research and development collaboration between universities and companies. This allows universities to work on developing cutting edge solutions for problems faced by the industries. The collaboration creates employment opportunities and trains a pool of industry-ready research talent.

**Delta Electronics CEO, Mr Cheng Ping** said, “The establishment of the Delta-NTU Corporate Laboratory for Cyber-Physical Systems is a testament of Delta’s brand promise, ‘Smarter. Greener. Together’.”

“Cyber-Physical Systems technologies can be referred as the integration of advanced computing, communication, and control technologies to enable interaction and services between information systems in the cyber space and engineering devices/systems in the physical world. These technologies have limitless possibilities to transform a wide spectrum of sectors such as manufacturing, energy, healthcare and transportation areas. We believe our collaboration will realise better lives and greater business opportunities for generations to come.”

**NTU’s Chief-of-Staff and Vice President (Research) Professor Lam Khin Yong** said, “The key areas of research in the corporate laboratory will draw on the strengths of both NTU and Delta Electronics, as we both have strong capabilities in engineering and technology with a track record of translating research into industrial applications.

“The new lab will take the partnership between NTU and Delta Electronics to an even higher level, as it builds on a joint lab set up in November 2014 to research the Internet of Things.”

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### ***About Nanyang Technological University, Singapore***

A research-intensive public university, Nanyang Technological University, Singapore (NTU Singapore) has 33,500 undergraduate and postgraduate students in the colleges of Engineering, Business, Science, Humanities, Arts, & Social Sciences, and its Interdisciplinary Graduate School. It has a new medical school, the Lee Kong Chian School of Medicine, set up jointly with Imperial College London.

NTU is also home to world-class autonomous institutes – the National Institute of Education, S Rajaratnam School of International Studies, Earth Observatory of Singapore, and Singapore Centre for Environmental Life Sciences Engineering – and various leading research centres such as the Nanyang Environment & Water Research Institute (NEWRI), Energy Research Institute @ NTU (ERI@N) and the Institute on Asian Consumer Insight (ACI).

Ranked 13<sup>th</sup> in the world, NTU has also been ranked the world's top young university for the last two years running. The University's main campus has been named one of the Top 15 Most Beautiful in the World. NTU also has a campus in Novena, Singapore's medical district.

For more information, visit [www.ntu.edu.sg](http://www.ntu.edu.sg)

### ***About Delta***

Delta, founded in 1971, is a global leader in power and thermal management solutions and a major player in several product segments such as industrial automation, displays, and networking. Its mission statement, "To provide innovative, clean and energy-efficient solutions for a better tomorrow," focuses on addressing key environmental issues such as global climate change. As an energy-saving solutions provider with core competencies in power electronics and innovative research and development, Delta's business domains include Power Electronics, Energy Management, and Smart Green Life. Delta has 153 sales offices, 60 R&D centers and 38 manufacturing facilities worldwide.

Throughout its history, Delta has received many global awards and recognition for its business achievements, innovative technologies and dedication to corporate social responsibility. Since 2011, Delta has been selected as a member of the Dow Jones Sustainability™ World Index (DJSI World) for 5 consecutive years. In 2014, Delta was ranked by CDP (formerly the Carbon Disclosure Project) at the highest A-level of the Climate Performance Leadership Index (CPLI), and is the only company from nearly 2,000 listed companies in Greater China to make the CPLI list.

For additional information about Delta, please visit: [www.deltaww.com](http://www.deltaww.com).

## ***About the National Research Foundation, Prime Minister's Office, Singapore***

The National Research Foundation (NRF) is a department within the Prime Minister's Office. The NRF sets the national direction for research, innovation and enterprise (RIE) in Singapore. It seeks to invest in science, technology and engineering, build up the technological capacity of our companies, encourage innovation by industry to exploit new opportunities that drive economic growth, and facilitate public-private partnerships to address national challenges.

Under RIE2020, NRF is committed to create greater value in Singapore from our investment in research, innovation and enterprise through 1) closer integration of research thrusts, 2) stronger dynamic towards the best teams and ideas, 3) sharper focus on value creation, and 4) better optimised RIE manpower. Visit [www.nrf.gov.sg/research/rie2020](http://www.nrf.gov.sg/research/rie2020) for more details.

## **Annex**

### **Delta-NTU Corporate Lab Management**

Housed at NTU's School of Electrical and Electronic Engineering, the joint research lab will be led by Co-Directors – NTU **Professor Xie Lihua** and Delta Singapore Research Center Director **Dr Tian Wei-Cheng**. They will be assisted by Deputy Co-Directors Assoc Prof Andy Khong (NTU) and Dr Liu Yishao (Delta).

### **Four key areas of research:**

#### **1) Smart Learning**

In the area of Smart Learning, Delta has previously implemented Taiwan's first online open learning platform, known as Massive Online Open Courses (MOOCx) which is a milestone for enterprise learning. Hence, it is the corporate lab's goal to further transform enterprise learning to meet the future's constantly evolving business needs.

It will aim to develop new smart learning systems for enterprise training. These systems will derive information from the environment and learners seamlessly to gain insights about the learners' ability and needs, their level of engagement, as well as the learning efficiency and performance.

Such real-time analytics on learners' mastery of concepts and progress will help instructors to determine the best mode and content for delivery. It will allow for a customised learning experience which is tailored to the need of the learner, which is also aligned with Singapore's SkillsFuture initiative.

## **2) Smart Living**

Delta also turns the concept of Smart Living into a reality with its Building Automation solutions which have helped the Company realise 21 green buildings in the past 10 years. With this basis, more advanced technologies and solutions which can improve the safety, security and living quality for occupants in their living environments will be developed at the corporate lab.

These technologies aims to transform our daily lives through integrative and seamless integration of smart homes with the neighbourhood, providing information on nearby shopping, healthcare, transportation and recreation facilities. Such information can be obtained from Internet of Things (IoT) devices and systems, compiled for the user on their mobile devices and wearables. Usage of shared facilities can be easily planned and coordinated, while patients with health conditions can also be monitored via medical diagnostics sent to their doctors' mobile devices.

## **3) Smart Manufacturing**

The core of Smart Manufacturing leverages on Delta's strong manufacturing competency. The lab will develop smart manufacturing solutions that integrates Delta's IoT technologies for real-time automation, optimisation, monitoring, and management of industrial processes to enable customised manufacturing.

Such an idea would be a modular factory where cyber-physical systems monitor physical processes, communicate and cooperate with each other and with humans in real time.

A huge part of the manufacturing sector in Singapore is comprised of small and medium-sized enterprises (SMEs). As industrial production becomes more complex and dynamic, SMEs will need to produce customer-oriented, high-performance products with minimal costs - known as low-volume/high-mix manufacturing - in order keep up with market demands.

Combining robotics and cyber-physical system technologies, the lab will develop reconfigurable and flexible production systems technologies to enhance local SMEs' competitiveness, such as a smart reconfigurable shop floor.

#### **4) Smart Commercialisation**

Smart commercialisation will focus on enhancing the effectiveness to engage clients, reducing time to the market, and enabling customer-centric solution businesses.

Technology, consumer sophistication and business globalisation have led to a highly competitive business environment which demands for timely, customized and more complex value-added solutions.

This research area will seek to use cyber-physical system technologies for innovative, knowledge-intensive, high value-added and customer-oriented product designs to enhance productivity, serviceability, shorten time-to-market and to compensate high resource or labour costs for companies.

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