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APPLIED ENERGY SYMPOSIUM & FORUM



# Media Release

## **IES Prestigious Engineering Achievement Awards 2017 – Twelve Local Engineering Projects Win Top Honours for Transforming Lives and Economy**

**Minister for the Environment and Water Resources Mr. Masagos Zulkifli conferred coveted industry awards to the best in engineering at global engineering summit**

**20 July 2017, Thursday** – The Institution of Engineers, Singapore (IES) bestowed the IES Prestigious Engineering Achievement Awards 2017 to 12 engineering projects for making exceptional contributions that enhance the quality of life and bring about engineering progress in Singapore.

Mr. Masagos Zulkifli, Minister for the Environment and Water Resources, presented the annual awards to the winning teams at the World Engineers Summit – Applied Energy Symposium & Forum (WES–CUE) 2017 Joint Conference Dinner today as the event guest–of–honour.

Spanning the healthcare, defence, manufacturing, chemical, energy and environmental industries, this year’s winners demonstrate distinctive brilliance in delivering exceptional value to the well–being of people and communities. Selected from a record–setting 37 entries, these projects proved their merit to a judging panel of industry experts in these areas: resourcefulness in the planning and solving of design problems and the pioneering use of materials and methods; innovations in planning, design and construction as well as unique aspects and aesthetic values.

The team behind each winning project received a commemorative plaque and individual certificates.

More than 400 international and local engineers, sustainability specialists, policy makers and business leaders celebrated these outstanding engineering achievements with the winners at the dinner that marked the end of the second day of WES-CUE 2017. Themed “Low Carbon Cities & Urban Energy”, the event championed engineering-led discussions on latest research findings and showcased cutting-edge engineering innovations in sustainable development.

“The winners of the Prestigious Engineering Achievement Awards 2017 embody the engineers’ spirit of determination and desire to improve lives. I would therefore like to commend all winners for their devotion and determination to break through difficult boundaries to achieve engineering excellence in their projects. Through these awards, IES hopes to recognise and reward these engineers for their achievements and hopefully inspire the younger generation to do the same and more in the years to come,” said Er. Edwin Khew, President of IES.

“This year’s award is significant as we had received the largest number of entries since the awards started. This shows the ingenuity across wide-ranging areas of engineering. It is also notable that three of the winning projects focus on sustainable urban development, in line with the push for Singapore to be a global hub for low-carbon, high energy-efficiency development through WES-CUE 2017,” said Er. Ho Siong Hin, Chairman, Awards Committee, IES Prestigious Engineering Achievement Awards 2017.

The winning projects in the four awards categories are:

#### *Applied Research and Development*

- Development of apparatus and method to assess endothelial function to better manage patients with diabetes by *School of Engineering, Nanyang Polytechnic*
- EscoGlove: A soft and wearable robotic glove for assistance of hand-impaired patients during activities of daily living and rehabilitation by *Department of Biomedical Engineering, National University of Singapore (NUS)*
- High power mid-infrared fiber laser by *SIMTech, Agency for Science, Technology and Research (A\*STAR)*

#### *Engineering Project*

- BCA SkyLab – the world's first high-rise rotatable laboratory for the tropics by *BCA SkyLab, Building and Construction Authority*
- Littoral Mission Vessel by *Defence Science and Technology Agency (DSTA)*
- Mitigation of pollution at Kandy Lake and Mid-Canal, Sri Lanka by *Nanyang Environment and Water Research Institute, Nanyang Technological University*

- Singapore Sports Hub by *ARUP, DP Architects and AECOM*

*Technology Innovation*

- Island Air Defence – networked air defence capabilities through technology by *DSTA*
- The av-Guardian – guardian for renal failure patients' lifeline; plug-&-play ready for dialysis of the future by *Advent Access Pte Ltd*

*Young Creators Award*

- Florisensors – Novel flower-based chemiresistive gas sensors by *NUS*
- Soft robotics technology for application on bedside ankle rehabilitation by *NUS*
- *(Special Mention)* Green and sustainable buildings: for our future by *School of Engineering, Temasek Polytechnic*

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**Notes to media:**

i. Annex

Citations – Winning projects of IES Prestigious Engineering Achievement Awards 2017

ii. Chinese Glossary

<i>English Terms</i>	<i>Chinese Terms</i>
The Institution of Engineers, Singapore (IES)	新加坡工程师学会
IES Prestigious Engineering Achievement Awards	新加坡工程师学会卓越工程成就奖
Er. Edwin Khew, President of IES	邱德福, 新加坡工程师学会会长
Er. Ho Siong Hin, Chairman, Awards Committee, IES Prestigious Engineering Achievement Awards 2017	何祥兴, 主席, 奖项委员会, 新加坡工程师学会卓越工程成就奖2017

**About The Institution of Engineers, Singapore (IES)**

The Institution of Engineers, Singapore (IES) was formally established in July 1966 as the national society of engineers in Singapore. IES is the premier engineering institution in Singapore and is called upon by the Government to provide feedback on professional engineering matters.

IES is well represented among the faculty members of the major engineering institutions of higher learning in Singapore. Through close collaboration with the local universities and polytechnics, IES organises courses, seminars and talks for engineers and IES members to advance the continuous development of engineers.

The Institution maintains close links with professional organisations of engineers regionally and throughout the world. These include organisations in Australia, China, Japan, United Kingdom and the United States. The Institution also represents Singapore in the ASEAN Federation of Engineering Organizations (AFEO) and the Federation of Engineering Institutions of Asia and the Pacific (FEIAP) in promoting goodwill, fellowship and exchange of knowledge among all engineers in ASEAN and the Asia-Pacific region.

Through its Engineering Accreditation Board (EAB), IES obtained full signatory status in the Washington Accord (WA) in June 2006. The entry grants IES the authority to represent Singapore, the first country within the ASEAN region which has obtained full signatory status in the WA, to vet education systems under the WA mutual recognition framework.

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## **Annex**

### **IES Prestigious Engineering Achievement Awards 2017 – Citations**

#### **Category: Applied Research and Development**

##### **1. Development of apparatus and method to assess endothelial function to better manage patients with diabetes**

*By: School of Engineering, Nanyang Polytechnic*

1. This project is a joint development by Nanyang Polytechnic (NYP) and Tan Tock Seng Hospital (TTSH) to assess the functionality of blood vessels in a non-invasive manner to determine the risk of cardiovascular diseases (CVD) in individuals, especially diabetic patients.

2. The device (VASMeter) is developed using NYP's patented magnetic-based blood flow sensing technology. Through this project, a new CVD risk indicator (RA-MDI) is established. It has been accepted by the world-renowned European Association for the Study of Diabetes (EASD) in May 2017.

3. In January 2017, NYP and TTSH filed a joint patent to protect this invention. The team is currently working with two local SMEs to conduct the next phase of clinical trial before commercialisation.

##### **2. EsoGlove: A soft and wearable robotic glove for assistance of hand-impaired patients during activities of daily living and rehabilitation**

*By: Department of Biomedical Engineering, National University of Singapore*

1. EsoGlove is a soft, wearable robotic glove capable of supporting a range of individual finger motion, allowing at-home hand movement assistance and rehabilitation.

2. The glove will serve as an important adjunct for physiotherapists, given growing manpower constraints and greying population.

3. This technology has led to an NUS spin-off, Roco Technology – Singapore's first soft robotics company.

##### **3. High power mid-infrared fiber laser**

*By: SIMTech, Agency for Science, Technology and Research (A\*STAR)*

Fiber laser is an important complex equipment for achieving green and sustainable manufacturing with greater precision performance. By employing specialty fiber technologies, we have achieved the highest pulse energy in our laser emitting at mid-infrared wavelength with an all-fiber configuration. We have also built up local

capabilities in optical design, optical fiber fabrication and fiber laser system development.

Category: Engineering Projects

**4. BCA SkyLab – the world's first high-rise rotatable laboratory for the tropics**

*By: BCA SkyLab, Building and Construction Authority*

1. The BCA SkyLab is a state-of-the-art testbed for energy-efficient technologies in façades, air-conditioning, lightings and controls.
2. Sitting atop a seven-storey building with a 360 degree rotatable platform, the BCA SkyLab conducts tests under “real world” conditions at any desired building orientation.
3. SkyLab exemplifies BCA’s goal of making Singapore’s built environment sector a global leader in green buildings for the tropics and sub-tropics.

**5. Littoral Mission Vessel**

*By: Defence Science and Technology Agency*

The Littoral Mission Vessel team pioneered the use of Cognitive Task Analysis as well as modelling and simulation technologies to validate the new Integrated Command Centre concept and workflows. The LMVs’ user-centric design reduced crew size and workload, and harnessed integration and automation for optimal manning. The team also adopted the design for support concept to deliver a more capable, faster and mission-flexible vessel for the RSN.

**6. Mitigation of pollution at Kandy Lake and Mid-Canal, Sri Lanka**

*By: Nanyang Environment and Water Research Institute, Nanyang Technological University*

1. Implemented clean-up of Kandy Lake to improve water quality and the aerobic Sequencing Batch Reactor (aeSBR) Sewage Treatment Plant (STP) at the Sri Dalada Maligawa Temple to mitigate pollution in Kandy – a UNESCO world heritage site.
2. Bringing the community, academia, industry and Sri Lankan government agencies together, the project was led by the Nanyang Environment & Water Research Institute (NTU, Singapore) and the University of Peradeniya (Sri Lanka), with support from the Lien Foundation.
3. The project benefitted 400,000 Kandyans through improved water quality and has since led to further water and wastewater infrastructure developments with funding from the World Bank and JICA in 2016, and NEWRI/UOP’s lake clean-up project expansion to Kurunegala Lake in 2017.

## **7. Singapore Sports Hub**

*By: ARUP, DP Architects and AECOM*

Located on a central, 35-hectare waterfront site, the Singapore Sports Hub provides a unique ecosystem of sporting, retail and leisure spaces, at the pivot between Singapore's expanding city centre and the wider public community. At S\$1.33 billion, it is the largest sports infrastructure Public-Private-Partnership (PPP) project in the world. At the heart of the hub is the National Stadium – a state-of-the-art 55,000-seat sports venue that is air-cooled for comfort to support a wide range of sports and leisure events throughout the year. At 310m, the National Stadium has achieved the largest free-spanning dome roof in the world and a remarkable feat of engineering, optimisation and efficient design.

Category: Technology Innovation

## **8. Island Air Defence – networked air defence capabilities through technology**

*By: Defence Science and Technology Agency*

The Island Air Defence (IAD) team developed a fully networked air defence system to protect Singapore's airspace. It integrated sensors, weapons, C2 systems and decision-making tools for enhanced awareness and action. The team also designed open and flexible interface standards and developed blueprints for System-of-Systems level methodologies to deliver a robust, resilient and evolvable air defence system.

## **9. The av-Guardian – guardian for renal failure patients' lifeline; plug-&-play ready for dialysis of the future**

*By: Advent Access Pte Ltd*

Vascular access, a necessary first step before hemodialysis can be performed, remains the Achilles heel of this life-saving therapy. Also known as the "lifeline" of kidney failure patients, the AV Fistula is the precious blood vessel through which vascular access is obtained.

The av-Guardian is the world's first medical device that introduces the concept of a guardian "guide door" to access the AV fistula with greater reliability and less pain, and in a non-invasive manner to the vessel. In the long run, the av-Guardian represents a

proprietary “device-guided blunt access” technique with the potential to preserve the health of the AV fistula, saving the need for repeated surgeries.

The av-Guardian further represents a key component of a plug-&-play platform that Advent Access is developing to empower patients to be ready for self-hemodialysis – either in-centre where dialysis centres can treat more patients at a lower cost with existing machines; or at home for patients to enjoy a higher quality of life.

#### Category: Young Creators Award

### **10. Florisensors– Novel flower-based chemiresistive gas sensors**

*By: National University of Singapore*

1. Chemiresistors are the class of sensors widely used in volatile sensing.
2. All existing chemiresistors either are expensive, use hazardous chemicals and physical conditions or are energy-inefficient.
3. This research presents the development of a novel class of chemiresistors called florisensors made from flower extracts that make these sensors renewable, reusable, reliable, low-cost and environmentally-friendly.

### **11. Soft robotics technology for application on bedside ankle rehabilitation**

*By: National University of Singapore*

The soft robotic sock for bedside ankle rehabilitation is a novel device to prevent deep vein thrombosis and ankle joint contracture, which are key complications of chronic immobility due to stroke. By using soft fluidic extension actuators, the sock is able to provide compliant robotic assistance to ankle dorsiflexion-plantarflexion and inversion-eversion exercises. Therefore, the soft robotic sock allows for effective rehabilitation, starting as early as immediate onset of stroke, and complements conventional manpower-intensive physiotherapy.

### **12. (Special Mention) Green and sustainable buildings: for our future**

*By: School of Engineering, Temasek Polytechnic*

This project is about raising green awareness amongst schools in Singapore by greening schools using the criteria from Green Mark for Existing Schools determined by the Building and Construction Authority of Singapore. Over a period of six months, the team has successfully elevated green awareness on the importance of saving

energy, water and recycling; and achieved Green Mark Awards for four schools, two Gold<sup>Plus</sup> Awards (*Hong Wen School and Da Qiao Primary School*) and two Gold Awards (*Chung Cheng High School(Main) and Serangoon Garden Secondary*). As a follow-up and to reach out to a wider audience about green awareness, the team has developed a workshop called “Green Our Little Red Dot (GOL.D) Workshop” and worked with Chung Cheng High School(Main), Cedar Girls Secondary and Westwood Secondary School.