

## ANNEX

### **NUS SCIENCE AND TECHNOLOGY EXHIBITION**

The exhibition features five themes:

- Digital Nation
- Healthy Nation
- Multimedia Nation
- Smart Nation
- Sustainable Nation

Exhibition venues, dates and opening hours:

- University Cultural Centre (Level 1): 9 April till 18 April, 11am to 8pm daily
- VivoCity (North Court): 27 April till 3 May, 10am to 10pm daily
- Great World City (Level 1, Atrium): 27 May to 2 June, 10am to 9pm daily

Admission is free.

Projects include:

#### **Digital Nation**

- *3-D Architectural Modelling with Single Image (Faculty of Engineering)*  
This technique creates textured and mapped 3D models from a single photograph.
- *Magneto-resistive Random Access Memory Chip (Faculty of Engineering)*  
The innovative Magneto-resistive Random Access Memory (MRAM) technology significantly increases storage space and enhances memory, ensuring that fresh data stays intact, even in the case of a power failure.
- *Quantum Cryptography (Faculty of Science)*  
An interactive display explaining the present and future of quantum cryptography and how it affects daily life. Exhibits include a satellite-based Small Photon-Entangling Quantum System (SPEQS) to create quantum entanglement, an area of extremely active research by the physics community, focusing on the utilisation of entanglement effects in communication and computation.

#### **Healthy Nation**

- *Implantable Artificial Pancreas (Faculty of Engineering)*  
Device prototype when coupled with wearable glucose detectors, potentially regulates insulin for diabetics efficiently.
- *Knee-ankle-foot Robot (Faculty of Engineering)*  
A Design-Centric Programme project which involves the design and engineering of a modular system for stroke patients to carry out gait rehabilitation at home or at smaller institutions such as outpatient clinics.
- *Retinal Diabetes Risk Assessment (School of Computing)*  
A system that assesses retinal vessel health, enabling early recognition of diseases and the rate of disease progression possible before the onset of

dysfunction symptoms. This will result in cost and time savings for patients, doctors and healthcare management organisations.

- *In-Vivo Molecular Diagnostic System (Faculty of Engineering & Yong Loo Lin School of Medicine)*  
A system which provides real time diagnosis of even pre-cancerous tissues during endoscopic examination. First and only in the world, clinically proven to be safe and effective.
- *TeleRehab (Faculty of Engineering & Yong Loo Lin School of Medicine)*  
A home-use system for stroke patients with real-time virtual guidance by physiotherapists.

### **Multimedia Nation**

- *Beauty e-Expert System (Faculty of Engineering)*  
An intelligent system which recommends hairstyles and make-up to help individuals look their best.
- *Data Science (Faculty of Science)*  
A display that shows how NUS research contributes to breakthroughs in the fundamentals and applications of mathematics, statistics and computing in the emerging field of data science.
- *Draco (School of Computing)*  
An iPad application that allows artists and casual users to add attractive and engaging animation effects to their drawings, seemingly bringing such illustrations to life.
- *Face Research (School of Computing)*  
A display on face recognition technology and its applications, featuring a game that enables participants to attempt all sorts of facial expressions in minimum time.

### **Smart Nation**

- *Intelligent Tubular Robotic System (Faculty of Engineering)*  
A robotic system that enables surgeons to perform minimally invasive procedures in skull or nasopharynx operations, leading to safer, faster and smoother recovery for patients.
- *Human-Robot Object Transfer (Faculty of Engineering)*  
A demonstration of how robots interact with humans in handing objects over to each other. Future robots helping humans in everyday tasks, such as service at home, elder care, entertainment, manufacturing and handling emergency situations, will have to acquire seamless skills that mimic human behaviour. Object handover is one of the most important interaction channels between humans and robots.
- *Robotic Carp (Faculty of Engineering)*  
This latest prototype is able to mimic the movements of a carp – a first in Asia with 3D movements. The robot can be programmed to perform specific functions which are difficult for divers or traditional AUVs to carry out, such

as underwater archaeology, military activities, pipeline leakage detection, and the laying of communications cables.

- *Robotic Turtle (Faculty of Engineering)*  
In the underwater robotic world, turtle robots are among the most maneuverable. The NUS robotic turtle, besides being maneuverable, can also go about performing what it is tasked to do, while being able to react to exigencies and obstacles. In addition, it can self-charge, further reducing the need for it to return to its base station for recharging.
- *NUS UAV Team (Faculty of Engineering)*  
The NUS Unmanned Aerial Vehicle (UAV) team has been working on various research topics related to defence technologies since 2003. Their current research focus is on topics related to navigation systems for indoor and foliage environments, vision-based navigation and motion coordination, micro aerial vehicles and unconventional aircraft.
- *BumbleBee (Faculty of Engineering and School of Computing)*  
The BumbleBee Autonomous Underwater Vehicle (BBAUV) project group is a multi-disciplinary, student-driven initiative founded in 2012. The students have been designing and building AUVs to compete in two annual world-acclaimed competitions: RoboSub held in San Diego, California; and the Singapore Autonomous Underwater Challenge.

### **Sustainable Nation**

- *Plant Genetics (Faculty of Science)*  
Featuring genetic biomarker technologies that have been developed to produce higher quality, more resilient and higher yield crops for agricultural sustainability and a secure food supply.
- *Biosensors (Faculty of Science)*  
Through interactive fluorescence-based exhibits, NUS scientists demonstrate the present state and future of sensors, and how they lead to high quality bioimaging, using the Diversity-Oriented Fluorescence Library Approach (DOFLA) pioneered at the Faculty of Science.
- *Food Science and Technology Programme (Faculty of Science)*  
This is an undergraduate course that trains students to meet society's needs for better food quality, safety and security. Through training in basic and applied sciences, the course focuses on practical aspects of the food and allied industries.
- *E-Bike (University Scholars Programme and Design-Centric Programme)*  
Students from the University Scholars Programme and the Design-Centric Programme have designed a system to convert motorbikes to e-bikes conveniently and speedily – and at low cost. This conversion paves the way for a quieter and cleaner mode of transportation.