

## **FACT SHEET**

**For immediate release**

**Total: 7 pages including this page**

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### **NTU RECIPIENTS OF NRF'S PROOF OF CONCEPT SCHEME GRANTS**

#### **1. A Semantics-Based and Service-Oriented Framework for the Virtualisation of Sensor Networks**



**Dr Lim Hock Beng**  
**Programme Director**  
**Intelligent System Centre**  
**Nanyang Technological University**

#### **Project Summary**

Wireless sensor network is a highly promising technology with a rapidly growing market and many important applications, such as industrial process monitoring and control, machine health monitoring, and environment and habitat monitoring. At present, the sensor node platforms from different vendors cannot interoperate easily with each other due to their heterogeneous programming environments, communication stacks and data management protocols. The objective of this project is to develop a sensor network virtualisation framework that will enable the seamless interoperability and scalability of heterogeneous sensor node platforms. This framework is designed to support existing and future sensor node platforms.

Dr Lim Hock Beng is Programme Director of the Intelligent System Centre, Nanyang Technological University. He received his BSs in Computer Engineering, MSc in Electrical Engineering, and PhD in Electrical and Computer Engineering from the University of Illinois at Urbana-Champaign, and his MSc in Management Science and Engineering from Stanford University. His research interests include sensor networks and sensor grids, cyber-physical systems, cloud computing, parallel and distributed computing, wireless and mobile networks, computer architecture, embedded systems, performance evaluation, e-Science, and high-performance computing.

## **2. Development and Demonstration of Silicon Carbide-Based Power Electric Converter for Motor-Generator Control in Hybrid Electric Vehicles**



**Associate Professor Tseng King Jet  
School of Electrical and Electronic  
Engineering  
Head of Division of Power Engineering  
Nanyang Technological University**

### **Project Summary**

Existing silicon-based power converters are limited in their capabilities to operate at high temperatures and high energy efficiency. Overcoming this limitation is particularly important in hybrid electric vehicle applications. The aim of this project is to develop a type of power converters based on the latest silicon-carbide technology in collaboration with industrial partners such as ST Kinetics for use in hybrid electric vehicles. The new converters will have higher operating temperature capability with less stringent cooling requirements, higher energy efficiency, and will be more compact and lighter in weight. This will result in hybrid electric vehicles with better fuel economy.

Dr Tseng King Jet is an Associate Professor at the School of Electrical and Electronic Engineering, Nanyang Technological University. He is currently the Head of the Division of Power Engineering and the Director of the Centre for Smart Energy Systems. He received his B Eng (First Class) and M Eng degrees from the National University of Singapore, and his PhD from Cambridge University, the United Kingdom (UK). He is a Fellow of the Cambridge Commonwealth Society and the Cambridge Philosophical Society. He is a Chartered Engineer registered in the UK. In 1996, he was awarded the Swan Premium by the Institution of Electrical Engineers (UK) for his work on gate turn-off thyristors for use in traction drives. He has held a number of major appointments in professional societies, including the Chair of IEEE Singapore Section in 2005, and he was awarded the Region Ten Outstanding Volunteer Award. He was awarded the IEEE Third Millennium Medal for his contributions to engineering education and research.

### 3. Photonic Micro Electromechanical Systems (MEMS) Tunable Laser



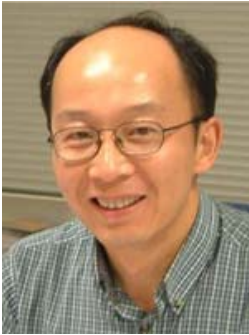
**Associate Professor Liu Ai Qun**  
**School of Electrical and Electronic**  
**Engineering**  
**Division of Microelectronics**  
**Nanyang Technological University**

#### **Project Summary**

Current tuning of laser is achieved using traditional GaAs semiconductor technology or hybrid micromechanical packaging actuator and movable mirror to manipulate the laser cavity length. The use of movable micro components makes the system complex and unreliable with high unit cost as it is very difficult to control the actuation accurately. The objective of this project is to develop a prototype of a wavelength tunable laser using MEMS optical digital mirror which does away with mechanical micro-actuators. The components are integrated into a single chip using the MEMS fabrication process and thus, have high cost savings, are small in size, and have high reliability and stability. The project will deliver the next generation of integrated MEMS tunable laser. It will potentially have wide-ranging applications in biomedical technology and the telecommunications industry, for example, increasing the bandwidth for higher data rate transmission in Internet communications.

Associate Professor Liu Ai Qun received his PhD degree from the National University of Singapore in 1994. He is an Associate Professor with the Division of Microelectronics, School of Electrical and Electronic Engineering, Nanyang Technological University. He is also an Associate Editor of *IEEE Sensors Journal* 2005-2008 and Guest Editor of *Sensors & Actuators (A Physics)* 2005 and 2006. He also published a book on Photonic MEMS design, fabrication and control. He won the *IES Prestigious Engineering Achievement Award* in 2006 and the *University Scholar Award* in 2007.

#### **4. High Efficiency Electro-generated Chemi-luminescence with Colloidal Quantum Dot Emitters in Ultrathin Cells for Display Applications**



**Associate Professor Sun Xiaowei  
School of Electrical and Electronic  
Engineering  
Division of Microelectronics  
Nanyang Technological University**

#### **Project Summary**

Electro-generated chemi-luminescence (EGCL) is a kind of luminescence produced during electrochemical reactions in a solution. EGCL is bio-inspired and capable of self-regeneration in liquid form like bio-luminescence. The aim of this project is to develop a new EGCL technology with high efficiency and self-regeneration capability. EGCL has great potential in a wide range of applications like smart phones and electronic wallets, interactive displays, flexible electronic devices, and micro display products, as well as indoor and outdoor decoration and lighting.

Dr Sun Xiaowei is an Associate Professor with the Division of Microelectronics in the School of Electrical and Electronic Engineering, Nanyang Technological University. From 1986 to 1994, he studied at Tianjin University, China, where he received his B Eng, M Eng, and PhD degrees, all in photonics. From 1994 to 1998, he studied at the Hong Kong University of Science and Technology, where he received his second PhD degree in Electrical and Electronic Engineering. His main research interest focuses on display and lighting technologies. Dr Sun is a Senior Member of IEEE and a Member of Society for Information Display (SID). He is the founding Chair of SID Singapore and Malaysia Chapters.

## **5. New Grid Array Antennas and their Integration Method for an Innovative Solution to 60-GHz Radio Devices**



**Associate Professor Zhang Yue Ping  
Division of Circuits and Systems  
School of Electrical and Electronic  
Engineering  
Nanyang Technological University**

### **Project Summary**

The objective of this project is to demonstrate new grid array antennas and their integration method for an innovative solution of millimetre-wave radio devices based on locally accessible low temperature cofired ceramic (LTCC) technology for emerging low-power high-speed wireless personal area network applications in the unlicensed millimetre-wave 60-GHz band. The project addresses the challenging issues of packaging highly-integrated 60-GHz radios with integrated antennas in a low-cost manner. The antenna developed in this project will aid in the realisation of applications like wireless transmission of high definition video streams from a Blu-ray player to a display device.

Dr Zhang Yue Ping is an Associate Professor, and the Deputy Supervisor of IC Design Laboratories, with the School of Electrical and Electronic Engineering, Nanyang Technological University (NTU). Trained as a radio scientist, he has contributed to Subsurface Radio Science, Antenna-in-Package Technology, and Wireless Chip Area Networks. He has published regular and invited papers in the IEEE Transactions and delivered many invited and keynote addresses at international scientific conferences. He serves as an Editor, a Guest Editor, and an Associate Editor for four International Journals. He also serves on the Editorial Boards of a large number of international journals, including the prestigious IEEE Transactions on Microwave Theory and Techniques and IEEE Microwave and Wireless Components Letters. Since 2000, he has been awarded two IEEE Best Paper Prizes in the United Kingdom and one William Meng Fellowship in Hong Kong for his research work conducted at NTU.

## **6. Low-Cost, High-Performance Anti-Reflective Coating Based on Silicon Nanocrystals Embedded in SiO<sub>2</sub> Film**



**Eunice Goh Shing Mei**  
**PhD student**  
**School of Electrical and Electronics Engineering**  
**Nanyang Technological University**

### **Project Summary**

Existing anti-reflectance coating (ARC) such as Silicon Dioxide (SiO<sub>2</sub>) and Silicon Nitride (Si<sub>3</sub>N<sub>4</sub>) requires multiple coating, which is complex and expensive as multiple passes are required during the deposition process. The aim of this project is to develop a low-cost, high-performance ARC based on silicon nanocrystals embedded in SiO<sub>2</sub> film for optical and optoelectronic devices, and lenses such as reading glasses, which employ only a single layer coating process.

Eunice Goh Shing Mei received her B Eng from Universiti Teknologi Malaysia in 2007. She is currently pursuing her PhD as a Research Student at the Nanyang Technological University. Her PhD research work is on the optical properties of semiconductor nanocrystals and its application on photonic devices.

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