UNMC reaps awards at international engineering

Dr Amin Malek mohammadi (left) with the UNMC team

Malaysia – The University of Nottingham Malaysia Campus (UNMC) team won one Gold, one Bronze and the Special award from Malaysian Research and Innovation Society (MyRIS) at the 2015 International Engineering and Technology Exhibition.

UNMC team consisted of Dr Amin Malek Mohammadi, Dr Mohanna, Mr How Chin Joe, Mr Ong Jun Yang, Mr Mohamed Asaad Elsherif, Mr Nguyen Dong Nhat, Mr Lee Han Lin and Ms Trishna Saeharaseelan.

"UNMC is a research intensive university. I am very proud of this achievement by my students after competing against more than 40 excellent teams from various universities," said Dr Amin Malek Mohammadi, head of Electrical and Applied Mathematics Research Division.

Researchers from the Electrical Systems and Applied Mathematics Research Division, Faculty of Engineering at UNMC won the awards for the Design and Implementation of an Autonomous Underwater Vehicle (AUV); and the Mapping Multiplexing Technique (MMT), a Power Efficient Transmission Format for High-Speed Optical Networks.

An AUV is ultimately an unmanned underwater vehicle that is able to navigate autonomously. This submersible vehicle is used with ultrasonic sensors to create a mapping of submerged elements and the underwater terrain. After its task completion, the AUV returns to its default location, or home location, with the data collected stored on a memory storage device.

MMT challenges the high power consumption issue that exists in high speed short-haul data centers. The N-channel MMT scheme provides means for increasing both, the information capacity and power efficiency of high speed optical transceivers.

The Chinese University of Hong Kong pioneers breakthroughs in solar energy research

Prof Yi-Chun Lu (Department of Mechanical and Automation Engineering, CUHK) and her research team are assembling lithium sulphur-impregnated carbon composite flow battery in a glovebox. Their work has demonstrated the highest catholyte volumetric capacity to date

Hong Kong – The fast-growing demand for energy and the recognition of man-made global climate change underscore the urgency of developing clean and renewable energy resources to replace fossil fuels. Harvesting energy directly from sunlight by photovoltaics (PV), photo catalysis, artificial photosynthesis, and other enabling technologies is a promising way to meet such requirements.

Professor Wong Ching-ping, dean of the Faculty of Engineering, The Chinese University of Hong Kong (CUHK), is leading an inter-disciplinary, multi-institutional team consisting of more than 30 senior academics to carry out the research project "Smart Solar Energy Harvesting, Storage and Utilization". Funded by the Theme-based Research Scheme (TRS) (US$7.7 million, 2014–18) of the Research Grants Council (RGC) of Hong Kong, the project covers the development of thin film PV devices and modules to enhance the performance of solar harvesting; the design of smart electricity storage; and the establishment of distributed grid systems to increase the penetration of solar energy utilization. The project aims to strengthen the competitive edge of Hong Kong in solar energy technologies and their market penetration by combining the newly developed PV modules with the intelligent system integration.

The project has recently achieved significant breakthroughs: development of a high-energy-density catholyte that exploits highly concentrated sulphur-impregnated carbon composite, to achieve the highest catholyte volumetric capacity (294 ampere-hours per liter) reported to date, which is five times that of the state-of-the-art vanadium catholyte; development of nanostructured metal oxide-carbon composites for asymmetric supercapacitors, which exhibit high energy and power densities of 98.0 W h kg-1 and 22,826 W kg-1, among the best performances reported to date; design of single-junction organic solar cells with a record efficiency of 11.5%, which has been officially certified and is noted as a major technological breakthrough by the US Department of Energy in its renowned NREL chart of "best research-cell efficiencies". In addition, the team members found that thermal radiation is an attractive route for photon-energy "upconversion", with efficiencies higher than those of state-of-the-art energy-transfer upconversion under continuous-wave laser excitation.

In the final stage, field demonstration of micro grids will be carried out at a student hostel at CUHK by incorporating PV modules, smart storage and advanced management system developed from this project. This will be the first R&D project of its kind focusing on rooftop solar panel and building-integrated PV (BIPV) powered urban-level micro grid systems at the very end of power grid (lowest voltage level). Uniquely, a full-scale system solution of urban micro grids from specific devices to system operation and management level will be provided, offering a significant reference for PV development in modern metropolises like Hong Kong.