16 April 2018

News Release

STUDENTS SHOWCASE DEFENCE TECHNOLOGY IDEAS AT YOUTH CONGRESS

Robots that autonomously detect obstacles and navigate hazardous terrains; intelligent systems that automatically classify objects in videos; and a smart Micro Air Vehicle that can manoeuvre indoors – these projects were among the 50 promising ideas that were showcased at the Young Defence Scientists Programme (YDSP) Congress on 16 April 2018. Through the programme, participants gained hands-on exposure and first-hand insights into the diverse application of defence technology. It also challenged them to explore creative solutions in fields like robotics, artificial intelligence (AI), aeronautical engineering, cybersecurity, nanotechnology and signal processing, under the mentorship of engineers and staff from the Defence Science and Technology Agency (DSTA), DSO National Laboratories (DSO) and local tertiary institutions.

Speaking at the annual congress, Senior Minister of State for Defence Dr Mohamad Maliki Bin Osman highlighted the importance of nurturing a strong Defence Technology Community[1] (DTC). “The defence area is a hotbed for (the) growth and development of new and emerging technologies. Here in Singapore, the DTC has been working with the Singapore Armed Forces to innovate and turn concepts into reality. In the face of new emerging threats and our manpower challenges, we need to rely on ourselves to innovate and achieve a quantum leap in our capabilities...I hope

[1] The Defence Technology Community includes the Defence Science and Technology Agency (DSTA), DSO National Laboratories (DSO) and Ministry of Defence departments – the Future Systems and Technology Directorate (FSTD), Technology Strategy and Policy Office (TSPO) and Industry and Resources Policy Office (IRPO).

that participating in the YDSP activities has fired your passion in the field and inspired you to join the ranks of our DTC and contribute to making Singapore a safe country for all," he said.

With a strong focus on practical research and learning, the YDSP provided opportunities for more than 260 students from 19 schools to participate in project attachments, lectures and laboratory sessions as part of Research@YDSP and YDSP World of Science (WOS) programmes in 2017.

A Research@YDSP team comprising Ryan Pary from St Joseph's Institution and Avellin Wong from Raffles Girls' School built an obstacle-avoiding Arduino robot. They integrated ultrasonic and infrared sensors to the robot and programmed it to perform positive (above the floor surface) and negative (below the floor surface) obstacle avoidance along its path.

"This was an exciting opportunity for us to learn more about the Arduino language and code our robot to perform specific tasks. Our mentors also shared examples of how other advanced technologies can be applied to more sophisticated robots used for defence. The experience sparked our interest in the fast advancing field of robotics," Ryan said. The team was mentored by defence engineers Charles Ng, Anthony Chua and Raven Poh from DSTA's Command, Control and Communications Development Programme Centre.

In another Research@YDSP project, Valerie Tan from Dunman High School applied machine learning techniques to train AI algorithms to identify objects in videos. Her project has the potential of enhancing security by quickly uncovering potential threats in cluttered environments with many objects of similar shape or colour.

Her mentor, Lo Man Ling, a programme manager at DSTA's National Security Programme Centre, shared: "As a YDSP mentor, it was important to introduce advanced concepts like AI and machine learning in a simple and interesting way to students. It's amazing what they can learn and accomplish within a short period of time, when they are provided with hands-on experience and exposure to real-life applications of complex concepts."

Conducted by DSO, WOS is a series of informative lectures and laboratory sessions for students to learn more about advanced science topics, such as AI and electromagnetics. “WOS takes me out of my comfort zone and challenges me, especially when it comes to applying concepts we learn to real world and practical scenarios. Like in the robotics module, we could see first-hand how our codes come to life in the robot. We also learnt the more practical side of electricity which is a lot more fun and engaging than the theoretical side that we learn in school, which can be quite dry,” Hubert Choo, from River Valley High School, said. The robotics module was also where he met Lim Zinn-E and Jerald Siah from Raffles Institution whom he later teamed up with to further their interests in robotics in the Research@YDSP project “Reaction Wheel Actuator for All Terrain Locomotion”, which explores a solution for robots to traverse across difficult terrains.

Not only has the YDSP encouraged many young talents to explore creative concepts in defence technology, it has also inspired others to pursue a career in the field. One alumnus is John Lee. John participated in several WOS modules and went on to do a research project where he designed an active optical limiter. Today, John is a Research Engineer in DSO working in an Imaging Radar Lab and, also, a Research@YDSP mentor. “YDSP was really the catalyst to my career in defence research and development. Now as a mentor, I hope to use my experience to help the next generation of aspiring researchers and engineers to realise their own dreams and goals.”

At the event, Dr Maliki also presented 30 YDSP Scholarships to students for their outstanding academic and co-curricular achievements, 108 Academic Awards to students for excellence in Physics and Mathematics, and 29 DSTA Junior College Scholarships to JC/IP Year 1 Science students. The event was attended by students, principals, teachers and members of the Defence Technology Community.

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About Defence Science and Technology Agency

The Defence Science and Technology Agency, or DSTA in short, (国防科技局), is a statutory board set up under the Ministry of Defence (MINDEF). It implements defence technology plans, acquires defence material and develops defence infrastructure for MINDEF.

DSTA provides leading-edge technological solutions to the Singapore Armed Forces (SAF) by tapping the best technologies and fostering an environment of creativity and innovation for defence applications. It also builds up a strong community of engineers and scientists from the universities, research institutes, government and industry to serve the defence needs of the nation. For more information, please visit www.dsta.gov.sg.

About DSO National Laboratories

DSO National Laboratories (DSO, 国防科技研究院) is Singapore's national defence research and development organisation. It undertakes indigenous development of advanced defence and weapon systems that provide the SAF with the superior technological edge in the battlefield. While its primary focus is to support the SAF, DSO also extends its defence R&D capabilities to support homeland security.

With more than 1,500 research scientists and engineers, DSO investigates emerging technologies, matures promising ones and integrates them into innovative system concepts to meet Singapore's defence and security needs. For more information, please visit www.dso.org.sg.