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Fact Sheet

The Young Defence Scientists Programme (YDSP) is an initiative by the Defence Science and Technology Agency (DSTA) and DSO National Laboratories (DSO). Established in 1992, YDSP nurtures students' passion for Science, Technology, Engineering and Mathematics (STEM) by providing experiential learning exposures to students with Singapore's top defence engineers, software developers, cybersecurity experts and research scientists.

YDSP also provides students with insights to the careers of professionals in the defence technology community, and recognises achievements of our young talents through the YDSP Scholarship and DSTA Junior College Scholarship.

In the past year, 425 students from 19 schools participated in various YDSP initiatives, which include:

Research@YDSP

Research@YDSP is a four-month project attachment which offers students a hands-on opportunity to work on defence-related projects, under the mentorship of top defence engineers, software developers, cybersecurity experts and research scientists from DSTA and DSO.

Over the past 12 months, DSTA and DSO conducted Research@YDSP internships for 77 students that focused on topics such as aerodynamics, user experience design, unmanned systems and AI cybersecurity to solve real-world challenges. Some of these projects have also gained recognition on prominent platforms. For instance, students attached to DSO developed a model framework to fact check images and

text on social media to combat misinformation in the Singaporean context. The framework clinched the silver award at the Singapore Science and Engineering Fair (SSEF), a national competition affiliated to the prestigious International Science and Engineering Fair (ISEF).

Two of these projects were also showcased on stage at YDSP Congress:

Optimising UAV Dynamics: User-Centric Large Language Model Integration for Dynamic Adaptation

For their project attachment with DSTA, students Serene Zhang and Zeaus Koh worked on addressing shortcomings identified in current drone systems as well as large language models (LLMs) where there's no reliable model for coding drones' behaviours to adapt swiftly and accomplish novel tasks without prior training. Through an adaptive retrieval augmented generation (RAG) system leveraging LLMs, the students explored how the model will outperform existing LLMs in responding reliably to dynamic scenarios with natural language prompts.

Can Large Language Models (LLMs) have a Fever? Investigating the Effects of Temperature on LLM Security

Artificial intelligence (AI) is commonly utilised in the realm of cybersecurity, but its usage in the opposite direction is not as prevalent. In this project, students and twin brothers James and David Chan highlighted the security vulnerabilities of Language Model Machines (LLMs) and the potential for them to be exploited for unethical behaviour or the generation of harmful content.

Science & Technology Camp

DSTA organised two physical five-day Science & Technology Camps for close to 170 students across 18 schools, which provide students with both theoretical knowledge and hands-on opportunities to code and develop applications in the areas of AI, Machine Learning and Drones. Students worked in groups to showcase their projects on the use of generative AI in military applications and to manoeuvre their drones to complete a search and recover mission through a mapped maze. Participants also had the opportunity to learn about real-work experiences from DSTA engineers.

One notable project was showcased during the YDSP Congress:

GenAI CCTV Stealth System

Sadhana Kumar and her team drew insights that they got from the YDSP camp sessions such as building applications with ChatGPT and Generative AI, to enhance surveillance capabilities for security purposes.

World of Science (WOS)

Organised by DSO National Laboratories over a one-month period, close to 190 students were exposed to a wide range of advanced technology topics such as Aerodynamics, AI, Cryptography, Computer Security, Electromagnetics, Robotics, Sensors and Quantum Technology. Students participated in physical workshops and field trips, conducted experiments and learned from DSO's technical experts.

Aerodynamics Module

Students had the opportunity to learn from experts on how airplane wings are designed, flew planes using a flight simulation software, and build their own gliders.

AI Module

Students explored and learnt about the latest trends in AI such as Natural Language Processing and Computer Vision, and its applications in defence. They had the opportunity to put their skills to the test with an Intelligent Game AI Agent Sandbox developed by DSO, which culminated in a mini-competition where students' AI agents competed with each other in a virtual environment.

Cryptography Module

Students were introduced to the intricate work of Mathematics in modern Cryptography, with lectures designed to deepen their understanding of advanced concepts in this field. A series of challenging problems were also designed to excite and inspire the students through the revelation of mathematical applications in the area of security research.

Computer Security Module

Students learnt how to defend against cyber threats through a series of lectures in this field, as well as hands-on exercises from testing web applications for vulnerabilities to uncovering a Personal Identification Number (PIN) code.

Electromagnetics Module

Students learnt various electromagnetic (EM) applications through a series of demonstrations and hands-on activities, such as building their own antennas and electromagnetic coil launchers. To connect EM concepts to the real-world scenarios, the students visited the advanced EM test and measurement facilities within Temasek Laboratories at the National University of Singapore (NUS).

Robotics Module

Students learnt the basics of electronics design, sensors integration and programming. They also had hands-on experience in robotics such as 3D printing and utilising the Robotic Operating System (ROS)and had the opportunity to build their own robots and compete against each other.

Sensors, Reducing the Fog of War Module

Students explored various sensing technologies crucial to defence such as sonar, radar, and digital image processing. They also participated in a real-time sense-making and decision-making team-based Battleship game.

Quantum Technology Module

Students experienced a series of hands-on experiments to investigate interferometry and superconductivity, tours and visits to DSO's quantum laboratories, NUS and NTU.

YDSP Scholarship

30 YDSP Scholarships were awarded this year. The scholarship recognises students who show interest and excel academically in science and technology, and is open to

science students in Secondary Three or equivalent. Scholarship recipients will receive S$1,000 over two years.

DSTA Junior College Scholarship

35 DSTA Junior College Scholarships were awarded this year. The scholarship recognises outstanding academic achievements in science, and is open to science students in their first year of junior college studies or equivalent. Scholarship recipients will receive S$2,000 over two years.

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About Defence Science and Technology Agency

The Defence Science and Technology Agency (DSTA) is a top-notch technology organisation that drives innovation and delivers state-of-the-art capabilities to make the Singapore Armed Forces a formidable fighting force. Harnessing and exploiting science and technology, our engineers and IT professionals leverage multidisciplinary expertise to equip our soldiers with advanced systems to defend Singapore. DSTA also contributes its technological expertise to support national-level developments. To achieve our mission, DSTA excels in systems engineering, digitalised platforms, cyber, software development and more.

Visit www.dsta.gov.sg for more information.

About DSO National Laboratories

DSO National Laboratories (DSO) is Singapore's national defence research and development organisation. For the past 5 decades, DSO has been undertaking indigenous development of advanced defence and weapon systems that provide the Singapore Armed Forces (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 1,600 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