Fact Sheet

Young Defence Scientists Programme (YDSP)

Organised by	Defence Science and Technology Agency (DSTA) and DSO National Laboratories (DSO)
Participants	Secondary 3 to Junior College students with strong interest in science, technology, engineering and mathematics (STEM)
Students Participated	Approximately 470 students
Schools Represented	19 schools
Date of Congress	28 April 2026
Guest-of-Honour	Senior Minister of State for Defence Mr Zaqy Mohamad

About YDSP

Established in 1992, YDSP inspires students with an interest in STEM by showing how these disciplines contribute to Singapore's defence and national security. Through research attachments, immersive camps and specialised modules, students gain early exposure to emerging technologies and real-world defence challenges, working alongside experienced engineers and scientists from DSTA and DSO.

Mentorship is central to the YDSP experience. Mentors guide students through substantive research projects, share expertise drawn from active work in the field, and offer a window into how scientific ideas are translated into operational capabilities. For many students, these interactions are their first encounter with what a career in defence science and technology can look like.

YDSP Activities

1. Research@YDSP

A four- to nine-month project attachment placing students directly into DSTA and DSO teams, where they work on live defence-related challenges under the mentorship of experienced engineers, software developers, cybersecurity specialists and research scientists.

Over the past 12 months, DSTA and DSO conducted Research@YDSP internships for 87 students across project areas including aerodynamics, artificial intelligence, drones and computer security.

Two of these projects were showcased during the stage presentation at the YDSP Congress:

i) Improving Kinetic Drone Strike Accuracy

During their attachment with DSTA, students Arkin Talukdar from Anglo-Chinese School (Independent) and Bernice Chang from Victoria Junior College worked on drone interception in a virtual simulation setup. Inspired by a research paper on augmented proportional navigation – a guidance technique designed to improve interception accuracy against accelerating targets – the students asked an ambitious question: could the existing approach be made more precise?

Encouraged by their mentor to explore beyond the brief, the students modified the algorithm and designed their own tests. They ran over 100 simulations, systematically varying conditions to see how the method held up. Through this, they identified the strengths and limitations of the approach, and provided concrete, tested insights, contributing to a deeper understanding that could inform further exploration in this area.

ii) Nitrogen-Vacancy Diamonds for Quantum Magnetometry

During their attachment with DSO, Jonathan Huang and Kabilan Ezhilarasan from NUS High School of Math and Science developed an advanced approach to navigation that could one day function where GPS fails. By using specially

engineered diamonds that react to magnetic forces, they built a prototype sensor that ‘reads’ magnetic fields through changes in light.

More significantly, their work challenged a prevailing assumption in the field: that such diamonds could only measure the strength of a magnetic field. Their results demonstrated that these sensors could also be used to measure its direction. This opens a potential path toward more sensitive and compact magnetic navigation systems for defence applications.

Below are two other projects showcased during the Guest-of-Honour Tour at the YDSP Congress

i) Powering the Frontline: Tactical Green Energy

During their attachment with DSTA, students Jasmine Cao from Raffles Institution and Joshua Ong from Hwa Chong Institution evaluated green energy technologies for soldiers on foot. Comparing direct methanol fuel cells and metal-air batteries across performance, efficiency and operational feasibility, the team also constructed an aluminium-air battery prototype with a 3D-printed housing using accessible materials. They iterated through multiple designs and gained first-hand insight into the realities of engineering trade-offs. Their findings pointed to a diversified energy approach – with fuel cells offering near- to mid-term deployment readiness and metal-air batteries showing strong long-term potential.

ii) **Oblivious Revocable Functions in School Networks**

During their attachment with DSO, students Claire-Leia Ng and Tan Pin Fei from Raffles Institution and Brian Tan from Eunoia Junior College created a secure way for multiple trusted users to store and search private data on untrusted servers, while ensuring that access can be instantly revoked when needed. Using advanced yet practical cryptography, their system ensures the server cannot access the data or queries. This work deepens their understanding of how cryptographic theory can be turned into practical systems, and how one balances mathematical security guarantees with real-world system constraints.

2. Science & Technology Camp

DSTA organised two camps – one in June and one in November – bringing together a total of 189 participations. The camps provide students with theoretical and hands-on learning experiences in emerging technology areas such as artificial intelligence, cybersecurity, unmanned systems and robotics. Working in teams to develop innovative solutions to real-world challenges, students gained insights into real-world engineering work and the defence applications of these technologies from DSTA engineers.

i. To Err is Human: Building Alliance with AI

Over the course of the five-day camp, 95 students from 19 schools dove into the digital trenches of AI in cybersecurity. They engineered machine learning solutions through hands-on coding, rigorous system hardening, and testing. Participants were also exposed to digital security tools such as Burp AI and large language models (LLMs) like SecurityLLM.

ii. Sailing Solo with Unmanned Surface Vessels

Over the course of the five-day camp, 94 students from 19 schools learnt about the engineering principles behind unmanned naval systems. Students built their own Unmanned Surface Vessels (USVs) from scratch using machine design and fabrication technology, motors, Light Detection and Ranging (LiDAR) sensors, and communication systems. Under the guidance of experienced instructors, they programmed their USVs using a block-based coding platform and Python. To see how technology comes to life, they were also given an exclusive tour of the DSTA Experience Centre, where they witnessed cutting-edge technologies used in Singapore today. The camp concluded with a series of naval mission challenges, where student-built USVs navigated complex courses in a large pool to prove their mission readiness.

3. World of Science (WOS)

Organised by DSO National Laboratories over a one-month period, 185 students were exposed to a wide range of advanced technology topics such as aerodynamics, artificial intelligence, cryptography, computer security,

electromagnetics, robotics, sensors and quantum technologies. Students participated in workshops and field trips, conducted experiments and learnt from DSO's technical experts.

i. Aerodynamics Module

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

ii. Artificial Intelligence Module

Students explored the latest trends in artificial intelligence such as natural language processing and computer vision, as well as adversarial AI and its applications in defence. They had the opportunity to put their skills to the test where they designed and fine-tuned their own AI models. The students also competed in team-based challenges while crafting adversarial inputs to test and outsmart one another's systems. The programme culminated in a custom action recognition project and a live vision-based dance-off, teaching students how to uncover vulnerabilities and build truly resilient AI.

iii. Cryptography Module

Students explored classical and modern cryptography, focusing on the mathematical foundations and real-world algorithms that secure modern communication. Through a blend of lectures and hands-on activities, students gained practical experience in both designing and breaking cryptographic schemes. The course demonstrated how these theoretical concepts directly safeguard defence networks and critical infrastructure.

iv. 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.

v. 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 reinforce EM concepts to real-world scenarios, students visited the advanced EM test and measurement facilities within Temasek Laboratories at NUS.

vi. Robotics Module

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

vii. Remote Sensing Technologies Module

Students explored various sensing technologies crucial to defence such as sonar, radar and digital image processing and experienced real-time sense-making and decision-making. They also applied their newly acquired knowledge of sensors in a multi-player war game.

viii. Quantum Technology Module

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

YDSP Congress

The YDSP Congress is the programme's flagship annual event and marks the culmination of students' participation in YDSP activities over the past year. In 2026, the Congress brought together over 350 students, educators, mentors and members of the defence technology community to celebrate student achievements and showcase research projects conducted under the programme.

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.