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Fact Sheet

YOUNG DEFENCE SCIENTISTS PROGRAMME

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, the YDSP nurtures students' interest in defence science and technology through a diverse range of activities including customised project attachments, topical camps and programmes.

The YDSP experience also provides students with insights into the careers of professionals in the Defence Technology Community, and recognises top young minds through the YDSP Scholarship and DSTA Junior College Scholarship.

More than 350 students from 19 Integrated Programme (IP) schools participated in the Research@YDSP, YDSP Science and Technology Camps and YDSP World of Science (WOS) programmes in 2018.

Research@YDSP

The Research@YDSP is a four-month project attachment which offers students the chance to learn engineering techniques and experience research work under the mentorship of defence engineers and scientists from DSTA and DSO.

Over 40 Research@YDSP projects were completed last year. Two of them were selected to represent Singapore at the Intel International Science and Engineering Fair (Intel ISEF) which will be held in May 2019 in the United States:

- The “**Data Analytics for Fake News Detection**” project explored how data analytics (DA) and visualisation can be harnessed to uncover trends and insights for national security, such as in the context of fake news. Leveraging open-source datasets of real and fake news articles, the student evaluated the effectiveness of different DA techniques and models and trained them to perform textual analysis to discern between real and fake news. Subsequently, she applied machine and deep learning methodologies, “stacking” multiple models to train a new model to predict the accuracy of news articles. This model could serve as a guide to help people make better judgements about the reliability of news they are reading.
- The project was done by Liu Haohui from Raffles Institution, mentored by Ryan Tarn from DSTA. It received a Gold award at the Singapore Science and Engineering Fair (SSEF) 2019 and has also been selected to represent Singapore at the Intel ISEF in the US in May 2019.
- The “**Origami Paper Parachute**” project researched on the feasibility of paper parachutes designed with various origami folding patterns to create a compact, self-deploying parachute that is suitable for one-time no-recovery usage, particularly useful for disaster relief operations. The most promising design that met the canopy design criteria – slowest drop speed, fewest oscillation, smallest drift distance, was then scaled up and benchmarked against an unfolded control parachute of the same canopy material. A low-cost inertia measurement unit built from hobby parts was used as a payload to track its trajectory. The origami paper parachute displayed improved stability against the control.
- The project was undertaken by Natalie Elizabeth Yam from Anglo-Chinese School (Independent) and mentored by Joel Ho, Defence Researcher from DSO National Laboratories. The project also received Gold award at SSEF 2019 and is selected to represent Singapore at the Intel ISEF in the US in May 2019.

Another Research@YSDP project was also presented on stage at the YDSP Congress 2019:

- The “**Enhancing Robotic Manipulators Control**” project studied how Explosive Ordnance Disposal (EOD) operators control robotic arms using 2D cameras, and proposed a system to aid operators in gauging distances when gripping objects. The prototype system, consisting of stereo cameras, infrared sensors and an LED display, was programmed using Python code to indicate visually the distance between the robotic arm and an object. This improves depth perception and could potentially enhance the precision and safety of EOD operations.
- The project was done by Wee Chun Hui from Victoria Junior College, mentored by Brandon Chia and Dominic Li from DSTA.

YDSP Science and Technology Camps

The YDSP Science and Technology Camps aim to introduce students to science and technology concepts and applications in a fun and interesting way through lectures, hands-on activities, project visits and competitions. Four five-day camps were held in June and November 2018 under two themes: Data Analytics and Robotics.

- **Data Analytics**. 55 IP Year 2 and 3 students from 17 schools learnt about data analytics and related concepts such as the Internet of Things (IoT). For hands-on practice, they extracted, prepared, and analysed publicly available local weather data to gain insights into abnormal weather patterns during floods. Participants also utilised IoT to build smart home models. Using a Raspberry Pi minicomputer, they coded and connected features like temperature and humidity sensors, motion sensor-controlled lights and solar panels, which can collect data for analysis.
- The winning IP3 team of the competition, comprising Chepurthy Varnika, Teo Jie Xuan (Raffles Girls' School), Chen Nuode and Venkatesh Nathan (Raffles Institution), presented their smart home model on stage during the Congress and at the exhibition.
- **Robotics**. 70 IP Year 2 and 3 students from 17 schools picked up robotics concepts such as single and multiple-block programming, and sensors and robot design. Working within the context of a disaster relief scenario, teams raced against time to build and programme an unmanned robot to clear debris, collect materials and perform safety checks.
- The winning IP2 team of the competition, comprising Arav Cabral, Lim Jin Tao, Javier Lim, Daniel Toh (NUS High School of Mathematics & Science) and Zachary See (Anglo-Chinese School Independent), showcased their robot prototype at the exhibition.

World of Science (WOS)

This informative series of lectures and laboratory sessions exposed students to advanced science topics beyond the school curriculum. Conducted by engineers and scientists from DSO National Laboratories during the June school holidays, the modules delved into the field of physical sciences and infocomm technologies that are critical to Singapore's defence needs.

The modules included Aerodynamics, Artificial Intelligence, Cryptography, Computer Security, Electromagnetics, Robotics, and Sensors, reducing the fog of war.

- Previously known as Signal Processing, the 'Sensors, reducing the fog of war' module was revamped to include new content where students learnt the various sensor technologies that harness speech, imagery and radar data. Samuel Chua and Cheryl Shua from Dunman High School demonstrated their understanding of the various sensing techniques used to identify the opponent's ships in a battleship-inspired DSO war game.
- In Cryptography, Kah Jean from Raffles Girls' School and Wee Leng from River Valley High School presented their project findings on the potential weaknesses of 'Digital Signature Algorithm Schemes', commonly used in the verification of online identity such as electronic funds transfer.
- In 'Aerodynamics', Natalie from ACS(I) showcased her paper origami parachute prototypes and shared her research findings for the best canopy design.

YDSP Scholarship

- 29 YDSP Scholarships were awarded this year. The scholarship recognises students who show interest and excel academically in Science and Technology. It is open to science students in IP Year 3.
- All applicants must be Singapore Citizens with good records of academic results and a passion for science and technology.

- Scholarship recipients will receive S\$1,000 over two years.

DSTA Junior College Scholarship

- 30 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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