22 June 2023

Fact Sheet

BRAINHACK

BrainHack 2023 was organised by the Defence Science and Technology Agency (DSTA) from 11 May to 22 June 2023 to generate interest in cybersecurity, artificial intelligence, space technology, extended reality, fake news detection and app development among students in Secondary Schools, Junior Colleges (JC), Integrated Programme (IP) Schools, Institutes of Technical Education (ITE), Polytechnics, as well as Universities.

Incepted in 2019, this year's annual learning festival saw close to 3,500 students from some 90 schools pick up knowledge across its various components: Cyber Defenders Discovery Camp (CDDC), the Today I Learned – Artificial Intelligence (TIL-AI) Camp, SpaceCube, XRperience, SeeTrue, CODE_EXP, as well as an interactive Tech Showcase.

Cyber Defenders Discovery Camp (CDDC)

To train students in fundamental cybersecurity techniques, students joined a comprehensive four-week online training programme on topics such as malware, cryptography and web-based attacks. A wide range of guided modules and stimulating hands-on exercises allowed participants to learn at their own pace according to their skill levels.

Thereafter, teams were given 36 hours at an online qualifier, where they had to solve challenges to enter the physical Capture-The-Flag competition on 22 June. The final stretch of the competition saw participants compete in a thrilling series of cyber-

physical challenges to take control of models simulating real-life components in an AI-driven city.

Today I Learned – Artificial Intelligence (TIL-AI) Camp

The TIL-AI Camp saw students immersing themselves in the field of machine learning, artificial intelligence and robotics autonomy. Participants acquired skills to develop diverse AI models for a counter-terrorism search-and-rescue mission, honing their abilities through self-paced upskilling training on the concepts of computer vision and automatic speech recognition.

The camp wrapped up in an exciting knockout-style physical competition on 21 and 22 June. Finalist teams integrated their models into a robot to search for terrorists and hostages in a maze within the shortest time possible. This year's camp featured two tiers (Novice and Advanced), to cater to varied competency levels of participants.

SpaceCube

Students embarked on a journey into the captivating realm of space technology, gaining hands-on experience in assembling, programming and testing a miniaturised satellite, or a CubeSat, during the workshop. Selected teams subsequently moved on to compete in a remote imaging mission using the CubeSat they built during the workshop.

Apart from the physical workshop, this year's programme was further expanded to include other space-related activities, where participants got to program and navigate a mock-up space rover through an obstacle course, experience the outer space environment to explore and complete tasks through Virtual Reality (VR), and learn about additive manufacturing through 3D printing of CubeSats. Participants also got the rare opportunity to interact with Dr Noguchi Soichi, a former astronaut from the Japan Aerospace Exploration Agency who has flown on the Space Shuttle, the Soyuz spacecraft and the SpaceX Crew Dragon to the International Space Station for different missions. Dr Noguchi has conducted 4 spacewalks and in total has spent almost a year in space.

XRperience

At XRperience, students delved into the world of eXtended Reality (XR), trying their hands on XR kits and devices while gaining knowledge in real-time development platforms such as Unity during the physical workshop and hackathon held from 19 to 22 June. Working in teams, participants learned how to harness XR by designing and developing their very own applications to address problem statements such as ways to educate people on the importance of sustainability, achieving Smart Nation goals, or transforming the training experience for the Singapore Armed Forces.

SeeTrue

SeeTrue aims to empower the next generation with the necessary tools to discern against fake news. Participants interacted with industry experts in specialised domains of computer vision and natural language processing, learned about the different types of fake news in curated lectures, and attained practical knowledge through hands-on coding lessons. At the hackathon held from 21 to 22 June, participants put their newfound skills to the test by using a dataset to develop a prototype to address the varying facets of fake news.

CODE_EXP

Students who participated in CODE_EXP gained a comprehensive understanding of the end-to-end experience as a software engineer and experienced the Software Development Lifecycle. At the physical finale held from 21 to 22 June, students worked in teams and leveraged their newly-acquired skills to code and develop mobile applications to benefit the public or to enhance employee experience in organisations. Participants then pitched their applications to a panel of judges, which were evaluated based on the functionality, usability, and popularity.

Tech Showcase

Apart from the six activities, students and camp participants also got up close with a diverse range of cutting-edge technologies and applications at the Tech Showcase on 21 and 22 June. Students were encouraged to explore and interact with the showcases, scan QR codes scattered through the exhibition space to answer quiz questions and win attractive prizes. Through interactions with DSTA engineers, participants gained a better appreciation of various technologies and applications in

Cybersecurity, AI and other emerging areas of technologies from the various programme centres of DSTA.

The list of interactive booth challenges are as follows:

Legged Robots for Security Applications: Automating the Dull & Dangerous	Walk a legged robot through an obstacle course with a wireless controller
Autonomous Drones: Safer Search and Rescue (SAR)	Compete in simulated drone flight and learn how autonomous drones help perform Search and Rescue
Maritime Simulators: Gamifying the Training Experience	Activity 1 – Unmanned Surface Vessel (USV). Control a simulated USV in a realistic simulation environment for training realism. Activity 2 – Admiral's Battleground. Try out the fundamentals of naval warfare tactical training
Stealing Secrets from Hardware | Hardware Vulnerability	Hands-on experience of how a hardware security tester can analyse a target device to search and extract security crucial information.
Unmasking the Dark Side of Large Language Models | ChatGPT	Interact with a 3D Chatbot built using off-the-shelf software and AI services
Identifying that Signal | Spectrum Sensing	Participate in hands-on activities to classify and locate the different types of signals in real-time.

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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.

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