DSTA
Defence Science &
Technology Agency

MAKING A MARK

IN SINGAPORE'S DEFENCE LANDSCAPE

MAKING A MARK is published by DSTA.

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MAKING A MARK is about DSTA engineers and professionals whose contributions and innovations have shaped and transformed Singapore's defence landscape. Through their stories, discover how the passion for defence science and technology translates into exciting, meaningful and fulfilling careers at DSTA.

A MARK OF STRENGTH

A MARK OF INGENUITY

A MARK OF EXCELLENCE

A MARK OF STRENGTH

At DSTA, work does not stop at the delivery of cutting-edge combat platforms. We take things up a notch with our passion and dedication. From developing new capabilities to enhancing training safety and effectiveness, our people constantly push the boundaries of science and engineering across diverse domains to create the technological edge for Singapore's defence.

NGOH CHUN RONG
Project Lead
Air Systems
Programme Centre

At DSTA, Ngoh Chun Rong is constantly challenged to deliver cutting-edge and innovative air system capabilities

TAKING PASSION TO THE SKIES

Witnessing the transformative effect of cutting-edge technologies delivered by DSTA during his time in National Service left an indelible mark on Ngoh Chun Rong.

"Back then, as a platoon commander of an air defence unit, I experienced first-hand how engineering and technological enhancements strengthened the Republic of Singapore Air Force's (RSAF) weapon systems. I was impressed by DSTA's ability to harness deep technical knowledge and advanced technologies to protect our nation," he recounts.

After graduating with a Bachelor of Engineering (Honours) degree in Aerospace Engineering from Nanyang Technological University (NTU) in 2010, Chun Rong was keen to put his engineering skills to use as a defence engineer in DSTA. He applied for the position and joined the organisation just two months after graduation.

INSIDE SCOOP

Always up for a challenge, Chun Rong spent a month backpacking in China where he scaled mountains and visited less-trodden areas like Tibet and Shangri-La. Physical challenges aside, Chun Rong was also the winner of an NTU residential hall pageant where he was awarded a part-time modelling contract!

"What I like about DSTA is that the people are driven, eager to come up with innovative solutions and get things moving."

EXCITING WORK
Today, as a Project Lead in the Air Systems Programme Centre, Chun Rong is involved in the acquisition and integration of air systems to bolster Singapore's defence.

One of his most exciting projects was on the S-70B naval helicopters that enhanced the Singapore Armed Forces' anti-surface and anti-submarine warfighting capabilities.

"It was a most fulfilling learning experience working with the Navy and Air Force to integrate advanced systems on the helicopter – ranging from weapons, sensors, communications and underwater detection capabilities."

The 30-year-old is never one to shy away from a challenge. "What I like about DSTA is that the people are driven, eager to come up with innovative solutions and get things moving. In my job, I strive to come up with new and better ways to do my work," he says.

CONSTANT LEARNING
He also shares that it is most gratifying to be able to develop himself beyond his potential and become more proficient at his job.

"Never stop learning, and always seek to better yourself." That is Chun Rong's work philosophy, and one that has spurred him to take up the DSTA Postgraduate Scholarship to pursue a Master of Science in Aerospace Engineering at the Georgia Institute of Technology in the United States.

Chun Rong looks forward to learning more and contributing fresh ideas to DSTA. "I am grateful for the opportunity and it moves me that DSTA values my work and believes in me. I hope to obtain intimate knowledge of engineering practices to aid me in my future projects," he adds.

Chun Rong says: "The role of a defence engineer is diverse and challenging. At one moment, you could be assessing technical specifications of complex systems, and in the next you could be working with defence contractors to develop innovative capabilities and solutions for Singapore."

Nanyang Technological University CAREERTracks, 2015

DID YOU KNOW?

The S-70B NAVAL HELICOPTER is the airborne "eye" of its parent ship. Its ability to detect underwater threats comes from a dipping sonar system – the L3 Helicopter Long Range Active Sonar. Able to detect and track underwater targets, it is operational up to depths of 500m. Utilising advanced Doppler sonar signal processing techniques, the dipping sonar system is able to detect small objects moving at slow speeds.

CALEB WONG SAI HONG
Project Manager
Land Systems
Programme Centre

Caleb Wong's work contributes directly to the defence and security of the nation

MAKING SINGAPORE A SAFE PLACE

Caleb Wong vividly recalls the time in 2008 when the very first Leopard 2 Main Battle Tank (L2-SG MBT) arrived in Singapore.

Says the Project Manager in tracked vehicles, Land Systems Programme Centre: "It was a proud moment witnessing the delivery of my first major milestone in DSTA, and knowing we delivered a highly capable fighting asset to the Singapore Army."

Caleb manages the upgrading of the L2-SG MBT programme for the Singapore Army. He also oversees the delivery of physical trainers and training simulators for the L2-SG MBT.

VARIETY IN HIS WORK
Caleb, 36, relishes the variety in his work.

"I go to the field to conduct tests and trials," he says.

"Some days are spent in the office reviewing technical documents and contracts, as well as attending project and technical meetings."

He adds: "On other days, I spend time working with partners in the Singapore Army and contractors, both local and overseas."

"All these are to ensure the smooth running of the programme, and that we deliver a capability that meets the requirements of the Singapore Armed Forces (SAF)."

DID YOU KNOW?

The LEOPARD 2 MAIN BATTLE TANK is equipped with the 120mm, L44 smoothbore gun operated with the Stabilised Control System. The fire control system enables the L2-SG MBT to maintain accuracy even while on the move. Powered by a turbo-charged diesel engine, the 55-tonne L2-SG MBT can travel at a maximum of 72km/h on road and up to 60km/h on cross-country terrain.

INSIDE SCOOP

Dancing, like engineering, requires precision and innovation. Caleb is an avid contemporary dancer who is also trained in hip-hop and ballet. He trains every week with his dance group, and is a fan of the 'So You Think You Can Dance' series.

"I take a personal responsibility in the delivery of defence capabilities that meet the Singapore Army's operational requirements and is safe for operation at the same time."

His work with DSTA has included overseas assignments.

In 2010, he was assigned to the project office of a tank integration plant in Munich, Germany.

His role there was to ensure that the production and delivery of the L2-SG MBTs met DSTA requirements, and to address any technical issues on-site.

He also participated in overseas exercises by the Singapore Army in Germany and Australia. These provided opportunities to evaluate and verify the performance of the L2-SG MBT systems under realistic and demanding operating conditions.

Caleb says DSTA has a strong culture of productivity and motivation.

He adds: "We are encouraged to leverage technology to come up with innovative solutions and increase productivity. Collaboration, knowledge sharing and discussion are integral to our work."

CAREER CHANGE
The graduate in Mechanical and Production Engineering from Nanyang Technological University has been with DSTA for seven years.

Previously, he was a Quality Assurance Engineer in the hard disk drive industry. Then in 2008, he began to look for a career change.

He recalls: "I was more certain of what I wanted to do and spent a considerable amount of time researching the profiles of various organisations and industries."

"It was then that I recalled reading about the deployment of infra-red thermal imaging scanners in Changi Airport – an effective tool to screen large groups of people for symptoms of fever during the height of the SARS epidemic."

"DSTA played a significant role in developing the scanner, applying ideas from military technology to public use. That stoked my interest in a career with the public sector and DSTA."

KEY QUALITIES
Asked what are the key qualities required in his job, Caleb says, "To succeed as a defence engineer, you must be passionate about science and technology, and take pride in contributing to the defence and security of the nation."

Caleb says ensuring the safety of soldiers during training is paramount.

"Every soldier is someone's son, brother, husband or father. I take a personal responsibility in the delivery of defence capabilities that meets the Singapore Army's operational requirements and is safe for operation at the same time."

"I always try to approach the work as if my own children will operate the equipment."

On what motivates him, Caleb says: "I consider myself a family man, and I believe my work contributes directly to Singapore's security and defence, and providing a safe and secure home for my wife and two daughters."

He enjoys strong support from family and friends.

"My friends think my choice of career in the public sector suits me as I am systematic and prudent. My wife Ashley thinks it is a higher calling to contribute to our nation's defence and security."

The Straits Times – Careers in the Public Sector, 23 May 2015

CREATIVE SOLUTIONS

Teo Jia Yao thrives in the ideal work environment at DSTA

Teo Jia Yao is on an important mission. The Project Lead with the Naval Systems Programme Centre helps to outfit Singapore's warships with state-of-the-art combat systems.

"One key aspect of my role is to integrate the enhanced ship control, monitoring and management system on the Missile Corvette," says the 33-year-old, who is part of a team that acquires and integrates advanced naval systems for the Republic of Singapore Navy (RSN).

The enhanced ship control, monitoring and management system regulates and oversees the "health" of the ship systems.

"Together with my teammates, we fitted a state-of-the-art combat suite on the Missile Corvette, which allows the warship to sense farther and enables faster decision-making in the operational environment," says Jia Yao.

An innovative idea the team came up with was to integrate a modern and customised combat management system console onto the commanding officer's chair to allow battle space information access at a touch.

"This improves operational efficiency and enables the commanding officer and his combat team to act more decisively and quickly to achieve mission effectiveness," he says.

For their significant achievements, Jia Yao and his teammates were awarded the Defence Technology Prize Team Engineering Award in 2014.

SMOOTH SAILING

In 2007, Jia Yao earned his Bachelor in Engineering (Electrical Engineering) degree with honours from the National University of Singapore and joined DSTA. His foray into the field was triggered by a deep interest in mathematics and science, as well as his love of sailing.

"My interest in naval engineering came about when I took up sailing at the Singapore Armed Forces Yacht Club during secondary school," he says.

"As I learnt how to manoeuvre a sailboat, I was intrigued by the concepts and principles behind the construction and operation of a vessel. As I have always had a deep interest in disciplines such as mathematics and science, which gave me a clear perspective of how things around me work, I naturally pursued an education in engineering," he says.

Contrary to the misperception that an engineering career is dull, Jia Yao says engineers are creative problem solvers who strive to come up with solutions to improve people's lives.

"There are usually several solutions to a problem. Innovation and creativity are important to push boundaries and come up with novel and optimal solutions. That, to me, is what makes engineering so exciting," he says.

And for someone like Jia Yao who is always up for a challenge, DSTA offers the ideal work environment, where projects are often large-scale and complex, involving many integrated and networked systems, stakeholders and engineering professionals.

TEO JIA YAO
Project Lead
Naval Systems
Programme Centre

INSIDE SCOOP

Jia Yao constantly challenges himself to scale new heights. He has climbed Mount Ophir and Gunung Datuk several times, and even completed a 22-day expedition trek to the summit of Kala Pattar in Nepal. Besides conquering heights on land, Jia Yao also clocked his first skydiving experience in Australia in 2015.

POSITIVE IMPACT

Jia Yao says the positive effects of engineering on Singapore can be seen in the areas of defence and beyond.

Apart from enhancing Singapore's defence capabilities, defence engineers have also developed solutions that used underground space for oil storage.

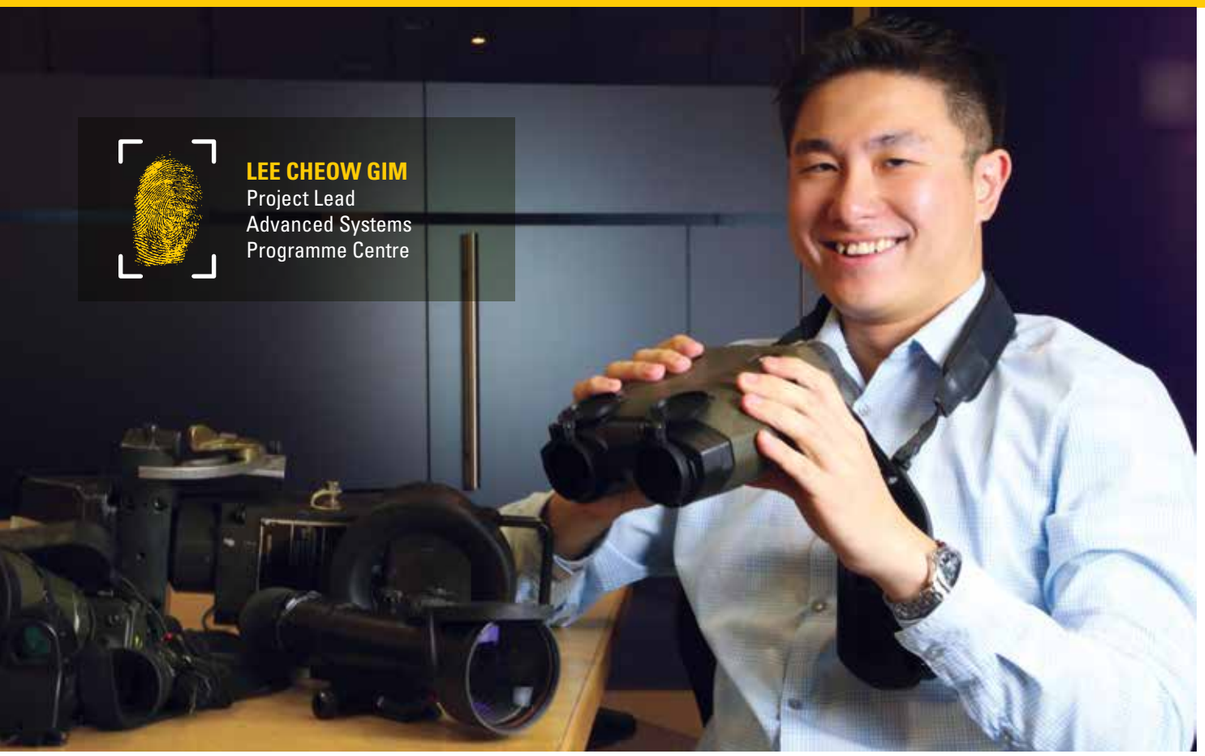
For those who are inspired and want to follow in his footsteps, Jia Yao's advice is to dream big, with a passion "to make a difference today for a better tomorrow".

The Straits Times – Careers in Engineering, 29 November 2014

"Innovation and creativity are important to push boundaries and come up with novel and optimal solutions. That, to me, is what makes engineering so exciting."

DID YOU KNOW?

A naval corvette is a type of warship designed to be small and highly manoeuvrable. The RSN's Victory class missile corvettes are equipped to deal with air, surface and underwater threats. They are the backbone of the RSN's strike capability and provide seaward defence and protection of Singapore's vital sea lines of communications. The MISSILE CORVETTE – RSS VALOUR was deployed in search for the AirAsia plane QZ8501.



MULTIDISCIPLINARY ARENA

At DSTA, Lee Cheow Gim helps to develop electro-optical sensor surveillance systems to keep Singapore safe and secure

Growing up, Lee Cheow Gim always had an interest in the engineering field. His father often encouraged him to find out how things worked, and ways to make them function better.

Says the 33-year-old graduate of Nanyang Technological University's School of Electrical and Electronic Engineering: "I became intrigued by the technical details governing individual components – how they are integrated to deliver effective system performance, how minor tweaks can make them more efficient and how systematic approaches can improve lives."

Cheow Gim's constant curiosity in systems engineering and his interest in connecting with people from different technical domains made him well suited to be a Project Lead in the Advanced Systems Programme Centre.

He currently leads a team in the area of electro-optical (EO) sensor systems, which is used for surveillance by the Ministry of Defence and the Singapore Armed Forces (SAF).

He plans acquisitions, does studies on new EO technologies, and conducts prototype tests to build developmental products into robust systems. He also tracks systems and conducts performance reviews.

WORKING IN A TEAM

Many of his team's tasks require multidisciplinary expertise, so it works closely with project teams specialising in other technical domains, as well as other organisations within the Defence Technology Community and even global contractors.

"Electro-optical sensor systems enhance surveillance capabilities, allowing the SAF to see further, and see before being seen."

As Cheow Gim explains, EO sensor systems are photon-sensitive detectors to identify changes and contrasts in the environment, before turning what is detected into measurable and recordable signals to warn soldiers in advance about hostile actions and activities.

"EO sensor systems enhance surveillance capabilities, allowing the SAF to see further, and see before being seen. With the information, preventive actions can be taken promptly to reduce casualties and minimise damage to civilian property," he adds.

He was part of a team that helped equip soldiers with mobile sensors.

AT THE FRONTIERS

At DSTA, the self-professed technology enthusiast gets the first scoops about current and future EO sensors system specifications.

"With a comprehensive picture of EO sensors systems available in the market, my horizons have been opened to the readiness of technologies available," he says.

In a job dealing with cutting-edge technology, Cheow Gim is constantly challenged to keep up and push the boundaries of what he and his team can do.

On a personal basis, he admits he had trouble initially grappling with the many terminologies, nomenclatures and technical lingo at DSTA. But his first supervisor foresaw that he would grow best under pressure, and threw him into the deep end by immersing him in an ongoing project.

Cheow Gim learnt the ropes quickly under his supervisor's mentorship and was able to contribute to the project with ideas that were eventually adopted and implemented.

The team faced one of its toughest challenges yet when it had to deliver sensor systems for a diverse group of SAF partners with different requirements.

Cheow Gim remembers that the sheer quantity of the customised systems to be delivered made the assignment more challenging. Project management and communication skills were vital, as were commitment and innovation to develop groundbreaking technical solutions, within the budget and timeline allocated.

The team held many discussions with the different groups of operators involved to understand their varying technical requirements and expectations.

Eventually, the fleet of systems was rolled out successfully, and Cheow Gim was gratified to hear positive feedback from the operators. He felt a great sense of satisfaction and accomplishment seeing how the systems he delivered improved job performances.

Cheow Gim aims to further improve his technical competencies in both the areas of EO and general engineering so that he can contribute to the optimisation and development of systems at DSTA.

"I want to lead teams to develop and acquire complex, high-performance sensor systems in large-scale programmes to contribute to the defence of Singapore," he says.

The Straits Times – Careers in Engineering, 13 June 2015

INSIDE SCOOP

Cheow Gim strives to develop multidisciplinary expertise both at work and in his personal life. A race bike enthusiast and a qualified lifeguard, Cheow Gim also participated in Othello competitions during his undergraduate days!

WORKING WITH BRIGHT MINDS

Being at the forefront of ammunition technology fuels Tan Puay Siang's passion

System Manager Tan Puay Siang, 33, started off as a research engineer with the National University of Singapore (NUS) where she developed an innovative method to enhance the properties of a biomaterial.

Her innovative streak led her to DSTA nine years ago, where she began her career in the ammunition acquisition team before taking up her current portfolio in armament safety.

Puay Siang is now dealing with new technologies to dispose of expired ammunition in an environmentally friendly manner, as well as ammunition disposal policies.

Previously, her job involved providing technical support for live-firing trials and exercises to ensure the ammunition is safe for use by soldiers. On being a female engineer in a male-dominated sector, Puay Siang says: "Being female doesn't mean we are at any disadvantage when we come to discuss engineering concepts."

"Mathematics is a common language and there is no such equation where man is greater than woman. At the end of the day, it is how we work as a team to build and develop better solutions for the defence community."

She was a member of the team that clinched the best project award in the Ministry of Defence (MINDEF) Economy Drive movement for saving MINDEF $27 million through innovative ammunition management in 2012.

"The thrust in DSTA is about innovation. The emphasis on innovation sharpens our thought processes, and encourages more creative thinking and analytical skills," says Puay Siang, who holds a Master of Engineering (Mechanical Engineering) from NUS.

COMPREHENSIVE TRAINING

DSTA runs its own training programme via DSTA Academy to develop staff in business and technical competencies, offering courses in project management and system management.

To stay at the forefront of technology development, Puay Siang attends international conferences and has been to the United States and Europe to learn about the latest defence technologies.

"As DSTA engineers, we get to be at the forefront of technology and harness technological developments to develop effective and unique capabilities for Singapore's defence," she says.

DEFENCE CAPABILITIES

During the Army Open House or Singapore Airshow, Puay Siang brings her family and friends along so she can share with them what she is doing and tell them about some of the defence capabilities being showcased.

TAN PUAY SIANG
System Manager
Systems Management
Programme Centre

INSIDE SCOOP

Puay Siang takes an interest in kayaking - an activity that requires strength, resilience and courage. Her longest expedition lasted three days and took her round the island of Singapore.

"I am passionate about national defence because I believe that defence is fundamental to a country's prosperity. One needs to have a safe home before one can have the capacity to dream and take actions to fulfil his or her goals," she says.

To excel in her line of work, Puay Siang says that qualities such as "resilience", "courage" and "passion" are important.

"Resilience is required to push on despite the odds, courage is needed to continue the pursuit to achieve the intended outcome, and passion allows one to find meaning in the work and stay focused to not only get the job done but to strive for excellence," she explains.

For those who are keen to follow in her footsteps, she says, "Be confident that you have the knowledge and skill sets to do the work you are passionate about."

The Straits Times – Careers in the Public Sector, 17 January 2015

"As DSTA engineers, we get to be at the forefront of technology and harness technological developments to develop effective and unique capabilities for Singapore's defence."

A MARK OF INGENUITY

Life at DSTA is all about innovation in action. Our silent warriors harness technology relentlessly to overcome Singapore's perennial vulnerabilities and constraints. These sophisticated solutions and capabilities bolster Singapore's defence across the realms of physical and cyberspace, and network the Singapore Armed Forces to operate as an integrated and advanced fighting force.

HIGH-TECH NETWORKED SOLUTIONS

Wong Chia Sern measures his contributions at work on a national scale and finds fulfilment in his career

Wong Chia Sern, 33, has always had a keen interest in computers. But what sparked his love for engineering was his first "solo" on the Piper Warrior aircraft while he was in the Singapore Youth Flying Club.

"Having dealt with the systems on the plane and experienced how technology can enable people to fly, I knew I wanted a job in engineering," he recalls.

ACADEMIC EXCELLENCE

Chia Sern holds a Bachelor's degree in Computer Engineering from the Nanyang Technological University and a Dual-Master's degree in Defence Technology and Systems, specialising in network engineering, from Temasek Defence Systems Institute.

He is a recipient of both the DSTA Undergraduate and Postgraduate Scholarships.

As a DSTA scholar, Chia Sern had the opportunity to intern at DSTA, during which he was part of the integrated knowledge-based command and control software development team.

"The engineering work I do in DSTA can improve the situational awareness of commanders on the ground and potentially save lives if used in operations."

There, he had the opportunity to help develop an artificial intelligence system that provides information updates and recommends courses of actions to military commanders.

"These projects made me realise that the engineering work I do in DSTA can improve the situational awareness of commanders on the ground and potentially save lives if used in operations," he says.

Chia Sern went on to attain the DSTA Postgraduate Scholarship in 2013, during which he attended classes at the National University of Singapore and the US Naval Postgraduate School.

SECURING NETWORKS

Chia Sern's journey at DSTA began in July 2006 when he joined the organisation as an engineer and helped to upgrade the Singapore Armed Forces' (SAF) transmission network, which is a wide area network.

He now leads a team in the InfoComm Infrastructure Programme Centre with a focus on the Republic of Singapore Navy (RSN) operations networks.

His primary responsibility is to help build secure networks for the RSN. This involves ensuring that the RSN's operations networks are secure and robust to support training and missions.

"The networks stretch between platforms, sensors, weapons, and command and control systems. It's my job to make sure that these features are able to 'talk' to each other securely and reliably," he says.

He liaises with RSN personnel regularly, and work often takes him from the desk to naval bases.

INSIDE SCOOP

With a keen focus on solving problems and making things work, Chia Sern is a "Mr Fix-It" who enjoys exploring simple DIY projects. He personally installed a reverse sensor in his car, and even built his own watch winder.

BEYOND DEFENCE PROJECTS

The wide variety of projects that Chia Sern gets to work on ensures that there is never a dull day at work.

"We get to work on the latest defence technology and interact with people from all over the world, whether it's for sourcing equipment or designing solutions for the SAF," he says.

A project that he is particularly proud of is the setting up of the Changi Regional Humanitarian Assistance and Disaster Relief (HADR) Coordination Centre that was launched on 12 September 2015.

The Changi Regional HADR Coordination Centre can co-relate information from regional disaster and early warning centres, and distribute situation pictures to partner militaries.

It will then coordinate and facilitate the deployment of foreign military assistance at disaster-hit areas.

Says Chia Sern: "My role was to help upgrade the network infrastructure to support RHCC's operations."

"The benefits from this centre are not limited to Singapore's shores; it will help save lives if a disaster strikes in the region."

The Straits Times – MINDEF/SAF & DSTA Scholarship Special 2015, 4 January 2015

DEFENDING THE NATION

Lian Zhengyi's role is a combination of an architect, detective and communicator

Principal Analyst Lian Zhengyi's role is a combination of an architect, detective and communicator.

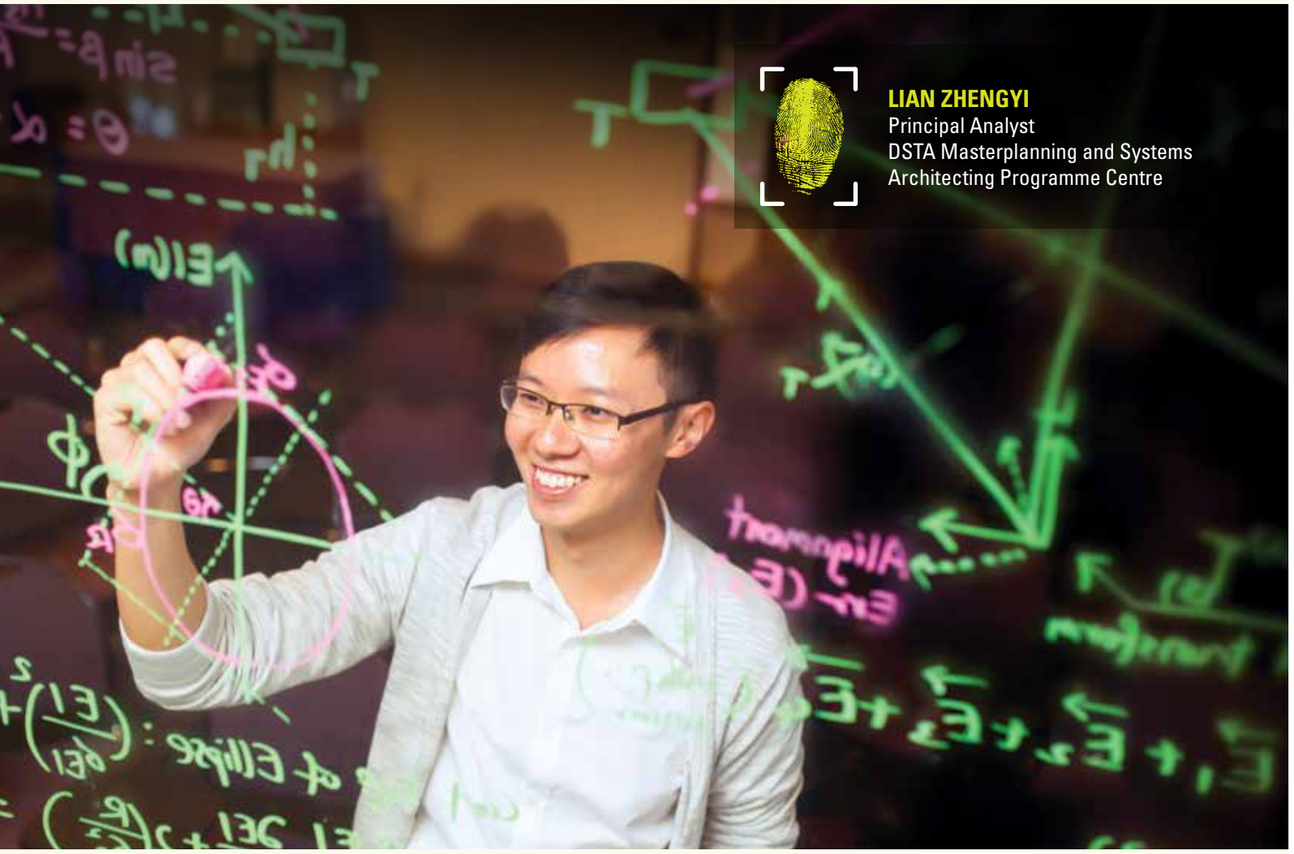
Lian Zhengyi knew of lucrative jobs in the finance sector when he graduated from the Massachusetts Institute of Technology (MIT) in the United States and the National University of Singapore (NUS).

But for him, the real pay-off was in deploying his engineering skills to boost national security. So, he joined DSTA in May 2008.

Zhengyi says: "An engineering position to work on Singapore's next generation air defence systems at DSTA attracted me the most because it offered me an appealing job scope, with a meaningful opportunity to make a difference in our country's defence."

The 33-year-old holds two Master's degrees: from MIT in Computation for Design and Optimisation, and from NUS in Computational Engineering. He also completed an undergraduate degree – in Mechanical Engineering – at NUS.

He is a Principal Analyst at the DSTA Masterplanning and Systems Architecting Programme Centre, which develops capabilities and systems architectures



LIAN ZHENGYI
Principal Analyst
DSTA Masterplanning and Systems Architecting Programme Centre

INSIDE SCOOP

Zhengyi has been learning pop piano for three years and enjoys playing mandopop pieces. It is said that piano playing is a mental exercise of analysing musical passages and figuring complex musical theories, much like the work of an operations analyst!

"One could compare our work to that of an architect who designs a building, except that we develop blueprints and frameworks that guide the acquisitions and integration of defence systems."

for Singapore's defence systems and networks to fit and operate well with one another.

Countries require air defences to repel aerial threats such as hostile aircraft. An air defence system can comprise sensors that detect threats, command and control systems that process information for decision-making, and weapon systems that destroy the threats. The use of these different components – including how they are networked to share information – can prove vital.

This is where operations analysts like Zhengyi enter the battlefield picture.

He says: "One could compare our work to that of an architect who designs a building, except that we develop blueprints and frameworks that guide the acquisitions and integration of defence systems."

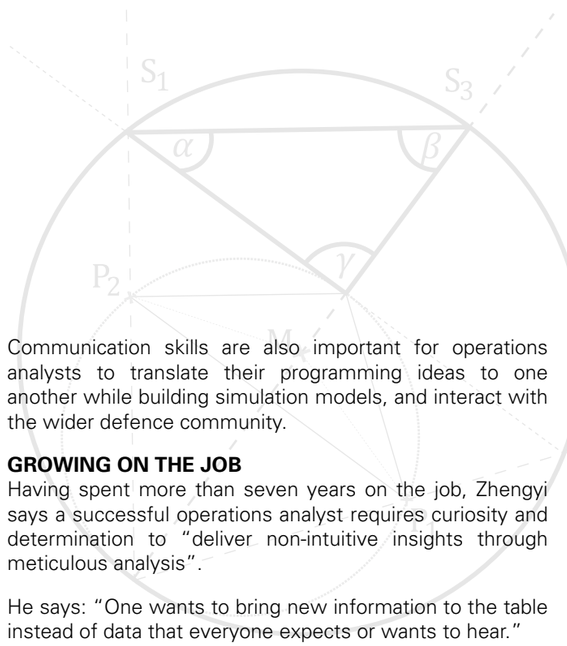
Studies are run on different air defence solutions to arm the Singapore Armed Forces with insights into "how different air defence systems should be integrated and deployed optimally". Studies are also conducted to help identify future defence capabilities.

Zhengyi has developed analytical tools to aid the work. One measures the performance of weapons when paired with sensors – even before these weapons are acquired.

He says: "I love the mental exercise of figuring things out from scratch, and the process of developing these tools has helped me to gain a better understanding of the features and performance of the systems that I conduct studies on."

But the best tools require data to crunch on. This is where he requires the resourcefulness of a detective, to make the most of the limited data on future systems that are being studied.

"I have to figure out what this data is through hypotheses, predictions and various cross-checks with colleagues and industry partners. Having little or no reference might be challenging, but I get to learn how to find information," he says.



Communication skills are also important for operations analysts to translate their programming ideas to one another while building simulation models, and interact with the wider defence community.

GROWING ON THE JOB

Having spent more than seven years on the job, Zhengyi says a successful operations analyst requires curiosity and determination to "deliver non-intuitive insights through meticulous analysis".

He says: "One wants to bring new information to the table instead of data that everyone expects or wants to hear."

An analyst should also have the courage and conviction to defend his findings that may challenge established norms, even as he keeps an open mind to other perspectives.

These traits are not acquired overnight. Zhengyi credits the "knowledge-sharing culture and emphasis on learning" at DSTA.

To better appreciate the synergy between technology and military operations, he has participated in air force courses and site visits to deepen his understanding of operational doctrines and procedures. He even gets to tap the knowledge of the international research community and foster professional relationships, by taking part in a joint research collaboration – to design robust and evolvable systems – between DSTA and MIT between 2010 and 2013.

He says: "Knowing that the studies I conduct and the recommendations I make help to enhance the ability of our military to fight as a networked force is a tremendous driving force."

The Straits Times – Careers in the Public Sector, 21 June 2014

FRANCIS CHUA KAI PING
Project Manager
Cybersecurity
Programme Centre

CYBER DEFENCE WARRIOR

"The field of cybersecurity is fast advancing and constantly evolving. Being able to adapt to change and learn new things quickly is important."

When Francis Chua was developing software modules at DSTA, there were network and data encryption and hardening policies that had to be followed to ensure security.

"Sometimes, these security policies made the software development process challenging," he recalls.

But he was also intrigued and started delving into why these policies existed. From software engineering, he progressed onto a new career path in cybersecurity.

Today, the 35-year-old is a Project Manager at the Cybersecurity Programme Centre, using analytics to protect Singapore's defence networks from cyberattacks.

He explains: "I use statistical models to study and identify anomalous patterns in massive data sets."

"I also detect cyber threats by picking up signals generated by malware as a result of its activities."

With cyber threats ranging from script kiddies who hack for bragging rights to state-sponsored agents looking to steal classified information, Francis has to be constantly vigilant to detect and respond swiftly to cyber attacks on Singapore's defence networks.

"DSTA's cybersecurity engineers conduct frequent monitoring of defence networks and constantly look for ways to innovate and reinforce our cyber defence," he says.

DID YOU KNOW?

The 2015 CYBER DEFENDERS DISCOVERY CAMP saw a record turnout of 323 students take on the challenge of defending cyberspace. Participants went on a two-day crash course on how cyberattacks are launched and how to defend against these attacks through firewalls and patching up server vulnerabilities. The camp culminated in an intense five-hour competition on the final day.

INSIDE SCOOP

Francis loves nature as it gives him a sense of peace. Together with his wife and two sons, Francis has hiked a number of National Parks in the US and even camped overnight at one. "The camping trip was the best vacation my family ever had," he says.

INVISIBLE PROTECTION

The work of cybersecurity engineers may be intangible, but it is no less crucial in the military.

Francis says: "In cybersecurity, if you do your job well, no one will be aware. But the converse is also true. Any mistake can result in severe consequences."

Besides observing data trends, his day-to-day work involves going on-site to ensure computer systems are running smoothly.

He also liaises with local and overseas IT vendors to evaluate their products to see if they fit the military's needs.

When necessary, he provides feedback to the firms to help them with their product development.

"This ensures we deliver solutions that best suit the requirements of the Ministry of Defence and the Singapore Armed Forces," he explains.

Every proposed solution has to be thoroughly evaluated, backed by scientific research and tested before it is implemented.

To provide a complete assessment, cybersecurity engineers have to be well read and on top of the latest developments in technology and cybersecurity.

"The field of cybersecurity is fast advancing and constantly evolving. Being able to adapt to change and learn new things quickly is important," he says.

CONSTANT LEARNING

A holder of a Bachelor's degree in Computer Engineering from the National University of Singapore (NUS), Francis has continued to acquire new skills and knowledge that are critical for his work.

Over the eight years he has been in DSTA, he has earned three postgraduate degrees.

In 2011, he obtained the Master of Science (Defence Technology and Systems) from NUS.

As part of a Dual Master's degree programme offered by NUS and the United States' Naval Postgraduate School, he earned a Master of Science (Computer Science) from the US Naval Postgraduate School in 2012, and a Master of Technology (Software Engineering) from NUS in 2013.

The programmes allowed Francis to acquire in-depth knowledge of various topics in defence engineering, such as managing large-scale systems and cryptography.

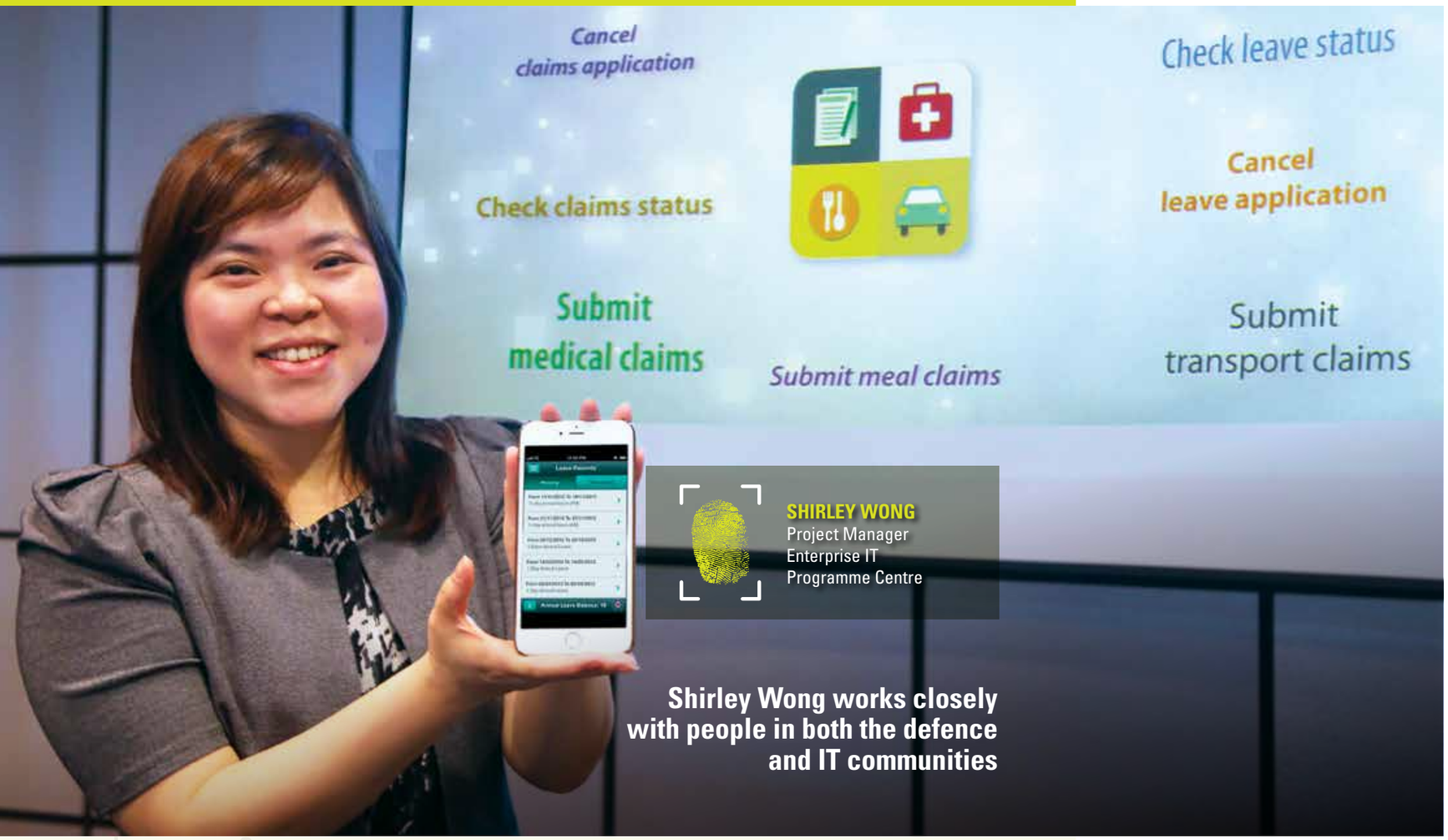
"DSTA takes technical competencies very seriously, and there are always opportunities to learn and upgrade one's knowledge and skills to contribute to Singapore's defence," says Francis.

Francis also takes an interest in educating Singapore's young about cybersecurity.

He was part of the organising committee for the 2015 Cyber Defenders Discovery Camp for students to learn about the latest cyber defence methods.

"Cybersecurity is not a fad. It will continue to grow in importance. It is important for young Singaporeans to be aware of cyber threats and the damage they can potentially cause Singapore's defence," he says.

The Straits Times – Careers in the Public Sector, 18 April 2015



Shirley Wong works closely with people in both the defence and IT communities

PUSHING THE BOUNDARIES

Staying intellectually stimulated after working for 14 years in an organisation is no mean feat.

When an individual feels an affinity for an organisation and its broad objectives, the relationship seems to transcend that of employee and employer.

That is the enviable situation of Shirley Wong, Project Manager, Enterprise IT Programme Centre.

"I consider my DSTA colleagues as my second family. I go jogging with my teammates together after work, and we organise regular gatherings on weekends. These are the relationships I treasure," says Shirley, 37.

Fascinated with science and technology from a young age, she was inspired by her elder brother who built a solar system model for a science project and moved on to software programming eventually.

"Science has been my rock throughout my education journey. I have always been interested in all things futuristic, and understanding the theories behind how things function is just amazing," she says.

That interest led her to pursue a degree in Electrical Engineering at Nanyang Technological University, where she met her current employer at the university career fair.

ALWAYS UP AND ABOUT

As Project Manager now, Shirley enjoys the fact that she is not deskbound as she needs to maintain regular contact with people in both the defence and IT communities.

By leveraging innovative IT solutions, she collaborates with her peers from the Singapore Armed Forces and the Ministry of Defence to provide practical e-solutions for full-time national servicemen (NSF).

In DSTA, Shirley has been given ample opportunities to stretch her abilities and develop new skill sets.

She first began as a programmer and learnt the ropes in the technical and developmental domains before branching out into managing IT systems.

She lists her work on "enhancing and extending the Employee Self-Service (ESS) online application" as her most memorable project so far.

Leading the project, she and her team developed an online system that eliminated the copious amount of paperwork which used to weigh down NSFs when they applied for leave or submitted medical, transport or meal claims.

ESS was the very first online application rolled out for NSFs, which made it doubly exciting for Shirley and her team. After designing and refining the system prototypes, they went to the various camps to conduct user studies, observing how soldiers took to the system.

Shirley admits a prescriptive approach to the ESS rollout would have saved her team a lot of time and trouble, but she says they were intent on developing a system that would benefit a large community of servicemen by catering to their particular needs and requirements.

Her team's diligence and thoroughness paid off when they discovered that most servicemen appreciated the new ESS system, which was subsequently deployed as a mobile application to allow NSFs convenient access via multiple interfaces.

POSITIVE ENERGY

For individuals passionate about defence engineering in general, Shirley says DSTA offers a wide range of projects in which one can contribute and learn so much from.

"The culture in DSTA is very warm and welcoming as we share a common mission to provide technological solutions to strengthen Singapore's defence," she says.

"Overall, DSTA exudes a positive energy and I am glad to be part of it."

The Straits Times – Careers in Engineering, 12 September 2015

"The culture in DSTA is very warm and welcoming as we share a common mission to provide technological solutions to strengthen Singapore's defence."

CHAN XINYI
Senior Engineer
Land Systems
Programme Centre

Chan Xinyi helps to adapt commercial technology to military needs

DESIGNING SYSTEMS FOR SOLDIERS

You are not likely to see Chan Xinyi in combat gear, but the 32-year-old Senior Engineer is as comfortable around armoured vehicles and army camps as any soldier.

A member of the Land Systems Programme Centre, Xinyi is part of a well-oiled team that helps to adapt commercial technology to military needs.

Armed with a mandate to be innovative in boosting the Singapore Armed Forces' (SAF) technological capabilities, Xinyi works on projects that often take him beyond the confines of a regular office to army bases and the facilities of defence contractors, where he discusses potential solutions, performs engineering tests and collaborates on design reviews of military equipment.

ALL-ROUNDED AND VERSATILE

"Work at DSTA is stimulating and never monotonous. I've had opportunities to work on armoured vehicles, military communication networks, sensors and many other cutting-edge technologies," says Xinyi, who joined DSTA in 2007 after graduating with a Bachelor of Engineering (Computer Engineering) from Nanyang Technological University.

"In designing systems for our NSmen, I put myself in their shoes and design something that I'd want to use myself."

Xinyi says he was drawn to DSTA because of the opportunity to manage engineering projects.

He says: "I love how I can build technical knowledge and soft skills simultaneously while working at DSTA so that I may become an all-rounded and versatile individual."

SUPPORTIVE ENVIRONMENT

For the father of three children, it is important that he works for an organisation that is both nurturing and understanding.

"I really appreciate how DSTA provides a supportive environment in both my professional and personal life. I have the flexibility to manage my projects' schedules and family commitments," he says.

INTEGRATING TECHNOLOGY

The ability to integrate advanced technology into military systems is an important part of Singapore's defence strategy.

"Singapore is a small country in both size and population, and we need engineering as a force multiplier to defend our shores," says Xinyi.

A recent project he was involved in – the upgrading of the command and control suite for SAF's Advanced Combat Man System (ACMS) – is an example of how engineering contributes to military preparedness.

The ACMS is a tactical Command and Control (C2) suite of equipment and software used by infantry soldiers to enhance tactical coordination and effectiveness during missions.

As project leader for the ACMS C2 software, Xinyi worked with contractors to design the system, and conducted design reviews as well as trials with the SAF to ensure that the ACMS works well and benefits the soldiers.

In 2012, he participated in Exercise Wallaby in Australia where the ACMS was deployed together with the Terrex Infantry Carrier Vehicles, armoured vehicles dedicated to troop transportation.

"We were there to assess if the ACMS could function well under operational conditions," he says.

Xinyi, who used to serve as a combat engineer during national service, knows first-hand the "joys and pains of equipment usage".

"In designing systems for our National Servicemen (NSmen), I put myself in their shoes and design something that I'd want to use myself," he says.

"I feel proud when our systems work the way we designed them to work. I'm also excited that my son might benefit from my work if he joins the army while serving his national service."

The Straits Times – Careers in Engineering, 13 September 2014

INSIDE SCOOP

Xinyi worked part-time as a bartender during his undergraduate days. His favourite drink to make is the Margarita, which he describes as elegant and having a well-rounded taste. From designing cocktails to designing defence systems, Xinyi has certainly come a long way!

LEW EE KENT
Engineer
Networked Systems
Programme Centre

SHARON ANG MEI LING
Senior Engineer
Land Systems
Programme Centre

A FUTURE OF EXCITING OPPORTUNITIES

For young engineers like Lew Ee Kent and Sharon Ang, the DSTA Scholarship provides exciting career opportunities to create the critical edge in Singapore's defence technology

Lew Ee Kent, 27, has been with the Networked Systems Programme Centre since graduating from Stanford University with a Master of Science (Management Science and Engineering) in 2010. He develops and integrates knowledge-based command and control (C2) capabilities for Singapore's air defence, ensuring that the systems work effectively and enable the Singapore Armed Forces (SAF) to exploit new technologies.

"C2 activities are similar to functions performed by the central nervous system, and involve receiving inputs, analysing information, and coordinating follow-up actions," Ee Kent explains.

BROAD-BASED EXPOSURE

A science and technology enthusiast since young, Ee Kent was fascinated by the terrain matching navigation in cruise missiles that enabled long distance travel without getting lost. "My interest grew over time and influenced my education choices. It also led to my decision in pursuing a career at the forefront of defence technology," he says.

Ee Kent was drawn to the DSTA Scholarship as he saw it as an opportunity to contribute towards strengthening the defence capabilities and enhancing the security of Singapore, while fulfilling a dream.

Through the scholarship, Ee Kent gained broad-based technical and non-technical exposure. "My technical exposure began during my undergraduate years at Carnegie Mellon University where I participated in engineering research projects such as remote electromagnetic sensing through fluctuations in gravitational fields," he recalls.

"Besides the sciences, I was involved in research projects on counterterrorism and security. Pursuing a Master's degree in Management Science and Engineering also allowed me opportunities to work with companies and leaders in Silicon Valley."

For Ee Kent, the internship experience with DSTA was especially rewarding and fruitful, as it helped him gain a deeper understanding of the organisation, and provided chances for him to get to know more colleagues. "Through my internships, I learnt how analytics, modelling and perspective sharing tools are employed to anticipate emerging security risks and identify patterns from large amounts of data," he shares.

"I also learnt about the SAF's training needs and worked with aircraft simulators that pilots use to train for their missions."

DRAWING INSPIRATION

27-year-old Sharon Ang comes from a family of defence professionals. Her father formerly served in the Republic of Singapore Navy as a senior instructor while her mother once worked at the Manpower Data Centre. "Growing up, I saw how dedicated they were to their work and the significance of their contributions to ensuring Singapore's defence and security," she explains.

"That nurtured my desire to contribute to the nation and motivated me to take up the DSTA Scholarship."

Now a Senior Engineer at the Land Systems Programme Centre, the graduate of the National University of Singapore's School of Electrical and Computer Engineering works to deliver robots to counter various chemical, biological, radiological and explosive threats for soldiers in the SAF.

"Aspiring DSTA scholars should be willing to embrace challenges, possess the passion for solving complex issues and pursue excellence in whatever they do."

- Sharon Ang

INSIDE SCOOP

Ee Kent is an outdoor adventurer that loves hiking the trails. His favourite trails so far are the ones at Mount Rainer and Olympic National Park in the United States. He looks forward to hiking in the Canadian Rockies one day.

Aside from being technically inclined, Sharon also excels in sports and the arts. She is a competitive handball player in the Breakers Handball Club, an affiliated club of the Handball Federation of Singapore. She also plays the erhu in the City Chinese Orchestra!

"These robots are capable of executing complex tasks in place of humans in potentially dangerous environments. They help to keep our soldiers out of harm's way by safely removing explosive ordnance as well as detecting and identifying chemical and radiological sources," she says.

THE RIGHT ATTITUDE

On interesting work experiences, Sharon shares that she participated as a mentor at the Young Defence Scientists Programme (YDSP) in 2013, where she guided two students from NUS High School of Mathematics and Science on a research project that involved harnessing the sensors in smartphones to create maps and track soldiers in indoor environments where the Global Position System (GPS) is unavailable.

"It was a fulfilling experience to nurture bright young minds and develop their passion for science and technology. It was wonderful that these students were given the chance to showcase their innovation and share their learning experiences at the YDSP Congress," she says.

When asked what aspiring DSTA scholars can look forward to, Sharon says: "They can look forward to a meaningful and exciting career. They would be exposed to challenging and multi-disciplinary work, given opportunities to learn and the chance to apply engineering skills to real-world challenges."

But it is also important to cultivate the right attitude.

"Aspiring DSTA scholars should be willing to embrace challenges, possess the passion for solving complex issues and pursue excellence in whatever they do," Sharon concludes.

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A MARK OF EXCELLENCE

Teamwork, the willingness to serve and the constant pursuit of excellence – these traits exemplify the DSTA spirit. Working as a close-knit community, our engineers and professionals take pride in contributing to the nation's defence and security, and in harnessing their collective expertise to meet Singapore's national challenges.

FASTER, SMARTER, LEANER SHIP

How do you build a ship that is two-and-a-half times bigger, but can be manned by a crew that is a quarter smaller?

When DSTA engineers received the brief to design the Littoral Mission Vessels (LMV), they knew that an out-of-the-box solution was needed. Instead of making small, incremental changes, they decided to radically change the way sailors operate a ship.

Traditionally, a group navigates the ship in the bridge, while the command team helms the weapon systems in the combat information centre, and the engineers work in the machinery control room.

DSTA's idea was to house these three functions together in an integrated command centre. "By putting them in one common space, we hoped that the sailors would gain synergy through teamwork, and reduce redundant roles and tasks," says Tng Yan Siong, 40. Yan Siong was in charge of integrating the LMV's various weapon and communication systems.

SIMULATION TRIAL

But would it work in reality? Short of building a real ship, the only way to find out was through a simulation trial. DSTA engineers created a replica of the integrated command centre in an analytical laboratory, where two teams of crew were put through mission scenarios such as patrol and counter-piracy, in varying weather conditions and sea states.

The test facility came with all-round windows (simulated by large LCD screens) just like in a real ship. It provided the crew with a 360-degree view of the ship's surroundings as if they were out at sea.

A key objective was to see how a leaner crew would affect the ship's performance. "Whenever you cut manpower, there are worries about whether the smaller crew can cope with operations," explains Yan Siong.

DSTA engineers conducted extensive interviews with the crew, and performed data analysis to come up with the optimal workload for each role. With the results, they were able to tailor the design of the LMV according to the needs of the crew.

DESIGNED FOR THE USERS

Automation is used extensively to reduce workload. For example, an all-round electro-optical surveillance system in the integrated command centre allows sailors to monitor the seas all around them on screen.

Traditionally, sailors on watch duty have to constantly scan the sea using binoculars. This smart system, however, alerts the crew automatically if a vessel is nearing the ship.

Training and logistics support are also simplified. The 80m-long warship's vital signs (such as the operating temperature of its engines and the operating status of its communication systems) are monitored remotely by crew with onboard cameras and sensors. The status of its systems can be transmitted wirelessly to shore, to facilitated pre-emptive maintenance work.

Tng Yan Siong was part of the DSTA team of engineers who had to think of innovative solutions to maximise the potential of the Littoral Mission Vessels with a leaner crew

TNG YAN SIONG
Programme Manager
Naval Systems
Programme Centre

INSIDE SCOOP

While he builds ships at work, Yan Siong also builds robots, airplanes, helicopters and even a space shuttle at the comfort of his home - using Lego. His personal hobby is slowly growing into a family activity, with both his children enjoying the building process as well.

Another feature is the warship's hi-tech consoles which come with touchscreens and an intuitive interface. Since the next generation of sailors are likely to be familiar with devices like the iPad, having touchscreen consoles will reduce training time.

"It's not just about the vessel's fighting capability, but also about enhancing training and logistics, which helps to reduce the number of people needed to support the ship," Yan Siong explains.

DSTA also developed the Combat Management System (CMS), an advanced command and control system that acts like the "brain" of the warship to integrate the many sensors and weapons on board. Decision support engines were developed to give commanders options based on various situations. The Threat Evaluation and Weapon Assignment engine in the CMS, for instance, helps to determine the threat level of targets and assign the most suitable weapon to engage them. This simplifies the decision-making process so that a smaller crew is required to man the combat systems.

Construction of the LMV began in 2013. The first LMV, *Independence*, was launched on 3 July 2015. A total of eight LMVs, including *Independence*, will be built. *Independence* is expected to be fully operational by 2017, and all eight LMVs fully operational by 2020.

PIONEER, November 2015

"We cut unnecessary tasks, make existing tasks easier, and streamline processes."

– Yan Siong on why the LMV can be operated with a lean crew

NEVER AT A STANDSTILL

Melene Chan and Sim Sze Liang are kept on their toes in their dynamic IT jobs at DSTA

Information Technology (IT) is a sector that is constantly changing and where opportunity abounds.

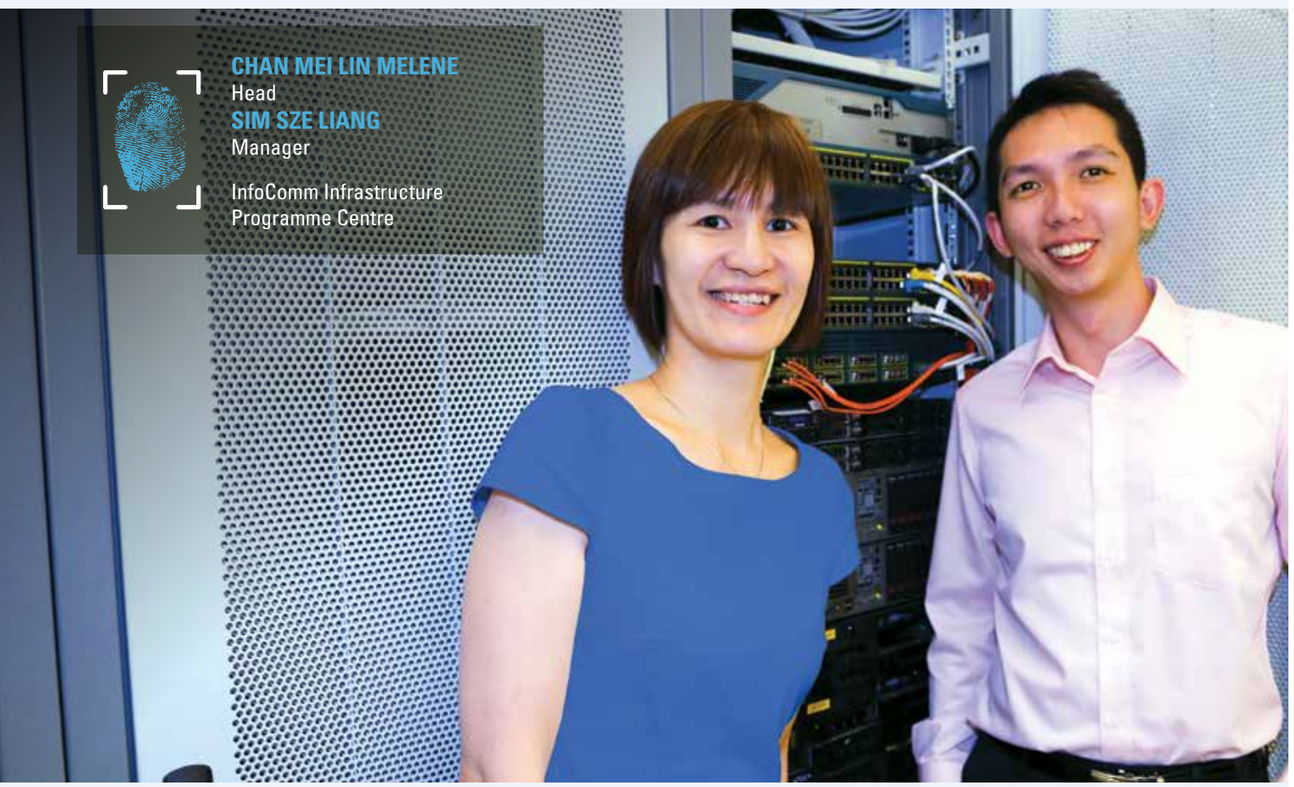
Melene Chan should know, having been in the industry for almost two decades.

After graduating with a Bachelor of Science (Computer Science) from the National University of Singapore (NUS), she joined the Systems and Computer Organisation (SCO) in the Ministry of Defence (MINDEF) in 1997.

SCO later merged with several other organisations to form DSTA in 2000.

Now the Head of a team in the InfoComm Infrastructure Programme Centre, Melene, 40, says: "It has been a good 18 years of working here, and I still don't feel like I have come to a standstill."

"IT is changing rapidly, all the time. For example, cloud computing technology did not even exist when I first joined SCO. But now it is very much a part of our IT infrastructure."



"There will always be a need for people who can bring new knowledge and fresh perspectives to the team."

She currently leads a team of 18 that manages and supports the IT infrastructure for a MINDEF network used by the Singapore Armed Forces (SAF) and defence technology personnel.

The infrastructure consists of the network, server, storage, plus other components.

"Think of it as a layer where business applications like email, logistics and human resource applications sit on top," she explains.

"As head of the team, I set the direction my team takes to enhance the IT infrastructure for the MINDEF network."

"I keep a close watch on technological trends to see how new developments could be tapped to strengthen network resilience and security, and how technology can help us manage our IT infrastructure more efficiently," she adds.

OPPORTUNITIES TO LEARN

One of her team members is Sim Sze Liang, 30, who joined DSTA in 2009 after graduating from NUS with a Bachelor of Engineering (Computer Engineering).

He was attracted by the ample learning opportunities DSTA offered.

"For instance, my bosses supported me to take up a course on data science – a relatively new area to me – which could help me to learn new ways to extract knowledge from data," he says.

To Sze Liang, Melene is a leader that excels at understanding the individual talents of her staff. "She advises on the strategic areas where we should focus our learning, and groups engineers who complement one another in skill sets and personalities, providing effective opportunities for individuals to learn and grow," he explains.

"Melene also brings a sense of positivity to the team. She influences us through rationale, inspiration and a willingness to help."

Melene was nominated by her team, and won the DSTA Excellence Award for Leadership in 2014.

SOLVING PROBLEMS

To Melene, qualities that are prized in the IT industry are foresight – to pick up problems before they crop up – and a proactive mindset that seeks solutions to nip these potential problems in the bud.

Openness to new ideas is another trait that Sze Liang finds important.

Once, when a data centre in an SAF camp reached its maximum capacity and required more space to expand, the team had to consider their options.

"Our work forms the basis for operations and activities, and knowing that what I design can influence people's behaviour to work more efficiently, makes me happy."

– Melene Chan

"Taking the traditional approach by setting up a new data centre in another building was not an ideal solution because the new data centre would have required its own set of basic network and server infrastructure – wasting server space when there was already a capacity crunch," says Melene.

In the end, they did establish a second data centre in another building, but it was one that tapped on the infrastructure of the existing centre.

"This optimised data space, and mechanical and electrical resources," she explains.

"Thinking of new and innovative solutions, and then delivering better results than before was extremely gratifying for my team members and me," she adds.

A PEOPLE JOB

One would think that jobs in IT are all about machines, but Melene does not agree.

"I am also fascinated by people," she says. "Connecting those who design and manage the IT infrastructure with users of the system and creating the middle platform for good user experience drives me."

She strives not only to keep up with new technologies in the market but also to understand human needs.

"Our work forms the basis for operations and activities, and knowing that what I design can influence people's behaviour to work more efficiently, makes me happy," she says.

The Straits Times – Careers in the Public Sector, 7 March 2015

POWERING SINGAPORE'S DEFENCE SYSTEMS

Lim Jiunn Shyan gets to see his designs become reality

Lim Jiunn Shyan's work literally powers Singapore's defence systems. The 34-year-old Programme Manager plans, designs and implements protective electrical systems and building management systems for the facilities of the Ministry of Defence.

"Power systems serve as the heart that provides the essential means for military facilities to remain operational even under various threat scenarios," he says.

PROUD OF HIS WORK

Jiunn Shyan regularly leads or works in teams that consist of civil engineers who design buildings for structural integrity, architects who oversee the aesthetics and safety features, and mechanical engineers who are in charge of mechanical systems such as lifts and cooling systems.

His role is to ensure a safe and reliable supply of power in defence facilities and infrastructure.

To check this, he conducts stress tests to ensure power systems in these facilities can tolerate external stress and still function.

"As a defence engineer, I have to look beyond purely making things work."

"My teammates and I consider various scenarios, and think of how our designs can continue to work under various what-if scenarios. For example, when we conduct tests, we force a solution to fail to see how the contingency will kick in," he explains.

One such instance was when he was designing electrical, building management and lightning protection systems for Singapore's Underground Ammunition Facility, which saw his team winning the Defence Technology Prize in 2007.

Another unique project he worked on was the power distribution at the Sports Hub for the 2015 South East Asian Games' opening and closing ceremonies.

"To all of us who put in effort to make sure the projections and illuminations worked, it was truly an emotional moment when we saw the field and decorations light up in a myriad of colours."

"I was reminded that what engineers can accomplish is really limited only by their imagination," he says.

In 2012, he also contributed to the National Day Parade where his team delivered a robust power supply for audio and lighting systems.

"Engineering is the bridge between science and reality. As engineers, we transform formulas from textbooks to tangible means, and I am very grateful to be in a position where I can deliver effective solutions for Singapore's defence."

Having now spent a decade at DSTA, he still continues to enjoy his job.

"What keeps me motivated is the ability to see my plans come to life. The desire to see the concepts and designs become reality drives me," he says.

CONTINUOUS LEARNING

As technology evolves, engineers must keep up.

Jiunn Shyan graduated with a Bachelor of Engineering in Electrical and Computer Engineering from the National University of Singapore in 2005, but he still regularly goes for training to grow his knowledge and keep it up to date.

He has attended DSTA Academy courses on systems engineering and management to learn how to manage projects. He has also been sent on technical certification courses to deepen his understanding on power systems.

On-the-job training is another important aspect of learning at DSTA. One such instance is when Jiunn Shyan participated in trials to study how well structures can withstand explosions, and to learn how to fortify buildings against high pressures and shocks.

"I find my work at DSTA meaningful as I help ensure our soldiers have a safe place to train and are able to defend the nation should the need arise," he says.

The Straits Times – Careers in Engineering, 11 July 2015

"As engineers, we transform formulas from textbooks to tangible means, and I am very grateful to be in a position where I can deliver effective solutions for Singapore's defence."

THOMAS TAN CHIN AIK
Manager
Procurement Programme Centre

FOR DEFENCE AND BEYOND

Working at DSTA has allowed Thomas Tan opportunities to contribute in overcoming challenges beyond defence

INSIDE SCOOP

Thomas is a fitness enthusiast who enjoys his weekly gym session. But he also enjoys hunting for good food. The foodie considers Japanese ramen, Korean BBQ and Spanish paella as the best eats!

As a Procurement Manager in DSTA, Thomas Tan describes his role as a gatekeeper in ensuring that public funds are properly and prudently spent.

"It is important to safeguard the integrity of the government procurement process by ensuring that it is conducted fairly so that we maintain the public and suppliers' trust and confidence in the Singapore government," Thomas explains.

The 32-year-old National University of Singapore (NUS) graduate with a Bachelor of Science in Life Sciences started out working in a laboratory as an Application Specialist. He soon realised that he was better suited for a career that would allow him to contribute to society at large in meaningful and fulfilling ways. "With some prior experience in purchasing chemical reagents for the laboratory, I decided to apply for a procurement position in DSTA," he recalls.

Thomas joined DSTA in 2008 and has not looked back since.

INSTILLING PUBLIC CONFIDENCE

Thomas manages DSTA's medical procurement portfolio, which includes the acquisition of medical systems, pharmaceuticals, as well as medical supplies and services for the Singapore Armed Forces (SAF) and DSTA.

"I felt a strong sense of accomplishment and fulfilment, knowing that our efforts in acquiring the masks had directly contributed to the well-being of the entire nation."

"I would study the acquisitions that are raised to my team and liaise with project requesters to better understand their requirements. I then provide recommendations on procurement approaches and strategies, taking the current market landscape into consideration."

"I also ensure that the government procurement guidelines of fairness, transparency and value-for-money are adhered to throughout the procurement process while meeting project requirements," he says.

A recent project that Thomas was involved in – the inaugural joint Emergency Ambulance Services (EAS) for the SAF, Singapore Civil Defence Force (SCDF) and the Ministry of Home Affairs (MHA) – is an example of how procurement plays a crucial role in instilling public confidence in the government, in more ways than one.

"It started with a SAF requirement to benchmark the service standards of their EAS against operational standards of the national EAS in terms of resuscitative skill sets and service levels. Through market research, we found out that the cost to acquire six ambulances of such standards was exorbitant, given the limited paramedic resources in the market," he shares.

That did not deter Thomas and his team from seeking the best and most cost-effective procurement approaches to meet the requirement. The team saw the opportunity and mooted the idea of collaboration for MHA, SCDF and SAF to participate in a joint tender that would leverage economies of scale through the consolidation of their requirements for EAS. This initiative yielded significant cost savings for the SAF.

"Beyond cost savings, the collaboration also ensured that SAF's EAS would operate at the same service standards as the national EAS, thus instilling public confidence in SAF's medical evacuation system. I believe this joint tender approach serves as a prime example for future collaborative tenders among different public agencies to achieve win-win outcomes," Thomas adds.

In 2015, Thomas and his team were awarded the Savings and Value Enhancement Award at the Ministry of Defence Productivity and Innovation in Daily Efforts Day, and the Most Innovative Project/Policy Merit Award at the Public Service Awards, for their work on the joint EAS.

BEYOND DEFENCE

"By providing medical procurement support, we allow the SAF to focus on its training and operations in the defence of Singapore. Our medical procurement efforts also extend beyond supporting the SAF. We have supported national and even transnational endeavours as well," Thomas says.

Thomas' most memorable project is the acquisition of N95 masks to replenish and build up the fast depleting national stockpile during the haze crisis in 2013. "I remember being called back on a weekend to provide first response in sourcing for N95 mask suppliers, together with the Ministry of Health," he says.

"To avoid further strain on the local and regional mask supplies, we worked with subject matter experts within DSTA and the Defence Technology Office in Europe to identify potential global suppliers that could supply large quantities of masks within a short period."

Eventually, the N95 masks were procured within five working days, and exceeded the initial stockpile target quantity.

"I felt a strong sense of accomplishment and fulfilment, knowing that our efforts in acquiring the masks had directly contributed to the well-being of the entire nation," he says.

In addition to supporting national efforts, Thomas and his team of procurement specialists were involved in the procurement of emergency medical supplies for humanitarian missions and disaster relief aids during the 2009 Sumatra earthquakes and the 2015 Nepal earthquake.

IMPORTANCE OF INTEGRITY

To those who are looking to pursue a career in procurement, Thomas says: "A procurement professional should have an innovative mind to explore various procurement approaches that would lead to improving work efficiency and achieving value-for-money. He should have a strong sense of integrity to uphold the principles of fairness and transparency in his work."

Thomas also appreciates opportunities to learn and grow on the job. "DSTA has a strong culture of sharing and learning. In the Procurement Programme Centre, we have Case Sharing Workshops to share our knowledge and experiences in dealing with project challenges that we face in our various areas of work," he says.

KEEPING OUR HARBOUR AND SEA LANES SAFE

Poh Chun Siong uses advanced technology to help maintain Singapore's maritime security and integrity

Poh Chun Siong, 34, has always known that he would pursue a career in information technology (IT) and engineering. Prior to graduating from Nanyang Technological University (NTU) with a Bachelor of Engineering (Computer Engineering), he conducted research on organisations to apply to.

He says: "DSTA stood out as an organisation that offered opportunities to learn and explore the best and most cutting-edge technologies and ideas."

Chun Siong joined DSTA in 2008 as an Engineer in the C4I Development Programme Centre, where he was part of a team that developed and enhanced command and control capabilities for the Republic of Singapore Navy (RSN). He is now a Development Manager.

Chun Siong says: "The C4I Development Programme Centre exploits leading-edge technologies to develop Command and Control, Communications, Computer and Intelligence (C4I) solutions. Currently, I work with my team of eight engineers and Singapore Armed Forces (SAF) partners to study system designs, identify potential issues and meet system requirements."

He adds: "This helps us to design and deliver working prototypes and systems that meet the operational requirements for the surveillance of Singapore's coastal waters, facilitate the concept of seamless maritime collaboration and improve incident reporting capabilities."

POH CHUN SIONG
Development Manager
C4I Development
Programme Centre

SURVEILLANCE SUPPORT

Supporting the surveillance of Singapore's coastal waters is critical for the nation's defence and security.

"Singapore lies next to the Straits of Malacca, one of the busiest and most important shipping lanes in the world. Vessels could potentially be used to carry illegal immigrants, or as platforms to conduct acts of maritime terrorism. It is important to have a robust coastal surveillance system to detect even the smallest vessels that may easily avoid detection."

He admitted that it was initially a challenge to pick up enough maritime knowledge when he started working at DSTA.

"Unlike air traffic, which has strict regulations, vessels have fewer rules when they sail into open waters, and their business model is a lot more complex. Fortunately, my supervisors and colleagues were forthcoming in sharing their expertise, experience and information with me. I also took every opportunity to shadow our SAF partners and users in their work to better understand their requirements and challenges."

FROM LABORATORY TO FIELD

In 2012 and 2014, Chun Siong was given the opportunity to present projects at the SAF-organised Optek (Ops-Tech) Exhibition, a platform for engineers and scientists to showcase, learn and exchange ideas on new capabilities developed for the military.

"In my work, I get opportunities to work with research laboratories to explore the application of cutting-edge technologies not yet available in the market. Witnessing how technologies evolve from laboratory to field deployment is definitely an eye-opening experience."

Some evolving technologies he believes will be useful include data analytics and advanced sensors, which are needed to design systems capable of sieving out real and false tracks. He anticipates such technologies will be needed if piracy and maritime terrorism create future security issues in Singapore's waters.

He says: "At DSTA, every day is new and exciting. Technical competencies are taken very seriously and there are always opportunities to learn and upgrade one's knowledge."

TODAY, 21 July 2015

ZEE SOW WAI
Faculty Head
DSTA Academy

"As DSTA is a knowledge-driven organisation, it is essential that staff are given the opportunity to acquire new competencies and perspectives to ensure that they stay relevant and innovative."

FROM ENGINEER TO MENTOR

Zee Sow Wai leverages 30 years of engineering experience to nurture the younger generation of defence engineers and scientists

Sow Wai's journey in defence engineering began when he started out as a Quality Assurance Engineer working on deriving environmental specifications and tests for new product designs for the military in 1983. "I was then a young graduate armed with a passion for engineering and the motivation to use my knowledge in a meaningful way. It was a natural decision for me to embark on a career in defence engineering as I could innovate and develop advanced defence capabilities for Singapore," Sow Wai recalls.

Over the years, Sow Wai has been exposed to various aspects of defence engineering which allowed him to build deep technical competencies and project management skills. It also provided him the opportunity to work on a number of significant projects, including the acquisition of the F16A/B and F-16C/D fighter jets, as well as the upgrades of the F-5 fighters and C130 transport aircraft.

INSPIRING THE NEXT GENERATION

To leverage his wealth of experience, Sow Wai was appointed Faculty Head in DSTA Academy in 2013. Faculty Heads are established and proficient subject matter experts in DSTA's core competencies of systems engineering and project management. Sow Wai spearheads the design, development and management of course curricula to train defence engineers and scientists from DSTA, Ministry of Defence and the Singapore Armed Forces. He also takes on the mantle of mentor and lecturer, tapping on his substantial experience to share unique insights with the younger generation of engineers and scientists.

LEARNING TO TEACH

Sow Wai has always been a strong advocate of lifelong learning. After obtaining his Bachelor of Engineering (Mechanical Engineering) from the National University of Singapore in 1983, he went on to pursue a Master of Science (Industrial and Systems Engineering) degree in 1987 to advance his competencies as a defence engineer. To cater to the new generation of learners, Sow Wai leverages new learning technologies such as Learning Management Systems, e-learning and gamification to facilitate a more engaging learning environment.

Sow Wai appreciates that DSTA places strong emphasis on investing in its people and sees DSTA Academy as playing a significant role in this endeavour. "Our vision is to be world-class in the way we develop our people to be practical systems engineers and astute programme managers. As DSTA is a knowledge-driven organisation, it is essential that staff are given the opportunity to acquire new competencies and perspectives to ensure that they stay relevant and innovative," Sow Wai explains.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