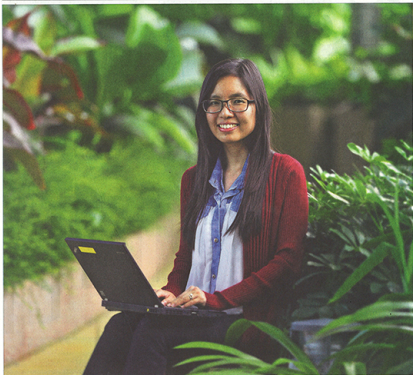


ENGINEER YOUR FUTURE



Ms Lim takes pride in contributing cutting-edge technology to safeguard Singapore. PHOTO: CHONG JUNG LING

Breaking new ground in defence engineering

Ms Lim Yee Siang's job involves research on advanced radar signal processing techniques to help keep Singapore safe

ESTHER TEO

DURING her junior college days, Ms Lim Yee Siang's interest in electrical engineering was first sparked by a particular physics topic — logic gates.

As her intrigue grew, she decided to take up a Defence Science and Technology Agency (DSTA) undergraduate scholarship and pursue a Bachelor of Engineering in Electrical and Electronics Engineering at the Nanyang Technological University.

Graduating with first class honours in 2011, she took up a job in signal processing at DSTO National Laboratories, Singapore's national defence research and development (R&D) agency.

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MS LIM YEE SIANG
defence researcher
DSTO National Laboratories

A constant education

The learning curve was steep. This, despite having undergone a two-month internship at DSTO's sensors division and having basic knowledge about the field that was acquired in university.

Ms Lim still remembers feeling intimidated by the demands of the challenging domain.

In her four years at DSTO, senior colleagues have helped her get up to speed by mentoring and guiding her along. She says: "I have grown and matured in both my technical knowledge and thought processes, and have become more accustomed to accepting the challenges that come my way."

"Today, I am still an inquisitive individual, curious about the endless number of interesting things to learn in the field."

The 28-year-old is a defence researcher at the R&D institution. Her role involves researching advanced radar signal processing techniques.

Together with her team of one other research engineer and a hardware engineer, she troubleshoots critical problems faced by Singapore's radar and ensures continued operating performance.

This guaranteed radar surveillance allows the Singapore Armed Forces (SAF) to detect and neutralise threats quickly, keeping Singapore safe from adversaries.

Making sense of science

A typical day begins with discussions of algorithm design, followed by computer simulations in MATLAB (a computing and interactive environment for algorithm development and data analysis) and performing real hardware tests in the laboratory.

She also works closely with universities in front-end research that can potentially become Singapore's next secret technological edge in defence.

"At DSTO, we seek to challenge convention. Pushing boundaries to achieve the next breakthrough is something that I believe the engineering industry values," Ms Lim says.

One of the most exciting aspects of working in her field is being able to work on new technological domains. Among them are the Multiple-Input-Multiple-Output (MIMO) concepts — this refers to more than one radar transmitter and more than one radar receiver providing some form of gain as compared to a single transmitter and receiver model — and compressive sensing, which obtains useful data information from sparse random data.

The biggest obstacle in her area of work is often researching solutions for uncharted domains and transforming new ideas into reality. This requires a lot of creativity in a context where there is usually little information available on a specific problem they want to solve, Ms Lim says.

The engineer is present throughout a project, from the point of conception to seeing the ideas come to reality.

"Very often, the work we do in the lab is sensitive to real-world environmental conditions that hinder perfect results. To overcome these, we need to perform a series of thorough analysis, tests and evaluation so that we cover all possible sources of failure," she explains.

Exploring new domains

For example, in a recent project, her team worked on an algorithm for a radar transmission design for a radar system currently being used in SAF.

Radar systems are traditionally unable to co-exist with another sub-system, but the team's algorithm did the impossible by allowing both systems to work together successfully.

She adds: "The process to ensure quality is non-negotiable, especially because we are dealing with national defence, and providing reliable and safe solutions for our SAF soldiers."

Diving into uncharted territory in pursuit of high-impact, cutting-edge solutions, Ms Lim has also found that resilience and persistence are indispensable.

It may take many rounds of conceptualisation and testing before they can provide the best solutions to their clients.

She has also attended conferences abroad where she interacted with and learnt from esteemed researchers from overseas global organisations.

These included the French national aerospace research agency, Office National d'Etudes et Recherches Aérospatiales (ONERA) and Safran Laboratories — the engineering and science laboratory for the US Department of Energy's National Nuclear Security Administration.

At the end of the day, what Ms Lim finds most satisfying is her job's ability to contribute to national security by providing secret, cutting-edge technologies.

She says: "I aspire to be like the ones who came before me — a strong technical lead, an expert in my domain, and a mentor to guide fellow engineers towards our goals in safeguarding the nation's security."