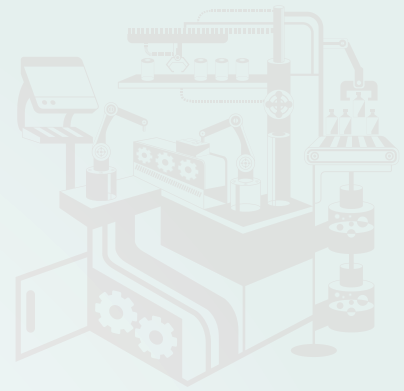


CHANGING THE **GAME**



When it comes to high-precision systems, it is crucial to have fast and accurate positioning within the working range of a few millimetres. Yet, since nanotechnology kicked off a few decades ago, actuators – the devices with nano-positioning capacities – could only work within the range of micrometres.

But things are set to change now, thanks to the work of A*STAR scientist, Dr. Daniel Teo Tat Joo, at the Singapore Institute of Manufacturing Technology (SIMTech).

Enter the Flexure-based Electromagnetic Linear Actuator (FELA). Invented by Daniel, FELA is a new class of nano-positioning actuators that is able to move within the nanometre range with a wide displacement range of a few millimetres. With this invention, the way for the next generation of high-precision systems, such as biomedical devices and nanolithography, is paved.

This game-changing invention has not gone unnoticed in the world. Just last year, Daniel clinched the prestigious R&D 100 Awards for their invention. Daniel shares, "It is a great honour to receive such a prestigious award. This is a source of motivation for me to work even harder and do more substantial research work, so as to leave footprints in the field of science and engineering!"

MELDING PASSION WITH WORK

Changing the game is what the young scientist is after in the field of science and engineering. At SIMTech, he leads his team to delve into technological areas, such as biomedical devices and energy harvesting, to seek better solutions.

Daniel shares, "In the past, the kind of difference I hoped for was to create a new technology that can enhance the life of mankind. Now, I also hope that my knowledge could be used for creating new innovations that can provide new hope in the lives of the less fortunate."

For Daniel, his job at A*STAR is a perfect melding of his passion for maths, engineering and creating impact on society at large. "Science and engineering is a natural choice for me because it involves a lot of formulations and calculations, which is exactly the kind of language I am comfortable with. Pursuing this career allows me to exhibit my strength," he elaborates. "I don't like routine jobs, so research and development is a good platform for me to explore new ideas and innovate!"

"For me, research is not a job. It is a constant pursuit of new knowledge."

Dr. Teo Tat Joo, Daniel
Scientist, Singapore Institute
of Manufacturing Technology





Such love for innovation and exploration started from his passion for motor-racing. The car and motor-racing enthusiast raves, "I became passionate about performance enhancement of cars because the process made me appreciate engineering! From engine, gearbox, suspension, tyres to aerodynamic parts etc., every part of a car is the result of evolution in science and engineering. Lots of formulations and precise calculations are required to build a race-spec engine. For example, enhancing an engine requires knowledge on crank-pulley mechanisms, material expansion coefficients and reliability, thermal and fluidic dynamics, multiple sensing and control etc. There is so much to share on this topic!"

ON THE LOOK-OUT FOR THE NEXT CHALLENGE

It is hardly surprising that what fuels Daniel are challenges. "My motto in life is – If others can do it, I can achieve the same or even better, as long as the other person is human," he states. "Perseverance and courage best describe my character. I am never afraid of failure because it is a step towards success. At the same time, achievements, awards and success are just milestones or closure of what I have set to achieve right from the beginning."

A typical day at work for Daniel involves getting updates from research projects in the morning, understanding industrial needs and challenges in the afternoon and sharing his research knowledge with his peers around the world through writing journal articles, conference papers, monographs etc. at night. Amidst his intense pursuit of science and engineering knowledge, he spends time with his family.

He reflects, "A*STAR has over and over again given me the opportunity to explore various research interests, providing me with funding and flexibility. Being a big family of many institutes, inter-research institute collaborations allow me to leverage on different skill sets and resources from the many great minds under one roof. My role here is to assist A*STAR in training post-graduate students and translating new technologies to the manufacturing industry."

While innovation and invention are set in the cards for Daniel, he muses about his life as a researcher now and then. His conclusion? "I'm a person who loves to share my knowledge and experience," he summarises. "If I run out of new ideas and motivation in research one day, I will go into academia to nurture the next generation of engineers!"