Three young researchers

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SCIENCE

Time to add nuance to the narrative on climate support

Three young researchers who made their mark early in their careers received the Young Scientist Award last Friday from Deputy Prime Minister Heng Swee Keat. Shabana Begum highlights how their research broke new ground.

Working on the building blocks for futuristic computer


Dr Yvonne Gao aims to be a leading player in the hardware development of the first full-scale quantum computer.

Dr Yvonne Gao, 33, is developing the key hardware building blocks for the quantum computer – a futuristic computer that is more powerful than today's supercomputers.

A quantum computer will be powered by quantum mechanics, and can speed up computational processes to tackle complex issues such as climate modelling and optimising logistics.

Creating such a supreme computer with robust performance is an active area of research, said Dr Gao, Presidential Young Professor from the National University of Singapore's physics department.

In quantum computers, information is stored in quantum bits, called qubits, and a pair of qubits that interact form the basic processing unit of a quantum computer.

Dr Gao and her team are working on new techniques to implement such units in a highly programmable and robust manner.

"My goal is to be a leading player in the hardware development of the first full-scale quantum computer, and learn more about the fascinating effects of the quantum world during this process," she said.

Dr Gao hopes that quantum computers will drive a new era of scientific discoveries and innovations.

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Unlocking the key to obesity and overeating


Dr Sarah Luo and her team's experiments on mice showed that there are regions in the brain that regulate feeding.

Dr Sarah Luo found that a cluster of neurons at the base of the brain regulates eating behaviour – with implications for those with metabolic conditions such as obesity and diabetes.

When she and her team activated the cluster – called the tuberal nucleus – in mice's brains, they started eating excessively even when they were not hungry.

She conducted these experiments when the mice were in a new environment, outside the cage they live in.

"When we later put the mice back into the new environment, they would start (excessively) eating, even without the neurons activated," added Dr Luo, 35, who is a principal investigator at the Agency for Science, Technology and Research's (A*Star) Institute of Molecular and Cell Biology.

This meant that the tuberal nucleus and environments associated with food can drive overeating and obesity.

"What our research shows is that there are regions in the brain that regulate feeding, and dysfunctions in these circuits contribute to overeating – and much of this might not be under conscious control. Most times, there is a stigma against people who overeat and are overweight, that they lack willpower or have no self-control," she explained.

Dr Luo and her team are looking to identify key areas to target, to treat obesity and curb overeating.

On a mission to build the next generation of AI tech


Dr Zhang Hanwang says his research is aimed at an energy-efficient AI that predicts by causation but not correlation. ST PHOTOS: KEVIN LIM

Dr Zhang Hanwang from Nanyang Technological University (NTU) is not satisfied with current artificial intelligence (AI) technology, and wants to create smarter, new-generation versions.

He pointed out: "Today's AI only works like a super imitator. Its superpower stems only from the perfect imitation of big data."

The assistant professor at NTU's School of Computer Science and Engineering noted that current AI makes predictions by merely recognising correlations instead of causal links.

He explained: "A fancy AI analyser may discover that nations with more Nobel prize winners consume more chocolate, for instance. If the AI is a policymaker, it will suggest that every kindergarten student should eat more chocolate each day, which is absurd."

The 34-year-old added: "My research is trying to make an energy-efficient AI that predicts by causation but not correlation."

Dr Zhang and his team have developed and been recognised for a number of advanced algorithms that will be the core for next-generation AI. Such advanced AI has a place in daily life, in areas such as online learning and healthcare.

"An AI teacher will not only tell you the solution to the question, but also explain why you made the mistake, and how to avoid similar errors," he said. "By then, AI is no longer just an imitation game, but a thinking, life being."