

# Spurred by dad's glaucoma to develop low-cost eye device



(From left) Mr David Lee, Ms Yu Kelu and Mr Li Si developed a low-cost biomedical device to measure eye pressure at home painlessly. The invention, powered by sensor technology and artificial intelligence, won the James Dyson Award 2021 in Singapore. (Right) Ms Yu helping Mr Li measure his eye pressure with the device. Glaucoma patients can check their eye pressure by touching their eyelids with a glove that has a sensor attached. PHOTOS: JAMES DYSON AWARD



## Ang Qing

The discomfort and inconvenience her father went through during frequent eye check-ups after he started losing his vision in December 2019 prompted Ms Yu Kelu, 25, to engineer a way to help.

Her 54-year-old father, who has glaucoma, has to visit the hospital every two to three months to get his eye pressure checked, said the doctoral student at the School of Materials Science and Engineering at the National University of Singapore (NUS).

Glaucoma is a condition where high fluid pressure in the eyeball damages the optic nerve, which can lead to blindness.

There is no cure for the condition, which is more common

among seniors.

Worldwide, 64 million people had glaucoma as at last year, said Dr Victor Koh, 38, department head for ophthalmology at National University Hospital. In Singapore, 3 to 4 per cent of the population had the condition last year, he added.

For Ms Yu's father, this meant regular hospital visits to ensure that his eyes' fluid pressure was not at dangerous levels.

Ms Yu said: "He needed anaesthesia every time the doctor measured his eye pressure. It was very uncomfortable and very hard for him to keep his eyes wide open while waiting for the probe to make contact."

Seeking a better solution, she and her team members – Mr Li Si and Mr David Lee – developed a low-cost biomedical device to measure eye pressure at home painlessly.

Glaucoma patients can measure

their eye pressure by touching their eyelids with a glove that has a sensor attached.

Mr Li, 27, estimates that the cost of the device, called Hopes, will be about \$50 when mass produced.

This is significantly lower than commercially available models, which can range from \$2,033 to \$4,745, according to Ms Yu.

The invention, arrived at after almost a hundred iterations, is powered by sensor technology and artificial intelligence.

It won the James Dyson Award 2021 in Singapore and will go on to compete with finalists from 28 countries in the final stage of the global competition.

Said Ms Yu: "Right now, we're collecting a lot of data for machine learning to make our technology reliable. We want to bring this to the market eventually, but we believe

that there are more design iterations to make this more lightweight and wearable."

Dr Koh, who is one of the collaborators of the project, noted that the invention will also enable ophthalmologists to improve management precision by being more accurate, faster and more cost-effective than current devices in the market.

Two runners-up in the Singapore award – an affordable toilet made from upcycled materials for low-income families and an electric car charging system – will also be among 84 international entries assessed by Dyson engineers before being presented to inventor James Dyson in the finals.

The team of three environmental engineering and architecture students and graduates from NUS behind the affordable toilet has begun a trial in India with four proto-

## MAKING A BETTER VERSION

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**MS YU KELU, 25, on developing a low-cost biomedical device to measure eye pressure at home painlessly.**

types, which can be assembled from materials readily found in slums and peri-urban and rural communities.

With the focus on hand-washing amid the pandemic, they hope to plug the huge sanitation gap in these areas – where people often have to resort to open defecation – using the power of design.

Said landscape urbanist and architect Eingeel J. Khan, 28: "When the second wave of Covid-19 struck India, the situation got really bad and we got feedback from families that the toilets were very helpful, because they could maintain hygiene standards."

"It's been a fulfilling journey because, right in the middle of Covid-19, we were able to help four families."

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