

Device helps knee surgery patients back on their feet

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An estimated 20,000 Singaporeans undergo total knee replacement surgery every year and the majority regain their mobility.

But not everyone has a happy outcome. An estimated one in five never regains full movement. Some develop other complications.

Often, the problem is that to get back on their feet – literally – patients have to exercise on their own at home as part of rehabilitation, and the outcomes are not always ideal.

The winners of Singapore's James Dyson Award this year, National University of Singapore (NUS) graduates Aaron Ramzeen, 26, and Ricky Guo, 30, decided to use their knowledge of engineering and science to help patients who have undergone knee replacement surgery.

They came up with Kimia, a wearable device that is attached to the knee, and gives feedback to physiotherapists on whether patients are doing the prescribed exercises

regularly and correctly.

There are other existing wearables in the market to track a patient while exercising, but their data is often unreliable, said Mr Ramzeen and Mr Guo.

On the other hand, Kimia, which is undergoing clinical trials in three public hospitals here, has been found to collect highly accurate data that clinicians can rely on to track their patients' progress.

The device, which is built for continuous 24/7 monitoring, can be comfortably worn whether the user is walking, sitting or sleeping, said the inventors.

Mr Abhishek Agrawal, chief executive of Kinexcs, the start-up company that will market the invention, is looking at adapting the device for use on other parts of the body, such as the hips, ankles and shoulders.

Mr Ramzeen, an engineering graduate, and Mr Guo, who has two degrees from NUS, said they are looking into developing more medical wearable products for the international market.

Both said they are delighted with being named the national winners, but are now looking for the bigger



National University of Singapore graduates and co-inventors of Kimia, Mr Ricky Guo and Mr Aaron Ramzeen, testing the accuracy of their knee rehabilitation device (seen here on Mr Ramzeen's leg). PHOTO: DYSON SINGAPORE

prize, of making it to the international top 20 shortlist.

Inventor and entrepreneur James Dyson will pick an international winner and two runners-up. He will

also choose a sustainability winner. One in five past international winners has gone on to successfully commercialise their inventions.

In a video interview with The

Straits Times, Mr Dyson said that if developed well, there is a huge international market for Kimia as anyone with knee problems would find the device useful.

He is also impressed with young people's zeal to help the less fortunate in society and their concern for the environment.

He mentioned last year's international winner, Briton Lucy Hughes, who received £30,000 (\$52,800) in prize money and gained an international media platform that has allowed her to pursue her invention, MarinaTex – a bioplastic made from fish waste – full time.

Mr Dyson said the award, which was started 15 years ago to encourage students to use their engineering and design skills to solve problems, has influenced engineering schools in Britain to include design thinking in training engineers.

Dyson Singapore today also announced the two runners-up entries in Singapore.

One is Ascend, an affordable accessory that can be retrofitted onto existing manual wheelchairs to make it easier for them to be wheeled up ramps. It was invented by Mr Kong Shao Ming from Nanyang Technological University.

The second runner-up is Little-Dreamer – a mask invented by a group of engineering and medical students from NUS to help children suffering from obstructive sleep apnoea.

Unlike other competitions, participants are given full autonomy over their intellectual property.

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