SINGAPORE — During his monthly visits to his paternal grandmother, Temasek Polytechnic student Frederick Ang, 18, noticed that several pressure ulcers had developed on her back and thighs due to inactivity.

Ang’s grandmother, who is in her late 60s, has been wheelchair-bound for over a decade but could initially walk short distances. However, she had grown increasingly reliant on her wheelchair after slipping and hurting her leg a few years back.

This personal experience inspired the final-year computing engineering student and his four teammates to develop a prototype system for wheelchair users and their caregivers. It can detect ulcers, encourage users to do simple exercises and allow caregivers to keep track of their physical activity.

For their invention, Ang and his team clinched a gold award in the Technology category of the 7th National Assistive & Rehabilitation Technologies Student Innovation Challenge on Friday (12 April).

The smart ulcer prevention system consists of a smart cushion outfitted with temperature and pressure sensors, as well as a pressure-sensing foot pad. When connected to an Android TV box, these allow a wheelchair user to play games designed for weight-shifting exercises, such as a simplified Snake game, via a dedicated app.

“This system can be used outside as it runs on Wi-Fi and battery (extendable via a power bank). Furthermore, the recorded data will be transferred to a database so caretakers can review the games they played,” said Ang.
Held since 2013, this year’s competition was co-organised by Nanyang Technological University (NTU)’s Rehabilitation Research Institute of Singapore (RRIS) and the Centre for Healthcare Assistive and Robotics Technology (CHART) at Changi General Hospital (CGH).

Gold, silver and bronze winners from the Design and Technology categories will be partially sponsored – from $1,500 to $500 – to represent Singapore at the Global Student Innovation Challenge for Assistive Technology held in Australia from 26 to 29 August.

One of the winners was 24-year-old Singapore Institute of Technology student Hilsann Yong, who developed the Troll-E, a personal mobility device that can transform into a shopping trolley in three steps. He was inspired to aid the elderly, like his 64-year-old mother, in their grocery shopping.

The PMD, when converted into a trolley, can carry up to 30kg of groceries. It took eight months for Yong to complete the prototype, which he plans to price at around $500 if it hits the market.

Meanwhile, ITE College East student Michelle Tey was motivated to develop Sensistove after realising that her grandmother, who suffers from dementia, often forgets to switch off the gas stove while boiling water.

“She will only realise the stove is still on when the water boils over. It is very dangerous,” said the 18-year-old nursing student. “(Moreover), there have been many reports of fires breaking out due to dementia patients forgetting to turn off their stoves after cooking.”

The device, attachable to any gas stove with knobs, can detect when the latter is switched on or off. At the same time, it sends an SMS notifying caregivers, allowing them to call the user to remind them to switch the stove off if it is kept on for too long.

The proportion of residents aged 65 years and over in Singapore has increased from 8.7 per cent in 2008 to 13.7 per cent last year, according to the latest government statistics.