

# Robot to help seniors stay active trialled at active ageing centres

## AI-driven robot assesses balance, prevents falls and helps them to sit and stand safely

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Moving his arms to the beat of music while on his feet during an hour-long Zumba class was once an impossible feat for retiree Leow Cher Hwa.

After suffering a stroke in August 2022, the 66-year-old could not stand on his own, let alone join the class at his active ageing centre in Tampines.

“The stroke affected both my arms and legs, and I became very depressed in the first two months,” he said.

Things began to improve after Mr Leow was selected for a trial in August 2025 of a wearable robot called “Dr Ba” – short for Data-driven Robotic Balance Assistant (DRBA). Since then, his health and balance have improved by leaps and bounds.

The robot uses artificial intelligence (AI)-driven algorithms to collect data on elderly users’ range of motion and assess their sense of balance, before automatically adjusting its parameters to support them while standing.

Associate Professor Ang Wei Tech, from NTU’s School of Mechanical and Aerospace Engineering, who invented the DRBA, said falls often result in serious injuries and loss of independence among the elderly.

The idea for the robot came from his mother, who had a fall in 2013. Prof Ang said she resisted walking for fear of falling again despite doctors telling her to walk more to hasten her recovery.

This experience inspired him to create a robot that would help the elderly avoid injuries from falls.

Falls are one of the top causes of injury-related hospitalisations among seniors in Singapore.

According to a 2022 report published in the Annals, the official medical journal of the Academy of Medicine, between 28 per cent and 35 per cent of adults aged over 65 experienced falls. This figure increased to about 50 per cent for those aged above 80.

With Singapore’s rapidly ageing population, there is a real need for innovative solutions that promote mobility and prevent accidents among seniors, Prof Ang said.

“With DRBA, our goal is to give seniors the confidence to stay active, while enabling caregivers and community partners to provide effective support.

“We want to take rehabilitation beyond hospitals and into the community through active ageing centres in the various neighbourhoods. We hope to make healthy ageing more accessible for all,” he said.

DRBA is an upgraded version of an earlier model worked on by NTU researchers and Tan Tock Seng Hospital in 2022 to help patients rehabilitate after their injuries.

Called the Mobile Robotic Balance Assistant, or MRBA (pronounced as “Mister-Bah”), the older version uses built-in sensors to detect a loss of balance and secures the user with a safety harness worn around the hips.

The robot is meant for users who have difficulty walking and balancing, helping them stand safely from a seated position and sit safely from a standing position. It uses a depth-sensing camera to observe movements, while machine-learning algorithms estimate the balance state of a user in real time to better predict any future imbalance or falls.

The MRBA, which is patented, has attracted interest from several local home-care providers.

Prof Ang said MRBA was initially designed for home and community use as an assistive device.

“But it was picked up by our hospital partners to be used as a rehabilitation device. So during commercialisation, we split the product into two versions – the home version is still called MRBA while the one for institutions has been renamed DRBA. The commercial MRBA (which is still under development) retains its wheelchair function.

“DRBA does not have a wheelchair function, but has more sensors to provide analytics of the user,” he said.

The NTU researchers deployed the patented DRBA to non-profit organisation Lions Befrienders’ active ageing centres in Tampines for trials in August 2025.

The team also worked with the

Smart Urban Co-Innovation Lab, where tech companies, start-ups and corporations co-create, test and deploy solutions for smart city challenges, and Lumens Group, which manages one of the largest fleets of vehicles across Singapore.

The trials were successfully conducted at the centres, where seniors using DRBA participated in Zumba classes and other group exercises.

The robot provided AI support that restored confidence without



Stroke survivor Leow Cher Hwa using a Data-driven Robotic Balance Assistant to take part in a Zumba class at a void deck near a Lions Befrienders active ageing centre in Tampines on Jan 21. ST PHOTO: SHINTARO TAY

compromising the user’s autonomy.

The results were demonstrated to Dr Charlene Chen, an MP for Tampines GRC and vice-chairwoman of Tampines Town Council, on Jan 21.

Ms Karen Wee, executive director of Lions Befrienders, said: “By working with NTU and introducing DRBA into our active ageing centres, we are creating a safer and more inclusive environment where seniors can regain confidence, stay active and enjoy a better quality of life.”

Prof Ang said DRBA was tested in China, where its top regulatory body for drugs, medical devices and cosmetics, the National Medical Products Administration, had classified the device as a Class II medical device, which is of moderate risk.

“We are expecting approval from HSA (Health Sciences Authority), hopefully by June,” he said.

His regret is that his mother, who died in 2023, did not see the device she inspired.

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