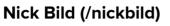# You Must Be Trippin'

This assistive robot uses machine learning to recognize a fall before it happens and safely catch at-risk patients.

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Each year, over three million older people in the US are treated in emergency departments as a result of a fall, according to the CDC. The cost of these fall-related medical treatments topped $50 billion in 2015. As the third most frequent cause of injury, unintentional falls place a huge strain on the healthcare system, not to mention the human cost of hip fractures and head injuries that often accompany a fall. Many healthcare providers have measures in place that attempt to prevent falls

making frequent rounds, for example, are high on that list. But given the magnitude of the problem that still exists today, it is clear that these measures simply are not good enough.

Researchers at the Nanyang Technological University, Singapore and Tan Tock Seng Hospital have approached the problem from a completely different angle, that if perfected, might be able to very significantly reduce the number of fall-related injuries in at-risk populations. They have designed and developed an assistive robot (https://www.eurekalert.org/news-releases/964013) that can not only detect a fall, but also take action to catch the patient and prevent injury. A robot such as this can keep watch over an individual around the clock, which hospital staff cannot do, and can also reduce the staff's present burden of making frequent rounds.

The team's so-called Mobile Robotic Balance Assistant (MRBA) is equipped with sensors including depth-sensing cameras that continually collect data about the patient in their care. The patient's movement information from these sensors is then processed by a machine learning algorithm that has been trained to predict when someone is losing their balance. When a fall is imminent, the robot activates a safety harness that catches the patient before they can fall and potentially injure themselves.

In addition to acting as a safety net after balance has been lost, MRBA can also give assistance to those that have problems with balance or walking to help them safely stand up from a seated position, or to sit back down again. This capability extends the utility of the robot beyond keeping watch over the elderly to helping people with an ankle sprain, an artificial limb, or those recovering from a surgery. And by reducing the care required by medical providers, it may also provide these people with more autonomy, and the ability to spend more time in their own homes.

A trial was conducted to assess the real-world utility of MRBA. A total of 29 participants were recruited, including patients who had had a stroke, traumatic brain injury, or a spinal cord injury that impacted their balance or mobility. During the course of a three day trial, it was observed that the participants were aided in sitting, standing, walking, and performing simple tasks like getting a glass of water. Importantly, throughout the course of the entire trial, none of the study participants were involved in a fall.

As populations age in many societies around the world, the need for a tool like MRBA is becoming ever more apparent. With further development, and larger clinical trials, this robot may one day help to promote independent living and aging. Based on the successes seen in the clinical trials, a pair of home care providers in Singapore are already exploring the possibility of using MRBA to assist their patients.