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US researchers develop tongue operated wheel chair

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Singapore: US researchers at Georgia Institute of Technology have developed a wireless, assistive device that lets paralyzed patients operate wheelchairs by simply moving their tongue in the desired direction.

The Tongue Drive System could offer people with tetraplegia, a condition that causes complete paralysis from the neck down, more independence, thus improving their quality of life.

The system consists of a small, magnetic titanium barbell that is attached to the tongue of the user by tongue piercing. A headset containing wireless sensors measures changes in the magnetic field when users flick their tongue, then sends the signals to a computer, which executes up to six commands based on the tongue position.

"It's really easy to understand what the Tongue Drive System can do and what it is good for," said Prof. Maysam Ghovanloo, associate professor at the Georgia Institute of Technology, and a study co-author and principal investigator, said in a statement. "Now, we have solid proof that people with disabilities can potentially benefit from it."

The researchers reported in the journal Science Translational Medicine they tested the technology in 23 able-bodied participants and 11 participants with tetraplegia. All participants received custom-made titanium barbells piercings.

Within 30 minutes of training, all 34 participants were able to use the device to complete a variety of tasks, and their performance improved over the following weeks, according to the researchers.

They said that participants clicked on randomly appearing targets on a laptop screen, played video games, dialed phone numbers and drove a powered wheelchair through an obstacle course using nothing but their tongue movements.

The researchers also compared the device with a popular assistive technology known as the sip-and-puff device, where patients' sip and puff into a straw-like tube to operate a wheelchair. On average, these participants completed tasks with the Tongue Drive System three times faster compared with the sip- and-puff system, but with the same level of accuracy, they

said.

"That was a very exciting finding," Ghovanloo said. "It attests to how quickly and accurately you can move your tongue."

Before the clinical trial, more than half of the participants with disabilities used the sip-and-puff on a daily basis. Experiments on the Tongue Drive System to date have been done in the lab or hospital, but the researchers said they will test how the Tongue Drive System performs outside of the controlled clinical environment in future studies.

Besides, they are developing a headset-free version of the system that fits inside the mouth, similar to a dental retainer.