

《China Breakthroughs: Quadriplegics get third-hand with senso》

By Tom McGregor, CCTV.com Panview commentator and editor

For people struggling with life-crippling disabilities, such as paralysis from the neck down or amyotrophic lateral sclerosis (ALS), commonly known as Lou Gehrig's disease, they have no muscle control of their limbs.

To live without body movement can be a nightmare, but for decades doctors and scientists have conducted extensive R&D (research and development) to search for new medical treatments and devices to make life much easier for the severely disabled.

Nonetheless, the science community has failed to deliver on amazing cures or introduced life-changing gadgets for them. Some progress has been made, but those paralyzed still can't control muscle movements on a daily basis.

Yet, scientists from the National Center for Neuroscience Technologies in China have developed sensor-equipped eyeglasses that can act as a third hand.

Blink and see results

Professor Chenguo Hu at Chongqing University and her team have authored a study on triboelectric nanogenerator (TENG), which can detect motion around the corner of the eyes, she told Xinhua.

The study was published in July 2017 by the US journal, Science Advances.

"When the TENG sensor is attached to the inside of the eyeglasses frame, the minuscule muscle movement of a closing eye momentarily pushes the sensors layers together, generating an electrical signal that can be reliably measured," according to Science Advances. "Compared to past approaches, the new sensors achieve impressive sensitivity in low-cost, highly adaptive devices that can be fabricated in a variety of forms."

Sensors can distinguish from involuntary blinking and deliberate closing of eyelids. That's groundbreaking technology, since the skin around the corner of the eyes "has never been considered as a good trigger signal source."

IoT eyeglasses

Users of sensor-equipped glasses can perform tasks, such as typing, switching lights on/off, or turning on fans via a wireless electric signal connected to a smartphone or computer.

You can text a message, the letters scroll past the glasses and when choosing a letter, just blink. The letters then form words that become phrases and sentences so you can send a clear message to the receiver.

Other benefits of the msTENG sensor include that they are light-weighted materials, easy-to-assemble for manufacturing and cheap to sell.

"Our work makes it possible to get a novel design concept of controlling electronic devices via eye blinks out of the lab to become part of our lives," Hu told Xinhua.

She added, "We believe that on the basis of the msTENG, many kinds of mechnosensational computer games will spring out to make life more fascinating."

Chinese scientists have made major advances in the field of mechnosensational.

Mechnosensational developments

Mechnosensational is defined - human to machine interfaces that extend channels between human beings and external devices. By utilizing TENG, the eye motion is triggered with a self-powered mechnosensational communications system.

Hu's team had developed skin-like TENG (STENG) devices, which generate electricity by pressing materials together and taking them apart to spark an electrostatic charge.

The device gets made by mixing an elastomer with an ionic hydrogel to create materials that are flexible and transparent. According to Phys.Org, the elastomer is used as a layer, while electrified hydrogel works as an electrode.

The device is considered "1000X" better than all other TENG devices already in use and best for transmission of optical data. In other words, STENG gets attached to eyeglasses for optimal use.

STENG is strong enough to power small electronic devices, such as smartphones and light switches, which are connected to IoT.

Better than implants

Chinese scientists have achieved remarkable progress to make life easier for quadriplegics. Beforehand, US-based scientists had focused on the development of brain implants that get connected to gel sleeves (mechanical limbs).

In April 2016, Science magazine published a story about American scientists placing an implant in the brain of a quadriplegic with successful results.

A brain continues to send messages to move limbs, but a severed spinal cord prevents signals from getting sent. Accordingly, a microelectrode array reads brain signals and transmits them through bio-wires to a gel sleeve.

In neurology, a brain signal goes to the body to cause movement. Let's say you want to pick up a box, your brain tells your body what to do and you make movements to achieve the action.

For quadriplegics, their body can't move, but scientists have attached gel sleeves that are connected to IoT and a machine-learning algorithm. Nonetheless, procedures here require invasive surgeries on the brain and limbs, while the machinery is expensive.

Eye-opening innovation

Sensor-equipped eyeglasses hold strong appeal for quadriplegics and ALS patients. Chinese scientists are standing at the forefront to unlock the mysteries of neuroscience and bridging them to mechnosensational devices.

TENG devices can be the crucial components to make greater advances in the field. Chinese scientists have become more aware of its potential and they are likely to develop new technologies to help those who really do need a helping hand in life to enjoy a life with the freedom to accomplish more routine tasks, such as text-messaging a friend on their smartphones.

