

Researchers develop smart gaming glove that puts control in your hands

20 August 2020



The smart glove was developed by a team of NUS researchers led by Professor Lim Chwee Teck (left). With him are two members of the research team, Dr Yeo Joo Chuan (center) and Dr Yu Longteng (right). Credit: National University of Singapore

Simply flex your index finger to fire your weapon and rotate your wrist clockwise to move forward. Immersive controls have always been a pipedream in the world of gaming but now they are steadily becoming reality. A team of researchers from the National University of Singapore (NUS), led by Professor Lim Chwee Teck, has developed a smart glove—called 'InfinityGlove'—that allows users to mimic a variety of in-game controls using simple hand gestures.

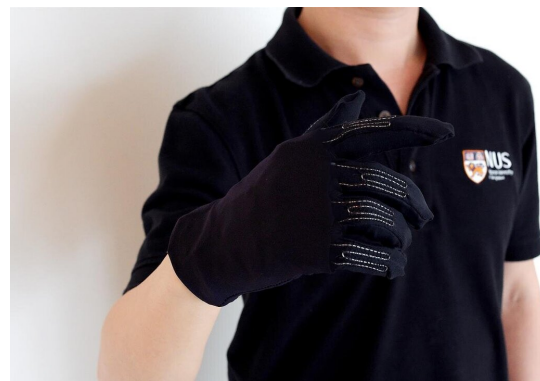
While the concept of controlling a game using your hands is not new, the main problems have always been weight and flexibility. The current generation of smart glove type controllers available on the market are usually bulky and rigid as they rely on conventional [sensors](#) which put the hard in hardware.

The InfinityGlove overcomes existing problems with weight and flexibility by weaving ultra-thin, highly sensitive microfiber sensors into the material of the glove. These sensors are not only

lightweight and accurate, but also fulfill the role of wires, thus reducing the need for additional wiring. Currently, the prototype weighs about 40 grams, and is flexible and comfortable.

Precise and quick gesture-based remote control

Currently, each InfinityGlove contains a total of five thread-like sensors, one for each finger. This network of sensors can interface with the game software to produce accurate three-dimensional (3-D) positions of a moving hand. Various gestures made by the user's hands are then mapped to specific inputs that are found on a regular controller. To date, the team has mapped a total of 11 inputs and commands which will allow users to play games such as Battlefield V.



The glove is embedded with thread-line microsensors to produce accurate three-dimensional positions of a moving hand, allowing users to mimic a variety of in-game controls using simple gestures. Credit: National University of Singapore

The application of this microfibre sensor technology is the breakthrough innovation that enables the InfinityGlove to accurately map finger gestures for human-machine interaction. The sensor is made up of a thin and stretchable rubber-like microfibre,

about the same thickness as a strand of human hair, that is filled with a conductive liquid metal. A small electric current runs through the conductive liquid metal, creating an electrical reading signal that changes when the fibers are bent and as the liquid metal is displaced. This microfibre sensor was developed by the team back in 2017 and was previously used to measure pulse and bandage pressure, but they have since adapted it for the smart glove by improving the strain sensing capabilities.

When linked up to the team's proprietary software, the sensors can rapidly translate the gestures via electrical signals into command inputs at a speed that is almost the same as pressing a button on the keyboard. The InfinityGlove can be wirelessly connected to a computer and is lightweight.

Redefine gaming, rehabilitation and robotic control

The team took two years to develop a working prototype of the InfinityGlove and is also producing the microfibre sensors commercially for other applications.

Professor Lim Chwee Teck, Director of the NUS Institute for Health Innovation & Technology, said, "We were very much inspired by the need to remotely control tasks with just hand gestures. Current commercially available technology is not very responsive and causes a strain on the user's hands after prolonged use due to their bulky setup. We envision that gesture-based control using our lightweight smart gloves can bring us one step closer to a truly immersive interface between humans and machines."

Other applications for the InfinityGlove include hand rehabilitation for patients as gamification motivates patients to continue their [hand](#) exercise regimes through immersive play, and medical professionals can track the progress of their patient's joint movements at the same time.

The NUS team's next steps include extending the glove's capabilities into the world of virtual reality, complex games and robotic control. This technology is being commercialized by a NUS start-

up, Microtube Technologies, co-founded by Prof Lim and his [team members](#), Dr. Yeo Joo Chuan and Dr. Yu Longteng.

Provided by National University of Singapore

APA citation: Researchers develop smart gaming glove that puts control in your hands (2020, August 20) retrieved 28 October 2021 from <https://techxplore.com/news/2020-08-smart-gaming-glove.html>

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