

# Scientists use pixels to ease amputees' pain

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Academics from the School of Computer Science and School of Psychological Sciences have developed a virtual reality system, which gives the illusion that a person's amputated limb is still there.

The computer system created by Dr Stephen Pettifer and Toby Howard of the School of Computer Science, immerses patients into a life-size virtual reality world.

By putting on a headset, patients will see themselves with two limbs. They can use their remaining physical limb to control the movements of a computer-generated limb, which appears in the 3D computer-generated world in the space of their amputated limb.

So for example, they can use their physical right arm to control the movement of their virtual left arm.

Patients have complex hand-eye coordination and can move their fingers, hands, arms, feet and legs. They can also use their virtual limb to play ball games.

Phantom limb pain or PLP is discomfort felt by a person in a limb that is missing due to amputation. Previous research has found that when a person's brain is 'tricked' into believing they can see and move a 'phantom limb', pain can decrease.

So far, five patients living in the Manchester area – including one who has suffered from PLP for 40 years – have used the virtual reality

system over several weeks in a small-scale study.

But this initial project has produced startling results, with four out of the five patients reporting improvement in their phantom limb pain. Some improvements were almost immediate.

The Manchester team's findings were recently presented at a major conference in Denmark on the use of virtual reality for rehabilitation.

Dr Stephen Pettifer, of the School of Computer Science said: "Most people know about 3D graphics and virtual reality from their use in the entertainment industry, in computer games and special effects in films.

"It's very satisfying being able apply the same technology to something that may have a real positive impact on someone's health and well being."

Project leader, Dr Craig Murray of the School of Psychological Sciences, said "Many people who undergo an amputation experience a phantom limb. These are often very painful for the person concerned. They can persist for many years, and are very difficult to treat.

"One patient felt that the fingers of her amputated hand were continually clenched into her palm, which was very painful for her. However, after just one session using the virtual system she began to feel movement in her fingers and the pain began to ease."

Each participant used the system between seven and 10 times over the course of two to three months. Sessions lasted around 30 minutes and involved putting on a special virtual reality headset.

Upper-limb amputees were fitted with a special data glove and had sensors attached to the elbow and wrist joints. Sensors were fitted to the

knee and ankle joints of lower-limb amputees. Head and arm movements were also monitored.

The three men and two women who took part in the study were aged between 56 and 65. The group included three arm amputees and two leg amputees, who had lost limbs between one and 40 years ago.

The University of Manchester research team hopes to include a larger number of patients in their future work in order to identify those most likely to benefit from the virtual reality system they have developed.

Source: University of Manchester

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