

New virtual reality-based exercises to help patients with hand paralysis



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A STROKE often leaves a patient with various degrees of paralysis in different parts of the body. In nearly 80% of cases, either one or both hands of the patient are rendered dysfunctional, at least partially. Movement and the ability to carry out different functions by the hand and fingers are severely restricted.

The most common way to deal with such paralytic impacts in the hands has been to carry out hand exercises, and take physiotherapy sessions. In most cases, these are subjective; progress is very slow and limited, and very often patients themselves lose interest or motivation to continue for a long enough time.

Uttama Lahiri and her team at the Indian Institute of Technology in Gandhinagar, and their collaborators at AIIMS in New Delhi and AMRI in Kolkata, have now developed virtual reality (VR) based exercises for such patients, and have been able to show that these have the potential to offer a motivational exercise environment, thereby, bringing in effective rehabilitation.

Lahiri and her team developed a number of virtual tasks for their patients, very similar in nature to computer games. They car-

ried out their study on six patients, who suffered a stroke, and were admitted to the Civil Hospital in Ahmedabad. The virtual tasks were of two kinds — 'reaching' tasks which involved the basic ability to stretch and move hands to a particular location, and 'coordination' tasks designed to improve the patients' control over their hands, something similar to the simple job of lifting and taking a glass of water to their mouths.

Virtual reality-based exercises to help such patients are not new. However, Lahiri's team added several innovations to get much-improved results. Their VR-systems were attached to haptic devices that gave the users a sense of touch, force, movement or vibrations while performing the tasks. Also, the task environment was individualised while being adaptive to their performance capabilities. As they performed these tasks, the various physiological parameters of the patients, such as electrodermal activity (sweating), were continuously monitored.

The study has so far yielded promising results. The patients showed quick progress in their ability to carry out both kinds of tasks. They also showed lower stress levels while carrying out these tasks.

Lahiri says that one of the most important reasons why this kind of system was effective was the increased interest of the patients. The usual physiotherapy sessions have repetitive and monotonous exercises, and patients very often complain of tiredness or lack of motivation to continue.

In VR-based exercises, however, the patients encounter new environments every time. They also have the ability to select tasks according to their interests. Each task has a



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different difficulty level, just like a computer game. Results showed that there was a progressive reduction in the time taken by patients to complete a task.

Lahiri says that the VR-based exercises have the potential to become an important adjunct to traditional physiotherapy sessions. The portability of the devices allows patients to do these tasks in their homes, while physiotherapists would have the ability to simultaneously supervise multiple patients while giving VR-based lessons.

For your research to be considered for this column, write to the author at amitabh.sinha@expressindia.com