The Challenger is published monthly in Nevada. Nevada's only independent Health/Rehab/Seniors/People With Disabilities, newspaper.

Vol. 28 No. 6 PO Box 530005, Henderson, NV 89053-0005. Phone: 702-496-8198.
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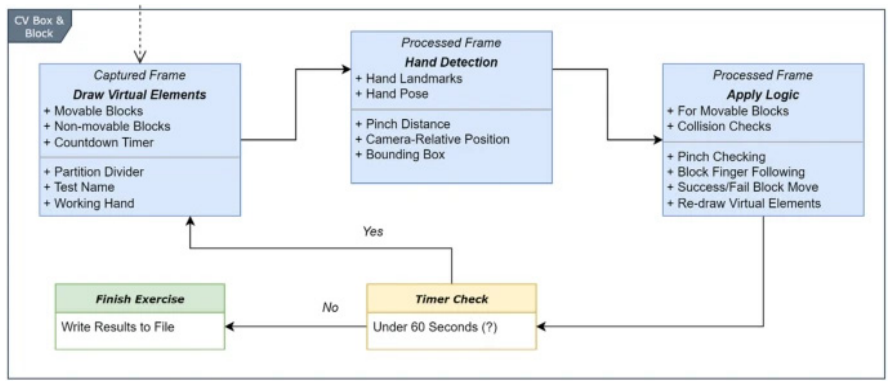
Here Comes Summer!

Hand Dexterities assessment in stroke patients

Scientific Reports



As the stroke rate rises, neurorehabilitation and developing innovative, efficient treatment approaches utilizing virtual reality (VR) and augmented reality (AR) solutions are increasingly important. AR can facilitate the delivery of goal-oriented activities, sensorimotor and performance feedback, and enhanced intervention results. Several studies have revealed that AR/VR might increase patient compliance by promoting their motivation. Including entertaining parts in the treatment, such as those provided by serious games, can be valuable in this direction. Moreover, when equipped with an autonomous headgear, VR allows patients to execute their treatment at home. Most AR/VR systems can monitor hand motions using infrared cameras or inertial measurement unit-integrated controllers. The use of fully immersive VR technology to perform functional evaluation and analyze upper extremity kinematics in post-stroke rehabilitation has not been investigated yet.

There is high scientific reasoning behind the development of AR tests. Using the automatic computing of quantitative measures, it may be possible for healthcare and rehabilitation professionals to measure the patient's performance objectively, thus reducing the inter-rater variability encountered in the conventional assessment.

It may also be a component of a complete home-based virtual evaluation process that patients might utilize to extract objective information on their improvement, providing clinicians with valuable input to adapt treatment regimens. In response to these demands and the rising popularity of telehealth, the development of such VR/AR systems has the potential to serve as an objective clinical assessment tool.

The exploration of virtual BBT started less than a decade ago when Chih-Pin Hsiao et al. developed a digital BBT using a depth-sensing camera, an existing **wooden box and blocks**, and a **host computer**. They aimed to detect and record hand kinematics data to provide clinicians with additional applications of VR-BBT to the test's score.

Two years later, Cho employed non-immersive virtual reality equipment and a depth-sensing sensor to design a VR-BBT to evaluate hand and finger dexterity and validate its efficiency in patients suffering from stroke. Comparing traditional and virtual BBTs demonstrates the viability of converting traditional and unsupervised assessments into a virtual setting. Despite the significant correlations between conventional and VR-BBT in the relative score comparison of affected and non-affected sides, VR-BBT scores were lower than BBT scores. Cho noted that the absence of an actual object is an essential factor that impacts the usability and convenience of virtual reality interactions due to the lack of physical feedback, resulting in different

(continued on page 10)