

# New-game based system with ocular movements

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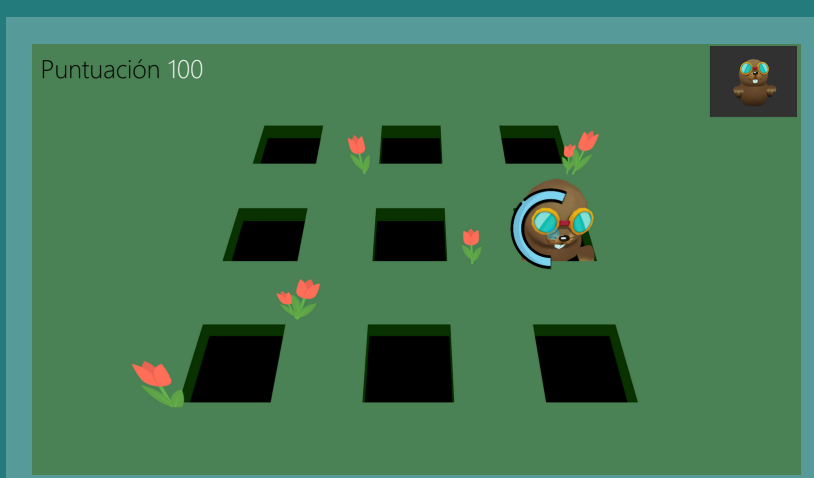
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## INTRODUCTION

Neuroplastic mechanisms in the nervous system could be induced through virtual reality (1) to achieve clinical objectives such as facilitating the recovery process in neurorehabilitation, promoting motivation or improving the adherence to treatment. Currently, our work investigates changes in brain activity related to the practice of eye control of virtual objects. Our previous works in healthy subjects (2-6) confirm that the control of virtual objects with ocular movements enhances brain activity in sensorimotor regions which can be useful to improve the accuracy in the hand. For this reason, we have developed a new-game based system which uses eye-controlled versions of different arcade games.

## METHODS

The subjects are normally involved in 4 weeks interventions with virtual training that only use the eye as an effector (the eye is used to execute the games). For the implementation of the software we use a portable and economic hardware that is composed of a laptop and an eye-tracker dispositive (Tobii 4c-<https://gaming.tobii.com>). During the training period, the participants play five games inspired by classic arcade such as memory, whac-a-mole, adventure game and target shooting. All games are structured by crescent levels of difficulty with a score system, performance visual and auditory feedback, and some of them with a chronometer and/or cutoff time. First, in the memory game the participant has to match pairs of cards by moving a virtual cursor with the eyes. In the whac-a-mole game, the subject has to fix the gaze on the animal that appears in the hole on the screen. Adventure games are one the most complex games due to the character movements you need to practice your visual precision to get to the shelter and dodge obstacles. Finally, target shooting implies more capacity of reaction and velocity since the targets appear suddenly on the screen in different zones.



## CONCLUSION

This new-game based system with ocular movements may be useful in the field of neurorehabilitation to increase the activations in sensorimotor regions in stroke patients with limitations in the affected limbs, without resorting to limb movements and to complement their rehabilitation therapy with a gamified perspective that provides autonomy and motivation.

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El proyecto pertenece al programa Agustín de Betancourt ha sido financiado por el Cabildo Insular de Tenerife al amparo de la Estrategia Tenerife 2030, del Marco Estratégico de Desarrollo Insular (MEDI) del Cabildo Insular de Tenerife y cofinanciado por el Fondo de Desarrollo de Canarias (FDCAN) del Gobierno de Canarias.

