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RetroRewind: A serious game for hand physiotherapy

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BACKGROUND

Here we describe a project that proposes the development of a serious game called RetroRewind. A videogame that ultimately aims to promote adherence to hand physiotherapy techniques by providing a tool that allows performing repetitive therapeutic movements in an engaging manner. Serious games aim to encourage modifications in behavior through the accomplishment of goals at the same time as providing an entertaining experience to the user [1]. This is applicable to physiotherapy, as some of the techniques tend to be tedious to patients given that they must perform constant repetitive movements.

OBJECTIVE

The objective of this project is to create a serious game that can be helpful to overcome the problem of low adherence to hand physiotherapy, a result of many factors, including boredom and lack of motivation. We aim to provide a tool that would give an enjoyable experience for the patient to perform repetitive exercises at home that is usually recommended as part of the process of hand physiotherapy. To support physiotherapy's main goal, which is restoring, maintaining, and maximizing physical strength and functioning [2]. Analysis of needs was carried out to identify the required elements such as easy gameplay, since patients should require little to no training to play the game, keeping the experience engaging by implementing different difficulty levels and finally, keeping score to evaluate hands' motor condition improved over time.

DESCRIPTION OF INNOVATION

Using the Thumb Touch Exercise as the base movement, consisting of touching each one of your fingers with your thumb in a repetitive cycle [3], the videogame RetroRewind was developed. By recreating a selection of classic video games, Snake, Pong, and Pac-Man, since they don't require any training or gaming experience to be played and enjoyed, and most people are already aware of classic games.

To interact with the video game, the player's glove was designed and developed. It essentially is a wearable controller with four push buttons, one on each finger except for the thumb. The thumb acts as the trigger to press each one of the buttons and allow the user to play.

IMPACT

RetroRewind is a serious game that allows performing repetitive therapeutic movements in a fun manner and promoting adherence to treatment. The prototype's functionality was tested by the developing team; however, more testing with subjects who require hand physiotherapy is required.

REFERENCES

1. GF. Bellotti, B. Kapralos, K. Lee, P. Moreno-Ger, and R. Berta, "Assessment in and of Serious Games: An Overview," Advances in human-computer interaction, vol. 2013, pp. 1–11, 2013.
2. Encyclopedia of disability. Thousand Oaks, Calif. ; SAGE, 2006.
3. CentralOrtho, "12 Simple Exercises to Heal Your Injured Hand | Central Orthopedic," Central Orthopedic Group, Aug. 15, 2022. https://centralorthopedicgroup.com/12-simple-exercises-to-heal-your-injured-hand/ (accessed Apr. 10, 2023).