VIRTUAL REALITY FOR MEDICAL TRAINING

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ABSTRACT

The goal of this demonstration is to present an immersive virtual reality environment aimed at training healthcare procedures. The environment was developed to be immersive and interactive and can be executed with the Meta Quest device.

KEYWORDS

Computer simulation; Health education; Simulation training.

1.   Introduction

Competency-based learning has been a prominent topic in discussions in the field of Medical Education, promoting a curricular organization that integrates theoretical knowledge and the development of practical skills essential for professional practice in a balanced manner [1]. In several medical specialties, the clinical skills required are predominantly psychomotor and are acquired through continuous practice. Traditionally, clinical training involved simulations with mannequins, animals, cadavers or direct practice on patients under supervision. However, these traditional methods raise ethical and logistical issues, in addition to generating insecurity in students when interacting with patients for the first time.

In view of these challenges, new techniques are constantly sought to improve students' clinical skills while simultaneously ensuring patient safety. In this context, Virtual Reality (VR) simulators have emerged as a promising alternative for medical training. These simulators allow interactions with virtual environments that mimic the real world, reducing costs and risks associated with traditional methods. In addition, they provide more training possibilities and enable real-time assessment of student performance [5].

This work presents an interactive and immersive virtual environment in which the user can select and modify objects related to a surgical simulation. In the environment, 3 procedure simulations can also be viewed. This application has the potential to replicate the surgical environment and complement the training of clinical procedures.

2.   Objective

The objective of this demonstration is to provide an immersive and interactive simulation in which the user can experience the potential of a simulation aimed at medical training.

3.   Materials and Methods

The virtual environment represents a surgical room, with interactive objects. The environment also features three panels that present videos with examples of simulators developed for medical training developed by the LabTEVE research group. They are:

- SIMTAMI: simulator for training the administration of injectable medications [2];

- ANESTESIM: simulator for training in the administration of spinal anesthesia [3];

- SIMCEC: collaborative simulator for training surgical teams [4].

The virtual environment was developed with the UNITY 3D platform, as were the simulators presented. The application is performed using the Meta Quest device, which allows immersive visualization (Figure 1 and 2). To interact with the virtual environment, the user may utilize the controls; however, their use is unnecessary.

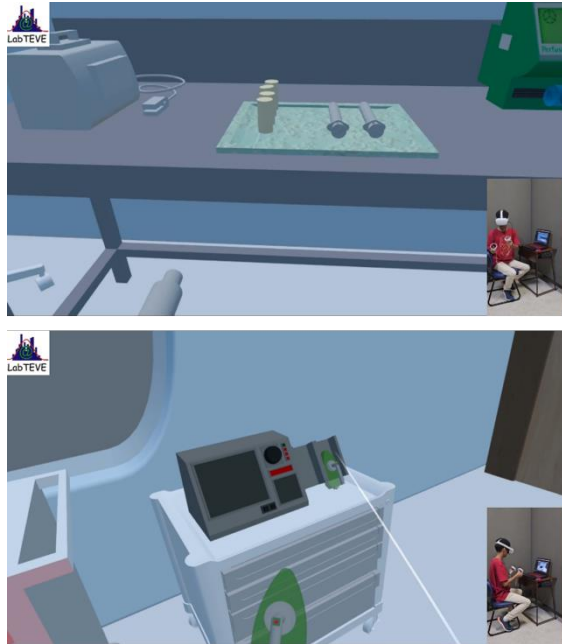**Figure 1.** User interaction with the tool tray (top) and the defibrillator (down).

Figure 2. Overview of the simulation.

4.   Conclusions

One of the main differences between the simulators developed by the research group is their ability to evaluate user actions in real time. In this way, intelligent models work integrated with the simulator and are capable of measuring or classifying user performance when performing the procedure [5].

This demonstration shows the potentiality of virtual reality for medical training. The simulators presented in this demonstration are products registered with the INPI (National Institute of Industrial Property) and are available for licensing.

Acknowledgments

References

[1]   Paiva, P.; Machado, L.; Santos, S.; Romero, R. Potencialidades da Educação em Saúde Baseada em Realidade Virtual. RECIIS - Revista Eletrônica de Comunicação, Informação & Inovação em Saúde, v. 7, p. a540, 2013.

[2]   Machado, L..; Moraes, R.; Valença, A.; Macedo, E.; Paiva, P.; Moura, I. Pesquisa e Desenvolvimento de Simuladores de Realidade Virtual para Saúde com Avaliação Automática do Desempenho do Usuário. In: Neir Paes; Liliane Machado; Ronei Moraes; Ana Maria Valença. (Org.). 10 Anos de Produção do Programa de Pós-Graduação em Modelos de Decisão e Saúde. 1ed.João Pessoa: UFPB, 2019, v. 1, p. 101-120. (Online: https://sig-arq.ufpb.br/arquivos/2020092086cd7118296848a8689608dec/ebook-10anosPPGMDS.pdf)

[3]   Gomes, D. and Machado, L. A Simulator for Regional Anesthesia Training. In *2017 19th Symposium on Virtual and Augmented Reality* (SVR). 2017. 289–292. https://doi.org/10.1109/SVR.2017.44

[4]   Paiva, P.V.F.; Valença, A.M.G.; Moraes, R.M.; Batista, T.V.V.; Machado, L.S. (2018) SimCEC: A Collaborative VR-Based Simulator for Surgical Teamwork Education. Computers in Entertainment 16(2): 3. DOI: https://doi.org/10.1145/3177747

[5]   Moraes, R.; Machado, L.. Assessment Systems for Training Based on Virtual Reality: A Comparison Study. SBC JOURNAL ON 3D INTERACTIVE SYSTEMS, v. 3, p. 1-p. 9-17, 2012. DOI: http://dx.doi.org/10.5753/jis.2012.608