Some novel applications of VR in the domain of health

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Recent progress in virtual reality (VR) technologies make immersion more accessible to everyone, and, in particular, developments aimed at the entertainment industry are being brought into to the domain of health.

The main uses of VR in health are of two forms. First, it is a new method to diagnose and to treat patients; second, it is a new method to train and/or teach healthcare and emergency-response professionals.

There are several reasons for using VR in healthcare. First, virtual environments (VE) are fully under control, so that the user (patient or professional) is then safe from any harm and the session can be interrupted if necessary. Second, there are many instances where placing the user in a real environment would be very hard to do and/or very costly. A major advantage of VR is that this user can instead be immerged in an equivalent artificial/virtual environment through the use of immersive technologies. Third, with regard to teaching, a significant advantage of VR is that it allows one "to bring the body to learning", thereby effectively embedding new knowledge into the muscles.

Below, we describe several uses of VR at our university in the domain of health.

Treatment of phobias

One way to treat phobias is to incite the patient to be confronted gradually with the object of his/her fear. The benefit of VR is that it allows the therapist to be fully in control of the exposition of the patient to his phobia.

For example, to treat the fear of spiders (arachnophobia), the Psychological and Speech Therapy Consultation Center (CPLU) of the university of Liège uses a VE representing a generic apartment with several rooms. In each room, there is one or more spiders, of various sizes, either moving or not. Depending on the degree of comfort of the patient, the therapist may guide the patient to enter or, on the contrary, to avoid some rooms. The same can be done for the fear of snakes and heights.

Training of healthcare and emergency-response professionals

The recent increase in the frequency of major disasters – whether natural disasters, vehicle crashes, or terrorist attacks - forces healthcare professionals to transition the emergency protocol from an individual model to a collective model. This transition implies learning new skills that are specific to these situations. VR allows the learner to evolve in a realistic environment that is nearly impossible to setup in real life.

The Faculty of Medicine of the university of Liège offers the possibility to train emergency-response personnel to develop skills such as accessing victims, triage, and first aid in an EV replicating the 2012 bus crash in the tunnel in Sierre, France.

Interaction with the environment

Usually, interactions with EV are made either through the headset and/or the controllers, but for some applications, these tools are not sufficient. The addition of eye tracking to the headset allows a precise knowledge of what the subject is looking at. Having this information is capital for some diagnostics and treatments, such as for phobias or alcoholism. One should note that most of the controllers that are well suited for entertainment interactions don't allow realistic interactions in other settings, such as those described above, which may constitute a significant obstacle to effective immersion. For example, an adequate combination of hand tracking and of matching between real and virtual objects is required to allow for the realistic grabbing of the virtual objects with the user's real hand.