VIRTUAL REALITY IN HEALTHCARE

exploring new realities!

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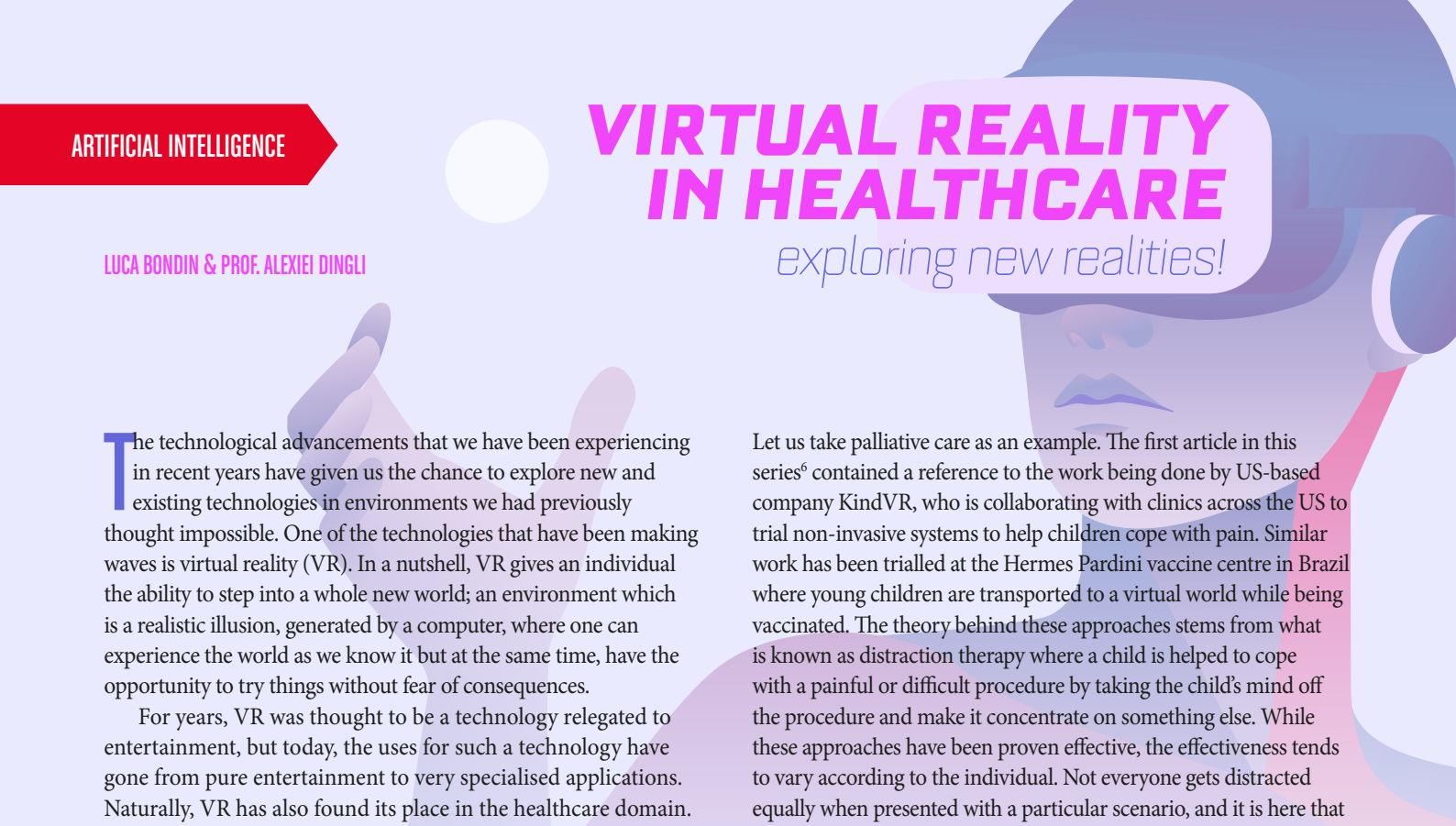

The technological advancements that we have been experiencing in recent years have given us the chance to explore new and existing technologies in environments we had previously thought impossible. One of the technologies that have been making waves is virtual reality (VR). In a nutshell, VR gives an individual the ability to step into a whole new world; an environment which is a realistic illusion, generated by a computer, where one can experience the world as we know it but at the same time, have the opportunity to try things without fear of consequences.

For years, VR was thought to be a technology relegated to entertainment, but today, the uses for such a technology have gone from pure entertainment to very specialised applications. Naturally, VR has also found its place in the healthcare domain.

Perhaps the most evident application of VR in healthcare is its application as a teaching tool. In 1993, Richard M. Satava[1] presented his vision for a VR surgical simulator. Satava suggested that this VR simulator signalled the beginning of an era of computer simulation for surgery. Despite this early vision, it is only now that we are beginning to witness increased acceptance of such VR simulations. While the reasons for this resistance are numerous, the delay is attributed to two main reasons. First, the initial lack of robust scientific evidence to support the use of VR for skills training which gave rise to scepticism about the validity of the approach itself. Second, the lack of knowledge of how to effectively apply simulations to a surgical training program led to early discordant views about its effectiveness.[2] As the levels of acceptance for such approaches continued to grow, other researchers pioneered the use of VR in other areas of healthcare. Buchanan[3] details the use of VR in teaching dentists to carry out restorative dental procedures. Gardner et al.[4] explore the use of VR simulations for obstetrics and gynaecology training procedures. Other applications include orthopaedic surgery, mastoidectomy simulation, training and pre-treatment planning of interventional neuroradiology procedures, and training and assessment of laparoscopic skills. Beyond the confined "hospital" or "clinical" environments, VR environments have been used to train psychiatrists. One such application is currently being developed at the Department of Artificial Intelligence at the University of Malta as a teaching tool to simulate what happens inside the mind of a person with schizophrenia. Similarly, research has looked into teaching carers and educators how to help children on the autism disorder spectrum. Another study carried out by the same department[5] focused on helping professionals step into the daily lives of an autistic child.

The use of VR as a tool for teaching individuals is relatively intuitive. However, what really distinguishes VR as a technology is its adaptability and the manner in which it can easily be deployed in a wide variety of use cases outside the conventional applications.

Let us take palliative care as an example. The first article in this series[6] contained a reference to the work being done by US-based company KindVR, who is collaborating with clinics across the US to trial non-invasive systems to help children cope with pain. Similar work has been trialled at the Hermes Pardini vaccine centre in Brazil where young children are transported to a virtual world while being vaccinated. The theory behind these approaches stems from what is known as distraction therapy where a child is helped to cope with a painful or difficult procedure by taking the child's mind off the procedure and make it concentrate on something else. While these approaches have been proven effective, the effectiveness tends to vary according to the individual. Not everyone gets distracted equally when presented with a particular scenario, and it is here that Artificial Intelligence comes into play through a field of study known as affective computing. In a nutshell, affective computing aims to make computers intelligent enough to adapt their behaviour to how the user is feeling at that point in time. Through the application of affective computing we can, therefore, ensure that if, for example, a child is using a game similar to that developed by KindVR or the one being trialled at the Hermes Pardini centre, the game adapts itself to how the child is feeling making the child feel more comfortable and at ease. For example, if the child feels a burning sensation, then the game changes it's environment to one that justifies the burning sensation by introducing dragons and other such characters. As a consequence of this, the child is more immersed in the game, which results in a better and less painful intervention.

The opportunities that VR and Artificial Intelligence have given us in delivering a better overall experience to patients are truly immense. More important is the fact that we are now starting to appreciate them more and finding innovative ways on how to adopt and implement them in our everyday activities. If this trend does indeed continue, we can guarantee a much better overall experience for patients and care-givers in the upcoming years.

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