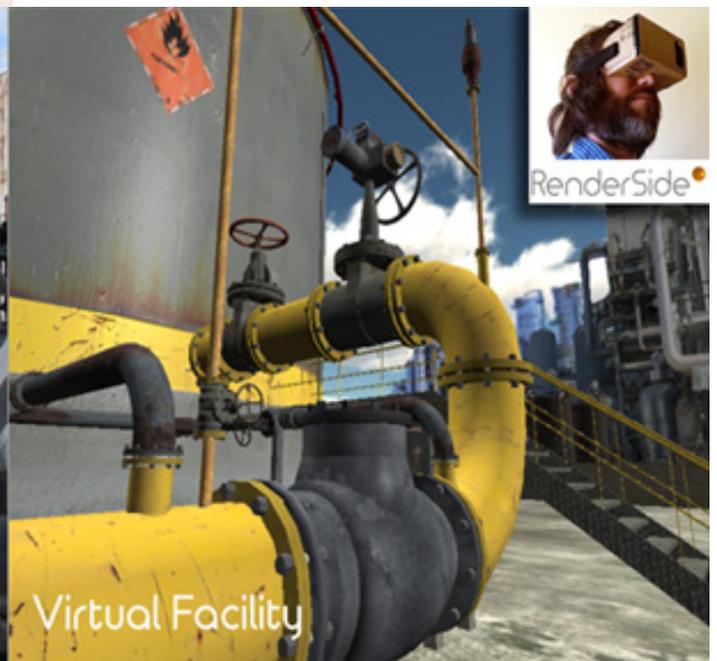


Virtual reality and augmented reality. Emerging technology in industry

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WHAT DO WE UNDERSTAND BY VIRTUAL REALITY AND AUGMENTED REALITY?

The expressions Virtual Reality and Augmented Reality are appearing increasingly and relentlessly in our daily lives, both at a personal and a professional level. The answer to this lies mainly in the fact that our world currently has the necessary development and technological resources for both hardware and software to guarantee an ideal virtual experience. By ideal, we mean effective and profitable products.

I should point out that Virtual Reality and Augmented Reality are not the same although both share the same basic concept, which is none other than that which is Virtual.

Let's just imagine that we are in a storage tank depot within any kind of facility. We see that the different elements comprising this facility remain in the same place day after day and they appear to be working, as they should. This is normal and how it should be, but what if we wanted the different elements comprising the tank depot to be able to communicate with us? In other words, that the facility itself, in real time and on site, could visually inform us of everything that is significant. This is what you get with Augmented Reality, adding "things" to a physical reality through our senses, mainly that of sight, by means of mobile devices which make such an interaction with the medium possible. In graphic terms, this is simply superimposing virtual layers of data, which combine with the reality in order to achieve a better understanding of the same.

Using the same example, if we now find ourselves in the tank depot which has been simulated and graphically recreated in accordance with its physical reality, with a degree of immersion which enables us to feel that we really are in this industrial area and able to interact with it just as we would in real life, then we could say that we are faced with a Virtual Reality. Obviously there are different levels of Virtual Reality

depending on the user's degree of immersion in the virtual world, digitally recreated and possible thanks to the devices enabling this kind of development.

The main difference between these two types of technology is that with Virtual Reality we replace reality with a virtual environment in accordance with the same. While Augmented Reality is achieved by superimposing virtual elements – graphic layers of information – on reality, but not replacing it.

The demand for graphic solutions has grown exponentially in recent years, with the growth rate increasing year after year. The annual growth rate forecast until 2018 is 24.7% CAGR (Compound Annual Growth Rate) 2014-2018, with more than 170 million potential users by the end of that year.

This type of virtual environment development is effective and profitable in numerous areas within a company, with a special mention for its usefulness in training and task assimilation environments. We should remember that 90% of practical training is retained by users as against 10% of what they read.

It is important to realize that we are living in the so-called Age of Entertainment and we should be aware that the way we work today will not be the way demanded by future generations comprising those considered to be "digital natives".

APPLICATION AREAS FOR VIRTUAL TECHNOLOGY

Virtual Reality and Augmented Reality have an extremely wide field of application in very different sectors of professional life. Mainly as a result of this type of technology's capacity for integration in many of the areas which comprise a company. In other words, its application may occur both at management and organizational levels and in the areas of manufacturing and operations as well as in sales and marketing functions.

As a reference, according to the DEV (Asociación Española de Empresas Productoras y Desarrolladoras de Videojuegos y Software de Entretenimiento) those sectors currently demanding the development of virtual content are entertainment, education, tourism and medicine with average annual growth rates estimated at 16.38% between 2015 and 2020. A significant factor is that these growth rates and shares are also envisaged for other sectors, which are currently only just starting to actively incorporate digital technology. One sector, which shows all the signs of taking advantage of the benefits of Virtual Reality, is that which the subject of this article is: the industrial sector in all its categories.



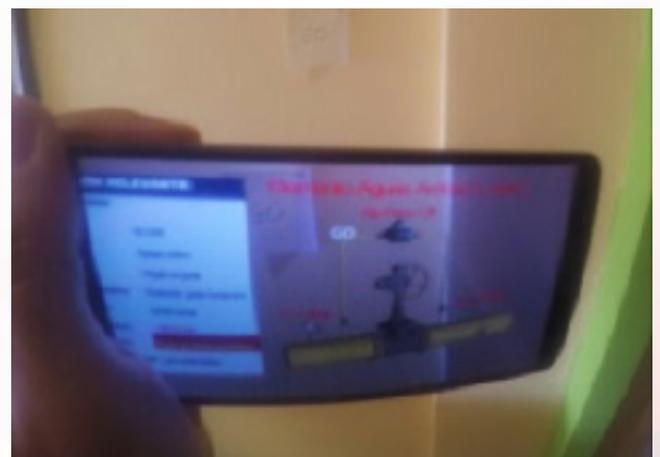
Focusing on the industrial sector as a potential consumer of virtual technology, understanding this to be that which incorporates developments in Virtual Reality and Augmented Reality based on 3D modeling, it is important to highlight one of the aspects where this type of virtual development can bring great benefits. This is none other than reducing the probability of human error to a negligible value. It is well known that the vast majority of accidents are caused by human error, and it is envisaged that virtual technology will be a key factor in controlling this. Therefore, one of the main parameters favorably influenced by the implementation of virtual technology will be the degree of Reliability both of the facility itself and the corresponding organization.

By definition, Virtual Reality and Augmented Reality require interaction with the real world for them to make any sense, so with this in mind the areas of application within an organization are those

where the user intervenes actively. In this case, virtual technology has a high degree of applicability in areas like Training, Maintenance, Operations, Safety and the Environment, and Marketing.

For example, Virtual Reality can be used to place an employee in a virtual environment, which is a true reflection of day-to-day reality where it is possible to assimilate and practice under total immersion those work procedures, which are difficult to reproduce in real life due to cost, resources required, etc. Likewise, an employee may receive guidance by making use of an Augmented Reality application for the maintenance of a certain piece of equipment step by step, “in situ”, with knowledge of its faults record, etc.

The options for applying this type of development are many and varied. It offers a new model not only in the world of training but also in any other area where the user or employee needs the backup of previous knowledge. This new line of action is one of the pillars on which RenderSide stands when it comes to developing 3D graphic and virtual technology projects.



WHAT DO I NEED TO BE ABLE TO USE VIRTUAL TECHNOLOGY?

The first thing you need to know is how to create 3D depth images. This is achieved by stereoscopy, a technique capable of converting three-dimensional

information into an illusion of depth. This processing of 3D images is achieved using so-called Virtual Reality glasses programmed by a computer. These glasses individually project the image next to the eyes, resulting in an independent projection for each eye, thus creating the illusion of 3D depth.

Encompassing the full field of vision using this type of device gives the user a sensation of total immersion in the virtual world created. It should be pointed out that if, instead of a computer-generated world the images were of a real environment processed in accordance with stereoscopic parameters, we would be talking of another emerging concept known as 360° videos or images. In this case, the users would be immersed and situated virtually in a location, which they would be visualizing through Virtual Reality glasses. This is what we are beginning to understand as teleportation.

Returning to the requirements to be able to use virtual technology, you must first be clear of your intentions for acquiring it. In other words, if what you are looking for is a high degree of immersion in the virtual world, the most feasible option in this case would be to use Virtual Reality glasses or a headset. These glasses are just like any other computer peripheral and have the advantage of being designed to encompass the sensory channels of both vision and hearing so the degree of immersion is very high. A



benchmark for this type of glasses is Oculus Rift. The hardware requirements beyond the glasses themselves focus on the graphic requirements of the computer, but these days this is not insurmountable.

If you are looking for a lesser degree of immersion, for example where you only need the employee to identify a specific area or item of equipment in a facility as real and you only want them to be able to “play” when relocated or even at home, the best device to use will be their own cellphone and using specific glasses. These glasses are a simple tool for locating the cellphone in its interior, at a certain distance from the eyes, without processing any type of image. Unlike others, it is the cellphone itself, which undertakes this functionality. Obviously not all cellphones are able to support this technology but it is just a question of time. A benchmark for this type of glasses is Cardboard.

Leaving aside stereoscopic concepts, it is possible to recreate virtual environments, with all the functions you may require, without entering into the concept of Virtual Reality as such. In other words, there will always be the option of all types of simulators available to be used via any computer. At this point, we should discuss another term, which is increasingly being used, the so-called Serious Game. This concept encompasses all those games which are not designed for the world of entertainment, but whose design and configuration focus on training in other types of industry.

Turning our attention to Augmented Reality, current requirements are fewer at the level of the devices required. It is true that you can also consider the use of specific glasses to superimpose virtual layers onto reality, which was the idea behind Google Glass. There are a multitude of projects relating to the implementation of Augmented Reality in different formats and scenarios, but in this particular case, we are going to look at what is currently immediately applicable.

The main requirement to be able to employ Augmented Reality developments, for practical purposes, is to use either a cellphone or a tablet. Using this type of device, you can capture knowledge and

information about the medium, for example, what a specific machine knows about its functioning and to show this in real time via a cellphone or a tablet.

All the above goes to show that virtual technology is no longer science fiction but has become real science available to all those who wish to use it.

ON TO THE NEXT INDUSTRIAL GENERATION

Virtual technology is an integral part of the digital enablers making up the recently denominated Industry 4.0. This new concept refers to the fourth industrial revolution, consisting of the introduction of digital technologies into industry. Thus Virtual Reality and Augmented Reality make it possible for industry to realize its full potential. As suggested by RenderSide, the aim of this new Industry 4.0 is to establish a perfect link between the real and the virtual in order to create intelligent industry or a Smart Factory. A term, which can be included in what is known as Smart City.

It cannot be denied that virtual technology is here to stay, since nowadays it is becoming possible to compare and contrast the resulting benefits with the statement of income in the different organizations, which enjoy this type of developments. In short, after tightening the links between Virtual Reality and Augmented Reality and industry, and as something, which is inherent to human nature, we are moving towards the next step where we are becoming aware of the world, which surrounds us, and taking advantage of available resources to improve ourselves. ■

