A virtual scene with conservation objects with different illuminants and colour management.

Francisco Diaz-Barrancas,[1,*] Halina C. Cwierz,[1] Pedro J. Pardo,[1] Angel Luis Perez,[2] Maria Isabel Suero[2]

1 Department of Computer and Network Systems Engineering, University of Extremadura, Centro Universitario de Mérida, C/Santa Teresa de Jornet 38, Mérida E06800, Spain

2 Department of Physics, University of Extremadura, Facultad de Ciencias, Avda. de Elvas s/n, Badajoz E06071, Spain

*Corresponding author: frdiaz@unex.es

INTRODUCTION

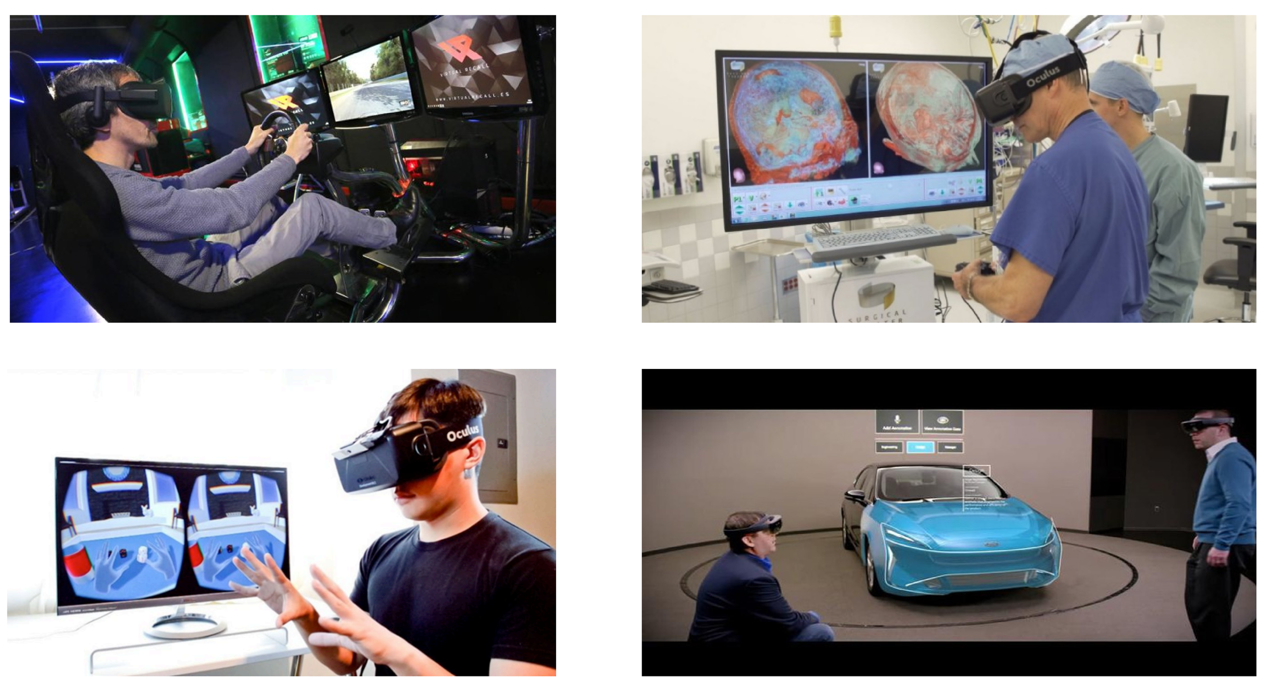


Fig. 1. Applications of Virtual Reality

Virtual reality is growing very fast. Different sectors are taking over this technology in order to provide services to its users, for example, the video game sector. Another sector that is beginning to incorporate virtual reality is archaeology, restoration and conservation of objects. However, rarely is the quality of the virtual reality image treated with special care.

METHODOLOGY

Fig. 2. Tele spectroradiometer measure

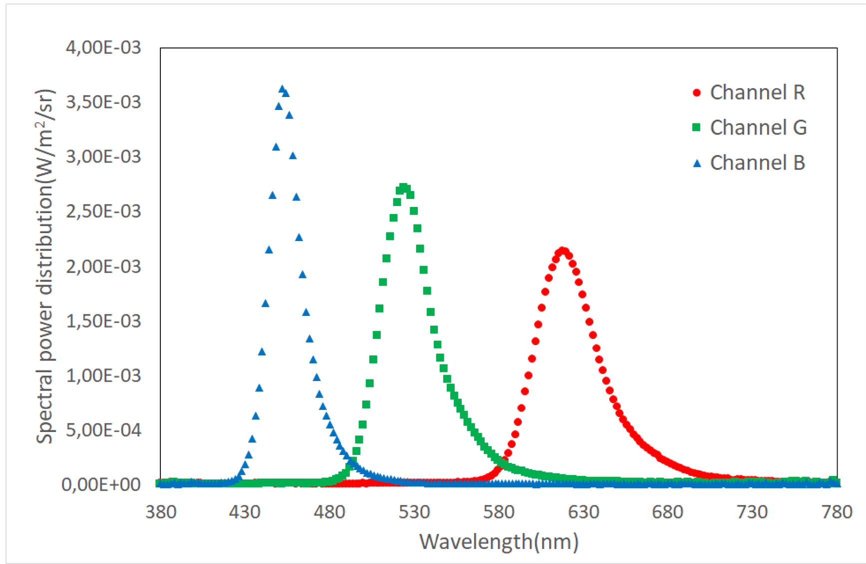
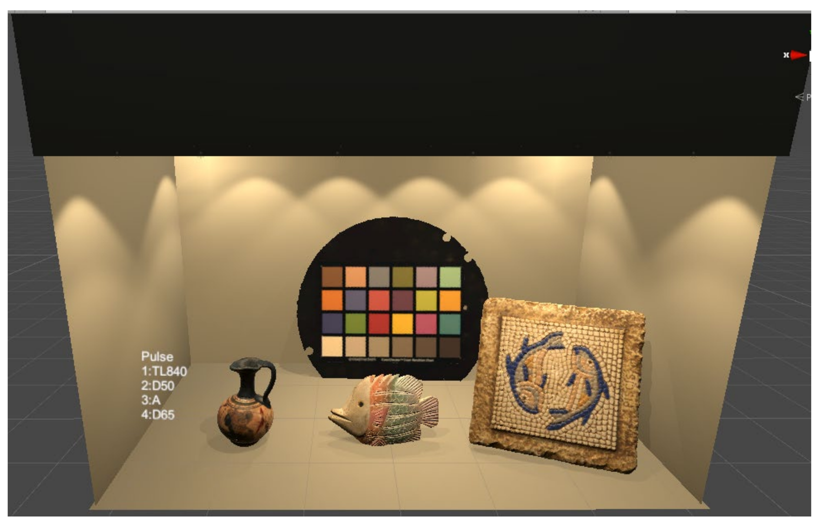


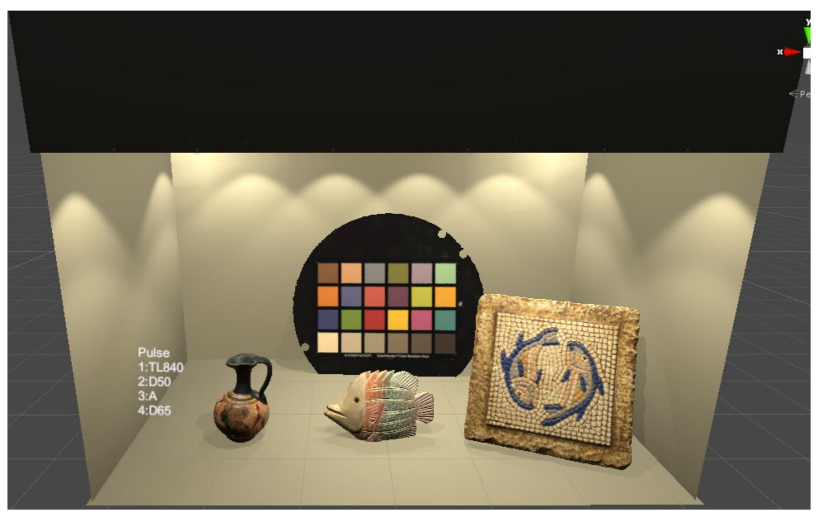
Fig. 3. Spectral Power Distribution

We introduced a Color Management System (CMS) within the virtual reality software whose native color space is RGB. The starting point was the chromatic characterization of two commercial HUD display devices (Oculus Rift CV1 and HTC Vive) and the definition of the colorimetric profiles associated with these devices. Then, a third part color management library (LittleCMS) was introduced into the colorimetric transformation chain made by the VR software. With these two elements is was then possible to make a correct color management in digital images without changing the color of the light source used to illuminate the virtual reality scene. As a step of further improvement, mathematical functions have been implemented in the VR software to allow the calculation of tristimulus values for any light source characterized by its spectral power distribution.

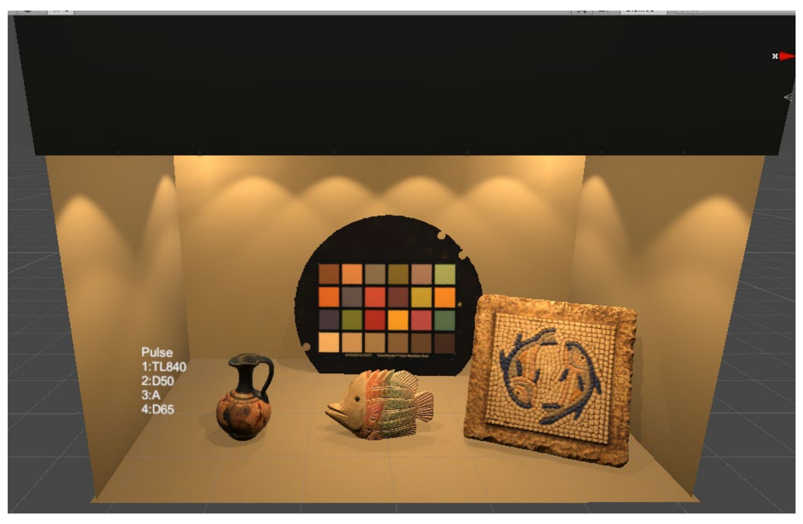
RESULTS



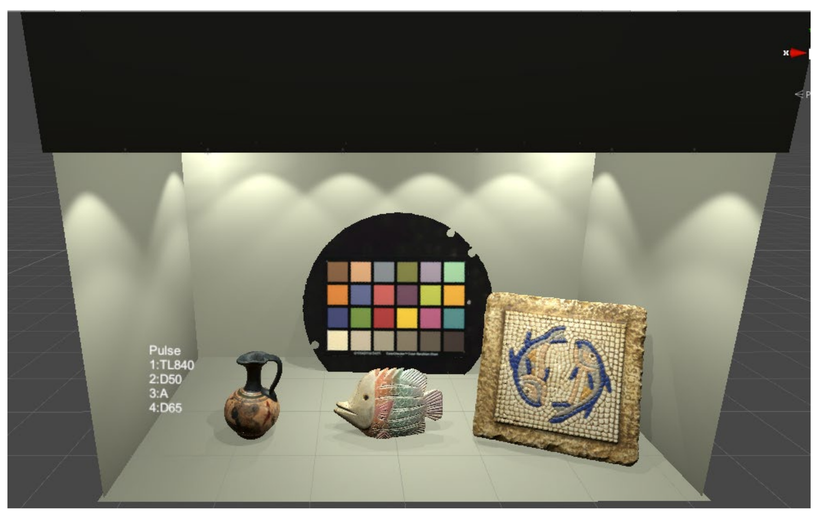
TL84 light source



D50 light source



A light source



D65 light source

In this work several virtual scenes with different archaeological objects and different simulations of light sources (TL84, D65, D50, A) are proposed, with which it is intended to observe these elements in different light conditions and color management technics.

CONCLUSIONS

Color Management	Light Source	$\overline{\Delta RGB}$			$\overline{\Delta XYZ}$			$\overline{\Delta E00}$
		R	G	B	X	Y	Z	
	TL84	2.7	2.4	1.8	0.6	0.5	0.3	2.4
ICC Profile Color	D50 Simulator	1.1	1.0	0.6	0.3	0.1	0.4	0.9
	A Simulator	1.6	1.5	4.0	0.4	0.1	0.4	3.5
	D50 Illuminant	0.6	0.4	0.3	0.3	0.2	0.2	0.5

Fig. 4. Average color differences with Color Management

In the table we can see the average error of the chromaticity coordinates RGB and XYZ.

The values show that the results obtained are good. In later works we will include ICAM techniques for the management of visual appearance in virtual scenes.

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