

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

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## Abstract

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.

It is for this reason that we aimed to improve this perception of realism by improving the reproduction of color in the virtual reality environment. We introduced a Color Management System (CMS) within the virtual reality software whose native colour 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 colour management library (LittleCMS) was introduced into the colorimetric transformation chain made by the VR software. With these two elements it was then possible to make a correct colour management in digital images without changing the colour 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. Subsequently, we applied a colour transformation from CIE XYZ 1964 colour space to the native RGB colour space of the VR software through the ICC profiles and the color management system.

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.

**Keywords:** virtual reality, conservation 3D objects, light sources, color management.