

# Improvement of realism sensation in virtual reality scenes applying spectral and colour management techniques

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## 1. PRELIMINARY STUDIES



Fig.1. Comparative images of real and virtual objects from a previous work. JOSA A 35 (4), B130-B135

In that study, several aspects related to the visual quality of the image were analysed, such as geometry, lighting, shading and colour.

The results indicated that the level of realism reached today is significant and the factor that most influenced this sense of realism is the colour.

## 3. LIGHTING SIMULATIONS

**TL84**

**D50**

**A**



## ICC PROFILE MANAGEMENT



## HYPERSPECTRAL MANAGEMENT



We have implemented in the VR software mathematical functions to allow the calculation of tristimulus values for any light source characterized by its spectral power distribution and any object colour characterized by hyperspectral texture.

## 2. COLOUR MANAGEMENT TECHNIQUES AND PROFILE ICC



Fig.3. Experimental Set-up

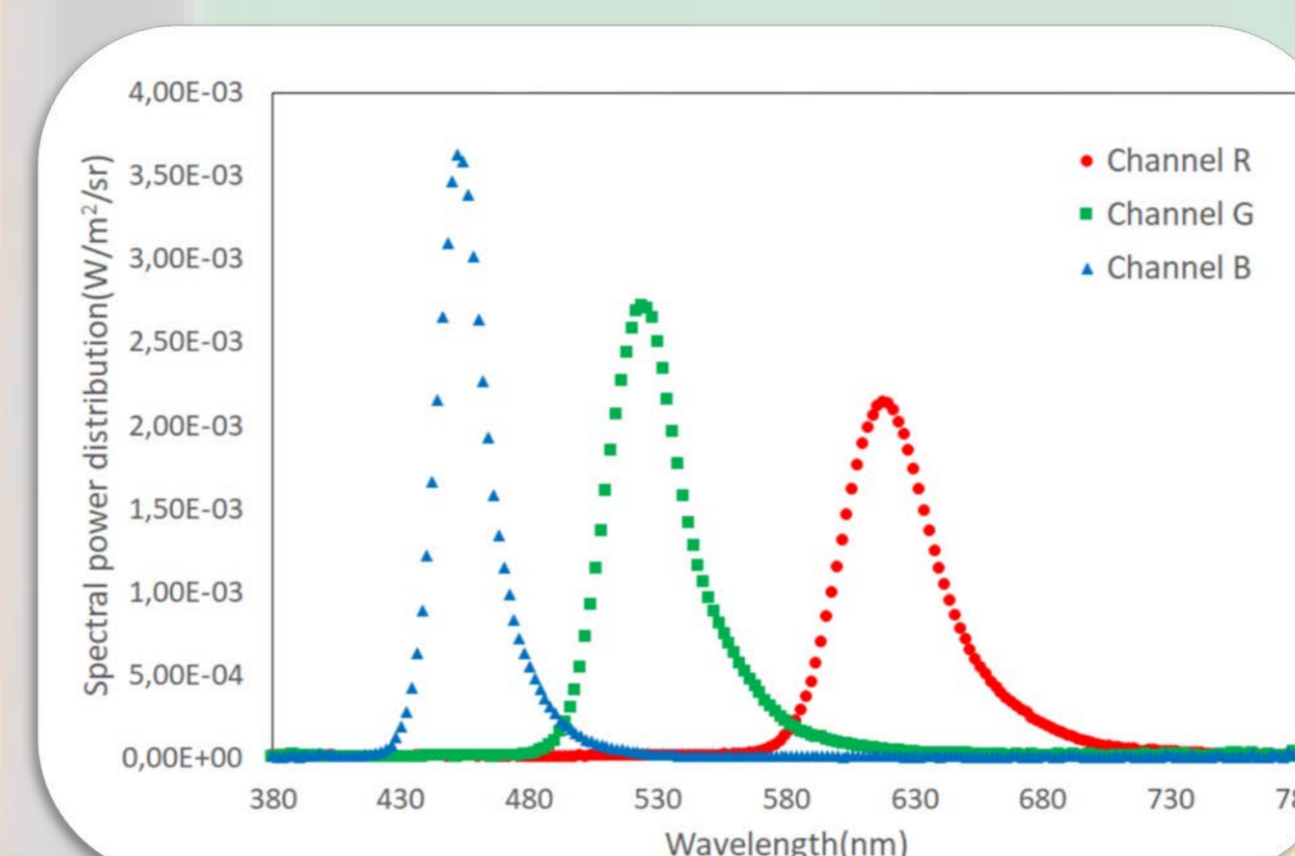


Fig.4. Spectral power distribution of RGB channels at 255 DAC value.



Fig.5. Digital image with color profile embedded without (left) and with (right) color management applied.

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.

## 4. 3D RECONSTRUCTION WITH HYPERSPECTRAL INFORMATION

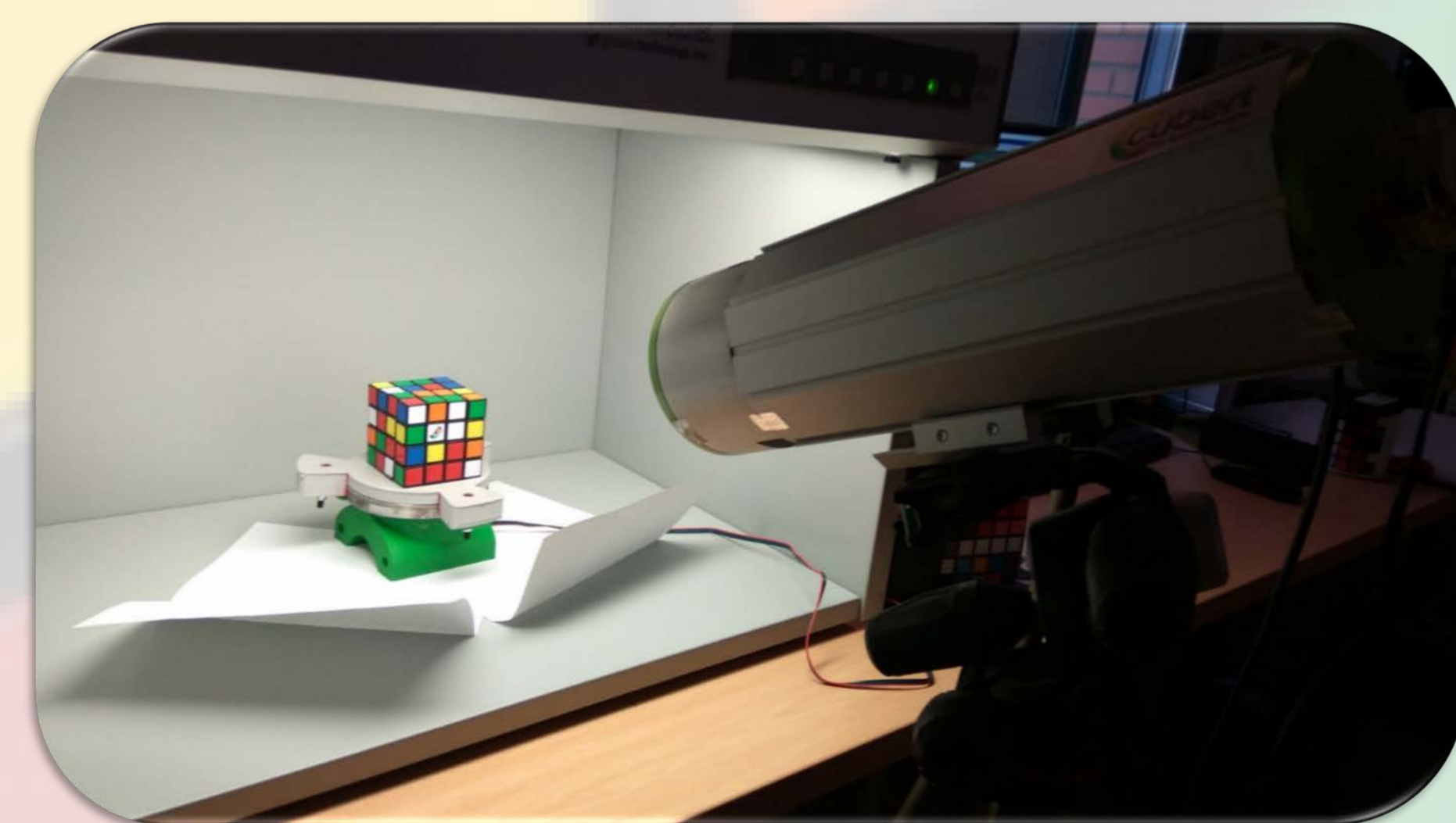


Fig.8. Experimental set-up for image capture



Fig.9. Point cloud reconstruction.



Fig.10. Mesh reconstruction with grayscale color.



Fig.11. Mesh reconstruction with hyperspectral information.

### ACKNOWLEDGEMENTS

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