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Hyperspectral textures for a better colour reproduction in virtual reality

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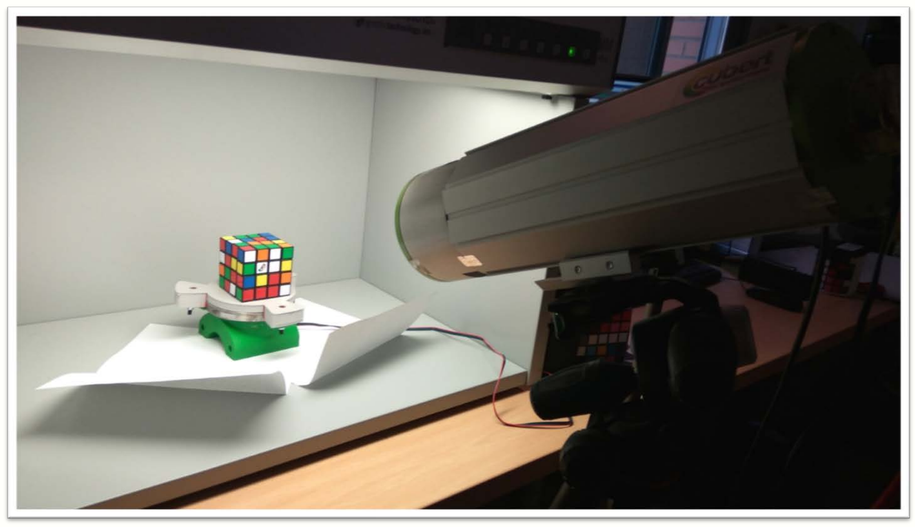
1. PRELIMINARY STUDIES

Preliminary studies gave us good scores in VR realism sensation; however we can still improve aspects such as color fidelity to improve this sensation of realism.

2. METHODOLOGY



Scanning 3D objects and measuring the spectral reflectance with a hyperspectral camera and a telespectroradiometer, we can add spectral information to the 3D model to modify their color.

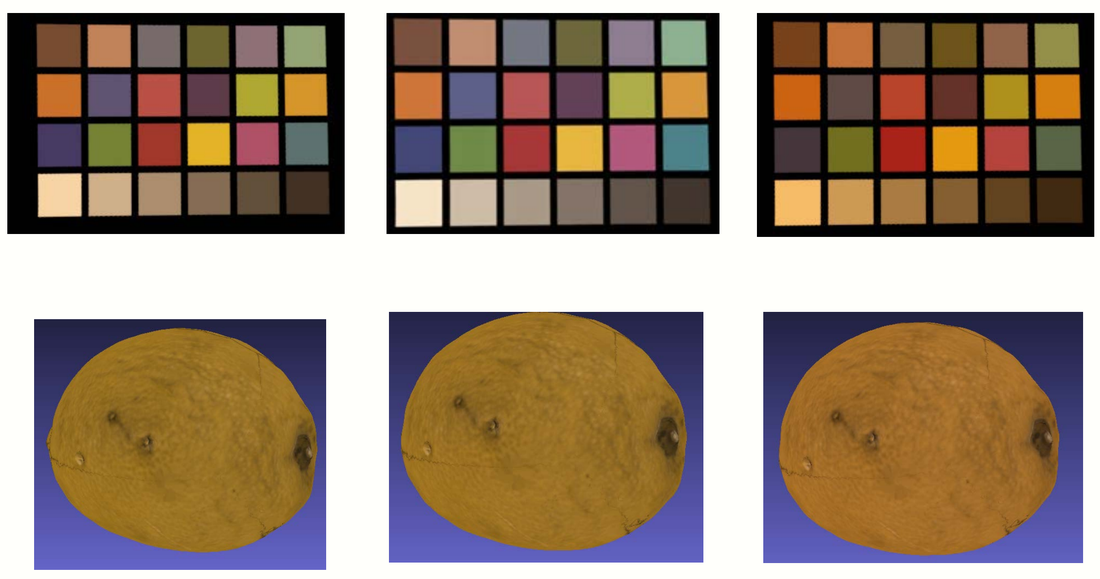
3.COLOR MANAGEMENT

We have implemented mathematical functions in the VR software to allow us to calculate the tristimulus XYZ values of any light source, characterized by its spectral power distribution, and any 3D object, characterized by its hyperspectral texture.

TL84 **D50** **A**

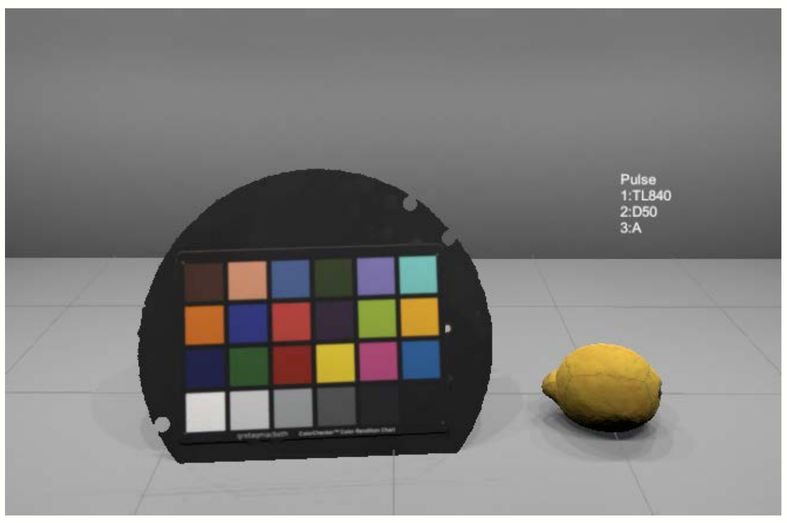
ICC PROFILE MANAGEMENT

HYPERSPECTRAL MANAGEMENT



4. RESULTS AND CONCLUSIONS

Finally, we have applied all this mathematical methods to a real 3D object model.



Numerical results are shown in this table.

Colour Management	Light Source	$\overline{\Delta RGB}$			$\overline{\Delta XYZ}$			$\overline{\Delta E00}$
		R	G	B	X	Y	Z	
ICC Profile Colour	TL84	2.7	2.4	1.8	0.6	0.5	0.3	2.4
	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
Spectral Calculations	TL84	1.3	0.7	1.5	0.3	0.2	0.2	1.4
	D50 Simulator	0.7	0.4	0.6	0.2	0.1	0.2	0.6
	A Simulator	0.7	1.3	3.5	0.2	0.1	0.3	2.3
	D50 Illuminant	0.5	0.4	0.2	0.2	0.2	0.2	0.5

We can conclude that it is possible to obtain an improvement in colour reproduction at virtual reality scenes through the application of hyperspectral textures obtained from hyperspectral multi-view images.

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