COLOR MATCH TOLERANCES OF CHROMATIC FILTERS FOR STEREOVISION TESTING PURPOSES

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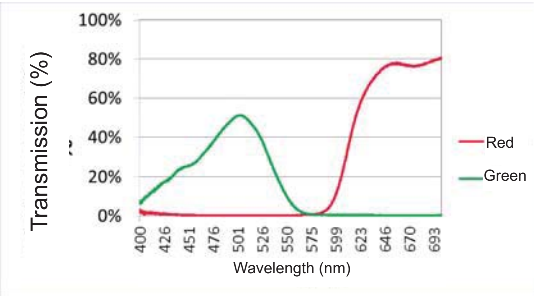
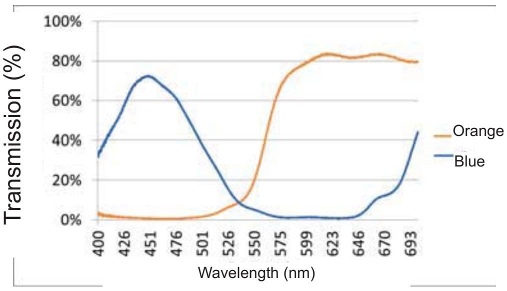
EIROPAS REĢIONĀLĀS ATTĪSTĪBAS FONDS

EIROPAS SAVIENĪBA

Stereovision is an ability of fusion of two images (of each eye) into one percept which result in enhanced depth perception. Nowadays this skill is widely used in visual activities like binocular microscopy and 3D media. There is a variety of methods to divide the signals of each eye and to produce a stereoscopic sensation. Hereby, our interest is in splitting technique, which deals with two spectral filters. Color sensation can differ in population and it is important to quickly and efficiently fix the color filter pairs so they can be used in stereo tests and binocular balance tests. We try to introduce a methodology for easy and guided characterization of filters and stimuli color for different projection devices (CRT, LCD, OLED).



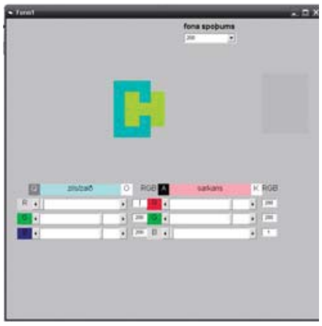
Spectral transmission of filter for googles No1.



Spectral transmission of filter for googles No3.

LCD		CRT		Ipad	
RGB values	CIE Y, x,y	RGB values	CIE Y, x,y	RGB values	CIE Y, x,y
128	31.0; 0.301; 0.312	132	30.08; 0.319; 0.362	145	30.8; 0.314; 0.333
170	49.2; 0,306; 0.321	168	49.2; 0.323; 0.365	178	50.1; 0.314; 0.334
200	82.6; 0.314; 0.328	219	82.9; 0.331; 0.361	218	82.7; 0.315; 0.335
220	92.5; 0.322; 0.339	239	92.7; 0.330; 0.368	232	92.3; 0.313; 0.333

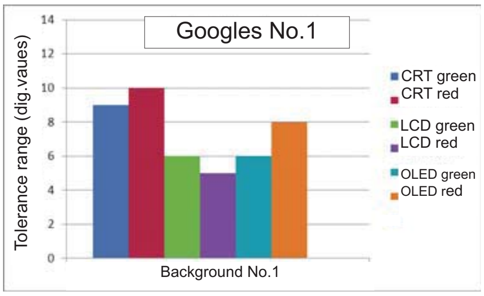
Isoluminance digital values for each monitor type identified using Konika Minolta CS100A . CIE Y units ar ein cd/m^2.

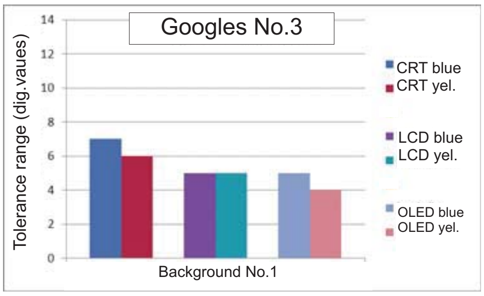


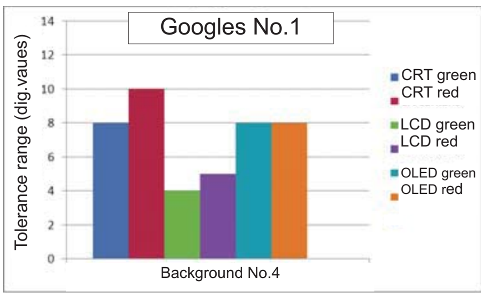
Software for tolerance identification.

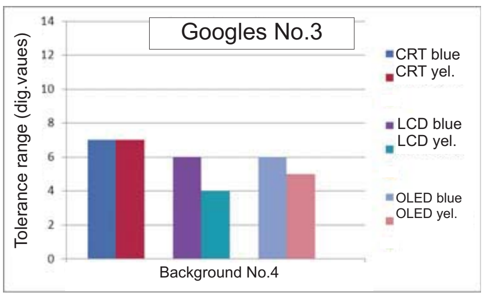
Ten pairs of commercially available gel filters were chosen for experiment. Filter combinations comprised yellow and red against the blue and green filters. Matching experiment started with each eye individually. Subject`s task was to match the chromatic value of test stimuli on the grey backgrounds until one disappears. Three brightness levels were chosen for match procedures. When the match is found the subject is asked to find the minimum and maximum values of the match range.

Only 4 best googles were selected for later phychophysical tolernace range experiment.









Results show that filters with completely divided spectra (No.1) (fig.1) produce more narrow color tolerances then mixed spectra filters (No.3). Match procedure depend on spectral composition of projection device and in many cases all primaries (R, G, B) should be engaged to completely vanish the stimuli. Our aim is to find the unique filter pair for many devices, when match procedure is done using minimal set of primaries.

Conclusions

Color balancing procedure can be reduced to simultaneous change of red and green monitor channels for red filters, and blue and green monitor channels for cyan/green filters. Largest tolerance ranges are obtained for the CRT type display, while lowest are for the LCD display. Minimal tolerance value is +/-4 digital values, acceptable for all subjects of the experiment.

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