Supplementary Data

Color and Texture Analysis of Textiles Using Image Acquisition and Spectral Analysis in Calibrated Sphere Imaging System-I

Nibedita Rout [1], George Baciu[2], Priyabrata Pattanaik[1], K. Nakkeeran[3],* and Asimananda Khandual[4],*

[1] School of Electronics, ITER, S'O'A University, Bhubaneswar-751030, Odisha, India
[2] Department of Computing, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China
[3] School of Engineering, Fraser Noble Building, University of Aberdeen, Aberdeen AB24 3UE, UK
[4] Department of Textile Engineering, OUTR (Former CET), Bhubaneswar -751029, Odisha, India
* Correspondence: k.nakkeeran@abdn.ac.uk (K.N.); asimte@cet.edu.in (A.K.); Tel.: +91-9658728145 (A.K.)

Abstract: Numerous imaging applications and analyses demand human perception, and color space transformation of device-dependent tri-band color interpretation (RGB) to device-independent CIE color space standards needs human intervention. The imaging acquisition environment, theoretical conversion errors, viewing geometry, well-defined illumination uniformity, and calibration protocols limit their precision and applicability. It is unfortunate that in most image processing applications, the spectral data are either unavailable or immeasurable. This study is based on developing a novel integrating sphere imaging system and experimentation with textiles' controlled variation of texture and color. It proposes a simple calibration technique and describes how unique digital color signatures can be derived from calibrated RGB derivatives to extract the best features for color and texture. Additionally, an alter-ego of reflectance function, missing in the imaging domain, is suggested that could be helpful for visualization, identification, and application for qualitative and quantitative color-texture analysis. Our further investigation revealed promising colorimetric results while validating color characterization and different color combinations over three textures.

[Figure S1. Proximity textures : 20 kinds of fabric from the same cotton fibres (only texture is varied in close proximity by spinning for making yarn and weaving for the fabric development)]

23 fab01

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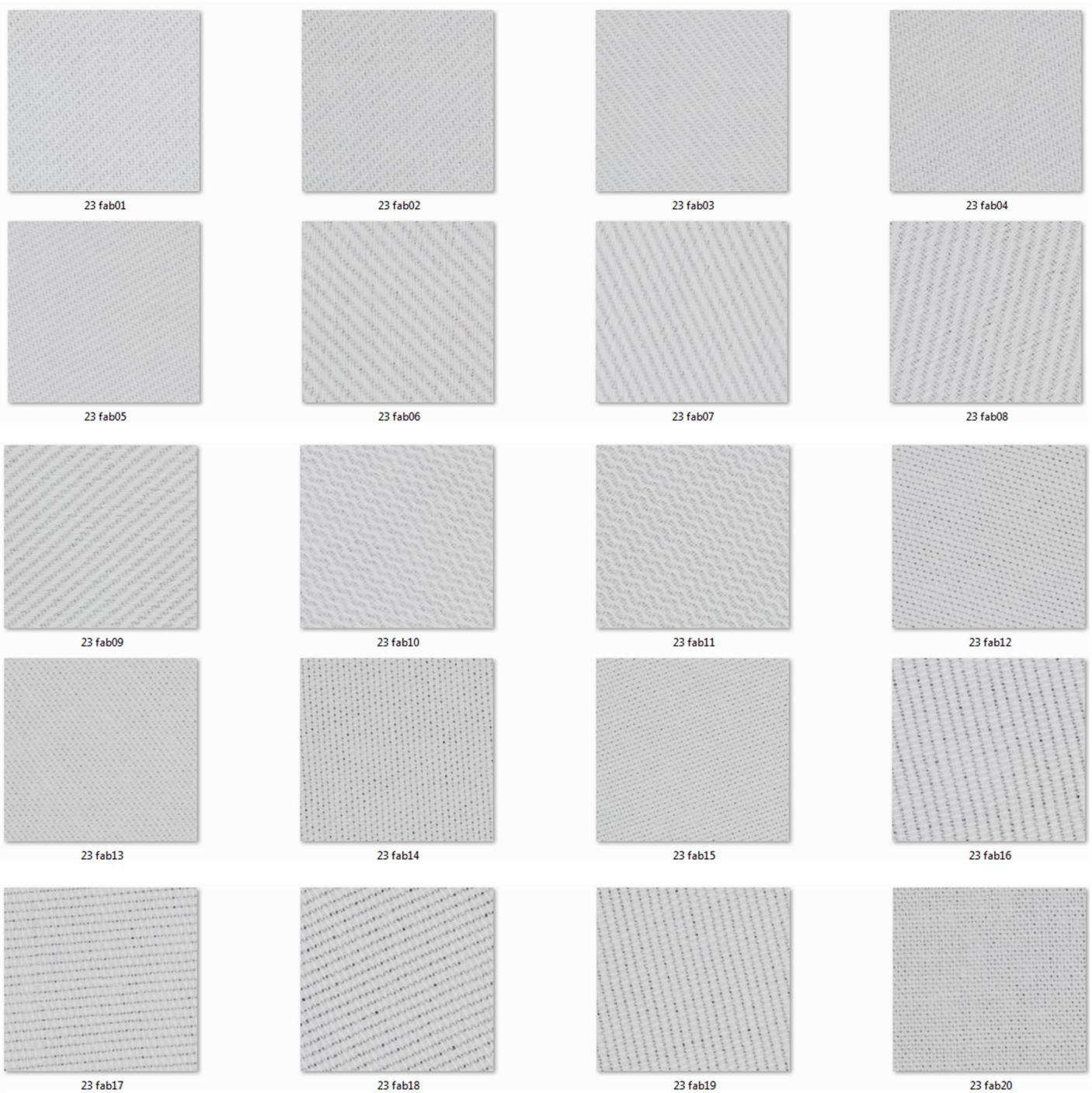
[Table S1. Calibrated RGB Readings of 20 fabric samples]

	R	G	B	Intensity	r	g	b	rg	rb	gb	rgb
White Calibration plate	242.133	243.864	242.999	242.999	1.000	1.000	1.000	1.000	1.000	1.000	1.000
sample 1	212.042	212.471	214.420	212.978	0.876	0.871	0.882	0.763	0.773	0.773	0.673
sample 2	205.926	205.990	207.990	206.635	0.850	0.845	0.856	0.718	0.728	0.728	0.615
sample 3	207.632	207.632	209.616	208.293	0.858	0.851	0.863	0.730	0.740	0.740	0.630
sample 4	205.118	205.115	207.116	205.783	0.847	0.841	0.852	0.713	0.722	0.722	0.607
sample 5	207.305	207.305	208.457	207.689	0.856	0.850	0.858	0.728	0.734	0.734	0.624
sample 6	207.205	207.179	207.477	207.287	0.856	0.850	0.854	0.727	0.731	0.731	0.621
sample 7	209.289	209.289	210.349	209.643	0.864	0.858	0.866	0.742	0.748	0.748	0.642
sample 8	206.337	206.337	206.653	206.442	0.852	0.846	0.850	0.721	0.725	0.725	0.613
sample 9	207.295	207.295	209.161	207.917	0.856	0.850	0.861	0.728	0.737	0.737	0.626
sample 10	208.066	208.066	209.010	208.381	0.859	0.853	0.860	0.733	0.739	0.739	0.631
sample 11	206.000	206.041	206.091	206.044	0.851	0.845	0.848	0.719	0.722	0.722	0.610
sample 12	203.539	203.539	205.488	204.188	0.841	0.835	0.846	0.702	0.711	0.711	0.593
sample 13	205.340	205.340	205.340	205.340	0.848	0.842	0.845	0.714	0.717	0.717	0.603
sample 14	201.459	201.464	201.803	201.575	0.832	0.826	0.830	0.687	0.691	0.691	0.571
sample 15	205.244	205.246	205.282	205.257	0.848	0.842	0.845	0.713	0.716	0.716	0.603
sample 16	204.727	204.728	206.689	205.381	0.846	0.840	0.851	0.710	0.719	0.719	0.604
sample 17	205.376	205.376	205.570	205.441	0.848	0.842	0.846	0.714	0.718	0.718	0.604
sample 18	202.741	202.741	203.054	202.845	0.837	0.831	0.836	0.696	0.700	0.700	0.582
sample 19	203.762	203.768	204.079	203.870	0.842	0.836	0.840	0.703	0.707	0.707	0.591
sample 20	198.767	198.767	199.928	199.154	0.821	0.815	0.823	0.669	0.675	0.675	0.550

[Table S2. %R Reflectrance　 & CIE XYZ, L*a*,b* readings of 20 fabric samples]

Sample No.	%R 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
360	62.34	64.11	63.97	64.22	63.28	66.59	63.69	67.03	65.83	63.89	62.07	61.45	62.57	63.77	64.17	66.58	61.51	64.85	61.63	61.52
370	63.62	65.36	64.98	65.46	64.66	67.80	64.89	68.11	66.89	65.25	63.11	62.82	63.56	64.78	64.94	67.40	62.68	65.69	62.39	62.44
380	65.46	67.06	66.44	67.14	66.48	69.47	66.47	69.70	68.45	67.02	64.70	64.72	65.03	66.32	66.35	68.78	64.33	67.03	63.59	63.87
390	66.73	68.31	67.52	68.31	67.77	70.77	67.62	70.71	69.51	68.33	65.78	66.16	65.99	67.36	67.32	69.86	65.56	67.97	64.51	64.91
400	67.88	69.58	68.48	69.44	68.98	71.88	68.65	71.66	70.62	69.46	66.84	67.43	66.92	68.22	68.20	70.69	66.66	68.91	65.39	66.02
410	68.44	70.26	68.96	69.97	69.75	72.48	69.21	72.13	71.18	70.29	67.43	68.40	67.45	68.81	68.67	71.21	67.48	69.33	65.87	66.71

420	68.86	70.75	69.34	70.43	70.34	73.03	69.60	72.60	71.59	70.85	67.88	68.98	67.93	69.14	69.11	71.53	67.92	69.69	66.18	67.21
430	69.52	71.38	69.93	71.13	70.97	73.60	70.16	73.21	72.27	71.47	68.43	69.80	68.38	69.60	69.45	72.06	68.58	70.14	66.62	67.70
440	69.37	71.33	69.81	70.98	71.08	73.56	70.17	73.14	72.16	71.54	68.45	69.97	68.27	69.52	69.37	71.96	68.47	70.04	66.49	67.63
450	69.76	71.77	70.21	71.45	71.47	74.01	70.55	73.48	72.53	71.93	68.74	70.40	68.63	69.84	69.70	72.30	68.93	70.18	66.76	68.03
460	70.00	72.05	70.45	71.82	71.77	74.25	70.79	73.71	72.78	72.31	69.00	70.65	68.84	70.12	69.87	72.46	69.16	70.53	66.92	68.29
470	69.94	72.02	70.37	71.76	71.90	74.25	70.84	73.67	72.77	72.28	68.97	70.73	68.81	70.03	69.83	72.40	69.14	70.44	66.83	68.24
480	70.12	72.21	70.57	71.98	71.98	74.48	70.98	73.74	72.92	72.47	69.19	71.00	68.88	70.12	69.99	72.53	69.34	70.53	66.95	68.34
490	70.08	72.20	70.43	71.95	72.03	74.46	70.92	73.74	72.84	72.47	69.11	71.01	68.89	70.06	69.85	72.47	69.25	70.50	66.89	68.33
500	70.28	72.35	70.64	72.10	72.27	74.68	71.15	73.94	73.04	72.64	69.26	71.21	68.97	70.22	70.03	72.59	69.45	70.62	66.97	68.46
510	70.33	72.43	70.62	72.18	72.35	74.64	71.19	73.89	73.10	72.70	69.32	71.27	69.00	70.23	69.99	72.63	69.48	70.59	66.95	68.50
520	70.29	72.42	70.67	72.15	72.39	74.63	71.16	73.90	73.08	72.73	69.30	71.37	68.99	70.12	69.96	72.61	69.38	70.58	66.98	68.46
530	70.29	72.39	70.64	72.14	72.32	74.65	71.19	73.85	73.03	72.71	69.31	71.39	68.98	70.10	69.99	72.59	69.43	70.52	66.91	68.44
540	70.27	72.38	70.66	72.21	72.38	74.69	71.14	73.89	73.13	72.72	69.34	71.38	69.00	70.16	70.03	72.59	69.51	70.53	66.90	68.49
550	70.24	72.32	70.62	72.14	72.40	74.68	71.10	73.87	73.03	72.72	69.27	71.34	68.91	70.10	69.94	72.55	69.44	70.49	66.83	68.40
560	70.28	72.37	70.62	72.17	72.45	74.71	71.16	73.87	73.04	72.74	69.30	71.38	68.93	70.12	69.95	72.57	69.44	70.53	66.86	68.43
570	70.31	72.40	70.68	72.23	72.47	74.77	71.16	73.85	73.12	72.74	69.34	71.47	68.98	70.12	69.96	72.57	69.48	70.52	66.87	68.46
580	70.28	72.39	70.64	72.21	72.44	74.74	71.13	73.84	73.05	72.71	69.28	71.46	68.93	70.05	69.91	72.49	69.45	70.46	66.82	68.41
590	70.31	72.44	70.70	72.25	72.49	74.72	71.15	73.85	73.10	72.73	69.31	71.43	68.91	70.11	69.95	72.57	69.48	70.47	66.87	68.41
600	70.21	72.28	70.59	72.08	72.35	74.65	71.01	73.73	73.02	72.60	69.22	71.42	68.77	70.00	69.82	72.42	69.35	70.33	66.82	68.35
610	70.26	72.35	70.61	72.11	72.42	74.67	71.13	73.81	73.04	72.64	69.27	71.43	68.84	70.05	69.86	72.45	69.40	70.44	66.78	68.39
620	70.25	72.30	70.59	72.14	72.40	74.59	71.10	73.76	72.99	72.67	69.20	71.40	68.82	70.01	69.81	72.38	69.29	70.35	66.76	68.32

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630	70.30	72.44	70.69	72.21	72.51	74.79	71.10	73.92	73.08	72.76	69.35	71.57	68.93	70.12	69.90	72.52	69.41	70.45	66.80	68.41
640	70.25	72.35	70.67	72.19	72.48	74.66	71.15	73.83	73.04	72.68	69.19	71.46	68.78	70.00	69.80	72.38	69.31	70.42	66.77	68.32
650	70.32	72.41	70.63	72.15	72.48	74.73	71.13	73.83	73.01	72.73	69.29	71.47	68.85	70.06	69.82	72.45	69.38	70.37	66.72	68.37
660	70.13	72.17	70.52	72.10	72.33	74.60	71.02	73.76	72.89	72.65	69.08	71.38	68.64	69.90	69.64	72.29	69.15	70.25	66.65	68.17
670	70.18	72.30	70.56	72.13	72.41	74.57	71.07	73.80	72.93	72.67	69.18	71.44	68.72	69.99	69.70	72.32	69.26	70.29	66.59	68.24
680	70.11	72.19	70.43	72.02	72.36	74.52	70.95	73.75	72.89	72.66	69.07	71.36	68.68	69.89	69.64	72.25	69.21	70.19	66.59	68.19
690	70.27	72.29	70.62	72.12	72.44	74.66	71.17	73.81	72.99	72.76	69.21	71.43	68.75	70.00	69.68	72.33	69.31	70.27	66.58	68.29
700	70.20	72.30	70.53	72.08	72.38	74.59	71.05	73.83	72.94	72.75	69.16	71.42	68.68	69.93	69.67	72.28	69.22	70.21	66.55	68.18
710	70.18	72.20	70.49	72.00	72.36	74.54	71.01	73.80	72.91	72.73	69.09	71.38	68.64	69.97	69.62	72.22	69.19	70.21	66.52	68.13
720	70.11	72.19	70.46	72.03	72.31	74.49	71.00	73.76	72.83	72.72	69.10	71.33	68.58	69.89	69.55	72.13	69.15	70.14	66.51	68.13
730	70.12	72.13	70.42	71.99	72.30	74.47	70.90	73.70	72.79	72.70	69.05	71.25	68.57	69.84	69.50	72.09	69.06	70.08	66.44	68.09
740	70.08	72.09	70.45	71.98	72.29	74.49	70.88	73.72	72.78	72.67	69.08	71.25	68.54	69.87	69.44	72.06	69.06	70.08	66.40	68.05
								D65 _64 CIE												
X	66.50	68.46	66.86	68.26	68.46	70.65	67.29	69.90	69.14	68.75	65.56	67.49	65.24	66.37	66.21	68.67	65.68	66.74	63.32	64.75
Y	70.24	72.34	70.61	72.12	72.34	74.64	71.10	73.83	73.03	72.66	69.26	71.32	68.91	70.10	69.93	72.53	69.40	70.49	66.87	68.40
Z	74.77	76.91	75.24	76.61	76.61	79.31	75.62	78.75	77.75	77.12	73.70	75.40	73.55	74.88	74.71	77.47	73.84	75.36	71.56	72.90
L*	87.12	88.13	87.30	88.03	88.13	89.22	87.53	88.84	88.46	88.28	86.63	87.64	86.46	87.04	86.96	88.22	86.70	87.24	85.44	86.21
a*	-0.22	-0.26	-0.19	-0.26	-0.27	-0.24	-0.26	-0.21	-0.22	-0.29	-0.24	-0.29	-0.23	-0.20	-0.21	-0.21	-0.26	-0.21	-0.17	-0.24
b*	0.48	0.55	0.42	0.61	0.78	0.59	0.53	0.36	0.47	0.65	0.49	0.88	0.31	0.26	0.26	0.28	0.50	0.22	0.16	0.40

[Figure S2: RED, CYAN, BLUE, YELLOW samples]

[RED :1-10 (Bottom to top & right to Left)]
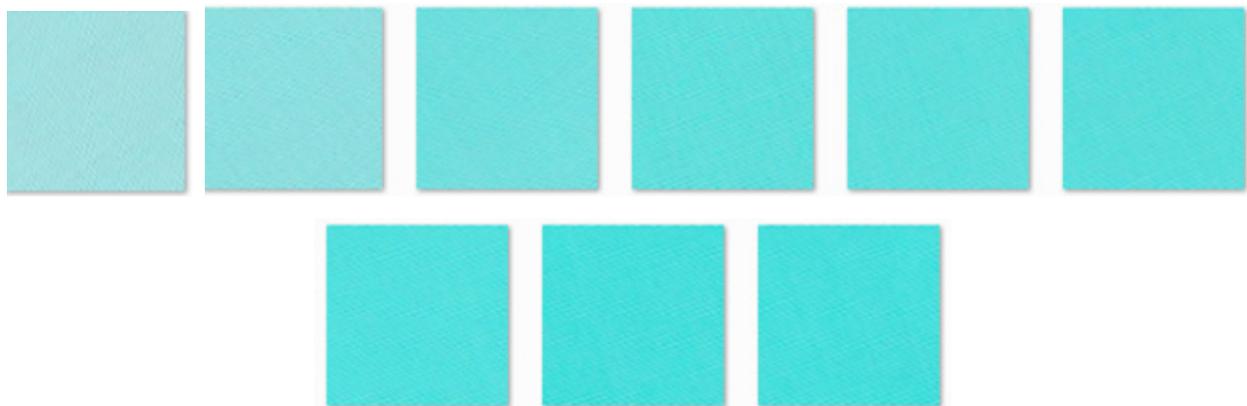
[CYAN :1-10 (Top to bottom & Left to right)]
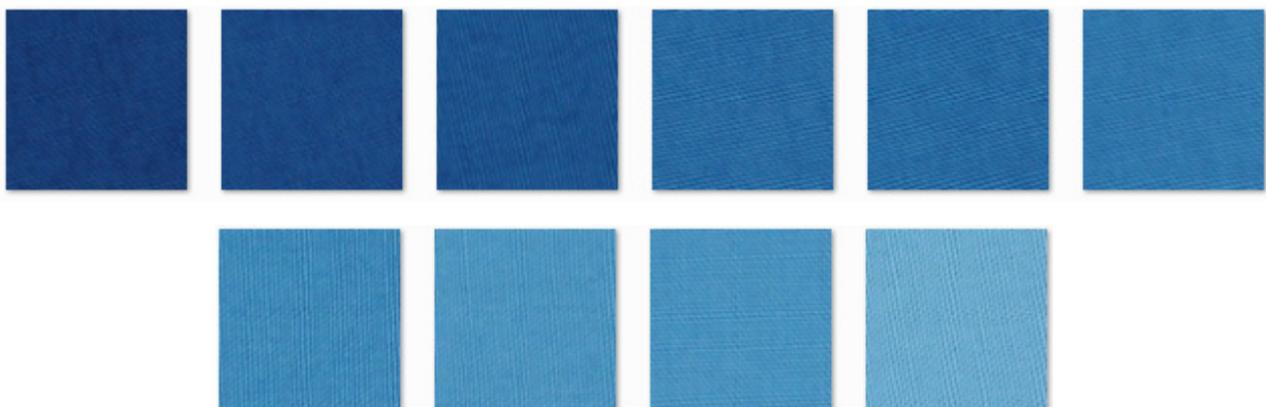
[BLUE :1-10 (Bottom to top & right to Left)]
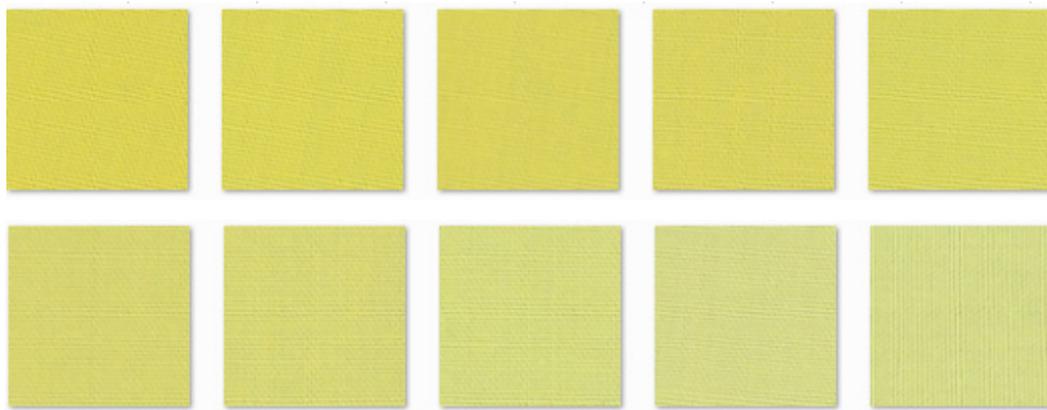
[YELLOW :1-10 (Bottom to top & right to Left)]

[Table S3. Calibrated RGB Readings of RED, CYAN, BLUE & YELLOW fabric samples]

		RED										
	R	G	B	I	r	g	b	rg	gb	rb	rgb
sample 1	246.24	51.91	146.10	148.08	0.97	0.20	0.57	0.20	0.12	0.55	0.11
sample 2	247.56	57.45	151.86	152.29	0.97	0.23	0.60	0.22	0.13	0.58	0.13
sample 3	247.77	65.37	158.23	157.12	0.97	0.26	0.62	0.25	0.16	0.60	0.15
sample 4	248.09	70.84	163.78	160.90	0.97	0.28	0.64	0.27	0.18	0.62	0.17
sample 5	246.83	79.70	170.15	165.56	0.97	0.31	0.67	0.30	0.21	0.65	0.20
sample 6	246.54	92.58	177.06	172.06	0.97	0.36	0.69	0.35	0.25	0.67	0.24
sample 7	245.11	113.26	188.38	182.25	0.96	0.44	0.74	0.43	0.33	0.71	0.32
sample 8	243.36	123.64	193.41	186.80	0.95	0.48	0.76	0.46	0.37	0.72	0.35
sample 9	238.90	135.36	196.98	190.42	0.94	0.53	0.77	0.50	0.41	0.72	0.38
sample 10	229.98	166.59	208.38	201.65	0.90	0.65	0.82	0.59	0.53	0.74	0.48
		CYAN										
sample 1	162.33	223.37	224.57	203.43	0.64	0.88	0.88	0.56	0.77	0.56	0.49
sample 2	140.97	223.22	223.88	196.02	0.55	0.88	0.88	0.48	0.77	0.49	0.42
sample 3	112.72	223.46	222.53	186.24	0.44	0.88	0.87	0.39	0.76	0.39	0.34
sample 4	97.15	223.52	220.77	180.48	0.38	0.88	0.87	0.33	0.76	0.33	0.29
sample 5	95.19	223.01	221.04	179.75	0.37	0.87	0.87	0.33	0.76	0.32	0.28
sample 6	90.33	222.38	220.23	177.65	0.35	0.87	0.86	0.31	0.75	0.31	0.27
sample 7	82.63	224.69	222.00	176.44	0.32	0.88	0.87	0.29	0.77	0.28	0.25
sample 8	71.04	222.88	219.78	171.23	0.28	0.87	0.86	0.24	0.75	0.24	0.21
sample 9	72.06	223.18	220.30	171.85	0.28	0.88	0.86	0.25	0.76	0.24	0.21
		BLUE										
sample 1	24.57	61.04	116.78	67.47	0.10	0.24	0.46	0.02	0.11	0.04	0.01
sample 2	27.66	72.02	129.65	76.44	0.11	0.28	0.51	0.03	0.14	0.06	0.02
sample 3	29.43	82.54	139.51	83.83	0.12	0.32	0.55	0.04	0.18	0.06	0.02
sample 4	39.59	105.62	160.23	101.81	0.16	0.41	0.63	0.06	0.26	0.10	0.04

sample 5	40.92	105.71	160.09	102.24	0.16	0.41	0.63	0.07	0.26	0.10	0.04	
sample 6	48.67	118.85	170.96	112.83	0.19	0.47	0.67	0.09	0.31	0.13	0.06	
sample 7	62.30	136.44	182.98	127.24	0.24	0.54	0.72	0.13	0.38	0.18	0.09	
sample 8	72.81	146.09	190.21	136.37	0.29	0.57	0.75	0.16	0.43	0.21	0.12	
sample 9	75.84	148.44	190.45	138.25	0.30	0.58	0.75	0.17	0.43	0.22	0.13	
sample 10	107.26	169.83	204.37	160.49	0.42	0.67	0.80	0.28	0.53	0.34	0.22	
		YELLOW										
sample 1	219.80	210.86	86.25	172.30	0.86	0.83	0.34	0.71	0.28	0.29	0.24	
sample 2	218.88	212.84	90.51	174.08	0.86	0.83	0.35	0.72	0.30	0.30	0.25	
sample 3	218.04	210.36	94.92	174.44	0.86	0.82	0.37	0.71	0.31	0.32	0.26	
sample 4	217.70	210.89	97.54	175.38	0.85	0.83	0.38	0.71	0.32	0.33	0.27	
sample 5	216.26	213.16	98.63	176.01	0.85	0.84	0.39	0.71	0.32	0.33	0.27	
sample 6	215.42	212.80	114.42	180.88	0.84	0.83	0.45	0.71	0.37	0.38	0.32	
sample 7	215.54	214.88	119.58	183.34	0.85	0.84	0.47	0.71	0.40	0.40	0.33	
sample 8	214.21	218.30	129.13	187.21	0.84	0.86	0.51	0.72	0.43	0.43	0.36	
sample 9	213.88	217.27	136.91	189.35	0.84	0.85	0.54	0.71	0.46	0.45	0.38	
sample 10	213.24	217.98	137.95	189.72	0.84	0.85	0.54	0.71	0.46	0.45	0.39	

[Table S4. %R Reflectance readings of RED, CYAN, BLUE, YELLOW Samples]

				Wavelength ~%R						
RED Shade%	**0.25%**	**0.50%**	**0.75%**	**1%**	**1.50%**	**2%**	**3%**	**4%**	**5%**	**6%**
360	16.75	15.37	17.92	18.22	20.04	21.37	23.27	24.7	25.97	30.6
370	17.76	16.38	18.9	19.22	20.99	22.28	24.03	25.4	26.6	31.01
380	19.03	17.62	20.25	20.61	22.53	23.92	25.86	27.28	28.62	33.22
390	21.27	19.73	22.65	23.14	25.25	26.92	29.29	30.98	32.45	37.7
400	24.48	22.72	26.19	26.91	29.42	31.62	35.05	37.2	39.41	46.19
410	28.59	26.47	30.85	31.9	35.11	38.05	43.54	46.71	50.01	59.58
420	30.78	28.59	33.28	34.48	37.86	41.14	47.38	50.5	54.45	64.36
430	31.86	29.53	34.38	35.65	39.12	42.38	48.81	52.2	56.1	66.13
440	31.93	29.61	34.46	35.68	39.12	42.31	48.63	51.87	55.62	65.31
450	30.39	28.15	32.87	33.96	37.29	40.42	46.36	49.54	53.14	62.56
460	26.85	24.72	29.29	30.24	33.48	36.53	42.29	45.44	49.06	58.92
470	22.37	20.42	24.72	25.51	28.54	31.64	37.14	40.32	44.09	54.71
480	17.9	16.19	20.12	20.73	23.54	26.49	31.63	34.77	38.51	49.74
490	14.8	13.27	16.86	17.35	19.99	22.79	27.52	30.65	34.27	45.83
500	12.43	11.06	14.31	14.72	17.16	19.85	24.25	27.35	30.86	42.68
510	10.26	9.07	11.95	12.3	14.5	17.01	21.09	23.96	27.39	39.16
520	8.79	7.75	10.34	10.63	12.65	14.97	18.8	21.57	24.86	36.44

530	8.34	7.34	9.83	10.09	12.05	14.23	18.05	20.78	24.01	35.52
540	8.37	7.36	9.85	10.11	12.08	14.32	18.06	20.78	24.03	35.49
550	8.11	7.14	9.56	9.82	11.72	13.95	17.56	20.32	23.51	34.86
560	8.06	7.08	9.46	9.73	11.64	13.81	17.48	20.16	23.43	34.73
570	9.51	8.39	11.15	11.41	13.54	15.89	19.91	22.74	26.12	37.62
580	14.15	12.69	16.29	16.66	19.26	21.9	26.61	29.79	33.2	44.42
590	23.2	21.2	25.78	26.29	29.34	32.13	37.41	40.6	43.65	52.96
600	35.18	32.8	37.77	38.49	41.54	44.01	48.83	51.38	53.36	59.37
610	47.27	44.95	49.15	50.22	52.46	54.2	57.47	59.09	59.91	62.82
620	56.68	54.88	57.29	58.7	59.99	60.88	62.54	63.33	63.3	64.41
630	61.93	60.61	61.62	63.13	63.7	64.1	64.79	65.22	64.79	65.07
640	64.23	63.28	63.38	64.89	65.18	65.24	65.55	65.73	65.2	65.18
650	65.1	64.35	63.98	65.54	65.6	65.65	65.64	65.87	65.26	65.14
660	65.31	64.63	64.19	65.62	65.68	65.64	65.54	65.72	65.09	64.92
670	65.52	64.83	64.23	65.73	65.67	65.59	65.52	65.7	65.05	64.95
680	65.34	64.7	64.09	65.54	65.47	65.41	65.18	65.42	64.81	64.74
690	65.43	64.78	64.12	65.53	65.51	65.37	65.29	65.43	64.93	64.84
700	65.33	64.75	64.01	65.47	65.41	65.35	65.11	65.32	64.81	64.76
710	65.37	64.74	64.08	65.45	65.36	65.23	65.06	65.3	64.76	64.71
720	65.22	64.58	63.88	65.25	65.23	65.09	64.89	65.15	64.67	64.64
730	65.11	64.44	63.83	65.17	65.08	65.03	64.77	65.03	64.51	64.57
740	64.99	64.39	63.84	65.11	65.01	64.98	64.66	64.95	64.46	64.49

CYAN	**0.25%**	**0.50%**	**0.75%**	**1%**	**1.50%**	**2%**	**3%**	**4%**	**5%**	
360	29.05	26.01	21.85	19.86	19.72	18.96	18.54	16.23	16.03	
370	30.99	28.96	25.54	23.78	23.95	23.24	22.93	20.63	20.5	
380	34.51	32.94	30.1	28.5	28.81	28.22	27.97	25.67	25.61	
390	40.04	38.43	35.66	33.98	34.36	33.77	33.59	31.14	31.06	
400	50.21	47.61	43.82	41.73	42.07	41.27	40.99	38.01	37.98	
410	66.27	60.93	54.9	52.28	52.1	51.02	50.33	47	46.39	
420	71.95	65.62	59.23	56.65	56.13	54.9	54.22	50.88	49.86	
430	73.83	67.19	60.77	58.19	57.61	56.36	55.64	52.25	51.27	
440	72.8	66.61	60.48	58.03	57.51	56.36	55.6	52.41	51.4	
450	70.3	64.8	59.42	57.17	56.71	55.59	55.02	51.94	51.05	
460	68.39	63.42	58.52	56.4	56	55.02	54.39	51.46	50.62	
470	67.17	62.84	58.47	56.52	56.16	55.23	54.69	51.93	51.09	
480	66.28	62.69	58.96	57.38	57.17	56.39	56.05	53.49	52.68	
490	65.59	62.68	59.56	58.29	58.08	57.4	57.15	54.9	54.11	
500	65.42	62.76	59.89	58.84	58.62	58.05	57.85	55.58	54.86	
510	64.8	62.21	59.46	58.43	58.15	57.65	57.44	55.15	54.5	
520	63.95	61.42	58.48	57.32	57.12	56.45	56.06	53.79	53.12	
530	63.08	60.26	56.94	55.49	55.24	54.5	53.92	51.44	50.78	

540	61.98	58.4	54.44	52.65	52.22	51.38	50.55	47.73	47.2	
550	60.2	55.6	50.68	48.39	47.82	46.77	45.69	42.6	42.19	
560	57.9	52.12	46.14	43.31	42.75	41.5	40.25	36.98	36.55	
570	55.4	48.61	41.77	38.62	38.14	36.79	35.41	32.04	31.69	
580	52.5	44.9	37.46	34.21	33.64	32.31	30.9	27.59	27.3	
590	48.15	39.69	31.98	28.77	28.05	26.75	25.42	22.32	22.06	
600	44.01	35.09	27.27	24.08	23.38	22.11	20.97	17.96	17.73	
610	42.28	33.33	25.29	21.93	21.52	20.29	19.06	16.14	15.98	
620	41.49	32.39	24.37	20.84	20.61	19.35	18.15	15.27	15.19	
630	40.78	31.64	23.66	20.24	19.94	18.65	17.59	14.72	14.6	
640	39.66	30.31	22.6	19.36	18.8	17.68	16.69	13.94	13.72	
650	35.73	26.49	19.36	16.45	15.69	14.75	13.91	11.54	11.32	
660	30.56	21.65	15.39	12.85	11.95	11.22	10.57	8.66	8.41	
670	29.67	20.66	14.56	12.13	11.32	10.58	10.17	8.29	8.01	
680	34.55	25.13	18.22	15.5	14.77	13.89	13.33	11.2	10.78	
690	44.15	34.65	26.62	23.44	22.99	21.86	21.22	18.44	17.69	
700	51.98	43.71	35.74	32.32	32.19	30.94	30.13	26.83	26.04	
710	56.25	49.42	42.46	39.24	39.13	37.94	36.99	33.68	32.85	
720	58.74	53.13	47.31	44.47	44.28	43.21	42.31	39.07	38.29	
730	60.15	55.48	50.62	48.15	47.88	46.95	46.11	43.07	42.33	
740	61.14	57.2	53.03	51.04	50.65	49.84	49.13	46.34	45.55	
BLUE	**0.25%**	**0.50%**	**0.75%**	**1%**	**1.50%**	**2%**	**3%**	**4%**	**5%**	**6%**
360	5.48	6.58	7.53	10.88	11.67	13.01	15.43	18.58	17.21	24.62
370	7.24	8.56	9.73	13.45	14.53	15.98	18.34	21.67	20.29	27.48
380	9.68	11.27	12.67	16.79	18.15	19.72	22.14	25.66	24.29	31.48
390	12.73	14.62	16.25	20.82	22.33	24.03	26.65	30.39	29.01	36.41
400	16.11	18.32	20.25	25.49	26.94	28.95	32.13	35.99	34.46	42.62
410	19.26	21.95	24.16	30.48	31.54	34.05	38.3	42.36	40.63	50.11
420	20.86	23.79	26.14	32.98	33.75	36.34	41.06	45.06	43.39	52.96
430	21.06	24.03	26.37	33.39	34.13	36.72	41.58	45.62	43.91	53.55
440	20.18	23.07	25.41	32.32	33.08	35.64	40.37	44.45	42.81	52.59
450	18.9	21.69	23.93	30.76	31.61	34.05	38.79	42.78	41.09	50.78
460	17.17	19.86	22.01	28.66	29.48	31.91	36.55	40.62	38.91	48.7
470	15.27	17.76	19.84	26.28	27.08	29.47	33.98	38.1	36.29	46.37
480	13.31	15.64	17.57	23.75	24.53	26.79	31.23	35.25	33.48	43.7
490	11.63	13.79	15.59	21.49	22.24	24.45	28.75	32.76	30.96	41.25
500	10.07	12.05	13.7	19.29	20.01	22.08	26.36	30.32	28.47	38.9
510	8.71	10.5	12.01	17.28	17.96	19.97	24.06	27.97	26.13	36.58
520	7.56	9.18	10.55	15.47	16.13	18.09	21.94	25.85	24.02	34.44
530	6.53	7.98	9.21	13.77	14.41	16.17	19.87	23.74	21.9	32.25
540	5.67	6.95	8.07	12.27	12.89	14.57	18.14	21.85	20.04	30.28

550	5	6.14	7.14	11.02	11.6	13.23	16.59	20.27	18.45	28.52
560	4.44	5.45	6.34	9.89	10.44	11.95	15.09	18.73	16.99	26.85
570	3.88	4.76	5.54	8.73	9.25	10.63	13.59	17.08	15.45	25.06
580	3.41	4.16	4.82	7.65	8.13	9.39	12.12	15.47	13.88	23.15
590	3.1	3.76	4.33	6.88	7.31	8.47	11.02	14.22	12.68	21.73
600	2.93	3.54	4.06	6.44	6.84	7.93	10.38	13.47	11.98	20.83
610	2.85	3.43	3.92	6.18	6.57	7.6	9.99	13	11.54	20.22
620	2.79	3.33	3.78	5.94	6.3	7.3	9.59	12.51	11.09	19.65
630	2.74	3.27	3.7	5.78	6.13	7.11	9.36	12.23	10.81	19.23
640	2.82	3.4	3.84	6.03	6.39	7.4	9.72	12.61	11.18	19.73
650	3.2	3.86	4.4	6.92	7.32	8.45	11.03	14.04	12.52	21.43
660	3.92	4.88	5.58	8.85	9.3	10.59	13.58	16.92	15.25	24.84
670	5.53	6.76	7.89	11.89	12.49	14.16	17.7	21.27	19.42	29.59
680	8.08	9.88	11.39	16.52	17.15	19.07	23.09	26.78	24.95	35.36
690	12.01	14.27	16.15	22.1	22.84	25.06	29.4	33.12	31.3	41.5
700	16.94	19.68	22.04	28.44	29.23	31.54	36.1	39.54	37.96	47.32
710	22.48	25.57	28.12	34.61	35.38	37.86	42.19	45.36	43.94	51.83
720	28.03	31.33	33.99	40.23	40.99	43.42	47.35	50.06	48.89	55.27
730	32.76	36.11	38.77	44.63	45.28	47.51	51.07	53.25	52.36	57.43
740	36.64	40.02	42.53	47.9	48.44	50.49	53.61	55.52	54.8	58.74
YELLOW	**0.25%**	**0.50%**	**0.75%**	**1%**	**1.50%**	**2%**	**3%**	**4%**	**5%**	**6%**
360	5.69	6.72	7.28	7.73	8.09	10.84	11.54	13.57	15.19	21.92
370	4.49	5.33	5.77	6.13	6.46	8.83	9.5	11.45	12.94	19.49
380	3.52	4.19	4.5	4.78	5.09	7.08	7.73	9.61	11.04	17.49
390	2.95	3.49	3.68	3.95	4.2	5.9	6.5	8.31	9.58	16.06
400	2.62	3.08	3.22	3.43	3.67	5.2	5.75	7.55	8.77	15.36
410	2.58	3.02	3.17	3.36	3.59	5.08	5.61	7.47	8.68	15.66
420	2.67	3.13	3.27	3.47	3.71	5.26	5.81	7.7	8.98	15.99
430	2.96	3.48	3.66	3.89	4.15	5.92	6.52	8.58	9.91	17.33
440	3.54	4.15	4.43	4.71	5.02	7.13	7.84	10.16	11.64	19.63
450	4.48	5.29	5.68	6.04	6.41	9.04	9.91	12.63	14.38	22.98
460	6.3	7.42	7.99	8.48	8.95	12.34	13.49	16.66	18.71	28.1
470	9.68	11.19	12.12	12.71	13.3	17.62	19.06	22.75	25.13	35.05
480	16.14	18.04	19.44	20.18	20.82	26.08	27.8	31.9	34.51	44.28
490	25.07	27.4	29.03	29.91	30.61	36.21	38.06	41.99	44.49	52.58
500	37.24	39.69	41.32	42.13	42.81	47.8	49.27	52.14	53.96	59.07
510	48.45	50.53	51.92	52.39	52.85	56.39	57.1	58.81	59.92	62.42
520	55.81	57.37	58.24	58.58	58.7	60.88	60.89	61.76	62.41	63.55
530	59.52	60.71	61.28	61.46	61.39	62.84	62.44	62.9	63.28	63.96
540	61.25	62.22	62.61	62.74	62.55	63.72	63.09	63.46	63.77	64.11
550	62.15	63.08	63.32	63.49	63.23	64.17	63.47	63.77	63.97	64.16

560	62.79	63.62	63.82	63.93	63.65	64.48	63.68	63.87	64.08	64.21
570	63.22	63.95	64.1	64.23	63.88	64.67	63.82	64.02	64.2	64.3
580	63.45	64.26	64.31	64.46	64.1	64.88	63.93	64.12	64.32	64.32
590	63.65	64.42	64.41	64.6	64.19	65.01	64.02	64.18	64.37	64.32
600	63.67	64.44	64.42	64.64	64.17	64.92	63.94	64.06	64.3	64.25
610	63.78	64.5	64.46	64.71	64.25	64.99	63.99	64.15	64.34	64.32
620	63.86	64.57	64.5	64.72	64.33	65.03	63.94	64.13	64.33	64.33
630	64.02	64.73	64.7	64.9	64.43	65.11	64.09	64.27	64.46	64.37
640	64.05	64.75	64.63	64.91	64.5	65.07	64.09	64.25	64.4	64.31
650	64.07	64.73	64.71	64.89	64.43	65.1	64.11	64.18	64.42	64.41
660	64.01	64.7	64.53	64.85	64.46	65.07	63.95	64.1	64.28	64.16
670	64.12	64.83	64.74	64.98	64.54	65.15	64.07	64.19	64.39	64.24
680	64.05	64.76	64.56	64.85	64.43	65.06	63.93	64.12	64.31	64.21
690	64.23	64.85	64.8	65.01	64.55	65.2	64.12	64.2	64.48	64.34
700	64.12	64.76	64.72	64.95	64.51	65.08	63.98	64.14	64.41	64.27
710	64.2	64.89	64.77	65.02	64.53	65.15	64.03	64.21	64.4	64.33
720	64.22	64.82	64.76	65.02	64.5	65.09	63.97	64.17	64.34	64.34
730	64.22	64.83	64.74	64.96	64.55	65.1	64	64.14	64.36	64.27
740	64.15	64.85	64.74	64.94	64.46	65.11	63.99	64.15	64.35	64.3
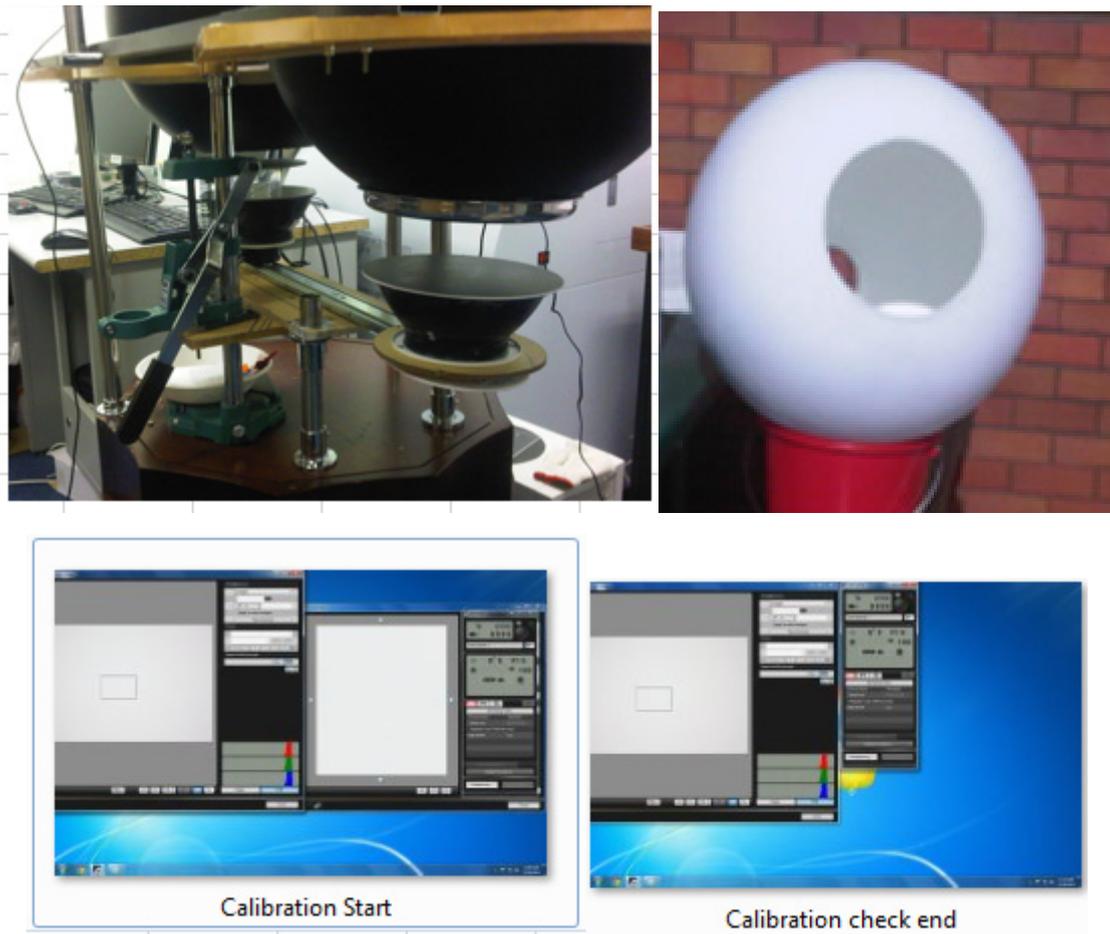
[Figure S3. System set-up and calibration]