

# **1st IS&T/SID Color Imaging Conference 1993**

## **Transforms & Transportability of Color**

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Society for Imaging Science & Technology  
7003 Kilworth Lane  
Springfield, Virginia 22151

Phone: 703-642-9090  
Fax: 703-642-9094

[info@imaging.org](mailto:info@imaging.org)

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# The Papers Program

8:00 a.m. - Noon - Monday Morning, November 8, 1993

## Understanding of Color Theory & Spaces

Program Chair: *Jan Walraven, TNO Institute for Human Factors (The Netherlands)*  
(Invited Papers - Lecture Format)

The invited speakers will describe how the fundamental assumptions of color theory are **used and misused** when applied to practical problems. Particular attention is given to current research in color theory.

- 8:00 a.m. Introduction by *A. Jaffe, Apple Computer, Inc.* and *A. Lakatos, Xerox Corporation*
- 8:20 a.m. Color Reproduction and Color Vision Modeling, *Robert W. G. Hunt, Color Consultant* 1
- 9:10 a.m. Color Spaces: Language and Framework for Color, *Joann M. Taylor, Color Technology Solutions* 6
- 10:00-10:20 a.m. - Coffee Break
- 10:20 a.m. Color and Brightness: Contrast and Context, *Steven K. Shevell, University of Chicago* 11e
- 11:10 p.m. Color Sensations in Complex Images, *John J. McCann, Polaroid Corporation* 16

Noon to 2:30 p.m. Lunch Break

2:30 - 4:00 p.m. - Monday Afternoon, November 8, 1993

## Poster Papers Sessions - Color Theory & Spaces

Program Chair: *Y. Miyake, Chiba University*

The afternoon session is made up of contributed papers, poster sessions and discussions.

1. New Tests to Validate the Visual Models of Color Appearance Using the Natural Color System Album, *S. Derbal, Laboratoire Signaux et Systemes (France)* P IC
2. Pseudo-Linearly Modified IHS Color Model and its Application to Color Image Enhancement, *J-Y. Kim and Y-H. Ha, Kyungpook National University (Korea)* 23e
3. RGB-YMCK Color Conversion by Application of the Neural Networks, *Gabriel Marcu, and Kansei Iwata, Graphica Computer Corporation (Japan)* 27e
4. Accuracy of Various Types of Neugebauer Models, *Robert Rolleston and Raja Balasubramanian, Webster Research Center, Xerox Corporation* 32e
5. Perceptual Quality of Color Images of Natural Scenes Transformed in CIELUV Color Space, *Elena A. Fedorovskaya, Moscow State University (Russia); Frans J. J. Blommaert and Huib de Ridder, Institute for Perception Research, Eindhoven University of Technology (The Netherlands)* 37e

6. A Method of Transformation from CIE L\*a\*b\* to CMY Value by a Three-Layered Neural Network, *Y. Arai, Y. Nakano, T. Iga, Toyo Ink Manufacturing Corporation Ltd; S. Usui, Toyohashi University of Technology (Japan)* 41
7. Color Mapping Using Neural Networks, *D. Adkins, DataCard Corporation; V. S. Cherkassky and E. S. Olson, University of Minnesota* 45
8. Bridging the Gap Between Color and 3-D Displays, *V. Petrov, Frankfurt (Germany)*\*\*\*\*\*P IC
9. Tristimulus Colorimetry for Video Display Units, *K. Muray, Institute for Photometry and Radiometry; I. Reti, Photon Ltd., (Hungary); I. Giczi, Compass GmbH (Hungary); and J. Schanda, CIE Central Bureau (Austria)* 49
10. Degradation Origin of Green Emitting Y<sub>2</sub>SiO<sub>5</sub>: Tb Phosphors for Projection Television CRT, *N. Hashimoto, T. Maegawa, M. Okumura, K. Yoshizaki and K. Sato, Mitsubishi Electric Corporation* 52e
11. High/Low Density Information Storage Technology Using Colors, *H. A. Shamir, ColorCode, UnLimited Corp.* 55

4:00 - 7:00 p.m. - Monday Afternoon, November 8, 1993  
**Understanding of Color Theory & Spaces**  
*Program Chair: John Meyer, Hewlett-Packard Laboratories*  
 (Contributed Papers -Lecture Format)

- 4:00 p.m. Quantifying Human Color Constancy, *J. Walraven and M. P. Lucassen, TNO Institute for Human Factors (The Netherlands)* 60
- 4:20 p.m. Rethinking the White Point, *J. E. Farrell, Hewlett-Packard Laboratories and B. A. Wandell, Stanford University* 65
- 4:40 p.m. Modelling Reflectance by Logarithmic Basis Functions, *B. V. Funt, Simon Fraser University (Canada)* 68
- 5:00 p.m. Comparing Appearance Models Using Pictorial Images, *T. G. Kim, R. S. Berns, M. D. Fairchild, Munsell Color Science Laboratory, Center for Imaging Science, Rochester Institute of Technology* 72
- 5:20-5:40 p.m. - Coffee Break
- 5:40 p.m. Comparisons of Color Mixing Theories for Use in Electronic Printing, *H. R. Kang, Xerox Corporation* 78
- 6:00 p.m. A Simplified Method for the Colorimetric Characterization of Fluorescent Inks, *R. Motta and J. E. Farrell, Hewlett-Packard Laboratories* 83
- 6:20 p.m. Lateral Diffusion and Scattered Light Errors in a Small Measurement Area Spectrocolorimeter, *D. L. Spooner, DuPont Printing & Publishing*\*\*\*\*\*P IC
- 6:40 p.m. Statistical Optics and Effective Medium Theories of Color, *R. J. Meyer, Webster Research Center, Xerox Corporation* 85

8:00 a.m. - Noon - Tuesday Morning, November 9, 1993

**Color at the Desktop**

*Program Chair: Annette Jaffe, Apple Computer*  
(Invited Papers - Lecture Format)

The invited papers describe systems that use color theory to calibrate color devices. These morning talks will establish a common framework and vocabulary so that contributed papers in the afternoon can concentrate on the new and unique aspects of the authors' work.

- 8:00 a.m. A Short History of Device-Independent Color, *Robert Buckley, Webster Research Center, Xerox Corporation* 88e
- 8:40 a.m. Integrating Scanners into Color Systems, *Paul G. Roetling, Webster Research Center, Xerox Corporation* 92
- 9:30 a.m. Color Management on the Desktop, *Gerald M. Murch, Apple Computer, Inc.* 95

10:10-10:40 a.m. - Coffee Break

- 10:40 a.m. The Color Engineer, *James C. King, Adobe Systems Inc.* 99e
- 11:20 p.m. Integrating Color Printers into Color Systems, *Gary Starkweather, Apple Computer, Inc.* 101

Noon to 2:00 p.m. Lunch Break

2:00-5:00 pm - Tuesday Afternoon, November 9, 1993

**Color at the Desktop**

*Program Chair: John Meyer, Hewlett Packard Laboratories*  
(Contributed Papers - Lecture Format)

- 2:00 p.m. Characterization of Scanner Sensitivity, *G. Sharma and H. J. Trussell, North Carolina State University* 103e
- 2:40 p.m. Characterizing Printer Gamuts Using Tetrahedral Interpolation, *I. E. Bell and W. Cowan, University of Waterloo (Canada)* 108
- 3:00 p.m. Color Rendition with Variable Point Interpolation, *H. Chen and K. L. Huang, Opto-Electronics and System Laboratory, ITRI (Taiwan)* 113e

3:20-3:40 p.m. - Coffee Break

- 3:40 p.m. The Estimation of Natural Reflectances by a Cone-based Linear Model, *Richard O. Brown, Center for Human Information Processing, VCSD* 117e
- 4:00 p.m. Device Independent Color Characterization, Modeling and Management, *C. B. Chittineni, Du Pont Company* 118
- 4:20 p.m. Nonlinear Color Transformations in Real Time Using a Video Supercomputer, *E. F. Kelley, B. F. Field and C. Fenimore, National Institute of Standards and Technology* 122

4:40 p.m. Working with Color in an Object Oriented Environment, *Jim Quarato, Bayles Holt and Jerry Harris, Taligent, Inc.* 129

5:00 p.m. Analysis of Adaptation Problems of Scanning and Printing Devices for Color Reproduction, *G-W. Chang, Industrial Technology Research Institute, (Taiwan) and Shyang Chang, National Tsing Hua University (Taiwan)* 131

6:00-8:00 p.m. The Conference Reception

8:00 p.m. - Tuesday Evening, November 9, 1993

**Panel Discussion on Commercial Systems**

*Moderator: Joann M. Taylor, Color Technology Solutions*

*Panelists include Gerald Murch, Apple Computer; Stu Ring, Eastman Kodak Company; Adam Stock, Electronics for Imaging; and James C. King, Adobe Systems Inc.; Jan De Clippeleer, Agfa Electronic Prepress Systems.*

The evening panel session gathers some of the top names involved with Commercial Color Management Systems (CMS). Here is an opportunity to learn first-hand about the Color Management Systems available today and hear about the visions and goals for the CMS of tomorrow. Come prepared to ask questions and participate in what promises to be an informative and lively session!.....P IC

8:00 a.m. - Noon, Wednesday Morning, November 10, 1993

**Applications of Color Systems**

*Program Chair: Andras I. Lakatos, Xerox Corporation*

(Invited Papers - Lecture Format)

Wednesdays morning's invited papers focus on system applications. How are calibrated color devices used in science, engineering, medicine, business and the arts? These talks will establish a common framework and vocabulary so that contributed papers in the afternoon can concentrate on specific customer requirements.

8:00 a.m. A Single Chip Color Processor for Device Independent Color Reproduction, *H. Kotera, K. Kanamori, T. Fumoto, O. Yamada, and H. Motomura, Matsushita Research Institute Tokyo, Inc. (Japan); and M. Inoue, Matsushita Electronics Co. (Japan)* 133

8:40 a.m. Reproducing Computer Generated Imagery, *Maureen C. Stone, Palo Alto Research Center, Xerox Corporation* 138

9:30 a.m. CRAFT: A Tool for Customizing Color and Font Selections Guided by Perceptual Rules, *Bernice E. Rogowitz and D. A. Rabenhorst, T. J. Watson Research Center, IBM Corporation* 140

10:10-10:40 a.m. - Coffee Break

10:40 a.m. Efficient Implementation of Nonlinear Color Transformations, *J. P. Allebach, J. Z. Chang and C. A. Bouman, Purdue University* 143e

11:20 p.m. Colorimetric and Photometric Modeling of Liquid Crystal Displays, *L. D. Silverstein, VCD Sciences, Inc. and T. G. Fiske, Palo Alto Research Center, Xerox Corporation* 149

Noon to 2:30 p.m. Lunch Break

2:30 - 4:00 p.m. - Wednesday Afternoon, November 10, 1993

**Poster Papers Sessions - Color Systems**

*Program Chair: Robert Buckley, Webster Research Center, Xerox Corporation*

1. Color Space Selection for JPEG Image Compression, *Nathan M. Moroney and Mark D. Fairchild, Munsell Color Science Laboratory, Center for Imaging Science, Rochester Institute of Technology* 157
2. The Faithful Rendition of Color Ranges on Display, *R. Schettini, IFCTR, National Research Council (Italy)* 160
3. The Development of a Color Reference Chart, New Color Test Pattern and Instrumentation for Television Camera Calibration, *Joann M. Taylor, Color Technology Solutions* 164
4. An Artificial Neural Network for Classification of Color Images, *A. Jaramillo, Pontifica Universidad Javeriana and K. Yamaba, Mechanical Engineering Laboratory (Japan)* 167
5. A Neural Network Approach to Color Reproduction in Color Printers, *S. Tominaga, Osaka Electro-Communication University (Japan)* 173e
6. Color Palette Reduction and Enhancement Techniques, *Michael E. Trenchard, Lancelot M. Riedlinger, Stephanie A. Myrick, Marlin L. Gendron, Naval Research Laboratory* 178
7. Interpolation of Color Data, *S. A. Rajala and A. P. Kakodkar, North Carolina State University* 180e
8. An Evaluation of Commercial Color Matching Schemes, *R. G. Guay, and M. Hernandez, Apple Computer, Inc.* P IC
9. Highly Efficient Holographic Hardcopy with No Color Shift, *V. Petrov, Frankfurt (Germany)* P IC
10. Minimization of Color Errors in Television Receivers Using Neural Networks, *S. Xu and P. B. Crilly, University of Tennessee* 184
11. Adaptive Calibration for Desktop Publishing, *R. Cook, Light Source Computer Images, Inc.* P IC
12. The White Color of Television Receivers, *R. Donofrio, D. Hess and W. Sember, Philips Display Components Company* 185
13. Theory and Application of Color Calibration for Desktop Scanners, *R. E. Burger, Savitar, Inc.* P IC
14. Modern Quantum Theory of Color Vision and Statistical Colorimetry, Their Role and Influence on Changing Fundamental Assumptions of the Color Theory and Color Imaging Practice, *Dmitry A. Novik, Universal Systems and Technology, Inc.* 188

4:00-7:30 p.m. - Wednesday Afternoon, November 10, 1993

**Applications of Color Systems**

*Program Chair: Louis D. Silverstein, VCD Sciences, Inc.*  
(Contributed Papers - Lecture Format)

4:00 p.m.	Gamut Mapping in Perceptual Colour Space, <i>Lindsay W. MacDonald, Crosfield Electronics, Ltd., (UK)</i>	193
4:20 p.m.	A Color Gamut Visualization Tool, <i>G. W. Meyer and L. S. Peting and F. Rakoczi, University of Oregon</i>	197
4:40 .m.	Visualization of the 3-D Histogram of Color Space Occupation: with an emphasis on color approximation algorithms for scanned images, <i>D. P. Huijsmans and A. Son, University of Leiden (The Netherlands)</i>	202
5:00 p.m.	Color Scene Analysis in the 1976 CIE (L*a*b*) Uniform Color Space, <i>Mehmet Celenk, Ohio University</i>	208
5:20-5:40 p.m. - Coffee Break		
5:40 p.m.	Compact Color Hard Copy System Using Vacuum Fluorescent Print Head and Instant Color Film, <i>Y. Shimizu, Futaba Corporation (Japan); and H. Haneishi and Y. Miyake, Chiba University (Japan)</i>	219
6:00 p.m.	The Evolution of Nonimpact Print—Impact on Image Quality, <i>Y. Miyake and H. Haneishi, Chiba University</i>	222
6:20 p.m.	A Content-Driven Color Adjustment System, <i>R. Amantea, J. Asmuth, D. P. Bortfeld, M. H. Czigler, G. E. Nostrand, and R. M. Peterson, David Sarnoff Research Center; E. Martinez-Uriegas, SRI; and D. Zokaities, USGS/EROS Data Center</i>	228
6:40 p.m.	A Colour Importance Measure for Colour Image Analysis, <i>A. Maeder, Queensland University of Technology, (Australia); and B. Pham, Griffith University (Australia)</i>	232e
7:00 p.m.	Colour Correction for an Image Sequence, <i>G. Pringle, Monash University (Australia) and B. Pham, Griffith University (Australia)</i>	238

8:00-9:30 a.m., Thursday Morning, November 11, 1993

**Applications of Color Systems**

*Program Chair: Program Chair: John McCann, Polaroid Corporation*  
(Invited Papers - Lecture Format)

Thursday mornings invited papers will focus on HDTV. This will be followed by a panel discussion on the future color spin-off applications of HDTV systems.

8:00 a.m.	The Applications of High Definition Television (HDTV) System for Still Imaging — Part 1, <i>Shin Ohno, Sony Corporation (Japan)</i>	243
8:40 a.m.	Application of HDTV System for Still Pictorial Imaging — Part 2, <i>Y. Miyake and Teiichi Nishioka, Chiba University (Japan)</i>	246



9:30 a.m. - 10:40 a.m. - Thursday Morning, November 11, 1993

**Panel Discussion: Colorful Topics in Digital HDTV**

*Moderator: Glen A. Reitmier, Director of High Definition Imaging and Computing,  
Information Systems Research Division, David Sarnoff Research Center*

*Panelists include: Wayne Bretl, AT& T, Woo Paik, General Instruments Company*

Topics to be discussed include:

- Compression Syntax
- Pixel Formating
- “Video Packetization”

10:40-11:00 a.m. - Coffee Break

11:00 a.m. Closing Summary, *Warren Rhodes, Chromatech Corporation*

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