7th IS&T/SID Color Imaging Conference 1999

Color Science, Systems, and Applications: Putting It All Together

Scottsdale, Arizona, USA
16-19 November 1999
The Papers Program
Wednesday Morning, Nov. 17, 8:30 a.m.

Opening Remarks: Jack Holm and Todd Newman, General Co-chairs

Wednesday Morning, Nov. 17, 8:40 a.m. – 9:25 a.m.

Keynote Presentation
8:40 am Lessons Learned from Mondrians Applied to Real Images and Color Gamuts
John McCann, McCann Imaging (USA)

Wednesday Morning, Nov. 17, 9:25 a.m. – 12:00 noon

Image Capture
Session Chair: Ingeborg Tastl, Sony U.S. Research Labs

9:25 am Imaging Colorimetry Using a Digital Camera
Wencheng Wu and Jan P. Allebach, School of ECE, Purdue University, West Lafayette, Indiana
Mostafa Analoui, School of Dentistry, Indiana University, Indianapolis, Indiana

9:50 am A Comparative Analysis of Spectral Reflectance Reconstruction in Various Spaces Using a Trichromatic Camera System
Francisco H. Imai and Roy S. Berns, Munsell Color Science Laboratory, Rochester Institute of Technology, Rochester, New York, USA

10:15 am BREAK

10:45 am Metamer Constrained Colour Correction
G. D. Finlayson and P. M. Morovic, School of Information Systems, University of East Anglia, Norwich, United Kingdom

11:10 am Quantization in Multispectral Color Image Acquisition
Peter D. Burns and Roy S. Berns*
Eastman Kodak Company, Rochester, New York, USA
*Munsell Color Science Laboratory, Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, Rochester, New York, USA

11:35 am Generation of Virtual Spectral Color Target and Its Application
Hiroaki Kotera, Chen Hung-Shing and Ryoichi Saito, Department of Information and Image Sciences, Chiba University

12:00 noon LUNCH
Wednesday Afternoon, Nov. 17, 1:30 – 2:45 p.m.

**Scene Perception**

*Session Chair: Brian Funt, Simon Fraser University, School of Computing Science*

1:30 pm  **Color Temperature Estimation of Scene Illumination**  42
Shoji Tominaga and Satoru Ebisui, Department of Engineering Informatics, Osaka Electro-Communication University, Neyagawa, Osaka, Japan
Brian A. Wandell
Image Systems Engineering, Stanford University, Stanford, California, USA

1:55 pm  **The Perception of Color at Dawn and Dusk**  48
Paul M. Hubel, Hewlett-Packard Laboratories, Hewlett-Packard Company, Palo Alto, California, USA

2:20 pm  **Application of the Hunt94 Model to Color Perception of Outdoor Objects**  52
Shudeish Mahadev, Arizona Department of Environmental Quality, Phoenix, Arizona, USA
Ronald C. Henry, University of Southern California, Los Angeles, California, USA

2:45 pm  **BREAK**

Wednesday Afternoon, Nov. 17, 3:15 – 5:20 p.m.

**Color Management**

*Session Chair: George Pawle, Eastman Kodak Company*

3:15 pm  **Smooth Ramps: Walking the Straight and Narrow Path through Color Space**  57
Thor Olson, Management Graphics Inc., Minneapolis Minnesota, USA

3:40 pm  **Reducing the Cost of Lookup Table Based Color Transformations**  65
Raja Balasubramanian, Xerox Digital Imaging Technology Center, Webster, New York, USA

4:05 pm  **Target-less Scanner Color Calibration**  69
Gaurav Sharma, Digital Imaging Technology Center, Xerox Corporation, Webster, New York, USA

4:30 pm  **Framework for an Image Sharpness Management System**  75
Lindsay MacDonald, Colour & Imaging Institute, University of Derby, United Kingdom

4:55 pm  **Integrating New Color Image Processing Techniques with Color Management**  80
Jack Holm, Hewlett-Packard Laboratories, Palo Alto, California, USA
Keynote Presentation

Session Chair: Todd Newman, Canon Information Systems

8:40 pm  How To Make Pictures and Please People
Robert W.G. Hunt, University of Derby, Derby, England

Thursday Morning, Nov. 18, 9:25 a.m. – 9:50 a.m.

IS&T Honors and Awards Presentation

John Meyer, IS&T President

9:50 pm  BREAK

Thursday Morning, Nov. 18, 10:20 a.m. – 12:00 noon

Color Appearance

Session Chair: Gary Dispoto, Hewlett-Packard Laboratories

10:20 pm  A Victory for Equivalent Background —On Average
Mark D. Fairchild, Munsell Color Science Laboratory, Rochester Institute of Technology, Rochester, New York, USA

10:45 pm  Model Based Color Tolerances
Nathan Moroney, Hewlett-Packard Laboratories, Palo Alto, California, USA

11:10 pm  White Point Estimation for Uncalibrated Images
Vlad C. Cardei, Brian Funt and Kobus Barnard
School of Computing Science, Simon Fraser University, Vancouver, Canada

11:35 pm  Determination of Adapted White Points for Various Viewing Environments
Peyma Oskoui and Elizabeth Pirrotta
Hewlett Packard Laboratories, Palo Alto, California, USA

12:00 noon  LUNCH
Thursday Afternoon, Nov. 18, 1:30 – 2:45 p.m.

**Color Constancy**

*Session Chair: Gene Martinez, Canon Information Systems*

1:30 pm  
**Single Surface Colour Constancy**  
*Graham Finlayson and Gerald Schaefer*, School of Information Systems, University of East Anglia, Norwich, United Kingdom

1:55 pm  
**Color Constancy with Specular and Non-Specular Surfaces**  
*Kobus Barnard and Brian Funt*, School of Computing Science, Simon Fraser University, Burnaby, British Columbia, Canada

2:20 pm  
**Unifying Colour Constancy**  
*Graham D. Finlayson and Steven Hordley*, School of Information Systems, University of East Anglia, Norwich, United Kingdom  
*Paul M. Hubel*, H-P Laboratories, Hewlett-Packard Company, Palo Alto, California, USA

Thursday Afternoon, Nov. 18, 2:45 to 5:30 p.m.

**The Poster Session**

*Session Chair: Karen M. Braun, Xerox Corporation*

**Noise Cleaning Digital Camera Images to Improve Color Fidelity Capabilities**  
*James E. Adams, Jr. and Kevin E. Spaulding*, Eastman Kodak Company, Rochester, New York, USA

**Gamut Boundary Determination using Alpha-Shapes**  
*Tomasz J. Cholewo and Shaun Love*, Lexmark International, Inc., Lexington, Kentucky, USA

**New Requirements on D50 Illumination in ISO/DIS 3664:1998 and the Implications**  
*Chengwu Cui*1,2  
1. GretagMacbeth LLC, New Windsor, New York  
2. Lexmark International Inc., Lexington, Kentucky

**Development of XYZ/sRGB-SCID and Color Gamut Compression**  
*Koichi Sakamoto and Hitoshi Urabe*, FUJI PHOTO FILM Co., Ltd., Saitama Japan

**pv – A Tool for Color Palette Visualization**  
*Irwin Sobel*, Hewlett-Packard Laboratories, Palo Alto, California, USA

**The Use of Color in Multidimensional Graphical Information Display**  
*Ethan D. Montag*, Munsell Color Science Laboratory, Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, Rochester, New York, USA
Positive Bradford Curves through Sharpening

Graham D. Finlayson, School of Information Systems, The University of East Anglia, Norwich NR4 7TJ, United Kingdom

Mark S. Drew, School of Computing Science, Simon Fraser University, Vancouver, British Columbia V5A 1S6, Canada

Color Reproductions Varying the Input Level on a Liquid Crystal Display Panel

Yukio Okano, Sharp Corporation, Information Systems Product Development Labs., Yamatokoriyama, Nara 639-1186, Japan

Opponent Color, Human Vision and Wavelets for Image Compression

Marcus J. Nadenau and Julien Reichel, Signal Processing Laboratory, Swiss Federal Institute of Technology, Lausanne, Switzerland

Automatic Color Enhancement and Scene Change Detection of Moving Pictures

Jyrki Korpi-Anttila, Laboratory of Media Technology, Helsinki University of Technology, Helsinki, Finland

Gamut Visualization Tools and Metrics

Richard L. Reel and Michael A. Penrod, Lexmark International, Inc., Lexington, Kentucky, USA

Demosaicing using Human Visual Properties and Wavelet Interpolation Filtering

Bo Tao, Ingeborg Tastl, Ted Cooper, Mike Blasgen and Eric Edwards

Sony US Research, San Jose, California, USA

Color Constancy with Fluorescent Surfaces

Kobus Barnard, School of Computing Science, Simon Fraser University, Burnaby, British Columbia, Canada

The CAM97s2 Model

Changjun Li, M. Ronnier Luo and Robert W. G. Hunt

Colour & Imaging Institute, University of Derby, Derby, United Kingdom

Color Mix Prediction for Printed Textiles

Norman Stein, Nedgraphics Print Ltd., Synergy House, Guildhall Close, Manchester Science Park, Manchester M15 6SY, United Kingdom

Color Image Classification Using Tree Classifiers

R. Schettini*, C. Brambilla†, G. Ciocca*, M. De Ponti‡

*ITIM, †IAMI, Consiglio Nazionale delle Ricerche
‡STMicroelectronics, TPA Group, Printer Division

Theory of the Effect of Light Scattering from Dispersed Pigment Particles on Hard Copy Monochrome Color

Robert J. Meyer, Xerox Corporation, Webster, NY USA
Image Coding for Classification
G. Qiu, School of Computer Studies, The University of Leeds, United Kingdom
G. D. Finlayson, School of Information Systems, The University of East Anglia, United Kingdom

An Evaluation of Colour Models’ Performance Using Image Compression Algorithms
Shao Ying Zhu and M. Ronnier Luo, Colour & Imaging Institute, University of Derby, Derby, United Kingdom

Gamut Mapping Method Adaptive to Hue-divided Color Distributions
Chen Hung-Shing, Minoru Omamiuda and Hiroaki Kotera
Graduate School of Science and Technology, Chiba University, Chiba, Japan

Gamut Compression Analysis Based on Observer Experimental Data
Byoung-Ho Kang and Maeng-Sub Cho
Colour Imaging Team, VR Center, CSTL/ETRI, Yusong, TaeJeon, Republic of Korea
Ján Morovic and M. Ronnier Luo
Colour and Imaging Institute, University of Derby, United Kingdom

Image Dependent Gamma Selection Based on Color Palette Equalization and a Simple Lightness Model
Juha Katajamäki and Pekka Laihanen, Laboratory of Media Technology, Helsinki University of Technology, Helsinki, Finland

Colorimetric Printer Calibration using Modified Sigmoidal Tone-Curve Function
Cheol-Hee Lee, Ho-Young Lee, Yang-Woo Park*, and Yeong-Ho Ha
School of Electronic and Electrical Eng., Kyungpook Natl. University, Taegu, Korea
*Dept. of Computer Science and Information, Kyungwoon University, Gumi, Korea

Committee-Based Color Constancy
Vlad C. Cardei and Brian Funt, School of Computing Science, Simon Fraser University, Vancouver, Canada

Multispectral Image Capture Across the Web
Hans Brettel, Jon Yngve Hardeberg* and Francis Schmitt
Signal and Image Processing Department, École Nationale Supérieure des Télécommunications, Paris, France
*DeviceGuys, Inc., Redmond, Washington, USA

Channel Reduction and Applications to Image Processing
Hans B. Wach, Edward R. Dowski, Jr., W. Thomas Cathey
University of Colorado, Boulder, Colorado, USA
Thursday Evening, Nov. 18, 7:30 – 8:45 p.m.

Imaging Rare Books

John Warnock, CEO, Adobe Systems Inc. (USA)

Friday Morning, Nov. 19, 8:40 – 9:25 a.m.

Keynote Presentation

Session Chair: Tony Johnson, Consultant UK

8:40 am

Designing Color Reproduction Systems: A Perspective View

Noboru Ohta, Munsell Color Science Laboratory, Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, Rochester, New York, USA

Friday Morning, Nov. 19, 9:25 – 10:15 a.m.

Standards

Session Chair: Tony Johnson, Consultant UK

9:25 am

Standard RGB Color Spaces

Sabine Süsstrunk, Laboratory of audio-visual Communication (EPFL), Lausanne, Switzerland
Robert Buckley, Xerox Architecture Center, Webster, New York, USA
Steve Swen, Apple Computer, Cupertino, California, USA

9:50 am

Standard Color Spaces and ICC Color Management

Tim Kohler, Canon Information Systems, San José, California, USA
Michael Rodriguez, R. R. Donnelley and Sons Co., Downers Grove, Illinois, USA

10:15 am

BREAK

Friday Morning, Nov. 19, 10:45 a.m. – Noon

Gamut Mapping I

Session Chair: Naoya Katoh, EP Laboratories, Sony Corp.

10:45 am

Methods for Investigating the Influence of Image Characteristics on Gamut Mapping

Ján Morovic and Pei–Li Sun, Colour & Imaging Institute, University of Derby, Derby, United Kingdom
Invited Paper: Which Trajectories Through Which Perceptually Uniform Color Spaces Produce Appropriate Colors Scales for Interval Data?  
Bernice Rogowitz and Alan Kalvin and Aron Cohen  
IBM T. J. Watson Research Center, Yorktown Heights, New York, USA  
Adar Pelah, Cambridge University, Cambridge, United Kingdom

Development and Evaluation of Six Gamut-Mapping Algorithms for Pictorial Images  
Karen M. Braun, Raja Balasubramanian and Reiner Eschbach  
Digital Imaging Technology Center, Xerox Corporation, Rochester, New York, USA

Friday Afternoon, Nov. 19, 1:30 – 3:10 p.m.

Gamut Mapping II  
Session Chair: Ján Morovic, Colour & Imaging Institute, University of Derby

Gamut-Mapping Techniques for Business Graphics  
Karen M. Braun, Raja Balasubramanian, and Steven J. Harrington  
Digital Imaging Technology Center, Xerox Corporation, Webster, New York, USA

Applying Non-linear Compression to the Three-dimensional Gamut Mapping  
Naoya Katoh and Masahiko Ito, PNC Development Center, Sony Corporation, Shinagawa, Tokyo, Japan

Optimizing Gamut Mapping: Lightness and Hue Adjustments  
Patrick G. Herzog and Hendrik Büring, Aachen University of Technology, Technical Electronics Institute, Aachen, Germany

General-Purpose Gamut-Mapping Algorithms: Evaluation of Contrast-Preserving Rescaling Functions for Color Gamut Mapping  
Gustav J. Braun and Mark D. Fairchild, Munsell Color Science Laboratory, Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology, Rochester, New York, USA

BREAK
Friday Afternoon, Nov. 19, 3:40 – 5:20 p.m.

**Printing**

*Session Chair: Raja Balasubramanian, Xerox Corporation*

3:40 pm  
**A Model for Colour Prediction of Halftoned Samples Incorporating Light Scattering and Ink Spreading**  
*Patrick Emmel, Roger David Hersch, Ecole Polytechnique Fédérale de Lausanne (EPFL), CH-1015 Lausanne, Switzerland*  
173

4:05 pm  
**Spectral Based Ink Selection for Multiple-Ink Printing II. Optimal Ink Selection**  
*Di-yuan Tzeng and Roy S. Berns, Munsell Color Science Laboratory, RIT Chester F. Carlson Center for Imaging Science, Rochester, New York, USA*  
182

4:30 pm  
**Properties of Jointly-Blue Noise Masks and Application on Color Halftoning**  
*Muge Wang and Kevin J. Parker, Department of Electrical and Computer Engineering, University of Rochester, Rochester, New York, USA*  
188

4:55 pm  
**Test Image Design Guidelines for Color Quality Evaluation**  
*Gary G. Field, California Polytechnic State University, San Luis Obispo, California, USA*  
194