Advance Technical Program

IS&T/SPIE 16th Annual Symposium

Electronic Imaging

Science and Technology

18–22 January 2004
San Jose Marriott and San Jose Convention Center
San Jose, California USA

Conferences • Courses • Exhibition

Symposium Chairs:
Giordano B. Beretta, Hewlett-Packard Co.
Robert L. Stevenson, Univ. of Notre Dame

Symposium Organizing Committee:
John D. Meyer, Hewlett-Packard Co.
Robert A. Sprague, Gyricon Media Inc.

2D Display Technologies

3D Displays and Holography

Image and Document Visualization

Image Processing

Sensors, Capture, and Machine Vision

Multimedia Processing and Applications

Visual Communications and Image Processing

Optical Security and Anti-Counterfeiting

Sponsored by:

IS&T The Society for Imaging Science and Technology

SPIE The International Society for Optical Engineering

IS&T/SPIE 16th Annual Symposium

Electronic Imaging

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Plan now to attend the premier imaging event!

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Rudolf L. van Renesse, VanRenesse Consulting (Netherlands)
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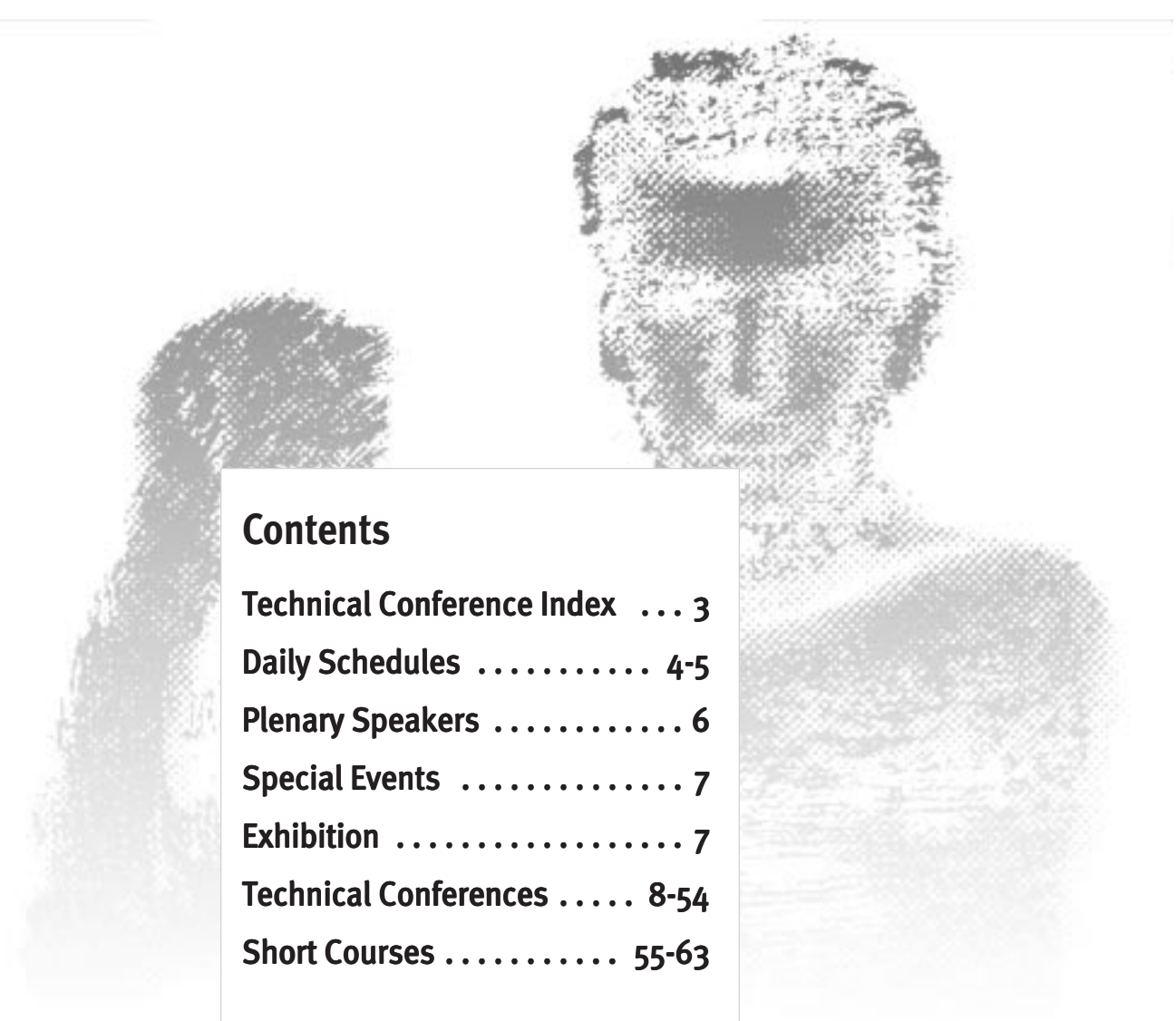


Contents

Register by 17 December 2003 and save $100!

Reserve your hotel space early!
See page 68.

IS&T/SPIE would like to express its deepest appreciation to the program chairs, conference chairs, cochairs, program committees, and session chairs who have so generously given of their time and advice to make this symposium possible. The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members.

This program is based on commitments received up to the time of publication and is subject to change without notice.

Figures used courtesy of N. D'Apuzzo from Proceedings Vol. 5013.

Participate in the premier imaging meeting in the industry!

Science and engineering may seem to be quite removed from business administration and the economy, yet there still is a coupling. When the economy is good, funding is generous but retention is hard; in bad economic times, funding is tight but researchers stay longer in a position. The best time is just before an upturn, because industry wants to be ready with new technologies when their customers are ready to invest again, resulting both in generous funding and in dedicated researchers.

As you browse this Advance Program of IS&T/SPIE's 16th Annual Symposium on Electronic Imaging: Science and Technology, you will realize that we are now at such a prime time. We received a record number of 1,065 submissions from 39 countries, and the Conference Chairs report that quality is generally up.

You will find other novelties attending this year's symposium. We are back to the San Jose Convention Center, yet we have maintained the separation in time of EI from Photonics West, leading to a more intimate setting and better networking opportunities. A new hotel will allow more attendees to comfortably lodge just a short walking distance from the venue.

Visitors from abroad will also find the new US bank notes; plenary speaker Annette Jaffe will reveal the imaging science and technology behind the new notes. The second plenary speaker is Jan Allebach, who will talk about the opportunities for a researcher in image processing to make a contribution to this important area of technology.

The conferences, along with short courses, panel discussions, and poster sessions, will continue to provide the depth necessary to today's researcher. Additional professional experiences will be provided by the conference receptions, the vendor exhibition, interest group meetings, and technology demonstrations that are part of every EI Symposium. The conference chairs and their technical committees represent a great resource for the newcomer who seeks ways to connect to the EI community and, perhaps, to eventually participate in organizing a conference. Becoming directly involved in EI is also an excellent way to develop contacts and learn who's who in the various fields.

You will find two new conferences for 2004: Vision Geometry, and Image Quality and System Performance. Both start with a strong program. In Vision Geometry you will find the latest results on surface reconstruction and simplification, shape analysis and object recognition, digital morphology, digital geometry and topology, and image segmentation. Image Quality has a strong program encompassing emerging image quality standards, psychophysical methods and standards for image quality evaluation, scanner-based print quality measurements, subjective image quality modeling; and system image quality measurements and modeling.

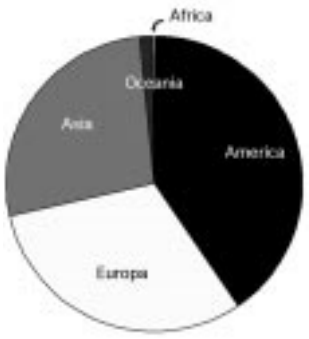
With its receptions and the downtown San Jose location, EI 2004 is an excellent opportunity to get accelerated for the next economic upswing by renewing old friendships and networking with new contacts. You and your family will also enjoy the vibrant culture and many points of interest in the San Francisco Bay Area. Make your plans now to join us January 18-22, 2004, for this exciting electronic imaging event.

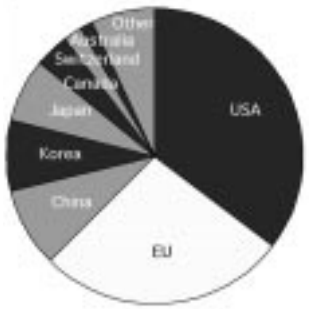
See you in San Jose!

Giordano B. Beretta, Hewlett-Packard Co.
Robert L. Stevenson, Univ. of Notre Dame
Symposium Chairs

A look at the international side of Electronic Imaging 2004

For a large number of papers at the 2004 meeting, the first author is in academia or in an independent research laboratory. Besides the effect of people staying in school longer, this is also due to the large proportion of U.S. papers-while in Europe, Japan, and Korea industry is heavily investing in research, U.S. companies still tend to invest their profits in executives rather than R&D, and U.S. papers come prominently from universities. As you peruse the program, you will also note how the shift of funding towards security is positively impacting related conferences.





Technical Conference Index

Program on 2D Displays

Program on 3D Displays and Holography

Program on Image and Document Visualization

Program on Image Processing

Program on Sensors, Capture, and Machine Vision

Program on Multimedia Processing and Applications

Program on Visual Communications and Image Processing

Program on Optical Security and Anti-Counterfeiting

One fee gains you access to all these conferences.

Register by 17 December 2003 and save $100!

Technical Conference Daily Schedule

Monday	Tuesday	Wednesday	Thursday
	EXHIBITION 10:00 am to 5:00 pm	**EXHIBITION** 10:00 am to 4:00 pm	
Program on **2D Displays**			
5289A **Liquid Crystal Materials, Devices, and Applications X** *(Chien)* p. 8		5289B **Projection Displays X** *(Wu)* p. 10	
Program on **3D Displays and Holography**			
5290 **Practical HolographyXVIII: Materials and Applications** *(Jeong, Bjelkhagen)* p. 11			5291B **The Engineering Reality of Virtual Reality 2004** *(Bolas)* p. 15
5291A **Stereoscopic Displays and Applications XV** *(Woods, Merritt)* p. 13			
Program on **Image and Document Visualization**			
5292 **Human Vision and Electronic Imaging IX** *(Rogowitz, Pappas)* p. 16			
5294 **Image Quality and System Performance** *(Miyake, Rasmussen)* p. 20			
5295 **Visualization and Data Analysis 2004** *(Erbacher, Chen, Roberts, Gröhn, Börner)* p. 22			
	5293 **Color Imaging IX: Processing, Hardcopy, and Applications IX** *(Eschbach, Marcu)* p. 18		
		5296 **Document Recognition and Retrieval XI** *(Barney Smith, Hu, Allan)* p. 24	
Program on **Image Processing**			
5299 **Computational Imaging II** *(Bouman, Miller)* p. 30		5297 **Real-Time Imaging VIII** *(Kehtarnavaz, Laplante)* p. 25	
5298 **Image Processing: Algorithms and Systems III** *(Dougherty, Astola, Egiazarian)* p.27			
5300 **Vision Geometry XII** *(Latecki, Mount, Wu)* p. 32			
Program on **Sensors, Capture, and Machine Vision**			
5302 **Three-Dimensional Image Capture and Applications VI** *(Corner, Li, Pargas)* p. 36			
5301B **Sensors, Color, Cameras, and Systems for Digital Photography** *(Sampat, Motta)* p. 35	5301A **Sensors, Cameras and Systems for Scientific/Industrial Applications VI** *(Blouke)* p. 33		
		5303 **Machine Vision Applications in Industrial Inspection XII** *(Price, Meriaudeau)* p. 37	
Program on **Multimedia Processing and Applications**			
5309 **Embedded Processors for Multimedia and Communications** *(Sudharsanan, Bove, Panchanathan)* p. 52			
5304 **Internet Imaging V** *(Santini, Schettini)* p. 38			
5306 **Security, Steganography, and Watermarking of Multimedia Contents VI** *(Delp, Wong)* p. 41			
	5307 **Storage and Retrieval Methods and Applications for Multimedia 2004** *(Yeung, Lienhart, Li)* p. 44		
		5305 **Multimedia Computing and Networking 2004** *(Venkatasubramanian)* p. 40	
Program on **Visual Communications and Image Processing**			
	5308 **Visual Communications and Image Processing 2004** *(Panchanathan, Vasudev)* p. 47		
Program on **Optical Security and Anti-Counterfeiting**			
	5310 **Optical Security and Counterfeit Deterrence Techniques V** *(van Renesse)* p. 53		

Short Course Daily Schedule

Sunday	Monday	Tuesday	Wednesday

Capture and Display

Sunday	Monday	Tuesday	Wednesday
SC060 Stereoscopic Display Application Issues (Merritt, Woods) 8:30 am to 5:30 pm, *p. 56*	**SC068** Use of CCD and CMOS Sensors in Visible Imaging Applications (Lomheim) 8:30 am to 12:30 pm, *p. 57*		
SC504 Introduction to CCD and CMOS Imaging Sensors and Applications (Janesick), 8:30 am to 5:30 pm, *p. 57*	**SC075** Effective Color Computing (Marcu) 8:30 am to 12:30 pm, *p. 57*		
	SC516 Color Considerations for Liquid Crystal Displays (Marcu), 1:30 to 5:30 pm, *p. 58*		
	SC528 Color Imaging with Visible Image Sensors (Lomheim), 1:30 to 5:30 pm, *p. 58*		
	SC592 Principles of Digital Color Management (Madden), 1:30 to 5:30 pm, *p. 58*		

If you're taking a course on Sunday, pick up your registration materials at the San Jose Marriott, San Jose Ballroom Foyer.
(Monday–Wednesday Courses: pick up materials at the Convention Center.)

Digital Systems and Engineering

Sunday	Monday	Tuesday	Wednesday
SC063 Applied Morphological and Nonlinear Image Analysis Techniques (Vincent) 8:30 am to 5:30 pm, *p. 59*	**SC189** Image Recognition Using Statistical Filtering Techniques, Wavelets and Neural Networks (Javidi), 8:30 am to 5:30 pm, *p. 59*	**SC527** Software Specification and Design for Image Processing (Laplante), 8:30 am to 5:30 pm, *p. 61*	**SC494** How to Select the Right Image Sensor for Your Application (Putnam), 1:30 am to 5:30 pm, *p. 60*
SC491 Neural Network Applications in Image Processing (Nasrabadi), 8:30 am to 5:30 pm, *p. 60*	**SC513** Practical MTF Metrology for Digital Cameras and Scanners (Burns, Williams), 8:30 am to 5:30 pm, *p. 60*		
SC589 Image and Video Compression: Standards and Trends (Rabbani), 8:30 am to 5:30 pm, *p. 61*	**SC590** Advanced Digital Image Processing Techniques (Rabbani), 8:30 am to 5:30 pm, *p. 61*		
	SC591 Digital Video Basics: Analog and Digital TV Basics and Signal Processing (Isailovic), 8:30 am to 5:30 pm, *p. 62*		

Data, Internet, and Multimedia

Sunday	Monday	Tuesday	Wednesday
SC083 Color Imaging on the Internet (Beretta, Buckley) 8:30 am to 5:30 pm, *p. 62*		**SC087** Optical Document Security (van Renesse) 1:30 to 5:30 pm, *p. 63*	**SC593** Characterization and Prediction of Image Quality (Keelan, Kane, Topfer, Wheeler), 8:30 am to 5:30 pm, *p. 63*
SC084 Multimedia Security: Cryptography and Watermarking (Delp) 8:30 am to 5:30 pm, *p. 63*			

Full course descriptions on pages 56–63

Register for Short Courses p. 71

Plenary Sessions

Tuesday 20 January . . . . . 8:30 to 9:15 am

Digital Printing—An Image Processor's Perspective

Jan P. Allebach,
School of Electrical and Computer Engineering, Purdue Univ.

Recipient of the 2004 Electronic Imaging Scientist of the Year award.

Despite the promise of a paperless world, revenue from sales of consumables and hardware for electrophotographic and inkjet printing now exceeds 50 billion U.S. dollars per year and continues to grow. What are the opportunities for a researcher in image processing to make a contribution to this important area of technology? Certainly, digital halftoning is a core technology for printing. While it has been around for over 25 years and is considered by many to be passé, some of the most exciting developments have occurred only recently. The needs in this area continue to be driven by relentless pressure to print faster with higher quality, and to do it at lower cost. But there is more-much more. Halftoning is only one step in the imaging pipeline of a digital printer. There is also a need for image scaling, compression, various types of color transformations, and image enhancement. In addition, it is increasingly important to consider these steps in the context of the printer mechanism and the properties of the human visual system. Image analysis, mechatronics, and psychophysics are critical to characterizing the behavior of the print mechanism and human viewer that enables the linkage between the imaging algorithms and these elements of the printing ecology.

Beyond the hardware platform itself, there are additional opportunities for image processing to play a role. The development life cycle of printers has been squeezed tremendously by the need to bring new products to market more quickly than ever before. Image analysis techniques can reduce development costs by efficiently inspecting printer output for defects and overall quality. During the manufacture of the printer, image analysis is used for inspection of parts and in the machine vision systems required for automated assembly of the printer. However, here the application of image processing is fundamentally the same as that used in the manufacture of other types of products. Finally, when the printer is deployed in the field, image processing can help to reduce the cost of service and support, and improve customer satisfaction by facilitating the diagnosis of print quality defects. Here again, there is an important interplay with the human user, which calls for both psychophysics and human factors methods.

Allebach will discuss the role of image processing in digital printing, as detailed above, in the context of the multidisciplinary research program at Purdue University in digital printing. He will illustrate these concepts with examples from his research activity.

Jan P. Allebach received his BSEE from the Univ. of Delaware in 1972 and his Ph.D. from Princeton Univ. in 1976. He was on the faculty at the Univ. of Delaware from 1976 to 1983. Since 1983, he has been at Purdue Univ. where he is Michael J. and Katherine R. Birck Professor of Electrical and Computer Engineering. His current research interests include image rendering, image quality, color imaging and color measurement, document management, and wireless applications of imaging and printing The results of his research on image rendering algorithms have been licensed to major vendors of imaging products, and can be found in millions of units that have been sold worldwide.

Jan P. Allebach is a member of the IEEE Signal Processing (SP) Society, the Society for Imaging Science and Technology (IS&T), and SPIE. He has been especially active with the IEEE SP Society and IS&T. He is a Fellow of both these societies, has served as Distinguished/Visiting Lecturer for both societies, and has served as an officer and on the Board of Directors of both societies. Prof. Allebach is a past Associate Editor for the IEEE Transactions on Signal Processing and the IEEE Transactions on Image Processing. He is presently Editor for the IS&T/SPIE Journal of Electronic Imaging. He received the Senior (best paper) Award from the IEEE Signal Processing Society and the Bowman Award from IS&T. He has also received four teaching awards at Purdue Univ.

Wednesday 21 January . . . . . 8:30 to 9:15 am

Security Is Not Just for Money Anymore

Annette Jaffe,
Annette Jaffe Consulting,
San Jose, CA

The evolution of printing has followed a predictable path until the advent of technologies that allow anyone to easily reproduce any printed material. Initially, as color copiers were developed, concern about the counterfeiting of banknotes was very prominent and security devices were developed to thwart potential counterfeiters. However, advances in digital scanning, printing and computers have transformed the color printing world and with that the security of any printed substrate. Security concerns extend from banknote counterfeiting to pharmaceutical packaging, travel documents, brand protection and more. The security devices used to give three levels of security include first-level devices, which have overt optical properties; second-level devices, which are covert but need only simple means to be seen; and third-level devices, which are covert and not easily detected.

This talk will describe security features used today, the rise and fall of specific security devices (for example fine lines, holograms, microtext, and color) and speculate on the types of devices that will protect us in the future.

Annette Jaffe received her Ph.D. in Physical Chemistry from Yale Univ. She has spent many years doing research and development on color non-impact printing at IBM, Apple, and Texas Instruments. Presently, she is a consultant in color digital imaging, ink jet printing, electrophotography as well as security printing and digital anticounterfeiting.

Electronic Imaging Poster Session

San Jose Marriott, San Jose Ballroom

Tuesday, 20 January . . . . . 5:30 to 7:00 pm

Conference attendees are invited to the poster session. Authors of poster papers will be on hand during these sessions to answer questions and provide in-depth discussion concerning their papers. Attendees are requested to wear their conference registration badges to the poster sessions.

Authors can set up posters after 10:00 am on Tuesday. Poster supplies (pushpins) will be available in the San Jose Marriott: San Jose Ballroom. Other supplies can be obtained from the Speakers Audio Visual Desk.

Posters can be previewed during the days of the events before the formal poster sessions begin at 5:30 pm.

Authors must remove their papers at the conclusion of the poster reception for that day. It is the author's responsibility to remove their posters. Papers not removed will be considered unwanted and will be discarded. The Societies assume no responsibility for posters left up after the end of each night's poster reception.

Women in Optics Lunch

Wednesday 21 January . . . . . 12:00 to 1:00 pm

Take this opportunity to network with other attendees at this hosted luncheon. Pre-register by emailing June Thompson (june@spie.org) or sign up onsite at registration before Tuesday noon. Location to be announced.

All Conference Reception

Wednesday, January 21 . . . . . 7:30 pm to 9:30 pm

Plan to join us for this great opportunity to get to know your Electronic Imaging colleagues. All attendees are invited to relax and enjoy a pleasant evening with friends old and new!

Exhibition Hours

Tuesday 20 January . . . . . 10:00 am to 5:00 pm

Wednesday 21 January . . . . . 10:00 am to 4:00 pm

Leading Electronic Imaging companies showcase the latest products and technologies in the industry. The current exhibitor list and floor plan is available on-line at www.electronicimaging.org.

There is no charge to visit the exhibition hall; however, a registration badge is required for admittance. On-site registration is available for exhibition-only visitors.

For information about exhibiting at this symposium, please contact, SPIE Exhibitions Manager at sales@spie.org; telephone 360-676-3290; fax: 360-647-1445; Web: www.spie.org/exhibitions/ei

Holography Display

Monday–Wednesday

Holograms related to the topics in the Practical Holography XVIII: Materials and Applications conference will be on display in the Marriott Hotel, Concourse Level near Ballroom A.

Technical Group Meetings

Members and non-members alike are invited to attend these informative meetings that provide excellent networking opportunities.

Electronic Imaging

Tuesday 20 January . . . . . 7:30 to 9:30 pm

Chair: **Gabriel Marcu,** Apple Computer, Inc.

This group addresses diverse research, engineering, and specialized applications of electronic imaging devices or systems. Because of the diverse topical areas within electronic imaging, the technical group covers image processing, image capture, display and hardcopy, system integration, visualization, and low-light instrumentation. Application areas are just as far-reaching. They include industrial automation, graphic arts, aerospace sensing, remote sensing, high-resolution television, optimal fiber tele-imaging, document processing, medical imaging, and all areas of digital image processing, including restoration, compression, and analysis.

Holography

Tuesday 20 January . . . . . 7:00 to 9:00 pm

Chairs: **Hans I. Bjelkhagen,** De Montfort Univ., (United Kingdom); **Raymond K. Kostuk,** Univ. of Arizona

The Holography Technical Group is involved with the whole record of research, engineering, and applications in holographic optical elements, nondestructive testing, computer-generated holography, materials and processing, commercial and artistic applications of holography, and standardization issues. This meeting will focus on recent developments in the field and directions it is taking, and serve as a networking and informal cooperative instructional opportunity.

Conference 5289A

Monday-Tuesday 19-20 January 2004 • Part of Proceedings Vol. 5289
Liquid Crystal Materials, Devices, and Applications X and Projection Displays X

Liquid Crystal Materials, Devices, and Applications X

Conference Chair: **Liang-Chy Chien**, Kent State Univ.

Program Committee: **Dick J. Broer**, Philips Research Labs. (Netherlands); **Harry J. Coles**, Univ. of Cambridge (United Kingdom); **Gregory P. Crawford**, Brown Univ.; **Wolfgang Haase**, Technische Univ. Darmstadt (Germany); **Yong-Bae Kim**, Konkuk Univ. (South Korea); **Shunsuke Kobayashi**, Science Univ. of Tokyo (Japan); **Shui-Chih A. Lien**, IBM Thomas J. Watson Research Ctr.; **Shohei Naemura**, Merck Japan, Ltd. (Japan); **Shin-Tson Wu**, CREOL/Univ. of Central Florida

Monday 19 January

SESSION 1 . . . . . Mon. 8:30 to 10:10 am

Materials and Applications

Chair: **Liang-Chy Chien**, Kent State Univ.

Novel homeotropic alignment materials with alkylcyclohexylbenzene *(Invited Paper)*, Y. B. Kim, H. K. Lee, Konkuk Univ. (South Korea) . . . . . [5289A-01]

Photochromic liquid crystals *(Invited Paper)*, G. H. Mehl, M. Frigoli, Univ. of Hull (United Kingdom) . . . . . [5289A-02]

Structure-property relationships of some high birefringence liquid crystals, J. Willmott, M. N. Pivnenko, Univ. of Cambridge (United Kingdom); M. Grasmann, J. Hannington, Dow Corning Ltd. (United Kingdom); H. J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [5289A-03]

Novel electroclinic organosiloxane materials for optoelectronic devices, M. N. Pivnenko, O. Hadeler, M. J. Coles, Univ. of Cambridge (United Kingdom); M. Grasmann, J. Hannington, Dow Corning Ltd. (United Kingdom); H. J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [5289A-04]

SESSION 2 . . . . . Mon. 10:40 am to 12:00 pm

Photonic Applications I

Chair: **Shin-Tson Wu**, CREOL/Univ. of Central Florida

From nanostructured liquid crystals to electro-optic devices and lasers *(Invited Paper)*, H. J. Coles, Univ. of Cambridge (United Kingdom) . . . . . [5289A-05]

Novel polarization interference filters for wide spectral tuning of an optical null *(Invited Paper)*, H. J. Masterson, J. E. Stockley, S. A. Serati, Boulder Nonlinear Systems, Inc. . . . . [5289A-06]

Fast switching dual-frequency liquid crystal optical retarder for beam steering applications, A. B. Golovin, S. V. Shiyanovskii, O. D. Lavrentovich, Kent State Univ. . . . . [5289A-07]

Lunch Break

SESSION 3 . . . . . Mon. 1:30 to 3:10 pm

Photonic Applications II

Chair: **Harry J. Coles**, Univ. of Cambridge (United Kingdom)

Electrically controlled lens and prism using nanoscale polymer-dispersed and polymer-networked liquid crystals *(Invited Paper)*, S. T. Wu, Y. Fan, H. Ren, CREOL/Univ. of Central Florida . . . . . [5289A-08]

LC vision application to malignant tumors detecting *(Invited Paper)*, M. G. Tomilin, S.I. Vavilov State Optical Institute (Russia); S. Povzun, Military Medical Academy (Russia) . . . . . [5289A-09]

Polymer stabilized liquid crystal light modulators, S. H. Kim, L. Chien, Kent State Univ. . . . . [5289A-10]

Concentration gradients in polymer dispersed liquid crystals analyzed by secondary ion mass spectrometry, C. Kjellander, L. van IJzendoorn, A. de Jong, Technische Univ. Eindhoven (Netherlands); D. J. Broer, Philips Research Labs. (Netherlands); M. de Voigt, H. Niemantsverdriet, Technische Univ. Eindhoven (Netherlands) . . [5289A-11]

SESSION 4 . . . . . Mon. 3:40 to 5:10 pm

Display Technologies I

Chair: **Akihiro Mochizuki**, Nano Loa USA Inc.

Threshold and grayscale stability of microcup electronic paper *(Invited Paper)*, R. Liang, J. J. Hwang, H. Gu, J. Hou, X. Weng, Y. Chen, H. Zang, SiPix Imaging, Inc. . . . . [5289A-12]

Modeling and measuring the effects of domain walls in liquid crystal displays *(Invited Paper)*, D. K. de Boer, Philips Research Labs. (Netherlands) . . . . . [5289A-13]

Geometrical optics approach in liquid crystal cells with two- and three-dimensional director variations *(Invited Paper)*, G. Y. Panasyuk, J. R. Kelly, P. J. Bos, E. C. Gartland, D. W. Allender, Kent State Univ. . . . . [5289A-14]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 11:20 am

Display Technologies II

Chair: **Dick K. G. de Boer**, Philips Research Labs. (Netherlands)

Polarization shielded V-shaped ferroelectric liquid crystal displays *(Invited Paper)*, A. Mochizuki, Nano Loa, Inc. (Japan) and Nano Loa USA, Inc. . . . . [5289A-15]

Fast electro-optic switching of frequency modulation (FM) TN-LCDs fabricated by doping nanoparticles *(Invited Paper)*, S. Kobayashi, Tokyo Univ. of Science (Japan); J. Thisayukta, Tokyo Institute of Technology (Japan); Y. Shiraishi, Y. Sakai, T. Miyama, T. Masumi, N. Toshima, Tokyo Univ. of Science (Japan) . . . . . [5289A-16]

Wide color gamut monitors: LED backlighting LCD and new phosphor CRT, H. Sugiura, H. Kaneko, S. Kagawa, M. Ozawa, Mitsubishi Electric Corp. (Japan); H. Tanizoe, NEC-Mitsubishi Electric Visual Systems Corp. (Japan) . . . . . [5289A-17]

SESSION 6 ..... Tues. 11:20 am to 12:40 pm

LC Technologies

Chair: **Liang-Chy Chien**, Kent State Univ.

Simulation study of a liquid crystal optical switch based on total internal reflection *(Invited Paper),* D. Yang, Kent State Univ. ..... [5289A-18]

Patterned alignment of liquid crystals *(Invited Paper),* S. Varghese, C. W. Bastiaansen, Technische Univ. Eindhoven (Netherlands); D. J. Broer, Philips Research Labs. (Netherlands) ..... [5289A-19]

Flexoelectric properties of liquid crystal bimesogens for use in device applications, M. Clarke, A. E. Blatch, M. J. Coles, H. J. Coles, Univ. of Cambridge (United Kingdom) ..... [5289A-20]

Lunch/Exhibition Break

SESSION 7 ..... Tues. 2:00 to 3:00 pm

Display Technologies III

Chair: **Yong B. Kim**, Konkuk Univ. (South Korea)

Novel design techniques for transflective liquid crystal displays *(Invited Paper),* J. Kim, H. W. Do, C. G. Jhun, K. Park, J. S. Gwag, S. H. Lee, G. D. Lee, T. Yoon, Pusan National Univ. (South Korea) ..... [5289A-21]

Flexible ferroelectric liquid crystal devices for roll-up displays *(Invited Paper),* H. Fujikake, H. Sato, NHK Science & Technical Research Labs. (Japan) ..... [5289A-22]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Influence of external tuning on the lasing action of N* and smectic C* liquid crystal lasers,** A. Ford, S. Morris, M. Pivnenko, O. Hadeler, J. Willmott, A. Blatch, M. Coles, H. Coles, Univ. of Cambridge (United Kingdom) ..... [5289A-23]

✔ **Dynamic diffraction ring projector by doped polymer dispersed liquid crystal,** A. Olivares-Perez, M. Pérez-Cortés, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico); M. Ortiz-Gutiérrez, Univ. Michoacana de San Nicolás de Hidalgo (Mexico); J. C. Ibarra-Torres, J. Juárez-Pérez, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico) ..... [5289A-24]

✔ **Influence of additives on the electro-optical properties of commercial nematic liquid crystal materials,** Y. Cho, H. J. Coles, Univ. of Cambridge (United Kingdom); C. Schott, Merck NB-C (United Kingdom) ..... [5289A-25]

✔ **Structure-property relations of dye-doped chiral nematic liquid crystal lasers,** S. M. Morris, A. Ford, J. Willmott, M. Pivnenko, O. Hadeler, A. Blatch, M. Coles, H. Coles, Univ. of Cambridge (United Kingdom) ..... [5289A-26]

✔ **Dot-matrix image precorrection for visor display basing,** Y. Liu, Optic-Electric Institute of Luoyang (China) ..... [5289A-27]

Conference 5289B

Wednesday 21 January 2004 • Part of Proceedings Vol. 5289
Liquid Crystal Materials, Devices, and Applications X and Projection Displays X

Projection Displays X

Conference Chair: **Ming H. Wu**, Hamamatsu Corp.

Program Committee: **Patrick Candry**, Barco Projection Systems N.V. (Belgium); **Dah Yu Cheng**, Cheng Technology & Services; **Arlie R. Conner**, 3M Precision Optics, Inc.; **Stephen K. Eckhardt**, 3M Optical Systems Div.; **James M. Florence**, ELCAN Optical Technologies; **Fang-Chuan Ho**, Industrial Technology Research Institute (Taiwan); **Larry J. Hornbeck**, Texas Instruments Inc.; **Robert J. Martinsen**, Coherent Inc.; **Shoichi Matsumoto**, Liquid Crystal Technology and Information Ctr. (Japan)

Wednesday 21–Thursday 22 January

The Projections Displays X Conference will feature a special session on "Projection Light Source Technology" and general projection display related topics/papers.

For a full list of sessions and paper order, please check the meeting website at www.electronicimaging.org

See p. 71 to order.

Conference 5290

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5290

Practical Holography XVIII: Materials and Applications

Conference Chairs: **Tung H. Jeong**, Lake Forest College; **Hans I. Bjelkhagen**, De Montfort Univ. (United Kingdom)

Program Committee: **Stephen A. Benton**, MIT Media Lab.; **Günther J. Dausmann**, Holographic Systems München GmbH (Germany); **Jean-Marc R. Fournier**, Rowland Institute at Harvard; **Gerald L. Heidt**, Wasatch Photonics; **Toshio Honda**, Chiba Univ. (Japan); **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan); **Raymond K. Kostuk**, Univ. of Arizona; **Roger A. Lessard**, Univ. Laval (Canada); **Junchang Li**, Kunming Univ. of Science and Technology (China); **Vladimir B. Markov**, MetroLaser, Inc.; **Gaylord E. Moss**, Moss Optics; **Nadya O. Reingand**, Celight, Inc.; **Fred D. Unterseher**, Columbia Area Career Ctr.

Director of Holography Exhibitions: **Steven L. Smith**, Massachusetts Institute of Technology

Monday 19 January

SESSION 1 . . . . . Mon. 8:30 to 10:00 am

Digital Holography I

Chair: **Emmett N. Leith**, Univ. of Michigan

Recent developments in computer-generated holography: toward a practical electroholography system for interactive 3D visualisation *(Invited Paper)*, C. W. Slinger, C. D. Cameron, S. D. Coomber, R. J. Miller, D. A. Payne, A. P. Smith, M. G. Smith, M. Stanley, QinetiQ (United Kingdom) . . . . . [5290-01]

Computer-generated holograms on a CD-R disk, Y. Sakamoto, Hokkaido Univ. (Japan); M. Morishima, A. Usui, Yamaha Corp. (Japan) . . . . . [5290-02]

Real-time color holography with high-resolution reflective LCD panels, S. Nakazaki, K. Sato, Himeji Institute of Technology (Japan) . . . . . [5290-03]

Large viewing angle electroholography by space projection method, K. Sato, Shonan Institute of Technology (Japan); K. Takano, Tokyo Metropolitan College of Aeronautical Engineering (Japan) . . . . . [5290-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:10 pm

Digital Holography II

Chair: **Fujio Iwata**, Toppan Printing Co., Ltd. (Japan)

Three-dimensional display of real existing objects using computer-generated holograms, Y. Sando, M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) . . . . . [5290-05]

Computer-generated 3D holograms of depth-annotated images, H. Kang, Electronics and Telecommunications Research Institute (South Korea) . . . . . [5290-06]

New type of optical diffuser with the directional property, H. Honma, Y. Maekawa, M. Takano, L. M. Murillo-Mora, A. Sato, K. Hirose, F. Iwata, Toppan Printing Co., Ltd. (Japan) . . . . . [5290-07]

Some fundamental issue analysis about digital hologram, L. Zhong, Tianjin Univ. (China) and Kunming University of Science and Technology (China) . . . . . [5290-08]

Quantitative analysis about digital holographic reconstructed image, X. Lu, Tianjin Univ. (China) and Kunming Univ. of Science and Technology (China) . . . . . [5290-09]

Lunch Break

SESSION 3 . . . . . Mon. 1:40 to 3:00 pm

Digital Holography III

Chair: **Toshio Honda**, Chiba Univ. (Japan)

Hologram bandwidth reduction and size change of 3D images for visual display, K. Sato, S. Nakazaki, Himeji Institute of Technology (Japan) . . . . . [5290-10]

Wave optical algorithm for hidden-surface removal in digitally synthetic full-parallax holograms for three-dimensional objects, K. Matsushima, A. Kondoh, Kansai Univ. (Japan) . . . . . [5290-11]

Problem of coaxial diffraction waves in digital holography, L. Xu, X. Peng, J. Miao, A. Asundi, Nanyang Technological Univ. (Singapore) . . . . . [5290-12]

Holographic low coherence confocal microscopy, K. D. Mills, Univ. of Michigan . . . . . [5290-13]

SESSION 4 . . . . . Mon. 3:30 to 5:10 pm

Art Holography

Chair: **Fred D. Unterseher**, Columbia Area Career Ctr.

Composing mosiac holograms, P. H. Dawson, Univ. of New South Wales (Australia) . . . . . [5290-14]

Holography as public art: pro and con, H. Casdin-Silver, Casdin-Silver Holography . . . . . [5290-15]

Integration of photography into holography, E. Wesly, M3 Visual Research Labs. . . . . [5290-16]

Holographic portraits: from reality to artistic creation, R. M. Oliveira, Univ. de Aveiro (Portugal); L. M. Bernardo, H. Crespo, Univ. do Porto (Portugal) . . . . . [5290-17]

From kinetics to holokinetics in holographic art, R. Nuñez, Space-Light (Venezuela) . . . . . [5290-18]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 10:30 am

Applications I

Intellectual property issues in holography and in high-tech in general, N. Reingand, Celight, Inc. . . . . [5290-19]

Optimal design of the grating with reflective plate of comb type, K. Oka, Japan Women's Univ. (Japan) and RIKEN-The Institute of Chemical and Physical Research (Japan); N. Ebizuka, RIKEN-The Institute of Chemical and Physical Research (Japan); K. Kodate, Japan Women's Univ. (Japan) . . . . . [5290-20]

Method of creation of real-time holographic video screen, D. Enkh-Amgalan, NOROV Department Store (Mongolia) and Otgonchimeg.Sh (Specialist) (Mongolia); S. Batsambuu, S. Otgonchimeg, NOROV Department Store (Mongolia) . . . . . [5290-21]

Conference 5290

SESSION 6 ..... Tues. 11:00 am to 12:00 pm

Applications II

Chair: **Steven L. Smith**, Massachusetts Institute of Technology

Stereographic and animated rainbow diffractive images in optical security, V. I. Girnyk, Optronics, Ltd. (Ukraine); V. I. Grygoruk, Kyiv Taras Shevchenko Univ. (Ukraine); I. S. Borisov, Kyiv Taras Shevchenko Univ. (Ukraine) and Optronics (Ukraine) ..... [5290-22]

Development of 40-inch hybrid hologram screen for auto stereoscopic video display, H. H. Song, Incheon City College (South Korea) ..... [5290-23]

Psychophysical effect of retouched and modified digital stereograms for binocular vision on depth perception, M. Iizuka, Tokyo Institute of Polytechnics (Japan) ..... [5290-24]

Lunch/Exhibition Break

SESSION 7 ..... Tues. 1:40 to 3:00 pm

Materials I

Chair: **Hans I. Bjelkhagen**, De Montfort Univ. (United Kingdom)

Effects of the film manufacturing procedure and development process on the holographic properties of HOEs in DCG *(Invited Paper),* C. G. Stojanoff, Holotec GmbH (Germany) and Aachen Univ. of Technology (Germany) ..... [5290-25]

Self-made silver bromide based emulsions for holography manufacturing, processing, and application, L. Duenkel, J. Eichler, G. Ackermann, C. Schneeweiss, Technische Fachhochschule Berlin (Germany) ..... [5290-26]

Dichromated photosensitive materials: involvement of the polymeric matrix, M. Bolte, Univ. Blaise Pascal (France); R. A. Lessard, Univ. Laval (Canada); Y. Israeli, A. Rivaton, Univ. Blaise Pascal (France) ..... [5290-27]

SESSION 8 ..... Tues. 3:30 to 5:10 pm

Materials II

Chair: **Roger A. Lessard**, Univ. Laval (Canada)

Modeling the Lippmann color process, M. Jäger, H. I. Bjelkhagen, M. Turner, De Montfort Univ. (United Kingdom) ..... [5290-29]

Characteristics of the holographic emulsion composed by bromocresol green (BCG) dye and resin with different thickness, J. C. Ibarra, Ctr. de Enseñanza Técnica Industrial (Mexico); M. Ortiz, Univ. Michoacana de San Nicolas de Hidalgo (Mexico); P. Alonso, J. J. Escobar, Ctr. de Enseñanza Técnica Industrial (Mexico) ..... [5290-30]

Time evolution analysis of holographic grating on azobenzene polymer films by MPS method, D. Barada, Univ. of Tsukuba (Japan); M. Itoh, T. Yatagai, Univ. of Tsukuba (Japan) and SR Project Nanoscience, Univ. Tsukuba (Japan) ..... [5290-31]

Development of thixotropic nanocomposite coatings for high-speed embossing, M. Mennig, P. W. Oliveira, H. Schmidt, Institut für Neue Materialien GmbH (Germany) ..... [5290-32]

Standby Oral Presentation: Holograms and authentication: meeting future demands, I. M. Lancaster, Reconnaissance International (United Kingdom) ..... [5290-50]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Comment for edge-lit hologram,** T. Tomono, Samsung Electronics Co., Ltd. (South Korea) ..... [5290-33]

✔ **Surface scratches: a method for 3D-imaging,** L. Duenkel, J. Eichler, C. Schneeweiss, G. Ackermann, Technische Fachhochschule Berlin (Germany) ..... [5290-34]

✔ **Polyvinyl acetate thermal holograms,** S. L. Toxqui, A. P. Olivares, I. Tapia-Fuentes, M. Gutierrez-Ortiz, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico) ..... [5290-35]

✔ **Design of compact optical setup for hologram multiplexing with a straight arrangement of two prisms,** T. Nakayama, K. Shimizu, Y. Okazaki, E. Watanabe, K. Kodate, Japan Women's Univ. (Japan); Y. Takayama, T. Aruga, Communications Research Lab. (Japan) ..... [5290-36]

✔ **Determination of phase transitions in liquid crystals by using holographic interferometry technique,** M. B. Dongre, P. P. Chikode, Shivaji Univ. (India); S. J. Gupta, Univ. of Mumbai (India); S. J. Pawar, Shivaji Univ. (India) ..... [5290-37]

✔ **Holographic method for obtaining images of two-dimensional objects with limiting high resolution for extreme short-wave lithography problems,** S. N. Koreshev, S.I. Vavilov State Optical Institute (Russia); V. P. Ratushnyi, HoloGrate (Russia) ..... [5290-38]

✔ **Glucose-fructose holograms,** E. P. Lee, A. O. Peréz, I. F. Tapia, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico) ..... [5290-39]

✔ **Computer-generated holograms considering multiple reflection, transmission, and shadow on object surfaces,** K. Ezura, Y. Sakamoto, Y. Aoki, Hokkaido Univ. (Japan) ..... [5290-40]

✔ **Making holograms in classrooms in universities with holography camera and the simplest optical setups,** H. Katsuma, Tama Art Univ. (Japan); T. Kimura, T. Shibuya, M.Wakaki, Tokai Univ. (Japan) ..... [5290-41]

✔ **Development compact direct fringe printer for computer-generated holograms,** H. Yoshikawa, K. Takei, Nihon Univ. (Japan) ..... [5290-42]

✔ **Error analysis in phase extraction in a 2D holographic imaging of semiconductor devices,** V. Dubec, S. Bychikhin, D. Pogany, E. Gornik, Technische Univ. Wien (Austria); G. Groos, Univ. der Bundeswehr München (Germany); M. Stecher, Infineon Technologies AG (Germany) ..... [5290-43]

✔ **Multi-imaging hologram for physics education in university and college,** T. Shibuya, T. Kimura, T. Sumi, S. Tada, Tokai Univ. (Japan); I. Huang, H. Katsuma, Tama Art Univ. (Japan); M. Wakaki, Tokai Univ. (Japan) ..... [5290-44]

✔ **Computer holograms: parametric study of binary codes,** J. L. Juarez-Perez, A. Olivares Perez, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico); M. Ortiz Gutierrez, Univ. Michoacana de San Nicolas de Hidalgo (Mexico); M. Perez Cortez, Instituto Nacional de Astrofísica Óptica y Electrónica (Mexico) . [5290-45]

✔ **Analysis of computer-generated holograms with fractal characteristics,** M. M. Lehman, Software Integral para Lab. SACV (Mexico) ..... [5290-46]

✔ **Fast phase identification method for real-time holographic interferometry,** J. Li, Kunming Univ. of Science and Technology (China) ..... [5290-47]

✔ **Novel methylene blue sensitized photopolymers for holographic recording: a comparison,** M. Ushamani, K. Sreekumar, C. Sudha Kartha, J. Rani, Cochin Univ. of Science and Technology (India) ..... [5290-48]

✔ **Preliminary study of visual effect of multiplex hologram,** H. Fu, H. Yang, Capital Normal Univ. (China); B. Xiong, Kunming Univ. of Science and Technology (China) ..... [5290-49]

Holography Display

Monday–Wednesday

Holograms related to the topics in the Practical Holography XVIII: Materials and Applications conference will be on display in the Marriott Hotel, Concourse Level near Ballroom A.

Conference 5291A

Monday-Wednesday 19-21 January 2004 • Part of Proceedings Vol. 5291A
Stereoscopic Displays and Virtual Reality Systems XI

Stereoscopic Displays and Applications XV

Conference Chairs: **Andrew J. Woods**, Ctr. for Marine Science and Technology/Curtin Univ. of Technology (Australia); **John O. Merritt**, The Merritt Group

Program Committee: **Mark T. Bolas**, Fakespace Inc.; **Neil A. Dodgson**, Univ. of Cambridge; **Janusz Konrad**, Boston Univ.; **Shojiro Nagata**, InterVision (Japan); **Lew B. Stelmach**, Communications Research Ctr. Canada; **Vivian K. Walworth**, Jasper Associates

Monday 19 January

SESSION 1 . . . . . Mon. 8:30 to 10:10 am

Human Factors

Chair: **John O. Merritt**, The Merritt Group

Development and evaluation of an amusement machine using autostereoscopic 3D display, T. Kawai, T. Shibata, Waseda Univ. (Japan); Y. Shimizu, M. Kawata, M. Suto, Sophia Inc. (Japan) . . . . . [5291A-01]

Perception of 3D spatial relations in 3D images, P. Rosen, Z. Pizlo, C. Hoffmann, V. S. Popescu, Purdue Univ. . . . . [5291A-02]

Stereo display for chest CT, X. H. Wang, C. R. Fuhrman, J. H. Sumkin, C. A. Britton, T. E. Warfel, D. Gur, W. F. Good, Univ. of Pittsburgh . . . . . [5291A-03]

Development of a miniaturized system for monitoring vergence during viewing of stereoscopic imagery using a HMD, S. L. Ames, N. A. McBrien, Univ. of Melbourne (Australia) . . . . . [5291A-04]

Variation and extrema of human interpupilliary distance, N. A. Dodgson, Univ. of Cambridge (United Kingdom) . . . . . [5291A-05]

SESSION 2 . . . . . Mon. 10:40 am to 12:00 pm

Stereoscopic Compression

Chair: **Lew B. Stelmach**, Communications Research Ctr. Canada

Coding of multiview images, T. Palfner, E. Müller, Univ. Rostock (Germany)[5291A-06]

Video memory compression for multiview autostereoscopic displays, B. Kaufmann, M. Akil, Groupe ESIEE (France) . . . . . [5291A-07]

Multiresolution image compression using image foveation and simulated depth of field for stereoscopic displays, I. Van der Linde, Anglia Polytechnic Univ. (United Kingdom) . . . . . [5291A-08]

Perceptually lossless rate controlled stereo image coding, E. A. Edirisinghe, S. Bedi, Loughborough Univ. (United Kingdom) . . . . . [5291A-09]

Lunch Break

SESSION 3 . . . . . Mon. 1:20 to 3:20 pm

Stereoscopic Image Processing and Rendering

Chair: **Janusz Konrad**, Boston Univ.

Depth-image-based rendering (DIBR), compression, and transmission for a new approach on 3D-TV, C. Fehn, Fraunhofer Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [5291A-10]

Non-orthogonal sub-sampling and anti-alias filtering for multiscopic 3-D displays, J. Konrad, P. Agniel, Boston Univ. . . . . [5291A-11]

Mapping perceived depth to regions of interest in stereoscopic images, N. S. Holliman, Univ. of Durham (United Kingdom) . . . . . [5291A-12]

Mosaicing impossible stereo views, S. Peleg, Hebrew Univ. of Jerusalem (Israel); Y. Pritch, M. Ben-Ezra, HumanEyes Technologies Ltd. (Israel) . . . . . [5291A-13]

Virtual voxel: a quantitative figure-of-merit for autostereoscopic display technology and implementation, M. Siegel, Carnegie Mellon Univ.; L. Lipton, Stereographics Corp. . . . . [5291A-14]

Stereoscopic display with enhanced user/image interpenetrability, S. Aubrey, Aubrey Imaging, Inc. . . . . [5291A-15]

SESSION 4 . . . . . Mon. 3:50 to 5:30 pm

Stereoscopic Camera Systems

Chair: **Andrew J. Woods**, Ctr. for Marine Science and Technology/Curtin Univ. of Technology (Australia)

Real-time capturing and interactive synthesis of 3D scenes using integral photography, T. Yamamoto, T. Naemura, Univ. of Tokyo (Japan) . . . . . [5291A-16]

Camera convergence problem revisited, R. S. Allison, York Univ. (Canada) [5291A-17]

Real-time ray-space acquisition system, T. Fujii, M. Tanimoto, Nagoya Univ. (Japan) . . . . . [5291A-18]

Development of a reliable and practical HD stereoscopic camera system, J. Lee, S. Nam, J. Lee, C. Park, Korean Broadcasting System (South Korea); Y. Joo, D. A. Petrov, Y. Kim, Y. Lee, Huhu Co., Ltd. (South Korea) . . . . . [5291A-19]

Improved stereovision scheme using one camera and a composite lens array, H. Choi, J. Park, J. Hong, B. Lee, Seoul National Univ. (South Korea) . . . . . [5291A-20]

Short Break

3D Screening Session . . . . . 5:40 to 7:10 pm

Chair: **Andrew J. Woods,** Ctr. for Marine Science and Technology/Curtin Univ. of Technology (Australia)

See large-screen examples of how 3D video is being used and produced around the world.

SD&A Dinner . . . . . 7:30 to late

A no-host informal dinner open to all SD&A attendees will be held at a local San Jose restaurant. Details will be available at the conference.

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 10:30 am

Autostereoscopic Displays I

Chair: **Neil A. Dodgson**, Univ. of Cambridge (United Kingdom)

Assessment and improvement of the stereo-image visualization on 4D-Vision 3D-displays, I. Relke, M. Klippstein, B. Riemann, 4D-Vision GmbH (Germany) [5291A-21]

Temporally consistent virtual camera generation from stereo image sequences, S. R. Fox, J. Shao, J. Flack, P. Harman, Dynamic Digital Depth Inc. (Australia) . . [5291A-22]

Multiview 3D projection system, S. S. Kim, Samsung Electronics Co., Ltd. (South Korea) . . . . . [5291A-23]

Conference 5291A

SESSION 6 ..... Tues. 11:00 am to 12:00 pm

Autostereoscopic Displays II

Chair: **Neil A. Dodgson**, Univ. of Cambridge (United Kingdom)

Three-dimensional interaction with autostereoscopic displays, Z. Y. Alpaslan, A. A. Sawchuk, Univ. of Southern California ..... [5291A-24]

Three-dimensional display system for user interface of FTV, T. Higashi, T. Fujii, M. Tanimoto, Nagoya Univ. (Japan) ..... [5291A-25]

Implementation of projection-type autostereoscopic multiview 3D display system for real-time applications, Y. Park, K. Bae, E. Kim, Kwangwoon Univ. (South Korea) ..... [5291A-26]

Lunch/Exhibition Break

SESSION 7 ..... Tues. 1:30 to 3:10 pm

Autostereoscopic Displays III

Chair: **Shojiro Nagata**, Intervision (Japan)

Multiview autosterescopic display with floating real image, H. Kakeya, Univ. of Tsukuba (Japan) ..... [5291A-27]

Step barrier system multiview glassless 3D display, K. Mashitani, G. Hamagishi, M. Higashino, T. Ando, S. Takemoto, SANYO Electric Co., Ltd. (Japan) ..... [5291A-28]

Novel view-sequential display based on DMD technology, O. Cossairt, Massachusetts Institute of Technology ..... [5291A-29]

DepthCube solid-state 3D volumetric display, A. Sullivan, LightSpace Technologies, Inc. ..... [5291A-30]

Fabrication of a novel projection screen for autostereoscopic display systems, W. Huang, C. Tsai, K. Huang, N. Wang, Industrial Technology Research Institute (Taiwan) ..... [5291A-31]

SESSION 8 ..... Tues. 3:30 to 4:30 pm

Stereoscopic Video

Chair: **Andrew J. Woods**, Curtin Univ. of Technology (Australia)

Production and evaluation of stereoscopic video presentation in surgical training, J. Ilgner, Aachen Univ. Hospital (Germany); T. Kawai, Waseda Univ. (Japan); M. Westhofen, Aachen Univ. Hospital (Germany); T. Shibata, Waseda Univ. (Japan) ..... [5291A-32]

Visual comfort/discomfort and visual fatigue on viewing stereoscopic HDTV, Y. Nojiri, NHK Science and Technical Research Labs. (Japan) ..... [5291A-33]

DepthQ: universal system for stereoscopic video visualization on WIN32 platform, M. Husak, Lightspeed Design, Inc. and Institute of Chemical Technology Prague (Czech Republic); C. Ward, Lightspeed Design, Inc. ..... [5291A-34]

Panel Discussion:
3D and 4D Attractions: The New Stereoscopic Cinema

Moderator: **Lenny Lipton,** Stereographics Corp.

Wednesday 21 January

Plenary Presentation ..... 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 9 ..... Wed. 9:30 to 10:30 am

Integral 3D Imaging

Chair: **Shojiro Nagata**, Intervision (Japan)

Computational models for integral imaging, J. Ren, A. Aggoun, M. McCormick, De Montfort Univ. (United Kingdom) ..... [5291A-35]

Improvement of an integral three-dimensional television system through correction of geometrical position errors, M. Okui, J. Arai, M. Kobayashi, F. Okano, NHK Science and Technical Research Labs. (Japan) ..... [5291A-36]

Extraction and conversion of the three-dimensional information for integral imaging, J. Park, H. Choi, J. Hong, B. Lee, Seoul National Univ. (South Korea) ..... [5291A-37]

SESSION 10 ..... Wed. 10:50 to 11:50 am

Stereoscopic Developments I

Chair: **Lew B. Stelmach**, Communications Research Ctr. Canada (Canada)

Dynamic dimension: system for simultaneous 3D and monoscopic viewing, A. Redert, Philips Research USA (Netherlands) ..... [5291A-38]

HMD type multifocus 3D display system, S. Kim, Korea Institute of Science and Technology (South Korea); J. Son, Hanyang Univ. (South Korea) ..... [5291A-39]

Ghosting in anaglyph stereoscopic images, A. J. Woods, T. Rourke, Ctr. for Marine Science and Technology/Curtin Univ. of Technology (Australia) ..... [5291A-40]

Lunch/Exhibition Break

SESSION 11 ..... Wed. 1:20 to 2:00 pm

Stereoscopic Developments II

Chair: **Vivian K. Walworth**, Jasper Associates

Stereoscopic retinal scanning laser display with integrated focus cues for ocular accommodation, B. T. Schowengerdt, Univ. of Washington and Univ. of California/Davis; E. J. Seibel, N. L. Silverman, T. A. Furness III, Univ. of Washington . [5291A-41]

Implementation issues for the full-time full-resolution stereoscopic 3D flat-panel display, J. C. Kirsch, B. K. Jones, U.S. Army Aviation and Missile Command; J. L. Johnson, U.S. Army Europe and V Corps Science Advisor Office; D. B. Chenault, Polaris Sensor Technologies, Inc.; I. Kleinberger, P. Kleinberger, H. Goldberg, J. Y. Mantinband, 3ality, Inc.; M. Jones, SYColeman, Inc. ..... [5291A-42]

✔ Poster Pop Session ..... 2:00 to 2:20 pm

Chair: **Vivian K. Walworth,** Jasper Associates

Poster authors will give a short oral review of their posters. Posters will be available for viewing during the demonstration session.

✔ **Camera system for autostereoscopic display using floating real image,** I. Matsuda, H. Kakeya, Univ. of Tsukuba (Japan) ..... [5291A-43]

✔ **Design and feasibility test for directional diffractive optical elements for LCD-based stereoscopic systems,** K. Choi, B. Lee, Seoul National Univ. (South Korea) ..... [5291A-44]

✔ **Depth-enhanced integral 3D imaging using a polarization-multiplexed display with different optical path lengths,** S. Jung, J. Park, H. Choi, B. Lee, Seoul National Univ. (South Korea) ..... [5291A-45]

✔ **Development of a stereoscopic 3D display system to observe restored heritage,** H. Morikawa, T. Kawai, J. Ohya, M. Kawaguchi, Waseda Univ. (Japan) . [5291A-46]

Keynote Presentation ..... 2:30 to 3:30 pm

Demonstration Session ..... 3:30 to 5:30 pm

Chairs: **Neil A. Dodgson,** Univ. of Cambridge (United Kingdom); **Andrew J. Woods,** Ctr. for Marine Science and Technology/Curtin Univ. of Technology (Australia)

Demonstrations of Stereoscopic Displays and Virtual Reality Technologies.

Interactive, hands-on demonstrations of stereoscopic hardware and display content to support presentations given in the conferences "Stereoscopic Displays and Applications XV" and "The Engineering Reality of Virtual Reality 2004".

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Conference 5291B

Thursday 22 January 2004 • Part of Proceedings Vol. 5291B
Stereoscopic Displays and Virtual Reality Systems XI

The Engineering Reality of Virtual Reality 2004

Conference Chair: **Mark T. Bolas**, Stanford Univ.

Program Committee: **Nick England**, 3rdTech, Inc.; **Guillaume Moreau**, Ecole Centrale de Nantes (France); **Shojiro Nagata**, Intervision (Japan); **Daniel J. Sandin**, Univ. of Illinois/Chicago; **Andreas Simon**, Fraunhofer Institute for Media Communication (Germany); **Henry A. Sowizral**, Sun Microsystems, Inc.

Thursday 22 January

SESSION 14 . . . . . Thurs. 8:30 to 10:10 am

Synthesis and Design

Chair: **Shojiro Nagata**, Intervision (Japan)

Presentation of moving objects in virtual environment, H. Ye, J. Gong, Wuhan Univ. (China) . . . . . [5291B-47]

DAVRS environment for architecture design, Y. Liu, J. Sun, Tianjin Univ. (China) . . . . . [5291B-48]

Experiments to evolve toward a tangible user interface for CAD parts assembly, J. Legardeur, Ecole Supérieure des Technologies Industrielles (France); L. Garreau, Ecole Supérieure des Technologies Industrielles (France) and Lab. LaBRI (France); N. Couture, Ecole Supérieure des Technologies Industrielles (France) . . . . . [5291B-49]

Open-architecture virtual reality platform for interdisciplinary applications, B. Takacs, Digital Elite Inc. . . . . [5291B-50]

Progressive sounding object model in virtual environment, Q. Zhang, Philips Research East Asia (China) . . . . . [5291B-51]

SESSION 15 . . . . . Thurs. 10:50 am to 12:10 pm

Research Programs

Chair: **Andreas Simon**, Fraunhofer Institute for Media Communication (Germany)

Sharing skills: using augmented reality for human-robot collaboration, B. Giesler, R. Dillmann, Univ. Karlsruhe (Germany) . . . . . [5291B-52]

Jedi training: playful evaluation of head-mounted augmented reality display systems, B. Giesler, R. Dillmann, Univ. Karlsruhe (Germany) . . . . . [5291B-53]

Shared database of annotation information for wearable augmented reality system, K. Makita, M. Kanbara, N. Yokoya, Nara Institute of Science and Technology (Japan) . . . . . [5291B-54]

Immersive telepresence using high-resolution omnidirectional movies and a locomotion interface, S. Ikeda, T. Sato, M. Kanbara, N. Yokoya, Nara Institute of Science and Technology (Japan) . . . . . [5291B-55]

Lunch Break

SESSION 16 . . . . . Thurs. 1:40 to 3:20 pm

Technology and Applications

Chair: **Guillaume Moreau**, CNRS (France)

Investigation into different visual/tactual feedback nodes, A. M. Bashir, P. M. Taylor, Univ. of Newcastle (United Kingdom) . . . . . [5291B-56]

Real-time data fusion on stabilizing camera pose estimation output for vision-based road navigation, Z. Hu, Matrox Electronic Systems Ltd. (Canada); K. Uchimura, Kumamoto Univ. (Japan) . . . . . [5291B-57]

Effect of visual distortion on postural balance in a full immersion stereoscopic environment, J. Faubert, R. Allard, Univ. de Montréal (Canada) . . . . . [5291B-58]

Human factor integration into development of a realistic tree rendering system based on lidar remote sensing, I. Fujisaki, D. L. Evans, R. J. Moorhead, M. J. Mohammadi-Aragh, D. W. Irby, S. D. Roberts, Mississippi State Univ. . . . . [5291B-59]

Development of a 3D interaction table, J. Gustafsson, C. Lindfors, Royal Institute of Technology (Sweden) . . . . . [5291B-60]

SESSION 17 . . . . . Thurs. 4:00 to 4:20 pm

Special Session: Virtual Reality Works

Chair: **Daniel J. Sandin**, Univ. of Illinois/Chicago

This session is set aside for papers and interactive demonstrations of virtual reality works.

Visual navigation structures in collaborative virtual environments, M. Dolinsky, Indiana Univ. . . . . [5291B-61]

Conference 5292

Monday-Thursday 19-22 January 2004 • Proceedings Vol. 5292

Human Vision and Electronic Imaging IX

Conference Chairs: **Bernice E. Rogowitz**, IBM Thomas J. Watson Research Ctr.; **Thrasyvoulos N. Pappas**, Northwestern Univ.

Program Committee: **Albert J. Ahumada, Jr.**, NASA Ames Research Ctr.; **Jan P. Allebach**, Purdue Univ.; **Walter R. Bender**, MIT Media Lab.; **Michael H. Brill**, Datacolor; **John C. Dalton**, Synthetik Software; **Scott J. Daly**, Sharp Labs. of America; **Huib de Ridder**, Delft Univ. of Technology (Netherlands); **Gunilla A. M. Derefeldt**, Swedish Defence Research Agency (Sweden); **Miguel P. Eckstein**, Univ. of California/Santa Barbara; **Elena A. Fedorovskaya**, Eastman Kodak Co.; **Jennifer Gille**, Raytheon ITSS; **Stanley A. Klein**, Univ. of California/Berkeley; **Jan J. Koenderink**, Univ. Utrecht (Netherlands); **John J. McCann**, McCann Imaging; **Jeffrey B. Mulligan**, NASA Ames Research Ctr.; **Karol Myszkowski**, Max-Planck-Institut für Informatik (Germany); **Adar Pelah**, Univ. of Cambridge (United Kingdom); **Hawley K. Rising III**, Sony Corp.; **Robert J. Safranek**, Benevue, Inc.; **Christopher W. Tyler**, Smith-Kettlewell Eye Research Institute; **Andrew B. Watson**, NASA Ames Research Ctr.

For a full list of sessions and paper order, please see the meeting website at www.electonicimaging.org

See p. 71 to order.

Conference 5293

Tuesday-Thursday 20-22 January 2004 • Proceedings Vol. 5293

Color Imaging IX: Processing, Hardcopy, and Applications IX

Conference Chairs: **Reiner Eschbach**, Xerox Corp.; **Gabriel G. Marcu**, Apple Computer, Inc.

Program Committee: **A. Ufuk Agar**, Hewlett-Packard Labs.; **Jan P. Allebach**, Purdue Univ.; **Jan Bares**, NexPress Solutions, LLC; **Makoto Fujino**, Seiko Epson Corp. (Japan); **Phil J. Green**, London College of Printing (United Kingdom); **Roger David Hersch**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Patrick G. Herzog**, RWTH-Aachen (Germany); **Hiroaki Ikegami**, Fuji Xerox Co., Ltd. (Japan); **Michael A. Kriss**, Sharp Labs. of America; **Shaun T. Love**, Lexmark International, Inc.; **Alessandro Rizzi**, Univ. degli Studi di Milano (Italy); **Shoji Tominaga**, Osaka Electro-Communication Univ. (Japan); **Chris Tuijn**, Agfa-Gevaert N.V. (Belgium)

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 1 . . . . . Tues. 9:30 to 10:40 am

Color and Applications

Chairs: **Reiner Eschbach**, Xerox Corp.; **Gabriel G. Marcu**, Apple Computer, Inc.

Color categories are diverse in thought as well as language: evidence from New Guinea and Africa *(Invited Paper),* D. D. Roberson, Univ. of Essex (United Kingdom) . . . . . [5293-01]

Maximum color separation in illuminant estimation, X. Jiang, N. Ohta, Rochester Institute of Technology; S. Quan, Sony Electronics Inc. . . . . [5293-03]

SESSION 2 . . . . . Tues. 11:10 am to 12:10 pm

Spectral Imaging

Chair: **Alessandro Rizzi**, Univ. degli Studi di Milano (Italy)

Selection of filters for multispectral acquisition using the filter vectors analysis method, G. Novati, P. Pellegri, Consiglio Nazionale delle Ricerche (Italy) and DISCo/ Univ. degli Studi di Milano-Bicocca (Italy); R. Schettini, DISCo/Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [5293-04]

Measurement-based spectral generator for colors, Y. Sun, Purdue Univ. . . [5293-05]

Subspace matching color filter design methodology for a multispectral imaging system, D. Ng, J. P. Allebach, Purdue Univ. . . . . [5293-06]

Lunch/Exhibition Break

SESSION 3 . . . . . Tues. 1:30 to 3:20 pm

Color Reproduction

Chair: **Raja Bala**, Xerox Corp.

Did Jan van Eyck build the first 'photocopier' (with enlarge button!) in 1432? *(Invited Paper),* D. G. Stork, Ricoh Innovations, Inc. . . . . [5293-07]

Document image enhancement algorithm for digital color copier, J. Yi, Samsung Electronics Co., Ltd. (South Korea) . . . . . [5293-08]

Workflow modeling in the graphic arts and printing industry, C. Tuijn, Agfa-Gevaert N.V. (Belgium) . . . . . [5293-09]

Printing customers' personal digital files, R. Fageth, CEWE Color AG (Germany) . . . . . [5293-10]

Evaluation of raster image compression in the context of large format document processing, C. Sibade, S. Barizien, Océ Print Logic Technologies (France); M. Akil, L. Perroton, Groupe ESIEE (France) . . . . . [5293-11]

SESSION 4 . . . . . Tues. 3:50 to 5:30 pm

Printing

Chair: **Gabriel G. Marcu**, Apple Computer, Inc.

Reproduction of colored images on substrates with varying chromaticity, P. J. Green, B. Oicherman, London College of Printing (United Kingdom) . . . . . [5293-12]

Color reproduction on inkjet printers and paper colorimetric properties, J. Fernández-Reche, Univ. de Granada (Spain); J. Uroz, Hewlett-Packard Española (Spain); J. A. Diaz, A. García-Beltrán, Univ. de Granada (Spain) . . . . . [5293-13]

Six-color separation for improving graininess in a middle tone region, C. Son, Y. Kim, Kyungpook National Univ. (South Korea); C. Lee, Kyungwoon Univ. (South Korea); Y. Ha, Kyungpook National Univ. (South Korea) . . . . . [5293-14]

How scaleable are gamut mapping algorithms?, P. J. Green, London College of Printing (United Kingdom); R. Luo, Univ. of Derby (United Kingdom) . . . . . [5293-15]

Dot for dot proofing: how to zoom into the dots without losing the big picture, S. Livens, Agfa-Gevaert N.V. (Belgium) . . . . . [5293-16]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Generation of realistic scene using illuminant estimation and mixed chromatic adaptation,** J. Kim, Electronics and Telecommunications Research Institute (South Korea) . . . . . [5293-02]

Wednesday 21 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 5 . . . . . Wed. 9:30 to 10:30 am

Applications I

Chair: **Michael A. Kriss**, Sharp Labs. of America

Modular procedure for automatic red-eye correction in digital photos, R. Schettini, DISCo/Univ. degli Studi di Milano-Bicocca (Italy); F. Gasparini, Consiglio Nazionale delle Ricerche (Italy); F. Chazli, DISCo/Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [5293-17]

CMOS CFA database under varying illumination for benchmarking of face detection algorithms, S. Bocchio, F. Beverina, A. Rosti, STMicroelectronics (Italy) . . . [5293-18]

Underwater color constancy: enhancement of automatic live fish recognition, M. Chambah, A. Renouf, D. Semani, P. Courtellemont, Univ. de La Rochelle (France); A. Rizzi, Univ. degli Studi di Milano (Italy) . . . . . [5293-19]

SESSION 6 . . . . . Wed. 11:00 am to 12:00 pm

Applications II

Chair: **Jan Bares**, NexPress Solutions, LLC

Evaluation of color differences in nearly neutral Munsell clips by a 3-CCD color camera, E. Valencia, M. S. Millán, M. Corbalán, Univ. Politècnica de Catalunya (Spain) . . . . . [5293-20]

Scanner show-through reduction using reflective optics, X. Feng, Sharp Labs. of America . . . . . [5293-21]

Single-spectral image obtain and processing of argon-helium mixture arc, C. Xu, H. Gao, G. Huang, L. Wu, Harbin Institute of Technology (China) . . . . . [5293-22]

Lunch/Exhibition Break

SESSION 7 . . . . . Wed. 1:40 to 3:00 pm

Algorithms

Chair: **Phil J. Green**, London College of Printing (United Kingdom)

Color-to-grayscale conversion to maintain discriminability, R. Bala, K. Braun, Xerox Corp. . . . . [5293-23]

Local linear LUT: a new method to speed up local color correction algorithms, C. Gatta, S. Vacchi, D. Marini, A. Rizzi, Univ. degli Studi di Milano (Italy) . . . . [5293-24]

Estimation of a color reflection model using range image data, N. Tanaka, S. Tominaga, Osaka Electro-Communication Univ. (Japan) . . . . . [5293-25]

Reflectance functions estimation from tri-stimulus values, S. Zuffi, Consiglio Nazionale delle Ricerche (Italy); R. Schettini, DISCo/Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [5293-26]

SESSION 8 . . . . . Wed. 3:30 to 5:50 pm

Characterization and Color Management

Chair: **Shaun T. Love**, Lexmark International, Inc.

Novel perception based colorimetric characterization model for visual output devices, A. Neumann, A. Artusi, G. Zotti, Technische Univ. Wien (Austria) . . [5293-27]

Combine 1D and 3D color calibration methods for ensuring consistent color reproduction, Y. Wu, Hewlett-Packard Co. . . . . [5293-28]

Two-dimensional transforms for device color calibration, R. Bala, Xerox Corp. . . . . [5293-29]

Fast linking approach for CMYK to CMYK conversion preserving black separation in ICC color management system, H. Zeng, Hewlett-Packard Co. . . . . [5293-30]

Process control and color management implementation, R. Y. Chung, Rochester Institute of Technology . . . . . [5293-31]

Gray tracking correction for TFTLCD, G. G. Marcu, Apple Computer, Inc. . . . [5293-32]

CRT calibration techniques for better accuracy including low luminance colors, O. Arslan, J. P. Allebach, Z. Pizlo, Purdue Univ. . . . . [5293-33]

Thursday 22 January

SESSION 9 . . . . . Thurs. 8:00 to 10:00 am

Error diffusion

Chair: **Jan P. Allebach**, Purdue Univ.

Some funny things about error diffusion, R. Eschbach, Xerox Corp. . . . . [5293-34]

Principal distance constraint error diffusion method for enhancing the homogeneity and reducing the colored noise, K. Kang, E. Lee, Samsung Electronics Co., Ltd. (South Korea) . . . . . [5293-35]

Channel dependent error diffusion algorithm for dot-off-dot printing, H. S. Seo, Inha Univ. (South Korea); K. M. Kang, Samsung Electronics Co., Ltd. (South Korea); C. Kim, Inha Univ. (South Korea) . . . . . [5293-36]

Fast multilevel vector error diffusion based on adaptive primary color selection, T. Park, Y. Cho, M. Lee, Y. Ha, Kyungpook National Univ. (South Korea) . . . . . [5293-37]

Input-level dependent approach to color error diffusion, V. Monga, Univ. of Texas/Austin; N. Damera-Venkata, Hewlett-Packard Labs.; B. L. Evans, Univ. of Texas/Austin . . . . . [5293-38]

Error diffusion stitching, Z. He, Xerox Corp.; T. Chang, C. A. Bouman, J. P. Allebach, Purdue Univ. . . . . [5293-39]

SESSION 10 . . . . . Thurs. 10:30 am to 12:00 pm

Implementation: Models, Architectures, and Algorithms

Chair: **Jan P. Allebach**, Purdue Univ.

Spectral-based color prediction model for offset prints *(Invited Paper),* R. D. Hersch, Ecole Polytechnique Fédérale de Lausanne (Switzerland); P. Emmel, Clariant International (Switzerland); F. Collaud, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [5293-40]

Design of high-performance coprocessor for color error diffusion, P. P. Dang, STMicroelectronics . . . . . [5293-41]

Halftoning processing on a JPEG-compressed image, C. Sibade, S. Barizien, Océ Print Logic Technologies (France); M. Akil, L. Perroton, Groupe ESIEE (France) . . [5293-42]

Visual cryptography via halftoning, G. R. Arce, Univ. of Delaware; Z. Zhou, Samsung Information Systems America; G. Di Crescenzo, Telcordia Technologies, Inc. [5293-43]

Lunch Break

SESSION 11 . . . . . Thurs. 1:40 to 3:00 pm

Texture Appearance and Hybrid/Adaptive Methods

Chair: **Charles M. Hains**, Xerox Corp.

Resolution-dependence of perceived contrast of textures, R. L. Levien, artofcode LLC . . . . . [5293-44]

New hybrid screen, G. Lin, Xerox Corp.; J. P. Allebach, Purdue Univ. . . . . [5293-45]

Adaptive halftone algorithm for composite documents, J. Huang, A. K. Bhattacharjya, Epson Research & Development, Inc. . . . . [5293-46]

Hybrid color halftoning in flexography, S. Gooran, Linköping Univ. (Sweden) . . . . . [5293-47]

SESSION 12 . . . . . Thurs. 3:30 to 5:00 pm

Screen Design

Chair: **Reiner Eschbach**, Xerox Corp.

30-year evolution of digital halftoning from the viewpoint of a participant *(Invited Paper),* C. M. Hains, Xerox Corp. . . . . [5293-48]

G/M dither or converting monochrome dither matrices to color, D. Shaked, Hewlett-Packard Labs. (Israel); Z. Baharav, Agilent Technologies; Q. Lin, Hewlett-Packard Co. . . . . [5293-49]

Stochastic screens robust to misregistration in multipass printing, G. Sharma, Z. Z. Fan, S. Wang, Xerox Corp. . . . . [5293-50]

AM-FM screen design using donut filters, N. Damera-Venkata, Q. Lin, Hewlett-Packard Labs. . . . . [5293-51]

Conference 5294

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5294

Image Quality and System Performance

Conference Chairs: **Yoichi Miyake**, Chiba Univ. (Japan); **Rene Rasmussen**, Xerox Corp.

Program Committee: **Peter G. J. Barten**, Barten Consultancy (Netherlands); **Peter D. Burns**, Eastman Kodak Co.; **Luke C. Cui**, Lexmark International; **Serguei Endrikhovski**, Eastman Kodak Co.; **Peter G. Engeldrum**, Imcotek, Inc.; **Mark D. Fairchild**, Rochester Institute of Technology; **Susan Farnand**, Eastman Kodak Co.; **Ralph E. Jacobson**, Univ. of Westminster (United Kingdom); **Robin Jenkin**, Cranfield Univ. (United Kingdom); **Eric K. Zeise**, Nexpress Solutions LLC

Monday 19 January

SESSION 1 ..... Mon. 8:30 to 10:30 am

IQ Standards I

Chairs: **Rene Rasmussen**, Xerox Corp.; **Eric K. Zeise**, NexPress Solutions LLC

Overview of the ANSI and international standards process, D. Q. McDowell, Eastman Kodak Co. ..... [5294-01]

CIE Division 8: progress and plans, T. Newman, Canon R&D Ctr. Americas, Inc ..... [5294-02]

Challenges and progress in digital photography standards, J. M. Holm, Hewlett-Packard Labs. ..... [5294-31]

Standardization of appearance-based image quality for printers (INCITS W1.1 & ISO/IEC 19751), E. K. Zeise, NexPress Solutions LLC ..... [5294-03]

Printing systems perceptual-based gloss and gloss uniformity standard (INCITS W1.1), Y. S. Ng, NexPress Solutions LLC ..... [5294-04]

INCITS W1.1 standards for perceptual evaluation of text and line quality, E. N. Dalal, Xerox Corp.; A. Haley, Agfa Monotype; M. Robb, Lexmark International, Inc. [5294-05]

SESSION 2 ..... Mon. 11:00 am to 12:00 pm

IQ Standards II

Chair: **Eric K. Zeise**, NexPress Solutions LLC

Digitization and metric conversion for image quality test targets, W. Kress, Toshiba America ..... [5294-06]

INCITS W1.1 macro-uniformity, R. Rasmussen, Xerox Corp. ..... [5294-07]

Update on INCITS W1.1 standard for perceptual evaluation of micro-uniformity, R. E. Zeman, Eastman Kodak Co.; W. Kress, Toshiba America; R. Rasmussen, Xerox Corp.; K. Donohue, Univ. of Kentucky; E. Zeise, NexPress Solutions LLC; G. Chiu, Purdue Univ. ..... [5294-08]

Update on INCITS W1.1 standard for evaluating the color rendition of printing systems, S. Farnand, R. Cookingham, Eastman Kodak Co.; E. Dalal, Xerox Corp.; D. Gusev, NexPress Solutions LLC; W. Kress, Toshiba America; O. Martinez, Hewlett-Packard Co. (Spain); A. McCarthy, Xerox Corp.; K. Topfer, Eastman Kodak Co.; E. Zeise, NexPress Solutions LLC ..... [5294-09]

Lunch Break

SESSION 3 ..... Mon. 1:35 to 3:15 pm

Measurement and Modeling I

Chair: **Peter D. Burns**, Eastman Kodak Co.

Use of the first order Wiener kernel transform in the evaluation of SQRIn and PIC quality metrics for JPEG compression, R. B. Jenkin, Cranfield Univ. (United Kingdom); R. E. Jacobson, Univ. of Westminster (United Kingdom); M. A. Richardson, Cranfield Univ. (United Kingdom) ..... [5294-10]

Circular-edge spatial frequency response test, R. L. Baer, Agilent Technologies ..... [5294-11]

Color print quality evaluation on structured papers, B. Steuernagel, E. Jung, NexPress GmbH (Germany) ..... [5294-12]

Multidimensional quality measure using singular value decomposition, A. Shnayderman, A. Gusev, A. M. Eskicioglu, Brooklyn College ..... [5294-13]

SESSION 4 ..... Mon. 3:45 to 5:25 pm

Measurement and Modeling II

Chair: **Luke C. Cui**, Lexmark International, Inc.

Low-frequency MTF estimation for digital imaging devices using slanted edge analysis, D. Williams, P. D. Burns, Eastman Kodak Co. ..... [5294-14]

Scanner-based image quality measurement system for automated analysis of EP output, K. Johnson, P. Mehta, ImageXpert Inc. ..... [5294-15]

Identification of image noise sources in digital scanner evaluation, P. D. Burns, D. Williams, Eastman Kodak Co. ..... [5294-16]

Simulation tool for evaluating digital camera image quality, J. E. Farrell, ImagEval Consulting; F. Xiao, P. B. Catrysse, B. A. Wandell, Stanford Univ. ..... [5294-17]

Tuesday 20 January

Plenary Presentation ..... 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 ..... Tues. 9:30 am to 12:15 pm

Preference and Psychophysics I

Chair: **Yoichi Miyake**, Chiba Univ. (Japan)

Do experts and naive observers judge print quality differently? *(Invited Paper),* L. C. Cui, Lexmark International, Inc. ..... [5294-18]

Appearance-consistent projector tolerant of various colored projection planes and ambient light: WallShot™, H. Matsuda, O. Wada, K. Fukasawa, M. Kanai, Seiko Epson Corp. (Japan) ..... [5294-19]

Predicting customer preference from objective image quality attributes for monochrome document products, H. H. Shin, E. N. Dalal, R. Rasmussen, Xerox Corp. ..... [5294-20]

Image quality scaling of electrophotographic prints, G. M. Johnson, R. A. Patil, E. D. Montag, M. D. Fairchild, Rochester Institute of Technology ..... [5294-21]

Memory-color test forms in real world applications, S. Herron, Isis Imaging Corp. (Canada) ..... [5294-22]

Lunch/Exhibition Break

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SESSION 6 . . . . . Tues. 1:45 to 4:55 pm

Preference and Psychophysics II

Chair: **Susan Farnand**, Eastman Kodak Co.

ISO 20462: a psychophysical image quality standard *(Invited Paper)*, B. W. Keelan, Eastman Kodak Co. . . . . [5294-23]

Video quality assessment based on data hiding driven by optical flow information, M. Q. Farias, Univ. of California/Santa Barbara; M. Carli, A. Neri, Univ. degli Studi di Roma Tre (Italy); S. K. Mitra, Univ. of California/Santa Barbara . . . . . [5294-24]

Subjective quality assessment and the effect of context in expert and non-expert viewers, F. Speranza, Communications Research Ctr. Canada . . . . . [5294-25]

Experimental congruence of interval scale production from paired comparisons and ranking for image evaluation, J. C. Handley, Xerox Corp.; J. S. Babcock, J. B. Pelz, Rochester Institute of Technology . . . . . [5294-26]

Louis Leon Thurstone in Monte Carlo: creating error bars for the method of paired comparison, E. D. Montag, Rochester Institute of Technology . . . . . [5294-27]

Formula for the contrast sensitivity of the human eye, P. G. J. Barten, Barten Consultancy (Netherlands) . . . . . [5294-28]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Digital TV image quality improvement considering distributions of edge characteristic,** S. Hong, Electronics and Telecommunications Research Institute (South Korea) . . . . . [5294-29]

✔ **Study of colorimetric prediction model for DLP PJ TV,** T. Kim, M. Kim, D. Kim, Y. R. Song, Samsung Electronics Co., Ltd. (South Korea) . . . . . [5294-30]

✔ **Research on SNR and image detecting property of LLL imaging system,** F. Zuo, Institute of Semiconductors (China) . . . . . [5294-40]

Conference 5295

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5295

Visualization and Data Analysis 2004

Conference Chairs: **Robert F. Erbacher**, Utah State Univ.; **Philip C. Chen**, Future, Inc.; **Jonathan C. Roberts**, Univ. of Kent (United Kingdom); **Matti T. Gröhn**, CSC-Scientific Computing Ltd. (Finland); **Katy Börner**, Indiana Univ.

Program Committee: **Uwe Brinkschulte**, Univ. Karlsruhe (Germany); **L. E. Greenwade**, Idaho National Engineering and Environmental Lab.; **Ming C. Hao**, Hewlett-Packard Labs.; **Hans-Georg Pagendarm**, German Aerospace Research Establishment DLR (Germany); **Alex Pang**, Univ. of California/Santa Cruz; **Christopher D. Shaw**, Georgia Institute of Technology; **J. E. Swan II**, Naval Research Lab.; **Craig M. Wittenbrink**, NVIDIA; **Pak C. Wong**, Pacific Northwest National Lab.; **Elijah Wright**, Indiana Univ; **Yingcai Xiao**, Univ. of Akron

Monday 19 January

SESSION 1 . . . . . Mon. 9:20 to 10:00 am

Medical Visualizations

Chair: **Robert F. Erbacher**, Utah State Univ.

Fast hierarchical traversal strategy for multimodal visualization, M. Ferre, Rovira i Virgili Univ. (Spain); A. Puig, D. Tost, Univ. Politecnica de Catalunya (Spain) [5295-01]

Real-time pointer to a pre-operative surgical planning index block of ultrasound images for image guided surgery, L. Eadie, Royal Free and Univ. College Medical School (United Kingdom); D. de Cunha, City Univ. (United Kingdom); B. Davidson, A. Seifalian, Royal Free and Univ. College Medical School (United Kingdom) . . . . . [5295-02]

SESSION 2 . . . . . Mon. 10:30 am to 12:10 pm

Information Visualization

Chair: **Jonathan C. Roberts**, Univ. of Kent (United Kingdom)

Visualizing the VLearn3D 2002 conference in space and time, K. Börner, G. J. Lee, S. Penumarthy, R. J. Jones, Indiana Univ. . . . . [5295-03]

Visualizing abstract information using motion properties of data-driven infoticles, A. V. Moere, K. H. Mieusset, M. Gross, Swiss Federal Institute of Technology (Switzerland) . . . . . [5295-04]

Exploring the computing literature using temporal graph visualization, C. Erten, P. Harding, S. Harding, K. Wampler, G. Yee, Univ. of Arizona . . . . . [5295-05]

Visualization and exploration of spatial probability density functions: a clustering-based approach, U. Bordoloi, The Ohio State Univ.; D. L. Kao, NASA Ames Research Ctr.; H. Shen, The Ohio State Univ. . . . . [5295-06]

Intuitive color-based visualization of multimedia content as large graphs, M. Delest, A. Don, J. Benois-Pineau, Univ. Bordeaux I (France) . . . . . [5295-07]

Lunch Break

SESSION 3 . . . . . Mon. 2:00 to 3:00 pm

Scientific Visualizations

Chair: **Matti T. Gröhn**, CSC-Scientific Computing Ltd. (Finland)

Toward design patterns for dynamic analytical data visualization, H. Chen, SAS Institute Inc. . . . . [5295-08]

Hardware accelerated anti-aliasing splatting algorithm for PC-based scientific visualization, W. Chen, Zhejiang Univ. (China) . . . . . [5295-09]

Multilayered image cache for scientific visualization, E. LaMar, Lawrence Livermore National Lab. . . . . [5295-10]

SESSION 4 . . . . . Mon. 3:20 to 4:40 pm

Applications

Chair: **Katy Börner**, Indiana Univ.

Computer-assisted visualization and analysis of scholarly manuscripts, M. S. Brown, A. Yang, Hong Kong Univ. of Science and Technology (Hong Kong) . . . . . [5295-11]

Visualizing weather with synthetic high dynamic range images, B. Olsson, A. Ynnerman, R. Lenz, Linköping Univ. (Sweden) . . . . . [5295-12]

Visual mining business service using pixel bar charts, M. C. Hao, U. Dayal, F. Casati, Hewlett-Packard Labs. . . . . [5295-13]

Webs on the Web (WOW): 3D visualization of ecological networks on the WWW for collaborative research and education, I. Yoon, San Francisco State Univ.; R. Williams, National Ctr. for Ecological Analysis and Synthesis; E. Levine, San Francisco State Univ.; S. Yoon, Rocky Mountain Biological Lab.; J. Dunne, Santa Fe Institute; N. Martinez, San Francisco State Univ. . . . . [5295-14]

Session Break

SESSION 5 . . . . . Mon. 4:50 to 5:30 pm

Flow Visualizations

Chair: **Matti T. Gröhn**, CSC-Scientific Computing Ltd. (Finland)

Fast dynamic flow volume rendering using textured splat on modern graphics hardware, D. Xue, R. Crawfis, The Ohio State Univ. . . . . [5295-15]

Gaze-directed flow visualization, X. Mao, D. Watanabe, M. Fujita, A. Imamiya, Univ. of Yamanashi (Japan) . . . . . [5295-16]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 6 . . . . . Tues. 9:30 to 10:30 am

Visualization Techniques I

Chair: **Katy Börner**, Indiana Univ.

Interpolating analytic visualizations, M. Trutschl, Louisiana State Univ.; G. Grinstein, U. Cvek, Univ. of Massachusetts/Lowell . . . . . [5295-17]

Determining gamma functions for reconstruction of unorganized point sets, M. Cameron, Birmingham-Southern College; K. R. Sloan, Jr., Y. Sun, Univ. of Alabama/Birmingham . . . . . [5295-18]

Interactive and high-quality digital reconstruction radiograph rendering, W. Chen, Zhejiang Univ. (China) . . . . . [5295-19]

SESSION 7 ..... Tues. 11:00 am to 12:00 pm

Virtual Reality

Chair: **Robert F. Erbacher**, Utah State Univ.

Peer-to-peer collaborative 3D virtual environment for visualization, Y. Pan, F. T. Marchese, Pace Univ. ..... [5295-20]

Mapping engine for metaphoric virtual worlds, C. Russo Dos Santos, Univ. de Toulon et du Var (France) ..... [5295-21]

Snap2Diverse: coordinating information visualizations, N. Polys, A. Ray, M. Moldenhauer, C. Dandekar, C. North, Virginia Polytechnic Institute and State Univ. ..... [5295-22]

Lunch/Exhibition Break

SESSION 8 ..... Tues. 2:00 to 3:20 pm

Visualization Techniques II

Chair: **Jonathan C. Roberts**, Univ. of Kent (United Kingdom)

Alpha-shapes for visualizing irregular shaped class clusters in 3D feature space for classification of remotely sensed imagery, A. Lucieer, M. Kraak, Institute for Geo-Information Science and Earth Observation (Netherlands) ..... [5295-23]

Conceptual model for adaptable and extensible visual data exploration, M. C. Ferreira de Oliveira, Univ. de São Paulo (Brazil); M. H. Shimabukuro, Univ. Estadual Paulista (Brazil) ..... [5295-24]

Progressive subdivision paradigm (PSP), R. Borgo, P. Cignoni, R. R. S. Scopigno, Consiglio Nazionale delle Ricerche (Italy); V. Pascucci, Lawrence Livermore National Lab. ..... [5295-25]

Synchronized views for exploring populations of neurons, K. Robbins, I. Grinshpan, K. Allen, D. Senseman, Univ. of Texas/San Antonio ..... [5295-26]

SESSION 9 ..... Tues. 3:50 to 4:30 pm

Volume Visualization

Chair: **Robert F. Erbacher**, Utah State Univ.

Issues of precision for hardware texture-based volume visualization, E. LaMar, Lawrence Livermore National Lab. ..... [5295-27]

New object-order volume rendering algorithm based on two step lookup tables, J. Zhang, J. Sun, Z. Sun, Tianjin Univ. (China) ..... [5295-29]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Visualization architecture for intelligence analysis,** A. Keahey, S. G. Eick, Visintuit, LLC ..... [5295-30]

✔ **Case study: visualization and analysis of mitogen-activated protein kinase pathways in the literature,** C. Lee, Korea Advanced Institute of Science and Technology (South Korea); J. Park, Information and Communications Univ. (South Korea); J. Park, Korea Advanced Institute of Science and Technology (South Korea) ..... [5295-31]

✔ **Visualizing the spinal neuronal dynamics of locomotion,** K. R. Subramanian, D. P. Bashor, M. T. Miller, J. A. Foster, Univ. of North Carolina/Charlotte ..... [5295-32]

✔ **Computing synthetic satellite images from weather prediction data,** B. Olsson, A. Ynnerman, R. Lenz, Linköping Univ. (Sweden) ..... [5295-33]

✔ **Content coverage of animal behavior data,** S. Thakur, K. Boerner, K. Mane, E. Martins, T. Ord, Indiana Univ. ..... [5295-34]

Conference 5296

Wednesday-Thursday 21-22 January 2004 • Proceedings Vol. 5296

Document Recognition and Retrieval XI

Conference Chairs: **Elisa H. Barney Smith**, Boise State Univ.; **Jianying Hu**, IBM Thomas J. Watson Research Ctr.; **James Allan**, Univ. of Massachusetts/Amherst

Program Committee: **Apostolos Antonacopoulos**, Univ. of Liverpool (United Kingdom); **Jamie Callan**, Carnegie Mellon Univ.; **Francine R. Chen**, Palo Alto Research Ctr.; **Xiaoqing Ding**, Tsinghua Univ. (China); **David S. Doermann**, Univ. of Maryland/College Park; **Hiromichi Fujisawa**, Hitachi, Ltd. (Japan); **David Grossman**, Illinois Institute of Technology; **Alexander G. Hauptmann**, Carnegie Mellon Univ.; **Matthew F. Hurst**, Intelliseek, Inc.; **Paul B. Kantor**, Rutgers Univ.; **Tapas Kanungo**, IBM Almaden Research Ctr.; **Daniel P. Lopresti**, Lehigh Univ.; **Thomas A. Nartker**, Univ. of Nevada/Las Vegas; **Kris Popat**, Palo Alto Research Ctr.; **Sargur N. Srihari**, Univ. at Buffalo; **Kazem Taghva**, Univ. of Nevada/Las Vegas; **George R. Thoma**, National Library of Medicine; **Karl Tombre**, LORIA-INPL (France); **Marcel Worring**, Univ. van Amsterdam (Netherlands); **Berrin A. Yanikoglu**, Sabanci Univ. (Turkey); **Jiangying Zhou**, Summus Ltd.

Wednesday 21 January

Plenary Presentation . . . . . **8:30 to 9:15 am**

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 1 . . . . . Wed. 9:30 to 10:30 am

Information Extraction

Impact of running headers and footers on proximity searching, K. Taghva, J. Borsack, T. Nartker, J. Coombs, R. Young, Univ. of Nevada/Las Vegas . . . . . [5296-01]

Hierarchical logical structure extraction of book documents by analyzing tables of contents, F. He, X. Ding, L. Peng, Tsinghua Univ. (China) . . . . . [5296-02]

Style-independent document labeling: design and performance evaluation, S. Mao, J. Kim, G. R. Thoma, National Library of Medicine . . . . . [5296-03]

SESSION 2 . . . . . Wed. 11:00 am to 12:00 pm

Invited Paper I

The past, present, and future of web information retrieval *(Invited Paper)*, M. Henzinger, Google, Inc. . . . . [5296-04]

Lunch/Exhibition Break

SESSION 3 . . . . . Wed. 2:00 to 3:00 pm

Information Retrieval

Retrieving topical sentiments from online document collections, M. F. Hurst, K. Nigam, Intelliseek, Inc. . . . . [5296-05]

Adaptive color document images binarization for text retrieval, Y. Li, South China Univ. of Technology (China) and SCUT Tomorrow Technology Co. (China); Z. Wang, H. Zeng, South China Univ. of Technology (China) . . . . . [5296-06]

Word image retrieval using binary features, B. Zhang, S. N. Srihari, C. Huang, Univ. at Buffalo . . . . . [5296-07]

SESSION 4 . . . . . Wed. 3:30 to 5:10 pm

Multimedia Applications

SmartNails: display and image dependent thumbnails, K. Berkner, E. L. Schwartz, Ricoh Innovations, Inc.; C. Marle, Microsoft Corp. . . . . [5296-08]

Automatic document navigation for digital content remastering, X. Lin, S. J. Simske, Hewlett-Packard Labs. . . . . [5296-09]

Slide identification for lecture movies by matching characters and images, N. Ozawa, H. Takebe, Y. Katsuyama, Fujitsu Labs., Ltd. (Japan); S. Naoi, Fujitsu Labs., Ltd. (Japan) and Tokyo Institute of Technology (Japan); H. Yokota, Tokyo Institute of Technology (Japan) . . . . . [5296-10]

Talking about documents: revealing a missing link to multimedia meeting archives, D. Lalanne, D. Mekhaldi, R. Ingold, Univ. de Fribourg (Switzerland) . . . . . [5296-11]

Block adaptive binarization of business card images in PDA using modified quadratic filter, K. T. Shin, Kyungpook National Univ. (South Korea); I. H. Jang, Kyungwoon Univ. (South Korea); N. C. Kim, Kyungpook National Univ. (South Korea) . . . . . [5296-12]

Thursday 22 January

SESSION 5 . . . . . Thurs. 9:00 to 10:00 am

Invited Paper II

Tablet PC: pushing the boundaries of ink understanding *(Invited Paper)*, M. Shilman, Microsoft Research . . . . . [5296-13]

SESSION 6 . . . . . Thurs. 10:30 to 11:50 am

Handwriting Recognition

Nonparametric classifier for unsegmented text, G. Nagy, Rensselaer Polytechnic Institute; D. P. Lopresti, Lehigh Univ.; M. Krishnamoorthy, Rensselaer Polytechnic Institute; Y. Lin, S. Seth, Univ. of Nebraska/Lincoln; S. Mehta, Indian Institute of Technology (India) . . . . . [5296-14]

Online handwriting recognition in a form filling task: evaluating the impact of context-awareness, G. Seni, K. Rice, E. Mayoraz, Motorola . . . . . [5296-15]

Discriminability of characters for category-dependent writer verification, C. I. Tomai, D. M. Kshirsagar, S. N. Srihari, Univ. at Buffalo . . . . . [5296-16]

Automatic segmentation and recognition of unconstrained handwritten numeral strings, J. Sadri, Concordia Univ. (Canada) . . . . . [5296-17]

Lunch Break

SESSION 7 . . . . . Thurs. 1:30 to 3:30 pm

Multilingual OCR

Application of three classifiers to word level script identification on scanned document images, H. Ma, D. Doermann, Univ. of Maryland/College Park . . [5296-18]

Comprehensive printed Tibetan/English mixed text segmentation method, H. Wang, X. Ding, Tsinghua Univ. (China) . . . . . [5296-19]

General framework for multicharacter segmentation and its application in recognizing multilingual Asian documents, D. Wen, X. Ding, Tsinghua Univ. (China) . . . . . [5296-20]

New statistical method for multifont printed Tibetan/English OCR, H. Wang, X. Ding, Tsinghua Univ. (China) . . . . . [5296-21]

Design and development of an ancient Chinese document recognition system, L. Peng, P. Xiu, X. Ding, Tsinghua Univ. (China) . . . . . [5296-22]

System for Oriya handwritten numeral recognition, U. Pal, N. Tripathy, M. Panda, Indian Statistical Institute (India) . . . . . [5296-23]

SESSION 8 . . . . . Thurs. 4:00 to 5:00 pm

Document Image Analysis

Using mathematical morphology for document skew estimation, L. A. Najman, Groupe ESIEE (France) . . . . . [5296-24]

Adaptive inverse halftoning for scanned document images through multiresolution and multiscale analysis, H. Nishida, Ricoh Co., Ltd. (Japan) . . . . . [5296-25]

Automatic content extraction of filled form images based on clustering component block projection vectors, H. Peng, X. He, Lawrence Berkeley National Lab.; F. Long, Duke Univ. . . . . [5296-26]

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Conference 5297

Tuesday-Thursday 20-22 January 2004 • Proceedings Vol. 5297

Real-Time Imaging VIII

Conference Chairs: **Nasser Kehtarnavaz**, Univ. of Texas at Dallas; **Phillip A. Laplante**, The Pennsylvania State Univ.

Program Committee: **Mohamed Akil**, Groupe ESIEE (France); **Aishy Amer**, Concordia Univ. (Canada); **Alberto Broggi**, Univ. di Parma (Italy); **Matthias F. Carlsohn**, Computer Vision and Image Communication (Germany); **Luciano da Fontoura Costa**, Univ. de Sao Paulo (Brazil); **Edward R. Dougherty**, Texas A&M Univ.; **Colin Neill**, The Pennsylvania State Univ.; **Volodymyr I. Ponomaryov**, Instituto Politecnico Nacional (Mexico); **Fatih M. Porikli**, Mitsubishi Electric Research Labs.; **Stewart F. Reddaway**, WorldScape, Inc. (United Kingdom); **Purnendu Sinha**, Concordia Univ. (Canada); **Moira I. Smith**, Waterfall Solutions Ltd. (United Kingdom); **Youngjun F. Yoo**, Texas Instruments Inc.

Tuesday 20 January

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Real-time vehicle type recognition system,** X. Lee, Institute of Automation (China) and Tsinghua Univ. (China) . . . . . [5297-31]

✔ **Improving the quality of dynamic imaging based on local mesh refinement,** Y. Peng, Y. L. Mo, Shanghai Univ. (China) . . . . . [5297-32]

✔ **Gibbs distributions-Markov random field model: application on background modeling in video surveillance,** L. Guo, S. Yang, Shanghai Jiao Tong Univ. (China) . . . . . [5297-33]

✔ **VLSI implementation of a reversible watermarking method for satellite imagery,** A. Chikouche, P. Sweeney, T. Vladimirova, Univ. of Surrey (United Kingdom) . . . . . [5297-34]

✔ **Real-time volume splatter for large scale data sets,** J. Zhang, J. Sun, Tianjin Univ. (China) . . . . . [5297-35]

✔ **Advanced real-time bus system for concurrent data paths used in high-performance image processing,** J. Brodersen, R. Palkovich, D. Landl, J. Fuertler, ARC Seibersdorf Research GmbH (Austria) . . . . . [5297-36]

✔ **Content-based image classification using quasi-Gabor filters,** L. Chen, J. H. Li, Shanghai Jiao Tong Univ. (China) . . . . . [5297-37]

✔ **Mixed-signal 128x128 SIMD vision chip with optical input: 8-bit digital I/O and programmable computing kernel,** G. Liñán-Cembrano, A. Rodríguez-Vázquez, S. Espejo-Meana, R. Dominguez-Castro, Instituto de Microelectronica de Sevilla (Spain) . . . . . [5297-38]

✔ **Video imaging,** D. Chandok, ... [5297-39]

Wednesday 21 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 1 . . . . . Wed. 1:30 to 3:00 pm

Algorithms I

Chair: **Phillip A. Laplante**, The Pennsylvania State Univ.

Leveraging object-orientation for real-time imaging, C. J. Neill, P. A. Laplante, The Pennsylvania State Univ. . . . . [5297-01]

Real-time implementation of auto focus on the TI DSC processor, N. Kehtarnavaz, Univ. of Texas/Dallas . . . . . [5297-02]

Real-time selective anti-aliasing, P. Rokita, Warsaw Univ. of Technology (Poland) . . . . . [5297-03]

Tracking of a 3D object using a 2D image based on a shape adaptive snake algorithm, Y. Han, Seoul Christian Univ. (South Korea); P. Song, Dong Seoul College (South Korea); H. Chung, Kyungbok College (South Korea); H. Hahn, Soongsil Univ. (South Korea) . . . . . [5297-04]

SESSION 2 . . . . . Wed. 3:30 to 5:40 pm

Algorithms II

Chair: **Nasser Kehtarnavaz**, Univ. of Texas at Dallas

Real-time color imaging using the vectorial order statistics filters, V. I. Ponomaryov, F. Gallegos-Funes, A. Rosales-Silva, Instituto Politecnico Nacional (Mexico) [5297-05]

New framework for real-time Hough transform, V. A. Shapiro, Orbograph Ltd. (Israel) . . . . . [5297-06]

Hierarchical active shape model for real-time tracking of non-rigid objects, J. Kang, H. Ki, J. Jung, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . . . . . [5297-07]

Real-time digital auto-focusing using a priori estimated set of PSFs, S. Hwang, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . . . . . [5297-08]

Real-time fractional Fourier transform using DSP, J. A. Cornejo, W. Castaño, Y. Torres, Univ. Industrial de Santander (Colombia) . . . . . [5297-09]

Block-based face detection scheme using face color and motion information, S. Kim, S. Lim, H. Cha, H. Hahn, Soongsil Univ. (South Korea) . . . . . [5297-10]

Thursday 22 January

SESSION 3 . . . . . Thurs. 8:00 to 10:10 am

Real-Time Systems

Chair: **Matthias F. Carlsohn**, Computer Vision and Image Communication (Germany)

Real-time full-spherical video imaging, D. Ripley, iMove, Inc. . . . . [5297-11]

Real-time thermographic image acquisition and segmentation algorithms for web material, R. Usamentiaga, D. F. García, Univ. de Oviedo (Spain); J. A. González, Aceralia Steel Corp. (Spain) . . . . . [5297-12]

Digital imaging based techniques applied to ornamental stone classification and recognition, G. Bonifazi, M. Paolo, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [5297-13]

Real-time visualization using a 3D imaging millimeter-wave radar, B. Takacs, WaveBand Corp. . . . . [5297-14]

Initial efforts toward mission-representative imaging surveys from aerial explorers, G. Pisanich, QSS Group, Inc. and NASA Ames Research Ctr.; L. A. Young, Army/NASA Div. and NASA Ames Research Ctr.; C. Ippolito, QSS Group, Inc.; L. Plice, QSS Group, Inc. and NASA Ames Research Ctr.; B. Lau, Army/NASA Div. and NASA Ames Research Ctr.; T. Roush, NASA Ames Research Ctr.; P. Lee, SETI Institute and NASA Ames Research Ctr.; S. Thakoor, Jet Propulsion Lab. and Bees for Mars Manager and California Institute of Technology . . . . . [5297-15]

Software architecture for live enhancement of medical images, J. Bredno, Philips Research Labs. (Germany); B. Martin-Leung, Philips Research Labs. (Germany) and Univ. of Lübeck (Germany); K. Eck, Philips Research Labs. (Germany) . . . . . [5297-16]

Conference 5297

SESSION 4 ..... Thurs. 10:40 am to 12:10 pm

Video Surveillance

Chair: **David Ripley**, iMove, Inc.

Generic flexible and robust approach for an intelligent real-time video-surveillance system, X. Desurmont, Multitel A.S.B.L. (Belgium); J. Delaigle, Univ. Catholique de Louvain (Belgium) and Multitel A.S.B.L (Belgium) ..... [5297-17]

Fast zooming and focusing algorithm for real-time surveillance camera system, J. Choi, Vision System Lab. (South Korea); P. Song, Dong Seoul College (South Korea); M. Hong, H. Hahn, Soongsil Univ. (South Korea) ..... [5297-18]

Implementation of real-time face tracking system based on pan/tilt-embedded stereo camera controller, E. S. Kim, J. H. Lee, J. H. Ko, Kwangwoon Univ. (South Korea) ..... [5297-19]

Region-wide real-time search and pursuit surveillance system using networked intelligent cameras, K. Komiya, Z. Liu, Kanagawa Institute of Technology (Japan) ..... [5297-20]

Lunch Break

SESSION 5 ..... Thurs. 1:30 to 3:00 pm

Image Compression

Chair: **Fatih M. Porikli**, Mitsubishi Electric Research Labs.

MPEG-21 in broadcasting: the novel digital broadcast item model, A. R. Lugmayr, Tampere Univ. of Technology (Finland) ..... [5297-21]

Prediction-based cross line for fast motion estimation in MPEG-4 videos, H. Fang, J. Jiang, Univ. of Bradford (United Kingdom) ..... [5297-22]

Fast image interpolation for motion estimation using graphics hardware, F. Kelly, A. Kokaram, Trinity College Dublin (Ireland) ..... [5297-23]

Real-time video object segmentation for MPEG encoded video sequences, F. M. Porikli, Mitsubishi Electric Research Labs. ..... [5297-24]

SESSION 6 ..... Thurs. 3:30 to 5:40 pm

Implementation/Hardware

Chair: **Philip P. Dang**, STMicroelectronics

Real-time image-processing-system-on-chip for security feature detection and classification, T. Türke, V. Lohweg, KBA-Bielefeld (Germany) ..... [5297-25]

FPGA-based acceleration of mutual information calculation for real-time 3D image registration, C. R. Castro-Pareja, The Ohio State Univ. and Cleveland Clinic Foundation; J. M. Jagadeesh, The Ohio State Univ.; R. Shekhar, Cleveland Clinic Foundation ..... [5297-26]

FPGA implementation of fuzzy morphological filters, N. Gupta, P. Sinha, Concordia Univ. (Canada) ..... [5297-27]

Architecture for dynamically reconfigurable real-time lossless compression, A. J. Carter, Univ. of Westminster (United Kingdom) and Univ. of York (United Kingdom); N. C. Audsley, Univ. of York (United Kingdom) ..... [5297-28]

Architecture for hardware thinning and crest restoration in graylevel images, A. Mohamed, Groupe ESIEE (France) ..... [5297-29]

High-performance low-power BinDCT coprocessor for wireless video applications, P. P. Dang, STMicroelectronics; T. Nguyen, Univ. of California/San Diego; T. Tran, Johns Hopkins Univ. ..... [5297-30]

Conference 5298

Monday-Wednesday 19-21 January 2004 • Proceedings Vol. 5298

Image Processing: Algorithms and Systems III

Conference Chairs: **Edward R. Dougherty**, Texas A&M Univ.; **Jaakko T. Astola**, Tampere Univ. of Technology (Finland); **Karen O. Egiazarian**, Tampere Univ. of Technology (Finland)

Program Committee: **Til Aach**, Univ. of Lübeck (Germany); **Sergey V. Ablameyko**, Institute of Engineering Cybernetics (Belarus); **Sos S. Agaian**, Univ. of Texas/San Antonio; **Junior Barrera**, Univ. de São Paulo (Brazil); **Reiner Creutzburg**, Fachhochschule Brandenburg (Germany); **Paul D. Gader**, Univ. of Florida; **John C. Handley**, Xerox Corp.; **Vladimir V. Lukin**, National Aerospace Univ. (Ukraine); **Stephen Marshall**, Univ. of Strathclyde (United Kingdom); **Françoise J. Prêteux**, Institut National des Télécommunications (France); **Giovanni Ramponi**, Univ. degli Studi di Trieste (Italy); **Jagath K. Samarabandu**, Univ. of Western Ontario (Canada); **Akira Taguchi**, Musashi Institute of Technology (Japan)

Monday 19 January

SESSION 1 . . . . . Mon. 8:40 to 10:00 am

Transforms and Applications

Fast parametric slantlet transform with applications, S. Agaian, Univ. of Texas/San Antonio; K. Tourshan, Lockheed Martin Corp.; J. Noonan, Tufts Univ. . . . . [5298-01]

Parametrized reversible integer discrete cosine transforms, A. M. Grigoryan II, V. S. Bhamidipati, S. S. Agaian, Univ. of Texas/San Antonio . . . . . [5298-02]

Class of Fibonacci-Daubechies-4-Haar wavelets with application to ECG denoising, C. B. Smith, Univ. of Texas/San Antonio and Southwest Research Institute; S. S. Agaian, Univ. of Texas/San Antonio . . . . . [5298-03]

Wavelet versus DCT-based spread spectrum watermarking of image databases, M. P. Mitrea, T. B. Zaharia, F. J. Prêteux, Institut National des Télécommunications (France); A. Vlad, Univ. Politehnica Bucuresti (Romania) . . . . . [5298-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:10 pm

Image Classification and Recognition

Three-dimensional versus 2D/3D shape descriptors: a comparative study, T. Zaharia, F. J. Prêteux, Institut National des Télécommunications (France) . . . . . [5298-05]

Variation of matched filtering for handwritten character recognition, D. Walvoord, R. L. Easton, Jr., Rochester Institute of Technology . . . . . [5298-06]

Three-dimensional virtual character reconstruction from projections: a NURBS-based approach, O. Triki, T. Zaharia, F. J. Prêteux, Institut National des Télécommunications (France) . . . . . [5298-07]

Pupil detection in photo ID, K. Hwang, Digimarc ID Systems . . . . . [5298-08]

Pattern matching for spherical images, L. Sorgi, K. Daniilidis, Univ. of Pennsylvania . . . . . [5298-09]

Lunch Break

SESSION 3 . . . . . Mon. 1:40 to 3:00 pm

Image Processing Systems I

GAYE: a face recognition system, B. Kepenekci, TUBITAK Bilten (Turkey) and Middle East Technical Univ. (Turkey); F. B. Tek, TUBITAK Bilten (Turkey); O. Cilingir, TUBITAK Bilten (Turkey) and Middle East Technical Univ. (Turkey); U. Sakarya, TUBITAK Bilten (Turkey); G. B. Akar, Middle East Technical Univ. (Turkey) . . . . . [5298-10]

Imaging-based dust sensors: equipment and methods, G. Bonifazi, G. Sonia, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [5298-11]

HEKA: general tool for multimedia indexing and research by content, M. Joint, CEA Fontenay aux Roses (France) . . . . . [5298-12]

Knowledge capturing approach for a cooperative intelligent image analysis system, K. Ranaweera, J. Samarabandu, Univ. of Western Ontario (Canada) . . . . . [5298-13]

SESSION 4 . . . . . Mon. 3:30 to 5:10 pm

Image Processing Systems II

Posture kinematics reconstruction and body model creation, M. Carli, T. D'Alessio, Univ. degli Studi di Roma Tre (Italy) . . . . . [5298-14]

Focus of attention mechanism for gaze control within a framework for intelligent image analysis tools, R. P. Rodrigo, K. Ranaweera, J. Samarabandu, Univ. of Western Ontario (Canada) . . . . . [5298-15]

Support vector machine with optimized time frequency kernel for texture classification, M. Sabri, J. Alirezaie, Ryerson Univ. (Canada) . . . . . [5298-16]

Advanced navigation tools for virtual bronchoscopy, D. Perchet, C. I. Fetita, F. Prêteux, Institut National des Télécommunications (France) . . . . . [5298-17]

General representation for image processing algorithms, M. C. d'Ornellas, Univ. Federal de Santa Maria (Brazil) . . . . . [5298-18]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 10:30 am

Nonlinear Methods

Minimal-memory bit vector architecture for computational mathematical morphology, J. C. Handley, Xerox Corp. . . . . [5298-19]

Median model for background subtraction in intelligent transportation system, P. Shi, Univ. of Nebraska/Omaha; E. G. Jones, Univ. of Nebraska/Lincoln; Q. Zhu, Univ. of Nebraska/Omaha . . . . . [5298-20]

Advanced image fusion algorithm based on wavelet transform: incorporation with PCA and morphological processing, Y. Zheng, Univ. of Louisville . . . . . [5298-21]

SESSION 6 . . . . . Tues. 11:00 am to 12:00 pm

Mathematical Methods in Image Processing

Protocol for dynamically storing and retrieving unexpected discrete visual information in a quantum computer, S. E. Venegas-Andraca, Univ. of Oxford (United Kingdom); S. Bose, California Institute of Technology . . . . . [5298-22]

Physically motivated correlation formalism in hyperspectral imaging, A. Roy, B. J. Rafert, Michigan Technological Univ. . . . . [5298-23]

Method of ariphmetical thresholding of images, A. M. Grigoryan, J. G. Vital, S. S. Agaian, Univ. of Texas/San Antonio . . . . . [5298-24]

Lunch/Exhibition Break

Conference 5298

SESSION 7 . . . . . Tues. 1:30 to 3:10 pm

Image Processing Algorithms

Directional edge-sensitive image interpolator, F. Zotta, P. Carrai, G. Ferretti, Philips Research Labs. (Italy); G. Ramponi, Univ. degli Studi di Trieste (Italy) . . . . . [5298-25]

Temporal co-occurrence matrix approaches to motion analysis, A. Ukovich, Fraunhofer-Institut für Produktionsanlagen und Konstruktionstechnik (Germany) and Univ. degli Studi di Trieste (Italy); M. Koeppen, Fraunhofer-Institut für Produktionsanlagen und Konstruktionstechnik (Germany); G. Ramponi, Univ. degli Studi di Trieste (Italy) . . . . . [5298-26]

Iterative linear algorithm for the analysis of oriented patterns, F. J. Ayres, R. M. Rangayyan, Univ. of Calgary (Canada) . . . . . [5298-27]

Automated model selection-based algorithm for tracking multiple nonlinear trajectories, M. A. Zaveri, U. B. Desai, S. N. Merchant, Indian Institute of Technology (India) . . . . . [5298-28]

Retrieval of similar objects in simulation data using machine learning techniques, E. Cantu-Paz, S. Cheung, C. Kamath, Lawrence Livermore National Lab. . . . . [5298-29]

SESSION 8 . . . . . Tues. 3:40 to 5:00 pm

Image Restoration

Blind image restoration based on RBF neural networks, P. Guo, Beijing Normal Univ. (China) . . . . . [5298-30]

New algorithm for the restoration of color photographic image degraded by the truncation noise and for the increasing of the compression rate of standards that use rgb—>ycbcr transformation, J. M'Boliguipa, E. Tonye, Univ. de Yaoundé 1 (Cameroon) . . . . . [5298-31]

Robust Lee local statistic filter for removal of mixed multiplicative and impulse noise, N. N. Ponomarenko, V. V. Lukin, National Aerospace Univ. (Ukraine); K. O. Egiazarian, J. T. Astola, Tampere Univ. of Technology (Finland) . . . . . [5298-32]

Integer orthogonal transforms: design, fast algorithms, and applications, K. O. Egiazarian, D. Rusanovskyy, J. T. Astola, Tampere Univ. of Technology (Finland) . . . . . [5298-33]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Motion and detail adaptive denoising of video,** V. Zlokolica, W. Philips, Univ. Gent (Belgium) . . . . . [5298-47]

✔ **Affine point-set and line invariant algorithm for photo-identification of gray whales,** C. Chandan, N. Kehtarnavaz, Univ. of Texas/Dallas; G. Hillman, Univ. of Texas Medical Branch at Galveston; B. Wursig, Texas A&M Univ. . . . . [5298-48]

✔ **Tracking of moving objects using morphological segmentation, statistical moments, and Hough transform,** J. Park, Chosun Univ. (South Korea) . . [5298-49]

✔ **Histogram as a measure of shape matching,** J. Park, Chosun Univ. (South Korea) . . . . . [5298-50]

✔ **Weather reflectivity radar data compression based on zerotree wavelet algorithm,** W. Li, PLA Univ. of Science and Technology (China) . . . . . [5298-51]

✔ **Adaptive mesh refinement based on wavelet transform in electrical impedance tomography,** Y. Peng, Y. L. Mo, Shanghai Univ. (China) . . . . . [5298-52]

✔ **Automatically locating the typhoon center based on satellite cloud image,** Z. Liu, Tianjin Univ. (China) . . . . . [5298-53]

✔ **Wavelet image threshold denoising based on edge detection,** W. Liu, M. Zhengming, Zhongshan Univ. (China) . . . . . [5298-54]

✔ **Using independent component analysis for electrical impedance tomography,** P. Yan, Y. Mo, Shanghai Univ. (China) . . . . . [5298-55]

✔ **Direct computation of linear-spline interpolation for real-time streaming video codec,** T. Truong, I-Shou Univ. (Taiwan); S. Chen, Shu-Te Univ. (Taiwan) . [5298-56]

✔ **Shape from shading based on wavelet transform multiresolution analysis,** L. Li, S. Chen, Shanghai Jiao Tong Univ. (China) . . . . . [5298-57]

✔ **Segmentation of tooth in CT images for the 3D reconstruction of teeth,** H. Heo, O. Chae, Kyunghee Univ. (South Korea) . . . . . [5298-58]

✔ **Surface imaging and parameters determination of an antenna range,** D. G. Asatryan, G. M. Babayan, Institute for Informatics and Automation Problems (Armenia) . . . . . [5298-59]

✔ **Real-time non-parametric background modeling using moving histogram method for visual surveillance,** G. Lee, W. Lee, D. Jeong, Inha Univ. (South Korea)[5298-60]

✔ **Optimized multi-channel decomposition for texture segmentation using Gabor filter bank,** N. Nezamoddini-Kachouie, Ryerson Univ. (Canada); J. Alirezaie, Ryerson Univ. (Canada) and Univ. of Waterloo (Canada) . . . . . [5298-61]

✔ **Segmentation based on information fusion applied to brain tissue on MRI,** W. Dou, Univ. de Caen (France) and Tsinghua Univ. (China); S. Ruan, Univ. de Caen (France); Q. Liao, Tsinghua Univ. (China); D. Bloyet, Univ. de Caen (France) . . . . . [5298-62]

✔ **Soil texture analysis using Gabor texture features,** Y. Sun, Z. Long, P. Jang, M. J. Plodinec, Mississippi State Univ. . . . . [5298-63]

✔ **Surface description and classification using coupled HMMs,** F. Pernkopf, Technische Univ. Graz (Austria) . . . . . [5298-64]

✔ **Feature extraction by best anisotropic Haar bases in an OCR system,** A. P. Gotchev, D. Rusanovskyy, R. Popov, K. Egiazarian, J. Astola, Tampere Univ. of Technology (Finland) . . . . . [5298-65]

✔ **Neural networks: different problems require different learning rate adaptive methods,** R. Allard, J. Faubert, Univ. de Montréal (Canada) . . . . . [5298-66]

✔ **Augmenting range data obtained from stereoscopy with model-based image segmentation using planar patches,** Z. J. Chen, J. Samarabandu, Univ. of Western Ontario (Canada) . . . . . [5298-67]

✔ **Automatic image segmentation by solving Eikonal equation based on Gaussian mixture models,** F. M. Porikli, Mitsubishi Electric Research Labs. . . . . [5298-68]

✔ **People detection from moving platforms,** C. Ran, J. Huang, Univ. of Maryland . . . . . [5298-69]

✔ **Efficient wavelet image coder for portable embedded systems,** W. Chang, California State Univ. . . . . [5298-71]

✔ **Estimation of noise deviation using polynomial masks,** A. Akhriev, Institute of Information Technologies (Russia) . . . . . [5298-72]

✔ **Impulsive noise suppression and analysis in color imaging,** V. I. Ponomaryov, A. Rosales-Silva, F. Gallegos-Funes, Instituto Politecnico Nacional (Mexico) [5298-73]

✔ **Modeling analysis of sensor sensitivity field based on quadrilateral and image reconstruction algorithm in electrical capacitance tomography,** D. Chen, Harbin Univ. of Science and Technology (China) . . . . . [5298-74]

See p. 71 to order.

Wednesday 21 January

Plenary Presentation . . . . . **8:30 to 9:15 am**

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 9 . . . . . Wed. 9:30 am to 12:00 pm

Image Segmentation, Classification, and Recognition Using Neural Networks

Chair: **Nasser M. Nasrabadi**, Army Research Lab.

Cellular pulse coupled neural network with adaptive weights for image segmentation and its analog VLSI implementation, J. Schreiter, D. Matolin, R. Schüffny, Technische Univ. Dresden (Germany); A. Heittmann, U. Ramacher, Infineon Technologies AG (Germany) . . . . . [5298-34]

Texture segmentation of satellite images using multichannel decomposition and neural networks, N. Nezamoddini-Kachouie, Ryerson Univ. (Canada); J. Alirezaie, Ryerson Univ. (Canada) and Univ. of Waterloo (Canada) . . . . . [5298-35]

Video objects segmentation based on spatio-temporal information and its realization in CNNUM, Q. Chang, Y. Mo, Shanghai Univ. (China); X. Lin, Changchun Univ. of Technology (China) . . . . . [5298-36]

Fuzzy C-mean classification for corrosion evolution of steel images, M. Trujillo, M. Sadki, Brunel Univ. (United Kingdom) . . . . . [5298-37]

Fusion of self-organizing network and response analysis in object recognition with the hybrid evolutionary algorithm, I. V. Maslov, Graduate Ctr./CUNY . . . . . [5298-38]

Robust neural net-based data association and multiple model-based tracking of multiple point targets, M. A. Zaveri, U. B. Desai, S. N. Merchant, Indian Institute of Technology (India) . . . . . [5298-39]

Lunch/Exhibition Break

SESSION 10 . . . . . Wed. 1:40 to 4:30 pm

Universal Mapping, Genetic Algorithms, Encoding, Deinterlacing Using Neural Networks

Chair: **Syed A. Rizvi**, City Univ. of New York/College of Staten Island

Competitive dynamics and pattern formation in a large array optoelectronic feedback circuit, A. J. Raglin, Army Research Lab.; M. Chouikha, Howard Univ. . . . . [5298-40]

Designs of a universal two-layered neural network derived from the PLI theory, C. J. Hu, Southern Illinois Univ./Carbondale . . . . . [5298-41]

Deinterlacing using modular neural network, D. H. Woo, Pusan National Univ. (South Korea) and Miryang National Univ. (South Korea); I. K. Eom, Miryang National Univ. (South Korea); Y. S. Kim, Pusan National Univ. (South Korea) . . . . . [5298-42]

Fast fractal image encoder using NN-based block classifier and improved isometry transformation, H. Chung, Kyungbok College (South Korea); B. Lee, Cheonan National Technical College (South Korea); H. Hahn, Soongsil Univ. (South Korea) . . . . . [5298-43]

Vector representation of user's view using self-organizing map, T. Ae, Hiroshima Univ. (Japan) . . . . . [5298-44]

Model establishment and restructure of table, C. Jin, Nanjing Univ. of Science and Technology (China) . . . . . [5298-45]

Application GA and ISODATA in unsupervised classification, M. Yang, Consultant (Taiwan); Y. Yang, National Chung Hsing Univ. (Taiwan) . . . . . [5298-46]

Conference 5299

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5299

Computational Imaging II

Conference Chairs: **Charles A. Bouman**, Purdue Univ.; **Eric L. Miller**, Northeastern Univ.

Program Committee: **Edmund Y. Lam**, Univ. of Hong Kong (Hong Kong); **Robert L. Stevenson**, Univ. of Notre Dame

Monday 19 January

SESSION 1 . . . . . Mon. 8:30 to 9:50 am

Physics-Based Inverse Methods I

Error study in neural source localization, Y. Sun, Purdue Univ. . . . . [5299-01]

Use of the FDTD method for time reversal: application to microwave breast cancer detection, P. Kosmas, C. Rappaport, Northeastern Univ. . . . . [5299-02]

Statistical performance characterization, limits, and optimization for the use of diffuse optical tomography in breast cancer detection and diagnosis, E. L. Miller, G. L. Boverman, Northeastern Univ.; D. Boas, Massachusetts General Hospital [5299-03]

Representing scattering functions with spherical harmonics of spectral Fourier components, Y. Sun, Purdue Univ. . . . . [5299-04]

SESSION 2 . . . . . Mon. 10:20 to 11:10 am

Temporal Imaging

Estimation of kinetic model parameters in optical diffusion tomography, A. B. Milstein, S. Oh, K. J. Webb, C. A. Bouman, Purdue Univ. . . . . [5299-05]

Recursive estimation methods for tracking of localized perturbations in absorption and scattering using diffuse optical tomography, E. L. Miller, A. L. Hamdi, Northeastern Univ.; D. Keesing, M. Kilmer, Tufts Univ.; M. A. Franceschini, D. Boas, Massachusetts General Hospital . . . . . [5299-06]

Reconstruction of image sequences using motion compensation, Y. Yang, E. Gravier, Illinois Institute of Technology . . . . . [5299-07]

SESSION 3 . . . . . Mon. 11:10 am to 12:10 pm

Physics-Based Inverse Methods II

Computational algorithm for reconstructing the profile of 2D rough surfaces, S. Nguyen, M. El-Shenawee, Univ. of Arkansas; E. L. Miller, Northeastern Univ.[5299-08]

Imaging multiple physical parameters in an inverse problems context, E. L. Miller, Northeastern Univ.; N. Baddour, Univ. of Toronto (Canada); Y. L. Fei, Northeastern Univ.; A. Mandelis, Univ. of Toronto (Canada) . . . . . [5299-09]

Noise reduction and 3D visualization of confocal microscopy images, Y. Sun, Purdue Univ. . . . . [5299-46]

Lunch Break

SESSION 4 . . . . . Mon. 1:40 to 5:30 pm

Computational Image Processing

Color filter array design based on a human visual model, M. Parmar, S. J. Reeves, Auburn Univ. . . . . [5299-10]

Inverting color transforms, M. R. Gupta, Univ. of Washington . . . . . [5299-11]

Restoration of images with optical aberrations and quantization in a transform domain, E. Y. Lam, M. K. Ng, Univ. of Hong Kong . . . . . [5299-12]

Optimal unsharp mask for image sharpening and noise removal, S. H. Kim, Samsung Electronics Co., Ltd. (South Korea) and Purdue Univ.; J. P. Allebach, Purdue Univ. . . . . [5299-13]

Computational imaging in automated analysis of mammograms, E. J. Delp III, Purdue Univ. . . . . [5299-14]

Image modeling: new perspective for image processing and computer vision, D. Ziou, Univ. de Sherbrooke (Canada); M. Allili, Bishop's Univ. (Canada) . . . . [5299-15]

Likelihood term in restoration of transform-compressed imagery, M. A. Robertson, Air Force Research Lab. . . . . [5299-16]

Bayesian approach to filter design detection of compact sources, J. L. Sanz, D. Herranz, P. Vielva, E. Martinez-Gonzalez, R. B. Barreiro, M. Lopez-Caniego, Univ. de Cantabria (Spain) . . . . . [5299-43]

Design and optimization of computational imaging systems, E. R. Dowski, Jr., K. Kubala, CDM Optics, Inc. . . . . [5299-17]

Applications of wavefront coded imaging systems, R. Narayanswamy, CDM Optics, Inc. . . . . [5299-18]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 11:10 am

Image Modeling

Optimizing knot positions for multidimensional B-spline models, X. Deng, T. S. Denney, Jr., Auburn Univ. . . . . [5299-19]

Inverse problems in computational biology, P. C. Doerschuk, Purdue Univ. [5299-20]

Time-frequency analysis with best local cosine bases, Y. Huang, C. A. Bouman, I. Pollak, Purdue Univ. . . . . [5299-21]

Bounded variation type image reconstruction, B. J. Lucier, Purdue Univ.; A. Chambolle, Univ. Paris Dauphine (France) . . . . . [5299-22]

SESSION 6 . . . . . Tues. 11:10 am to 12:30 pm

Multigrid Processing Methods

Grouping and segmentation in a hierarchy of graphs, W. G. Kropatsch, Y. Haxhimusa, Technicshe Univ. Wien (Austria) . . . . . [5299-44]

Graph pyramids as models of human problem solving, Z. Pizlo, Z. Li, Purdue Univ. . . . . [5299-45]

Multigrid inversion with variable resolution data and parameter spaces, S. Oh, A. B. Milstein, C. A. Bouman, K. J. Webb, Purdue Univ. . . . . [5299-23]

Alternating minimization multigrid algorithms for transmission tomography, J. A. O'Sullivan, J. Benac, Washington Univ. . . . . [5299-24]

Lunch/Exhibition Break

SESSION 7 . . . . . Tues. 2:00 to 3:20 pm

Registration and Mosaicing

Multiframe demosaicing of under-sampled color images, S. Farsiu, Univ. of California/Santa Cruz; M. Elad, Technion—Israel Institute of Technology (Israel); P. Milanfar, Univ. of California/Santa Cruz . . . . . [5299-25]

Linear models for multi-frame super-resolution restoration under non-affine registration and spatially varying PSF, S. Borman, R. L. Stevenson, Univ. of Notre Dame . . . . . [5299-26]

High-resolution video mosaicing for documents and photos by estimating camera motion, T. Sato, Nara Institute of Science and Technology (Japan) and NEC Labs. (Japan); S. Ikeda, Nara Institute of Science and Technology (Japan); M. Kanbara, Nara Institute of Science and Technology (Japan) and NEC Labs. (Japan); A. Iketani, N. Nakajima, NEC Labs. (Japan); N. Yokoya, Nara Institute of Science and Technology (Japan) and NEC Labs. (Japan); K. Yamada, NEC Labs. (Japan) . . . . . [5299-27]

Mobile robot control for composition of seamless and high-resolution images in library, R. Ueda, Univ. of Tokyo (Japan) and Hitachi, Ltd. (Japan); T. Moriya, Hitachi, Ltd. (Japan); C. Trevai, Univ. of Tokyo (Japan) and Hitachi, Ltd. (Japan); T. Arai, Univ. of Tokyo (Japan) . . . . . [5299-28]

SESSION 8 . . . . . Tues. 3:40 to 5:40 pm

Geometric Inversion

Color feature and density-based image mosaicing using repeated application of the ICP algorithm, S. H. Chang, J. Fuller, A. Farsaie, L. Elkins, Spatial Integrated Systems, Inc. . . . . [5299-29]

Shape distributions as priors for image segmentation, A. V. Litvin, W. C. Karl, Boston Univ. . . . . [5299-30]

Statistical-model based identification of complete vessel-tree frames in coronary angiograms, T. Aach, A. P. Condurache, Univ. zu Lübeck (Germany); K. Eck, J. Bredno, Philips Research Labs. (Germany) . . . . . [5299-31]

Shape reconstruction of flexible objects from monocular images for industrial applications, M. M. Ellenrieder, DaimlerChrysler AG (Germany) . . . . . [5299-32]

New flexible parameterization for the estimation of 3D shape structure from scattered field data, E. L. Miller, B. L. Tarokh, Northeastern Univ.; D. Boas, Massachusetts General Hospital . . . . . [5299-33]

Subspace-based analysis of the ERT inverse problem, E. L. Miller, M. Khames, Northeastern Univ. . . . . [5299-34]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Computational image processing for a computer vision system using biomimetic sensors and Eigenspace object models,** C. H. G. Wright, S. F. Barrett, Univ. of Wyoming; D. J. Pack, M. J. Wilcox, U.S. Air Force Academy . . . . . [5299-35]

✔ **Automatic road extraction based on cross detection in suburb,** G. Koutaki, K. Uchimura, Kumamoto Univ. (Japan) . . . . . [5299-36]

✔ **Performance analysis of color spaces for optimally fitting the active shape model,** S. Kim, J. Kang, J. Jung, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . [5299-37]

✔ **Global computational algebraic topology approach for diffusion,** M. Auclair-Fortier, D. Ziou, Univ. de Sherbrooke (Canada); M. Allili, Bishop's Univ. (Canada) . . . . . [5299-38]

✔ **Adaptive Wiener filtering for image restoration using wavelet packets,** J. Zhang, Beijing Institute of Technology (China) . . . . . [5299-39]

✔ **Dynamic region-of-interest acquisition and face tracking for intelligent surveillance system,** Y. Kim, Korea Electronics Technology Institute (South Korea) and Chung-Ang Univ (South Korea); C. Park, Korea Electronics Technology Institute (South Korea); S. Kim, J. Paik, Chung-Ang Univ. (South Korea) . [5299-40]

✔ **Frame interpolation of ultrasound images using optical flow,** T. Nam, R. Park, Sogang Univ. (South Korea) . . . . . [5299-41]

✔ **Image denoising via fundamental anisotropic diffusion and wavelet shrinkage: a comparative study,** B. Bayraktar, Purdue Univ.; M. Analoui, Pfizer Inc. . [5299-42]

Conference 5300

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5300

Vision Geometry XII

Conference Chairs: **Longin Jan Latecki**, Temple Univ.; **David M. Mount**, Univ. of Maryland/College Park; **Angela Y. Wu**, American Univ.

Program Committee: **Gilles Bertrand**, Groupe ESIEE Paris (France); **Atsushi Imiya**, Chiba Univ. (Japan); **Jack Koplowitz**, Clarkson Univ.; **Nathan S. Netanyahu**, Bar Ilan Univ. (Israel); **Azriel Rosenfeld**, Univ. of Maryland/College Park; **Mubarak A. Shah**, Univ. of Central Florida; **Peter Veelaert**, Hogeschool Gent (Belgium)

Monday 19 January

SESSION 1 . . . . . Mon. 9:00 to 10:30 am

Surface Reconstruction and Simplification

Chair: **Alexander G. Belyaev**, Univ. of Aizu (Japan)

Reversible discrete volume polyhedrization using Marching Cubes simplification, D. Coeurjolly, Univ. Lumière Lyon 2 (France); I. Sivignon, Institut National Polytechnique de Grenoble (France) . . . . . [5300-01]

Novel algorithms for surface and hyper-surface extraction, B. R. Schlei, Los Alamos National Lab. . . . . [5300-02]

Visualization and modeling of three-dimensional scattered volume data by using wavelet transformation and generalized asymptotic decider criterion, K. Lee, Handong Univ. (South Korea); O. Gwun, Chonbuk National Univ. (Sri Lanka) . . . . . [5300-03]

SESSION 2 . . . . . Mon. 11:00 am to 1:00 pm

Aspects of Vision Geometry

Chair: **Peter F. Stiller**, Texas A&M Univ.

Were optical projections used in early Renaissance painting?, D. G. Stork, Ricoh Innovations, Inc. and Stanford Univ. . . . . [5300-04]

Fast and precise angular projection evaluation (Hough-Green transform), V. A. Shapiro, Orbograph Ltd. (Israel) . . . . . [5300-05]

Number of possible hyperedges of an INH, S. Chastel, D. Paulus, Univ. Koblenz-Landau (Germany) . . . . . [5300-06]

Video compression using geometry processing, R. Balter, France Telecom R&D (France) . . . . . [5300-07]

Lunch Break

SESSION 3 . . . . . Mon. 2:30 to 6:30 pm

Shape Analysis and Object Recognition

Chair: **Bernd R. Schlei**, Los Alamos National Lab.

Filling holes for building surface models using hierarchy scheme, X. Li, F. Gao, W. G. Wee, Univ. of Cincinnati . . . . . [5300-08]

Curve-based local surface geometry estimation in polyhedral surfaces, X. Tang, G. Agam, Illinois Institute of Technology . . . . . [5300-09]

Topological approach for detecting objects from images, L. G. Nonato, A. Castelo, M. C. F. de Oliveira, M. A. Lizier, Univ. de São Paulo (Brazil) . . . . . [5300-10]

Discrimination metrics and object/image duality, P. F. Stiller, Texas A&M Univ. . . . . [5300-11]

New method for evaluating object's recognition in an appearance-based model, F. Biswas, Kyushu Institute of Technology (Japan) . . . . . [5300-12]

Eigen-decomposition approach for 3D model retrieval, Y. Mao, W. Chen, Zhejiang Univ. (China) . . . . . [5300-13]

Applying Earth movers' distance to partial 3D model retrieval, Y. Mao, W. Chen, Zhejiang Univ. (China) . . . . . [5300-14]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 4 . . . . . Tues. 9:30 am to 12:00 pm

Digital Morphology

Chair: **Isabelle Debled-Rennesson**, LORIA (France)

More direct approach to the processing of 3D binary image descriptors, J. Poiraudeau, I. Blasquez, Univ. de Limoges (France) . . . . . [5300-15]

New sufficient conditions for P-simple points, G. Bertrand, E. Plougonven, Groupe ESIEE (France) . . . . . [5300-16]

Efficient morphological processing of 3D data based on directional interval coding, G. Agam, P. Gauthier, Illinois Institute of Technology . . . . . [5300-17]

Union-find algorithm for the component tree, L. A. Najman, M. Couprie, Groupe ESIEE (France) . . . . . [5300-18]

Lunch/Exhibition Break

SESSION 5 . . . . . Tues. 1:30 to 3:00 pm

Digital Geometry and Topology

Chair: **Gady Agam**, Illinois Institute of Technology

Digital straight line recognition on multiscale grids, D. Coeurjolly, L. Tougne, Univ. Lumière Lyon 2 (France) . . . . . [5300-19]

Estimation of tangents to a noisy discrete curve, I. Debled-Rennesson, LORIA (France) . . . . . [5300-20]

Some properties of topological greyscale watersheds, G. Bertrand, Groupe ESIEE (France) . . . . . [5300-21]

SESSION 6 . . . . . Tues. 3:30 to 5:30 pm

Segmentation

Chair: **Gilles Bertrand**, Groupe ESIEE (France)

Ridge and ravine detection in curved-surface range data, A. G. Belyaev, Univ. of Aizu (Japan) . . . . . [5300-22]

New image segmentation approach using mode finding, multilink clustering, and region graph analysis, S. Kim, Samsung Advanced Institute of Technology (South Korea); D. Nikolayev, Institute for Information Transmission Problems (Russia); S. Lee, C. Kim, Y. Seo, Samsung Advanced Institute of Technology (South Korea) . . . . . [5300-23]

Corner-edge structure detection and reconstruction using virtual line scanning, S. Chanekasi, A. Boonnithrovalkur, C. J. Hu, Southern Illinois Univ./ Carbondale . . . . . [5300-24]

Area-mura detection in TFT-LCD panel, K. N. Choi, S. I. Yoo, J. Y. Lee, H. K. Kang, H. W. Kim, Seoul National Univ. (South Korea) . . . . . [5300-25]

Conference 5301A

Tuesday-Wednesday 20-21 January 2004 • Part of Proceedings Vol. 5301A
Sensors and Camera Systems for Scientific, Industrial, and Digital Photography Applications V

Sensors, Cameras and Systems for Scientific/ Industrial Applications VI

Conference Chair: **Morley M. Blouke**, Scientific Imaging Technologies, Inc.

Program Committee: **Joseph Carbone**, Thermo CIDTEC; **Robin M. Dawson**, Sarnoff Corp.; **El-Sayed I. Eid**, Gentex Corp.; **Terrence S. Lomheim**, The Aerospace Corp.; **Gloria G. Putnam**, Eastman Kodak Co.; **Nobukazu Teranishi**, Matsushita Electronics Co. (Japan); **Orly Yadid-Pecht**, Ben-Gurion Univ. of the Negev (Israel)

Tuesday 20 January

Plenary Presentation . . . . . **8:30 to 9:15 am**

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 1 . . . . . Tues. 9:30 am to 12:00 pm

Image restoration from camera vibration and object motion blur in infrared staggered TDI systems, S. I. Raiter, Ben-Gurion Univ. of the Negev (Israel) [5301A-02]

Automatic analysis of images, V. S. Abrukov, Chuvash State Univ. (Russia) and Cheboksary Institute of the Moscow State Open Univ. (Russia) . . . . . [5301A-03]

Thin observation module by bound optics (TOMBO) with color filters, S. Miyatake, Minolta Co., Ltd. (Japan) and Osaka Univ. (Japan) and Japan Science and Technology Corp. (Japan); R. Shogenji, Osaka Univ. (Japan); M. Miyamoto, OptiWorks Inc. (Japan); K. Nitta, Japan Science and Technology Corp. (Japan); J. Tanida, Osaka Univ. (Japan) . . . . . [5301A-04]

Electronic compound-eye image sensor: construction and calibration, R. I. Hornsey, York Univ. (Canada); P. Thomas, Topaz Technology Inc. (Canada); S. Pepic, S. Sargoytchev, R. Krishnasamy, E. Savchenko, W. Wong, C. Thomas, York Univ. (Canada) . . . . . [5301A-05]

Microoptical fabricated artificial apposition compound eye, J. W. Duparre, P. Dannberg, P. Schreiber, A. Braeuer, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [5301A-06]

Walsh transform-based face detection for artificial retina LSIs, H. Kage, K. Tanaka, K. Kyuma, Mitsubishi Electric Corp. (Japan) . . . . . [5301A-07]

Lunch/Exhibition Break

SESSION 2 . . . . . Tues. 1:30 to 5:50 pm

CMOS image sensor array for surface plasmon resonance spectroscopy, J. Rhee, Arizona State Univ. . . . . [5301A-08]

Analysis of electrooptical camera (EOC) on KOMPSAT-1 during mission life of 3 years, H. Baek, J. Jun, S. Yong, E. Kim, H. Choi, Y. Kim, H. Paik, Korea Aerospace Research Institute (South Korea) . . . . . [5301A-09]

Analysis of ocean scanning multispectral imager (OSMI) on KOMPSAT-1 during mission life of 3 years, S. Yong, H. Baek, M. Kim, E. Kim, H. Choi, H. Youn, H. Paik, Korea Aerospace Research Institute (South Korea) . . . . . [5301A-10]

System-on-chip spectrophotometer for the high-throughput analysis of enzymatic reaction, D. Wang, C. Ha, C. B. Park, Y. Joo, Arizona State Univ. . . . . [5301A-11]

16x16-pixel retinal-prosthesis vision chip with in-pixel digital image processing in a frequency domain by use of a pulse-frequency-modulation photosensor, K. Kagawa, T. Furumiya, D. C. Ng, A. Uehara, J. Ohta, M. Nunoshita, Nara Institute of Science and Technology (Japan) . . . . . [5301A-12]

Two-phase full-frame CCD with double ITO gate structure for increased sensitivity, G. G. Putnam, W. Des Jardin, S. Kosman, N. Kurfiss, J. Johnson, D. Losee, Eastman Kodak Co.; A. Tanbakuchi, Optical Sciences Ctr./Univ. of Arizona . . . . . [5301A-13]

New sensor alignment method for an 8kx4k-pixel ultra-high definition camera with four imagers, T. Yamashita, K. Mitani, M. Shirakawa, F. Okano, NHK Science and Technical Research Labs. (Japan) . . . . . [5301A-14]

Development of a large sensitive area x-ray crystallography detector using multiple lens-based CCD cameras, I. Naday, T. Madden, A. McArthur, M. Molitsky, Argonne National Lab.; E. Westbrook, Molecular Biology Consortium . . . . . [5301A-15]

LBNL four side abuttable CCD package development, H. M. Oluseyi, J. H. Bercovitz, A. Karcher, C. Hernikl, T. Miller, C. Bebek, S. E. Holland, M. E. Levi, Lawrence Berkeley National Lab. . . . . [5301A-16]

Characterization results of 1k x 1k charge multiplying CCD image sensor, S. Ohta, H. Shibuya, I. Kobayashi, T. Tachibana, T. Nishiwaki, Texas Instruments Japan Ltd. (Japan); J. Hynecek, Isetex, Inc. . . . . [5301A-17]

Curved CCD's and their application with astronomical telescopes and stereo panoramic cameras, P. Swain, D. Channin, G. Taylor, S. Lipp, Sarnoff Corp.; D. Mark, Mark Resources LLC . . . . . [5301A-18]

High-accuracy simulation method for CCD image sensors below 2.5 um square cell size, K. Kikuchi, I. Murakami, T. Kawamura, M. Kimura, K. Kubota, H. Kamata, H. Kanbe, T. Narabu, Sony Corp. (Japan) . . . . . [5301A-60]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Digital camera for forensic photography,** D. Har, Chung-Ang Univ. (South Korea) . . . . . [5301A-33]

✔ **Compact CCD-based microarray scanner,** Q. Zhou, Beijing Univ. of Aeronautics and Astronautics (China) . . . . . [5301A-34]

✔ **Sensor of ammonium on the base of MDM-structure,** Y. Lednik, G. Ivan, Institute of Electronics (Belarus) . . . . . [5301A-35]

✔ **Hydrogen gas sensor based on thermoelectrical transducer,** A. M. Kudanovich, Institute of Electronics (Belarus) . . . . . [5301A-36]

✔ **Software development for airborne imaging system,** R. Bachnak, R. Kulkarni, S. Dannelly, C. Steidley, Texas A&M Univ. . . . . [5301A-37]

✔ **Agro-environment observation using LCTF imaging spectropolarimeters,** H. Shingu, K. Homma, H. Yamamoto, National Aerospace Lab. of Japan (Japan) . . . . . [5301A-38]

✔ **Optomechanical analysis for confocal microscopes,** G. Chang, H. Jian, National Taiwan Normal Univ. (Taiwan) . . . . . [5301A-39]

✔ **Research on SNR and image detecting property of LLL imaging system,** F. Zuo, Institute of Semiconductors (China) . . . . . [5301A-40]

✔ **Novel digital logic gate for high performance CMOS imaging system,** H. H. Chung, Y. Joo, Arizona State Univ. . . . . [5301A-41]

Conference 5301A

Wednesday 21 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 3 . . . . . Wed. 9:30 am to 12:00 pm

Improving the sensitivity of a vision chip using a software A-D conversion method, D. Takeuchi, S. Kagami, T. Komuro, M. Ishikawa, Univ. of Tokyo (Japan) . . . . [5301A-19]

High dynamic range active pixel sensor, T. Anaxagoras, N. Allinson, UMIST (United Kingdom) . . . . . [5301A-20]

Pixel level stochastic arithmetic for intelligent image capture, T. Hammadou, DigiSens (Australia) . . . . . [5301A-21]

Low noise charge injection device, C. G. Borman, S. Bhaskaran, J. Swab, C. Beam, Spectra-Physics Inc.; H. Jung, Supertex inc. . . . . [5301A-22]

14-megapixel 36x24-mm2 image sensor, G. Meynants, D. Scheffer, B. Dierickx, A. Alaerts, FillFactory NV (Belgium) . . . . . [5301A-23]

Large area CMOS monolithic active pixel sensor for extreme ultraviolet spectroscopy and imaging, M. L. Prydderch, N. R. Waltham, P. D. Read, S. Manolopoulos, A. J. Marshall, Rutherford Appleton Lab. (United Kingdom); A. Evans, Univ. of Liverpool (United Kingdom); P. Pool, e2v Technologies (United Kingdom) . . . . . [5301A-24]

Lunch Break

SESSION 4 . . . . . Wed. 1:30 to 5:20 pm

Infrared and ultraviolet imaging with a CMOS sensor having layered photodiodes, D. L. Gilblom, Alternative Vision Corp.; S. K. Yoo, HanVision Co., Ltd. (South Korea) . . . . . [5301A-25]

Sampling architecture for smart CMOS image sensors, F. Saffih, Univ. of Waterloo (Canada); R. Hornsey, York Univ. (Canada) . . . . . [5301A-26]

High sensitive VGA CMOS image sensor at 250 frames/sec and global shutter for industrial vision, J. P. Seijnaeve, H. Witters, T. Walschap, B. Dierickx, FillFactory NV (Belgium) . . . . . [5301A-27]

Novel CMOS digital pixel sensor for 1D barcode scanning, M. Yan, Stony Brook Univ.; G. DeGeronimo, P. O'Connor, Brookhaven National Lab.; B. Carlson, Symbol Technologies . . . . . [5301A-28]

Ultra-low-noise high-speed CMOS linescan sensor for scientific and industrial applications, B. A. Fowler, J. Balicki, S. Mims, D. How, Agilent Technologies; J. Canfield, Pixel Devices International, Inc.; M. Godfrey, Stanford Univ. . . . [5301A-29]

CMOS image sensor modulation transfer function modeling and characterization, M. Estribeau, P. Magnan, SUPAERO (France) . . . . . [5301A-30]

Point by point thorough photoresponse analysis of CMPOS APS by means of our unique submicron scanning system, I. Shcherback, T. Danov, B. Belotserkovsky, O. Yadid-Pecht, Ben-Gurion Univ. of the Negev (Israel) . . . . . [5301A-59]

First use of a high-sensitivity active pixel sensor array as a detector for electron microscopy, N. Xuong, A. Milazzo, M. Ellisman, S. Peltier, J. Bouwer, F. Duttweiler, P. Leblanc, J. Matteson, Univ. of California/San Diego; H. Wieman, H. Matis, F. Bieser, P. Denes, Lawrence Berkeley National Lab.; S. Kleinfelder, Univ. of California/Irvine . . . . . [5301A-31]

CMOS active pixel image sensor with in-pixel CDS for high-speed cameras, T. Inoue, Photron Ltd. (Japan); S. Kawahito, Shizuoka Univ. (Japan) . . . . . [5301A-32]

4.1 mega pixel JFET imaging sensor LBCAST, T. Isogai, T. Ishida, A. Kamashita, S. Suzuki, M. Juen, T. Kazama, Nikon Corp. (Japan) . . . . . [5301A-58]

Conference 5301B

Monday 19 January 2004 • Part of Proceedings Vol. 5301B
Sensors and Camera Systems for Scientific, Industrial, and Digital Photography Applications V

Sensors, Color, Cameras, and Systems for Digital Photography

Conference Chairs: **Nitin Sampat**, Rochester Institute of Technology; **Ricardo J. Motta**, PIXIM, Inc.

Program Committee: **Eiji Atsumi**, Nokia Japan Co., Ltd. (Japan); **Ted J. Cooper**, Sony Electronics Inc.; **Russel A. Martin**, FOVEON; **Gloria G. Putnam**, Eastman Kodak Co.; **Sabine E. Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Monday 19 January

SESSION 6 . . . . . Mon. 9:00 to 10:00 am

Color Photography

Chair: **Nitin Sampat**, Rochester Institute of Technology

Uses and abuses of color spaces for digital photography *(Invited Paper)*, N. Moroney, Hewlett-Packard Labs. . . . . [5301B-42]

Comparison of the accuracy of different white balancing options as quantified by their color constancy, J. S. Viggiano, Acolyte Color Research . . . . . [5301B-43]

SESSION 7 . . . . . Mon. 10:30 am to 12:30 pm

Camera Processing Algorithms

Chair: **Ricardo J. Motta**, PIXIM, Inc.

Object-based color reconstruction, A. A. Tanbakuchi, DALSA Professional Imaging (Netherlands) and Optical Sciences Ctr./Univ. of Arizona (Netherlands); A. van der Sijde, Philips Semiconductors (Netherlands); B. Dillen, DALSA Professional Imaging (Netherlands); A. Theuwissen, DALSA Professional Imaging (Netherlands) and Delft Univ. of Technology (Netherlands); W. de Haan, Philips Semiconductors (Netherlands) . . . . . [5301B-44]

Demosaicking for a color image sensor with removal of blur due to an optical low-pass filter, T. Komatsu, T. Saito, Kanagawa Univ. (Japan) . . . . . [5301B-45]

Restoration and demosaicing method for a pixel mixture image, I. Tsubaki, K. Aizawa, Univ. of Tokyo (Japan) . . . . . [5301B-46]

Suppressing Moiré with lateral dispersion, B. M. Radl, Mosaic Sciences, Inc. . . . . [5301B-47]

Unsupervised automation of photographic composition rules in digital still cameras, S. Banerjee, B. L. Evans, Univ. of Texas/Austin . . . . . [5301B-48]

Super-resolution imaging from shifted and rotated aliased images, P. Vandewalle, S. Süsstrunk, M. Vetterli, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [5301B-49]

Lunch Break

SESSION 8 . . . . . Mon. 2:00 to 3:00 pm

Digital Camera Characterization

Chair: **Sabine E. Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Building an automatic colorimetric fine art reproduction system from readily available components, J. DiCarlo, Hewlett-Packard Labs.; N. Sampat, Rochester Institute of Technology and Hewlett-Packard Labs.; M. D. McGuire, G. Dispoto, M. Bhachech, Hewlett-Packard Labs. . . . . [5301B-50]

Contrast sensitivity method for acceptable limits of visual defects in CMOS sensors, A. W. Yanof, K. E. Jachimowicz, Motorola . . . . . [5301B-51]

Automatic color calibration for a digital camera, C. L. Miller, Hewlett-Packard Co. . . . . [5301B-52]

SESSION 9 . . . . . Mon. 3:30 to 5:10 pm

Camera Design

Chair: **Russel A. Martin**, FOVEON

Virtual sensor design, R. Costantini, S. Susstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [5301B-53]

Universal Imager Bus: a digital still camera system with interchangeable sensor components, M. S. Whalen, Applied Color Science, Inc. . . . . [5301B-54]

UBC ScanCam: an inexpensive 122-million pixel scan camera, W. Heidrich, S. Wang, Univ. of British Columbia (Canada) . . . . . [5301B-55]

DCT optimization for CFA data images, A. Capra, S. Battiato, I. Guarneri, M. Mancuso, STMicroelectronics (Italy) . . . . . [5301B-56]

CMOS active pixel sensor achieving 90-dB dynamic range, S. Kleinfelder, Y. Chen, Univ. of California/Irvine . . . . . [5301B-57]

See p. 71 to order.

Conference 5302

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5302

Three-Dimensional Image Capture and Applications VI

Conference Chairs: **Brian D. Corner**, U.S. Army Natick Soldier Ctr.; **Peng Li**, GEOCENTERS, Inc.; **Roy P. Pargas**, Clemson Univ.

Monday 19 January

SESSION 1 . . . . . Mon. 9:00 to 10:00 am

Hardware I

Chair: **Brian D. Corner**, U.S. Army Natick Soldier Ctr.

Adaptive edge detection filter for light stripe projection in 3D surface reconstruction, S. H. Chang, J. Fuller, H. L. Deng, A. Farsaie, L. Elkins, Spatial Integrated Systems, Inc. . . . . [5302-01]

Demonstration of a novel drift field pixel structure for the demodulation of modulated light waves with application in three-dimensional image capture, B. Büttgen, T. Oggier, R. Kaufmann, P. Seitz, N. Blanc, CSEM SA (Switzerland) [5302-02]

Smart pixels for real-time optical coherence tomography, S. Beer, P. Seitz, CSEM SA (Switzerland) . . . . . [5302-03]

SESSION 2 . . . . . Mon. 10:30 am to 12:10 pm

Hardware II

Chair: **Jeremy M. Carson**, U.S. Army

Spherical/cylindrical laser scanner for geometric reverse engineering, V. H. Chan, M. Samaan, Ryerson Univ. (Canada) . . . . . [5302-04]

New understanding of single-lens stereovision using a biprism, K. B. Lim, Y. Xiao, National Univ. of Singapore (Singapore) . . . . . [5302-05]

Chromatic confocal detection for high-speed microtopography measurements, A. K. Ruprecht, K. Körner, T. F. Wiesendanger, H. J. Tiziani, W. Osten, Univ. Stuttgart (Germany) . . . . . [5302-06]

Binocular robot vision system with autonomous movement of viewpoint, Y. Yabuta, Tottori Univ. (Japan) . . . . . [5302-07]

Active pixel circuits for CMOS time-of-flight range image sensors, S. Kawahito, I. A. Halin, Shizuoka Univ. (Japan) . . . . . [5302-08]

Lunch Break

SESSION 3 . . . . . Mon. 2:00 to 3:00 pm

Hardware III

Chair: **Peng Li**, GEO-Centers, Inc.

Ultrasound/vision sensor for an advanced vehicle smart parking system, T. Hammadou, DigiSens (Australia) . . . . . [5302-09]

Simple zoom-lens digital camera calibration method based on EXIF metadata, X. Sun, J. Sun, Tianjin Univ. (China) . . . . . [5302-10]

Camera calibration and 3D reconstruction using RBF network, H. Hu, Zhongshan Univ. (China) . . . . . [5302-11]

SESSION 4 . . . . . Mon. 3:30 to 5:30 pm

3D Scene Reconstruction

Chair: **Roy P. Pargas**, Clemson Univ.

Real metrology by using depth map information, S. Battiato, S. Curti, STMicroelectronics (Italy); E. Ardizzone, R. Salvo, Univ. degli Studi di Palermo (Italy) . . . . . [5302-12]

Depth map generation by image classification, S. Battiato, S. Curti, STMicroelectronics (Italy); M. La Cascia, E. Scordato, M. Tortora, Univ. degli Studi di Palermo (Italy) . . . . . [5302-13]

Challenges and advances in interactive modeling, V. S. Popescu, E. Sacks, Purdue Univ. . . . . [5302-14]

Flexible method for camera calibration, W. Xie, Wuhan Univ. (China) . . . . . [5302-15]

Topology-based strategy for 3D reconstruction of complicated buildings, D. Li, Z. Shao, Wuhan Univ. (China) . . . . . [5302-16]

Three-dimensional building reconstruction with lidar data and aerial image sequences, Y. Zhang, Wuhan Univ. (China) . . . . . [5302-17]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 10:10 am

Human Modeling

Chair: **Brian D. Corner**, U.S. Army Natick Soldier Ctr.

Facial modeling for plastic surgery using magnetic resonance imagery and 3D surface data, B. Takacs, Digital Elite Inc. . . . . [5302-18]

Quantitative assessment of human body shape using Fourier analysis, M. Friess, Anthrotech Inc.; J. Rohlf, Stony Brook Univ.; H. Hsiao, National Institute for Occupational Safety and Health . . . . . [5302-19]

SESSION 6 . . . . . Tues. 10:10 am to 12:30 pm

Object Modeling

Chair: **Martin Friess**, Anthrotech Inc.

Integration method for 3D model reconstruction, X. Li, W. G. Wee, Univ. of Cincinnati . . . . . [5302-20]

Three-dimensional reconstruction and texturation of museographic objects using multiple images and stereoscopic depth map fusion, J. Aubourg, Ecole des Mines de Paris (France); G. Moreau, Ecole d'Architecture de Nantes (France); P. Fuchs, Ecole des Mines de Paris (France) . . . . . [5302-21]

Three-dimensional scanner and virtual gallery of small cultural heritage objects, G. Schirripa Spagnolo, A. Neri, M. Carli, Univ. degli Studi di Roma Tre (Italy) . [5302-22]

Robust 3D object model reconstruction from video, C. Cheng, P. Huang, Y. Chen, Y. Lu, S. Lai, National Tsing Hua Univ. (Taiwan) . . . . . [5302-23]

Adaptive surface smoothing for enhancement of range data with multiple regularization parameters, H. Ki, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . . . . . [5302-24]

Regularized adaptive surface smoothing for enhancement of range data, H. Ki, Chung-Ang Univ. (South Korea) . . . . . [5302-25]

Conference 5303

Wednesday-Thursday 21-22 January 2004 • Proceedings Vol. 5303

Machine Vision Applications in Industrial Inspection XII

Conference Chairs: **Jeffery R. Price**, Oak Ridge National Lab.; **Fabrice Meriaudeau**, Univ. de Bourgogne (France)

Program Committee: **Zachi I. Baharav**, Agilent Technologies Labs.; **Ariel Ben-Porath**, Applied Materials (Israel); **Steven P. Floeder**, 3M Co.; **Ralph M. Ford**, The Pennsylvania State Univ.; **Martin A. Hunt**, nLine Corp.; **Johel Miteran**, Univ. de Bourgogne (France); **Kurt Niel**, Univ. of Applied Sciences Wels (Austria); **Paul O'Leary**, Univ. Leoben (Austria); **A. Ravishankar Rao**, IBM Thomas J. Watson Research Ctr.; **Hamed Sari-Sarraf**, Texas Tech Univ.; **Kenneth W. Tobin, Jr.**, Oak Ridge National Lab.; **Yvon Voisin**, Univ. de Bourgogne (France)

Wednesday 21 January

SESSION 1 . . . . . Wed. 9:30 to 10:30 am

Segmentation and Classification I

Chair: **Jeffery R. Price**, Oak Ridge National Lab.

Segmentation and classification of four common cotton contaminants in x-ray microtomographic image, S. K. Pavani, M. S. Dogan, H. Sari-Sarraf, E. F. Hequet, Texas Tech Univ. . . . . [5303-01]

Method to improve sugar crystals classification, J. Tapamo, Univ. of Natal (South Africa) . . . . . [5303-02]

Three color selective stereo gradient method (3CSSGM) as a fast classification tool for Euro coins, M. Hossfeld, M. Adameck, M. Eich, Technische Univ. Hamburg-Harburg (Germany) . . . . . [5303-03]

SESSION 2 . . . . . Wed. 11:00 am to 12:20 pm

3D and Photogrammetry I

Chair: **Fabrice Meriaudeau**, Univ. de Bourgogne (France)

Real-time stereo for industrial inspection, B. Buchner, P. O'Leary, Montan Univ. Leoben (Austria) . . . . . [5303-04]

Smart laser profiler, F. Martin, INO; J. Laurent, INO (Canada) . . . . . [5303-05]

Camera calibration, data segmentation, and fitting approaches for a visual edge inspection system, M. Tratnig, P. O'Leary, Montan Univ. Leoben (Austria) . [5303-06]

Calibration method using only one plane for 3D machine vision and its application, S. Deng, Y. Yang, X. Wang, Hefei Univ. of Technology (China) . . . . . [5303-07]

Lunch/Exhibition Break

SESSION 3 . . . . . Wed. 2:00 to 3:20 pm

Industrial Applications I

Chair: **Kurt Niel**, Fachhochschule Wels (Austria)

Machine vision system for surface inspection on brushed industrial parts, N. Bonnot, R. Seulin, F. Merienne, Univ. de Bourgogne (France) . . . . . [5303-08]

Sheet inspection system: an integrated inspection system for sheet prints in stamp printing application, J. Fuertler, A. Vrabl, I. Holländer, J. Brodersen, K. J. Mayer, ARC Seibersdorf Research GmbH (Austria) . . . . . [5303-09]

Panoramic optical-servoing for industrial inspection and repair, C. Sallinger, P. O´Leary, Montan Univ. Leoben (Austria) . . . . . [5303-10]

Digital imaging based spectrometry applied to printing defect identification in food packages, G. Bonifazi, G. Mari, Univ. degli Studi di Roma La Sapienza (Italy) [5303-11]

SESSION 4 . . . . . Wed. 3:50 to 5:30 pm

Sensors and Devices

Chair: **Paul O'Leary**, Montan Univ. Leoben (Austria)

CCD cameras as thermal imaging devices in heat treatment processes (500°C), G. Zauner, K. Niel, Fachhochschule Wels (Austria) . . . . . [5303-12]

Comparative survey on invisible structured light, D. Fofi, T. Sliwa, Y. Voisin, IUT Le Creusot (France) . . . . . [5303-13]

LEDs as light source: examining quality of acquired images, R. Bachnak, L. Funtanilla, Texas A&M Univ.; J. Hernandez, NASA Johnson Space Ctr. . . . . [5303-14]

Comparison of CMOS- and CCD-cameras for laser profiling, N. Koller, P. O'Leary, Montan Univ. Leoben (Austria) . . . . . [5303-15]

Self-learning camera for sampled-data applications, D. W. Lake, PULNiX America, Inc. . . . . [5303-16]

Thursday 22 January

SESSION 5 . . . . . Thurs. 9:00 to 10:20 am

Industrial Applications II

Chair: **Hamed Sari-Sarraf**, Texas Tech Univ.

Complete machine vision solution for tube inspection in nuclear industry, R. Seulin, Y. Voisin, D. Fofi, F. Meriaudeau, Univ. de Bourgogne (France) . . . . . [5303-17]

Optical inspection of coated particle nuclear fuel, J. R. Price, J. D. Hunn, Oak Ridge National Lab. . . . . [5303-18]

Digital imaging based spectrometry applied to ceramic glass inspection, G. Bonifazi, M. Paolo, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [5303-19]

Automatic filling system based on machine vision, P. Fu, H. Li, H. Jiang, D. Meng, Jilin Univ. (China) . . . . . [5303-20]

SESSION 6 . . . . . Thurs. 10:50 am to 12:10 pm

Segmentation and Classification II

Chair: **Ralph M. Ford**, The Pennsylvania State Univ.

Sensitivity analysis for texture models applied to rust steel classification, M. Trujillo, M. Sadki, Brunel Univ. (United Kingdom); V. Hlebarov, City Univ. (United Kingdom) . . . . . [5303-21]

Real-time flaw detection on complex part: classification with SVM and Hyperrectangle based method, S. Bouillant, Univ. de Bourgogne (France) . [5303-22]

SOM-based system for web surface inspection, J. Iivarinen, J. Pakkanen, Helsinki Univ. of Technology (Finland); J. Rauhamaa, ABB Oy (Finland) . . . . . [5303-23]

Assessment of trash content of cotton using 2D x-ray imagery, M. S. Dogan, S. K. Pavani, H. Sari-Sarraf, E. F. Hequet, Texas Tech Univ. . . . . [5303-24]

Lunch Break

SESSION 7 . . . . . Thurs. 2:00 to 3:00 pm

3D and Photogrammetry II

Chair: **Jeffery R. Price**, Oak Ridge National Lab.

High-speed 3D imaging by DMD technology, R. Hoefling, ViALUX GmbH (Germany) . . . . . [5303-25]

New method for three-dimensional measurement by using the relative stereo method, K. Sumioka, S. Takahashi, S. Hata, Kagawa Univ. (Japan) . . . . . [5303-26]

Three-dimensional reconstruction and visual inspection of sheetmetal parts, Y. Zhang, Wuhan Univ. (China) . . . . . [5303-27]

Conference 5304

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5304

Internet Imaging V

Conference Chairs: **Simone Santini**, Univ. of California/San Diego; **Raimondo Schettini**, Univ. degli Studi di Milano-Bicocca (Italy)

Program Committee: **Kobus Barnard**, Univ. of Arizona; **Nadia L. Bianchi-Berthouze**, Univ. of Aizu (Japan); **Jeffrey E. Boyd**, Univ. of Calgary (Canada); **Alberto Del Bimbo**, Univ. degli Studi di Firenze (Italy); **Theo Gevers**, Univ. of Amsterdam (Netherlands); **Jennifer Gille**, Raytheon ITSS; **Amarnath Gupta**, Univ. of California/San Diego; **Hagit Z. Hel-Or**, Univ. of Haifa (Israel); **Ivan Herman**, W3C (Netherlands); **Roger-David Hersch**, Ecole Polytechnique Fédérale de Lausanne (Switzerland); **Yasuyo G. Ichihara**, Hosen-Gakuen College (Japan); **Ramesh C. Jain**, Georgia Institute of Technology; **Clement H. C. Leung**, Victoria Univ. of Technology (Australia); **Stéphane Marchand-Maillet**, Univ. de Genève (Switzerland); **Wolfgang T. Müller**, Univ. Bayreuth (Germany); **Simon Shim**, San Jose State Univ.; **Alain Trémeau**, Univ. Jean Monnet (France)

Monday 19 January

SESSION 1 . . . . . Mon. 8:30 to 10:00 am

Internet Standards I

Chair: **Alain Trémeau**, Univ. Jean Monnet (France)

TBD *(Invited Paper)*, I. K. Sethi, Oakland Univ. . . . . [5304-01]

Mobile spatial information presentation based on SVG, Z. Xie, Wuhan Univ. (China) . . . . . [5304-02]

Content-based video retrieval and summarization using MPEG-7, H. Mayer, W. Bailer, H. Neuschmied, W. Haas, JOANNEUM RESEARCH (Austria); M. Lux, W. Klieber, Know-Ctr. (Austria) . . . . . [5304-03]

Data submission of 3D image sets to a bio-molecular database using active shape models and a 3D reference model for projection, F. J. Verbeek, Leiden Univ. (Netherlands) . . . . . [5304-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:00 pm

Indexing and Retrieval Techniques

Chair: **Jeffrey E. Boyd**, Univ. of Calgary (Canada)

Color imaging management in film processing *(Invited Paper)*, A. Trémeau, Univ. Jean Monnet (France) . . . . . [5304-05]

Accessing images with multiple representations, S. Santini, A. Gupta, Univ. of California/San Diego . . . . . [5304-07]

Efficient content-based P2P image retrieval using peer content descriptions, W. T. Müller, M. Eisenhardt, A. Henrich, Univ. Bayreuth (Germany) . . . . . [5304-08]

Content-based image retrieval from the World Wide Web using growing hierarchical self-organizing maps, H. M. Gomes, L. B. Batista, Univ. Federal de Campina Grande (Brazil) . . . . . [5304-09]

Lunch Break

SESSION 3 . . . . . Mon. 1:40 to 3:00 pm

Internet Standards II

Chair: **James J. Little**, Univ. of British Columbia (Canada)

JPEG 2000 vs JPEG from an image retrieval point of view, G. Schaefer, Nottingham Trent Univ. (United Kingdom) . . . . . [5304-10]

Compressed domain retrieval of JPEG images: a comparative evaluation, G. Schaefer, Nottingham Trent Univ. (United Kingdom); K. Nurzynska, Nottingham Trent Univ. (United Kingdom) and Silesian Technical University (Poland) . . . . . [5304-11]

Internet online mapping with GML and SVG, J. Guan, Wuhan Univ. (China); S. Zhou, Fudan Univ. (China); J. Chen, X. Chen, Y. An, W. Yu, F. Bian, Z. Peng, Wuhan Univ. (China) . . . . . [5304-12]

SMIL and SVG in teaching, H. Eidenberger, Technische Univ. Wien (Austria) [5304-13]

SESSION 4 . . . . . Mon. 3:30 to 5:10 pm

Interaction and Collaboration

Chair: **Stéphane Marchand-Maillet**, Univ. de Genève (Switzerland)

Real-time interactive virtual tour on the World Wide Web (WWW), I. Yoon, San Francisco State Univ.; S. Yoon, Rocky Mountain Biological Lab.; H. Chen, T. Hsu, San Francisco State Univ. . . . . [5304-14]

E.D.G.E. enhanced digital graphic environment: an experimental platform for virtual collaboration and VR-based communication, G. Iannizzotto, Univ. degli Studi di Messina (Italy); G. Fischetti, L. Vita, Univ. degli Studi di Catania (Italy) . . . . [5304-15]

Distributed collaborative environment with real-time tracking of 3D body postures, T. Alisi, A. Del Bimbo, F. Pucci, A. Valli, Univ. degli Studi di Firenze (Italy) . . . . [5304-16]

Multimedia approach to social research, C. Mutti, Univ. degli Studi di Milano-Bicocca (Italy) . . . . . [5304-17]

Multimedia links and metadata channels for distributed shared browsing and authoring, U. Gargi, P. Obrador, Hewlett-Packard Labs. . . . . [5304-18]

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 5 . . . . . Tues. 9:30 to 10:40 am

Color

Chair: **Sabine E. Süsstrunk**, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

Color image quality on the Internet *(Invited Paper)*, S. E. Süsstrunk, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [5304-19]

Combining color and shape information for content-based image retrieval on the Internet, A. Diplaros, T. Gevers, Univ. of Amsterdam (Netherlands); I. Patras, Technische Univ. Delft (Netherlands) . . . . . [5304-20]

Content-based quality evaluation of color images: overview and proposals, A. Trémeau, Univ. Jean Monnet (France); N. Richard, Univ. de Poitiers (France); P. Colantoni, Univ. Jean Monnet (France); C. Fernandez-Maloigne, Univ. de Poitiers (France) . . . . . [5304-21]

SESSION 6 ..... Tues. 11:00 am to 12:00 pm

Heterogeneous Data

Chair: **Simone Santini**, Univ. of California/San Diego

Framework for querying heterogeneous images repository, M. G. Albanesi, M. Ferretti, F. Guerrini, E. Falchero, Univ. degli Studi di Pavia (Italy) ..... [5304-22]

Innovative system for formulating complex combined content-based and keyword-based queries, H. E. Rehatschek, P. Schallauer, W. Bailer, W. Haas, A. Wertner, JOANNEUM RESEARCH (Austria) ..... [5304-23]

Creating agents for locating images of specific categories, A. Mustafa, I. K. Sethi, Oakland Univ. ..... [5304-24]

Lunch/Exhibition Break

SESSION 7 ..... Tues. 1:40 to 3:30 pm

Video

Chair: **Raimondo Schettini**, DISCo Univ. degli Studi di Milano-Bicocca (Italy)

TBD *(Invited Paper),* S. Mehrotra, Univ. of California/Irvine ..... [5304-25]

Internet broadcast of hockey: a scale prototype, J. E. Boyd, M. Sayles, L. Olsen, P. Tarjan, Univ. of Calgary (Canada) ..... [5304-26]

Automatic acquisition of motion tracks of hockey players: computing homographies over long video sequences, J. J. Little, D. Lowe, K. Okuma, Univ. of British Columbia (Canada) ..... [5304-27]

Video segmentation by hidden Markov model using multimodal MPEG-7 descriptors, T. M. Bae, Information and Communications Univ. (South Korea) ..... [5304-28]

Effective interactive web-based control of large-scale high-bandwidth sensor systems, R. A. Cross, LiveWave, Inc. ..... [5304-29]

SESSION 8 ..... Tues. 4:00 to 5:00 pm

Programming Tools

Chair: **Simon Shim**, San Jose State Univ.

Web interface for image processing algorithms, S. Chastel, D. Paulus, G. Schwab, Univ. Koblenz-Landau (Germany) ..... [5304-30]

Java megawave (JMW), V. Kuckreja, A. Trujillo, Univ. de Las Palmas de Gran Canaria (Spain) ..... [5304-31]

Interactive specification and extraction of free-form surfaces from the visible human, L. Saroul, S. Gerlach, R. D. Hersch, Ecole Polytechnique (France) ..... [5304-42]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Region-based trimmed feature matching approach to content-based image retrieval,** Y. Cheng, L. Fan, Xidian Univ. (China) ..... [5304-32]

✔ **Hybrid color spaces applied to image database,** J. Da Rugna, P. Colantoni, Univ. Jean Monnet (France) ..... [5304-33]

✔ **Massive topographic data release and 3D display on internet,** X. Tong, Tongji Univ. (China) ..... [5304-34]

✔ **Novel stereo pair coding algorithm based on hybrid block matching disparity estimation,** J. Han, Z. Lu, Xidian Univ. (China) ..... [5304-35]

✔ **Research on realization scheme of interactive voice response (IVR) system,** X. Jin, Huazhong Univ. of Science and Technology (China) ..... [5304-36]

✔ **Automatic blur detection for meta-data extraction in content-based retrieval context,** J. Da Rugna, H. Konik, Univ. Jean Monnet (France) ..... [5304-37]

✔ **Consultation model integration in the SIRBeC cultural heritage web,** I. Gagliardi, Consiglio Nazionale delle Ricerche (Italy) ..... [5304-38]

✔ **IMIKAS: Internet-based medical image and knowledge acquisition,** M. Rudrapatna, S. Basayarat, A. Misra, A. Sowmya, J. Wong, T. Zirmec, Univ. of New South Wales (Australia); G. Kossoff, P. Wilson, P. Lucas, Medical Imaging Australasia Ltd. (Australia) ..... [5304-39]

✔ **MPEG-7 audio-visual indexing testbed for video retrieval,** L. Gagnon, S. Foucher, V. Gouaillier, J. Brousseau, G. Boulianne, F. Osterrath, C. Chapdelaine, C. Brun, Ctr. de Recherche Informatique de Montréal (Canada); J. Dutrisac, F. St-Onge, National Film Board (Canada); B. Champagne, X. Lu, McGill Univ. (Canada) ..... [5304-40]

✔ **Image annotation using SVM,** C. Cusano, Consiglio Nazionale delle Ricerche (Italy) and DISCo/Univ. degli Studi di Milano-Bicocca (Italy); G. Ciocca, Consiglio Nazionale delle Ricerche (Italy) and DISCo - University of Milano - Bicocca (Italy); R. Schettini, DISCo/Univ. degli Studi di Milano-Bicocca (Italy) ..... [5304-41]

Conference 5305

Wednesday-Thursday 21-22 January 2004 • Proceedings Vol. 5305

Multimedia Computing and Networking 2004

In Cooperation with **ACM SIG Multimedia**

Conference Chair: **Nalini Venkatasubramanian**, Univ. of California/Irvine

Program Committee: **Tarek F. Abdelzaher**, Univ. of Virginia; **Kevin C. Almeroth**, Univ. of California/Santa Barbara; **Ricardo Bettati**, Texas A&M Univ.; **Nina Bhatti**, Hewlett-Packard Lab.; **Sajal K. Das**, Univ. of Texas/Arlington; **Magda El Zarki**, Univ. of California/Irvine; **Carsten Griwodz**, Univ. of Oslo (Norway); **Martin G. Kienzle**, IBM Corp.; **Ketan D. Mayer-Patel**, Univ. of North Carolina/Chapel Hill; **Klara Nahrstedt**, Univ. of Illinois/Urbana-Champaign; **Ragunathan Rajkumar**, Carnegie Mellon Univ.; **Douglas C. Schmidt**, Univ. of California/Irvine; **Prashant J. Shenoy**, Univ. of Massachusetts Amherst; **Cormac J. Sreenan**, Univ. of Cork (Ireland); **Dongyan Xu**, Purdue Univ.; **Hongjiang Zhang**, Microsoft Research China (China)

Wednesday 21 January

Plenary Presentation . . . . . **8:30 to 9:15 am**

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

Opening Remarks

Chair: **Nalini Venkatasubramanian,** Univ. of California/Irvine

SESSION 1 . . . . . **Wed. 9:30 to 11:30 am**

Peer-to-Peer and Overlay Networks

Use of stream merging mechanisms in a hierarchical CDN, C. Griwodz, Univ. of Oslo (Norway) . . . . . [5305-01]

Congestion control and message loss in Gnutella networks, Q. He, M. H. Ammar, Georgia Institute of Technology . . . . . [5305-02]

CodedStream: live media streaming with overlay coded multicast, J. Guo, Y. Zhu, B. Li, Univ. of Toronto (Canada) . . . . . [5305-03]

SESSION 2 . . . . . **Wed. 11:30 am to 1:00 pm**

Performance and Power Optimization

Energy conservation in ad hoc multimedia networks using traffic-shaping mechanisms, S. Chandra, Univ. of Notre Dame . . . . . [5305-04]

Managing application dependency in cross-layer adaptation, W. Yuan, K. Nahrstedt, Univ. of Illinois/Urbana-Champaign . . . . . [5305-05]

Performance analysis of a hybrid media streaming system, Y. Tu, J. Sun, S. Prabhakar, Purdue Univ. . . . . [5305-06]

Lunch Break

SESSION 3 . . . . . **Wed. 2:30 to 4:30 pm**

Wireless Networking

Dynamic priority re-allocation scheme for quality of service in IEEE 802.11e WLANs, M. Li, P. Balakrishnan, Univ. of Texas/Dallas . . . . . [5305-07]

Efficient QoS provisioning for adaptive multimedia in mobile communication networks by reinforcement learning, F. Yu, V. Wong, V. Leung, Univ. of British Columbia (Canada) . . . . . [5305-08]

Size matters: size-based scheduling for MPEG-4 over wireless channels, R. Mangharam, M. Demirhan, R. Rajkumar, D. Raychaudhuri, Carnegie Mellon Univ. . . . . [5305-09]

Panel Discussion . . . . . **4:00 to 5:30 pm**

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Thursday 22 January

Keynote Presentation . . . . . **9:00 to 10:30 am**

SESSION 5 . . . . . **Thurs. 11:00 am to 12:30 pm**

Scheduling and Caching

Missed deadline notification in best-effort schedulers, S. A. Banachowski, J. Wu, S. Brandt, Univ. of California/Santa Cruz . . . . . [5305-11]

Elastic flows with deadlines: a QoS abstraction for middleware, R. Harinath, J. Srivastava, Univ. of Minnesota . . . . . [5305-12]

Analysis and design of segment-based proxy caching of streaming media strategies, S. Chen, College of William and Mary; B. Shen, S. J. Wee, Hewlett-Packard Labs.; X. Zhang, National Science Foundation and College of William and Mary . . . . [5305-13]

Lunch Break

SESSION 6 . . . . . **Thurs. 2:00 to 3:30 pm**

Video and Image Processing

Data storage and delivery protocols to support interactive high-resolution image browsing on a PC-cluster-based image-wall, J. Beyer, D. H. C. Du, Univ. of Minnesota . . . . . [5305-14]

Implementation of flexible-playtime video skimming, S. Aoyagi, K. Kourai, K. Sato, T. Takada, T. Sugawara, NTT Network Innovation Labs. (Japan); R. Onai, Univ. of Electro-Communications (Japan) . . . . . [5305-15]

Polishing: a technique to reduce variations in cached layer-encoded video, M. Zink, O. Heckmann, J. Schmitt, R. Steinmetz, Technische Univ. Darmstadt (Germany) . . . . . [5305-16]

SESSION 7 . . . . . **Thurs. 4:00 to 5:30 pm**

Applications

Comprehensive multiplatform collaboration, K. Singh, X. Wu, J. Lennox, H. G. Schulzrinne, Columbia Univ. . . . . [5305-17]

Indiva: a middleware for managing distributed media environment, W. Ooi, National Univ. of Singapore (Singapore); P. Pletcher, L. A. Rowe, Univ. of California/Berkeley . . . . . [5305-18]

MIM web gateway to IP multicast e-meetings, R. Parviainen, P. Parnes, Luleå Tekniska Univ. (Sweden) . . . . . [5305-19]

Conference 5306

Monday-Thursday 19-22 January 2004 • Proceedings Vol. 5306

Security, Steganography, and Watermarking of Multimedia Contents VI

Conference Chairs: **Edward J. Delp III**, Purdue Univ.; **Ping W. Wong**, Consultant

Program Committee: **Adnan M. Alattar**, Digimarc Corp.; **Franco Bartolini**, Univ. degli Studi di Firenze (Italy); **Jeffrey A. Bloom**, Sarnoff Corp.; **Gordon W. Braudaway**, IBM Thomas J. Watson Research Ctr.; **Ingemar J. Cox**, Univ. College London (United Kingdom); **Jana Dittman**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Ahmet M. Eskicioglu**, CUNY Brooklyn College; **Jessica Fridrich**, SUNY/Binghamton Univ.; **Ton Kalker**, Philips Research Labs. (Netherlands); **Martin Kutter**, AlpVision (Switzerland); **Reginald L. Lagendijk**, Technische Univ. Delft (Netherlands); **Benoit M. M. Macq**, Univ. Catholique de Louvain (Belgium); **Nasir D. Memon**, Polytechnic Univ.; **Pierre Moulin**, Univ. of Illinois/Urbana-Champaign; **Fabien A. P. Petitcolas**, Microsoft Research Cambridge (United Kingdom); **Christine I. Podilchuk**, Lucent Technologies/Bell Labs.; **Minerva M. Yeung**, Intel Corp.

Monday 19 January

SESSION 1 ..... Mon. 9:00 to 11:45 am

Special Session: Steganalysis and Steganography

Chair: **Jessica Fridrich**, Binghamton Univ.

Locally most powerful detector for secret key estimation in spread spectrum image steganography, R. Chandramouli, S. Trivedi, Stevens Institute of Technology ..... [5306-01]

Kernel Fisher linear discriminant for steganalysis of JPEG hiding methods, J. J. Harmsen, W. A. Pearlman, Rensselaer Polytechnic Institute ..... [5306-02]

Estimation of secret message length in LSB steganography in spatial domain, J. Fridrich, M. Goljan, Binghamton Univ. ..... [5306-03]

Steganalysis using color wavelet statistics and one-class support vector machines, S. Lyu, H. Farid, Dartmouth College ..... [5306-04]

Steganalysis using modified pixel comparison and complexity measure, B. M. Rodriguez, S. Agaian, Univ. of Texas/San Antonio ..... [5306-05]

Performance evaluation of blind steganalysis classifiers, M. T. Hogan, G. C. Silvestre, N. J. Hurley, Univ. College Dublin (Ireland) ..... [5306-06]

Searching for the stego-key, J. Fridrich, M. Goljan, D. Soukal, Binghamton Univ. ..... [5306-07]

Quantitative evaluation of pairs and RS steganalysis, A. D. Ker, Univ. College Oxford (United Kingdom) ..... [5306-08]

Blind steganalysis method for JPEG images, R. Du, L. Guthrie, D. Buchy, MTL Systems, Inc. ..... [5306-09]

Lunch Break

SESSION 2 ..... Mon. 1:30 to 3:00 pm

Audio Watermarking

Fast audio watermarking concepts and realizations, M. Arnold, Z. Huang, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) ..... [5306-10]

Audio watermarking by imperceptible tone insertion, K. Gopalan, Purdue Univ./Calumet ..... [5306-11]

Informed-synchronization scheme for audio data-hiding, A. LoboGuerrero, J. Lienard, P. Bas, Institut National Polytechnique de Grenoble (France) ..... [5306-12]

Digital watermarking based on the process of speech production, T. Sakai, M. Kondo, Waseda Univ. (Japan) ..... [5306-13]

Two-dimentional audio watermark for MPEG AAC audio, R. Tachibana, IBM Japan Ltd. (Japan) ..... [5306-14]

Cepstral domain modification of audio signals for data embedding: preliminary results, K. Gopalan, Purdue Univ./Calumet ..... [5306-15]

SESSION 3 ..... Mon. 3:30 to 5:00 pm

Applications

Robust logo watermark based independent component analysis, H. D. Thai, Univ. of the Ryukyus (Japan); C. Y. Wei, Univ. of the Ryukyus (Japan) and Institute for Computational Science and Enineerin (China); Z. Nakao, Univ. of the Ryukyus (Japan) ..... [5306-16]

Collocated DataGlyphs for large message storage and retrieval, R. C. Motwani, Univ. of Nevada/Reno; J. Breidenbach, Xerox Palo Alto Research Ctr.; J. R. Black, Univ. of Colorado/Boulder ..... [5306-17]

Machine vision applications of digital watermarking, J. Stach, Digimarc Corp. ..... [5306-18]

Fingerprinting of music scores, M. Schmucker, Fraunhofer Institut für Graphische Datenverarbeitung (Germany); J. Irons, Sheet Music Now A/S (Denmark) .. [5306-19]

Watermarking and fingerprinting for electronic music delivery, M. van der Veen, A. Lemma, T. Kalker, Philips Research Labs. (Netherlands) ..... [5306-20]

Improvement to CDF grounded lattice codes, B. A. Bradley, Digimarc Corp. [5306-21]

Tuesday 20 January

Plenary Presentation ..... 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 4 ..... Tues. 9:30 to 10:30 am

Special Session: Watermark Benchmarking

Chair: **Jana Dittman**, Otto-von-Guericke-Univ. Magdeburg (Germany)

Advanced audio benchmarking, J. Dittman, Otto-von-Guericke-Univ. Magdeburg (Germany); M. Steinebach, S. Zmudzinski, Fraunhofer Institut für Integrierte Publikations-und Informationssysteme (Germany); A. Lang, Univ. Otto-von-Guericke (Germany) ..... [5306-22]

Watermarking evaluation testbed (WET) at Purdue University, H. C. Kim, H. Ogunleye, O. Guitart, E. J. Delp, Purdue Univ. ..... [5306-23]

TBD, B. M. Macq, Univ. Catholique de Louvain (Belgium) ..... [5306-24]

Human perception of geometric distortions in images, I. Setyawan, R. L. Lagendijk, Technische Univ. Delft (Netherlands) ..... [5306-25]

Conference 5306

SESSION 5 ..... Tues. 11:00 am to 12:00 pm

Theoretical Methods

Chair: **Pierre Moulin**, Univ. of Illinois/Urbana-Champaign

Rate-distortion analysis of steganography for conveying stereovision disparity maps, A. Barros Dias Torrão Bartolomeu, F. André Libório Franco, Instituto Superior Técnico (Portugal); D. Delannay, B. Macq, Univ. Catholique de Louvain (Belgium) ..... [5306-26]

Orthogonal dirty paper coding for informed data hiding, A. Abrardo, M. Barni, Univ. degli Studi di Siena (Italy) ..... [5306-27]

Capacity of data-hiding system subject to desynchronization, S. Pateux, G. Le Guelvouit, J. Delhumeau, INRIA (France) ..... [5306-28]

Local adaptivity for the scalar Costa scheme, J. C. Oostveen, T. Kalker, Philips Research Labs. (Netherlands); M. Staring, Univ. Utrecht (Netherlands) .... [5306-29]

Lunch/Exhibition Break

SESSION 6 ..... Tues. 1:30 to 3:00 pm

Video

Chair: **Benoit M. Macq**, Univ. Catholique de Louvain (Belgium)

XML-based approach to secure MPEG video representation, X. Sun, C.-C. J. Kuo, Univ. of Southern California ..... [5306-30]

Secure background watermarking based on video mosaicing, G. Doërr, J. Dugelay, Institut Eurécom (France) ..... [5306-31]

Synchronization technique to detect MPEG video frames for watermark retrieval, E. Hauer, S. Thiemert, Fraunhofer-Institut für Integrierte Publikations- und Informationssysteme (Germany) ..... [5306-32]

Feature-based watermarking scheme for MPEG-I/II video authentication, S. Thiemert, Fraunhofer Institut für Integrierte Publikations- und Informationssysteme (Germany); Y. Dai, Nanjing Univ. of Science and Technology (China); M. Steinebach, Fraunhofer Institut für Integrierte Publikations- und Informationssysteme (Germany) ..... [5306-33]

Impact of MPEG-4 3D mesh coding on watermarking algorithms for polygonal 3D models, W. Funk, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany) ..... [5306-34]

Video steganography based on bit-plane decomposition of wavelet transformed video, H. Noda, Kyushu Institute of Technology (Japan) ..... [5306-35]

SESSION 7 ..... Tues. 3:30 to 5:00 pm

Reversible Techniques

Chair: **Gordon W. Braudaway**, IBM Corp.

Lossless data embedding with file size preservation, J. Fridrich, M. Goljan, Q. Chen, Binghamton Univ. ..... [5306-36]

Reversible compressed domain watermarking by exploiting codespace inefficiency, B. G. Mobasseri, R. J. Berger II, Villanova Univ. ..... [5306-37]

Reversible watermarking for images, A. J. van Leest, M. van der Veen, F. Bruekers, Philips Research Labs. (Netherlands) ..... [5306-38]

High capacity invertible data hiding algorithm using a generalized reversible integer transform, J. Stach, A. M. Alattar, Digimarc Corp. ..... [5306-39]

Reversible watermarking using two-way decodable codes, B. G. Mobasseri, D. Cinalli, Villanova Univ. ..... [5306-40]

Integer DCT-based reversible watermarking for images using companding technique, M. Schmucker, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); B. Yang, Harbin Institute of Technology (China) and Fraunhofer-Institut für Graphische Datenverarbeitung (China); W. Funk, C. Busch, Fraunhofer-Institut für Graphische Datenverarbeitung (Germany); S. Sun, Harbin Institute of Technology (China) ..... [5306-41]

Wednesday 21 January

Plenary Presentation ..... 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 8 ..... Wed. 9:30 to 10:30 am

Special Session: Document Security

Chair: **Sviatoslav V. Voloshynovskiy**, Univ. de Genève (Switzerland)

Fraud-proof ID card based on multiple data hiding technologies and biometrics, J. Picard, MediaSec Technologies; C. Vielhauler, Otto-von-Guericke Univ. Magdeburg (Germany) ..... [5306-42]

Visual communications with side information via printing channels, S. V. Voloshynovskiy, F. Deguillaume, O. Koval, T. Pun, Univ. de Genève (Switzerland) ..... [5306-43]

Print protection using high-frequency fractal noise, K. W. Mahmoud, J. Blackledge, S. Datta, J. Flint, Loughborough Univ. (United Kingdom) ..... [5306-44]

Signature-embedding in printed documents for security and forensic applications, A. K. Mikkilineni, G. N. Ali, P. Chiang, G. T. C. Chiu, J. P. Allebach, E. J. Delp, Purdue Univ. ..... [5306-45]

SESSION 9 ..... Wed. 11:00 am to 12:00 pm

Steganography

Universal image steganalysis using rate-distortion curves, M. U. Celik, G. Sharma, A. M. Tekalp, Univ. of Rochester ..... [5306-46]

Steganalysis of block-structured stegotext, Y. Wang, P. Moulin, Univ. of Illinois/ Urbana-Champaign ..... [5306-47]

Fast additive noise steganalysis, J. J. Harmsen, K. D. Bowers, W. A. Pearlman, Rensselaer Polytechnic Institute ..... [5306-48]

NP-completeness of steganographic embedding problem and its implications, R. Chandramouli, Stevens Institute of Technology; R. Uma, Univ. of Texas/ Dallas ..... [5306-49]

Lunch/Exhibition Break

SESSION 10 ..... Wed. 1:30 to 4:00 pm

Embedding

Chair: **Franco Bartolini**, Univ. degli Studi di Firenze (Italy)

Hiding correlation-based watermark templates using secret modulation, J. F. Lichtenauer, R. L. Lagendijk, I. Setyawan, Technische Univ. Delft (Netherlands) ..... [5306-50]

LOT-based adaptive image watermarking, Y. Liu, B. Ni, X. Feng, E. J. Delp III, Purdue Univ. ..... [5306-51]

Side informed watermarking in the real field using DFT codes, J. Delhumeau, T. Furon, C. Guillemot, IRISA (France) ..... [5306-52]

Error correction coding of non-linear side-informed watermarking schemes, K. M. Whelan, G. C. Silvestre, N. J. Hurley, Univ. College Dublin (Ireland) ..... [5306-53]

Spatial synchronization using watermark key structure, E. T. Lin, E. J. Lin, Purdue Univ. ..... [5306-54]

Vector quantization-based scheme for data embedding for images, K. P. Subbalakshmi, N. Liu, Stevens Institute of Technology ..... [5306-55]

Image watermarking based on scale-space representation, J. S. Seo, C. D. Yoo, Korea Advanced Institute of Science and Technology (South Korea) ..... [5306-56]

Wavelet watermarking algorithm based on tree structure, O. Guitart Pla, E. J. Delp, Purdue Univ. ..... [5306-57]

SESSION 11 . . . . . Wed. 4:00 to 5:00 pm

Attacks II

Chair: **Edward J. Delp III**, Purdue Univ.

Classification of watermarking schemes robust against geometrical distortions, D. Delannay, B. Macq, Univ. Catholique de Louvain (Belgium) . . . . . [5306-58]

Quantifying security leaks in spread spectrum data hiding: a game-theoretic approach, F. Pérez-González, P. Comesaña, Univ. de Vigo (Spain) . . . . . [5306-59]

New attacks on SARI image authentication system, J. Wu, Tsinghua Univ. (China); B. B. Zhu, S. Li, Microsoft Research Asia (China); F. Lin, Tsinghua Univ. (China)[5306-60]

Distortion compensated lookup-table embedding: joint enhancement of security and robustness for quantization based data hiding, M. Wu, Univ. of Maryland/College Park . . . . . [5306-61]

Thursday 22 January

SESSION 12 . . . . . Thurs. 8:30 to 9:30 am

Special Session: Biometrics

Chairs: **Claus Vielhauer**, Otto-von-Guericke-Univ. Magdeburg (Germany); **Ton Kalker**, Philips Research Labs. (Netherlands)

Attacks on biometric systems: a case study in fingerprints, U. Uludag, A. K. Jain, Michigan State Univ. . . . . [5306-62]

Biometric verification based on grip-pattern recognition, R. Veldhuis, J. Kauffman, A. Bazen, P. Hartel, Univ. Twente (Netherlands) . . . . . [5306-63]

Integration techniques in biometric systems: an overview, R. M. Bolle, IBM Thomas J. Watson Research Ctr. . . . . [5306-64]

Security for biometric data, C. Vielhauer, Otto-von-Guericke-Univ. Magdeburg (Germany) and Technische Univ. Darmstadt (Germany); T. Kalker, Philips Research Labs. (Netherlands) . . . . . [5306-65]

SESSION 13 . . . . . Thurs. 9:30 to 11:00 am

Document Watermarking

Chair: **Ping W. Wong**, Consultant

Watermarking document images for authentication using on-line signature, A. M. Namboodiri, A. K. Jain, Michigan State Univ. . . . . [5306-66]

Application of invisible image watermarks to previously halftoned images, G. W. Braudaway, F. Mintzer, IBM Corp. . . . . [5306-67]

Show-through watermarking of duplex printed documents, G. Sharma, S. Wang, Xerox Corp. . . . . [5306-68]

Watermarking electronic text documents containing margin justified paragraph and irregular line spacing, A. M. Alattar, O. M. Alattar, Digimarc Corp. . . . . [5306-69]

SESSION 14 . . . . . Thurs. 11:00 am to 12:05 pm

Crytography

Chair: **Ahmet M. Eskicioglu**, Brooklyn College

Multimedia data encryption based on flexible QM codecs, D. Xie, C.-C. J. Kuo, Univ. of Southern California . . . . . [5306-70]

Multilayer multicast key management with threshold cryptography, S. D. Dexter, A. M. Eskicioglu, Brooklyn College . . . . . [5306-71]

Securing display of grayscale and multicolored images by use of visual cryptography, H. Yamamoto, Y. Hayasaki, N. Nishida, Univ. of Tokushima (Japan) . . . . . [5306-72]

Hybrid scheme for encryption and watermarking, X. Xu, A. C. Kwan, Graduate Ctr./CUNY; A. M. Eskicioglu, Brooklyn College . . . . . [5306-73]

Lunch Break

SESSION 15 . . . . . Thurs. 1:30 to 2:45 pm

Authentication

Chair: **Nasir D. Memon**, Polytechnic Univ.

Near-lossless image authentication transparent to near-lossless compression, R. Caldelli, G. Macaluso, F. Bartolini, Univ. degli Studi di Firenze (Italy); M. Barni, Univ. degli Studi di Siena (Italy) . . . . . [5306-74]

Collusion-resistant fingerprinting for multimedia: a unified framework, M. Wu, Univ. of Maryland/College Park; W. Trappe, Rutgers Univ.; J. Z. Wang, K. R. Liu, Univ. of Maryland/College Park . . . . . [5306-75]

Analysis and design of authentication watermarking, C. Fei, Univ. of Toronto (Canada); D. Kundur, Texas A&M Univ.; R. Kwong, Univ. of Toronto (Canada) [5306-76]

Analysis of a wavelet-based robust Hash algorithm, A. Meixner, A. Uhl, Paris-Lodron-Univ. Salzburg (Austria) . . . . . [5306-77]

Geometric soft hash functions for 2D and 3D objects, E. Fernandes, Multitel A.S.B.L. (Belgium); J. Delaigle, Multitel A.S.B.L. (Belgium) and Univ. Catholique de Louvain (Belgium) . . . . . [5306-78]

SESSION 16 . . . . . Thurs. 2:45 to 4:15 pm

Detection

Chair: **Adnan M. Alattar**, Digimarc Corp.

Statistical amplitude scale estimation for quantization-based watermarking, I. D. Shterev, R. L. Lagendijk, R. Heusdens, Technische Univ. Delft (Netherlands) [5306-79]

Blind iterative decoding of side-informed data hiding using the expectation maximization algorithm, F. Pérez-González, F. Balado, Univ. de Vigo (Spain)[5306-80]

Wavelet domain watermarking using maximum-likelihood detection, T. M. Ng, H. K. Garg, National Univ. of Singapore . . . . . [5306-81]

Performance bound on optimum watermark synchronizers, V. Licks, Univ. of New Mexico; F. Pérez-González, Univ. de Vigo (Spain) . . . . . [5306-82]

SESSION 17 . . . . . Thurs. 4:15 to 5:15 pm

Attacks II

Chair: **Jeffrey A. Bloom**, Sarnoff Corp.

Malicious attacks on media authentication schemes based on invertibe watermarks, S. Katzenbeisser, Technische Univ. Wien (Austria); J. Dittmann, Otto-von-Guericke-Univ. Magdeburg (Germany) . . . . . [5306-83]

Attacking digital watermarks, R. Sion, M. Atallah, Purdue Univ./Calumet . [5306-84]

Evaluating the performance of ST-DM watermarking in non-additive channels, M. Barni, Univ. degli Studi di Siena (Italy); F. Bartolini, Univ. degli Studi di Firenze (Italy); A. Borello, Univ. degli Studi di Siena (Italy) . . . . . [5306-85]

Characterization of geometric distortions attacks in robust watermarking, X. Desurmont, Multitel A.S.B.L. (Belgium); J. Delaigle, Univ. Catholique de Louvain (Belgium) and Multitel A.S.B.L. (Belgium) . . . . . [5306-86]

Conference 5307

Tuesday-Thursday 20-22 January 2004 • Proceedings Vol. 5307

Storage and Retrieval Methods and Applications for Multimedia 2004

Conference Chairs: **Minerva M. Yeung**, Intel Corp.; **Rainer W. Lienhart**, Intel Corp.; **Chung-Sheng Li**, IBM Thomas J. Watson Research Ctr.

Program Committee: **Nozha Boujemaa**, INRIA (France); **Edward Y. Chang**, Univ. of California/Santa Barbara; **Shih-Fu Chang**, Columbia Univ.; **Nevenka Dimitrova**, Philips Research; **Ajay Divakaran**, Mitsubishi Electric Research Labs.; **Wolfgang Effelsberg**, Univ. Mannheim (Germany); **Jonathan Foote**, FX Palo Alto Lab., Inc.; **Arun Hampapur**, IBM Thomas J. Watson Research Ctr.; **Alan Hanjalic**, Technische Univ. Delft (Netherlands); **Anil K. Jain**, Michigan State Univ.; **Wei-Ying Ma**, Microsoft Research China (China); **Bernard Merialdo**, Institut Eurecom (France); **Dragutin Petkovic**, San Francisco State Univ.; **Silvia Pfeiffer**, CSIRO Mathematical and Information Sciences (Australia); **Dulce B. Ponceleon**, IBM Almaden Research Ctr.; **John R. Smith**, IBM Thomas J. Watson Research Ctr.; **A. Murat Tekalp**, Univ. of Rochester; **Stephen T. C. Wong**, Univ. of California/San Francisco; **Aidong Zhang**, Univ. at Buffalo; **Hongjiang Zhang**, Microsoft Research China (China)

Tuesday 20 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

SESSION 1 . . . . . Tues. 9:30 to 10:30 am

Search and Retrieval of Image Databases I

Chair: **Rainer W. Lienhart**, Intel Corp.

Partial shape matching for CBIR of spine x-ray images, S. K. Antani, National Library of Medicine; X. Xu, Brigham Young Univ.; L. R. Long, G. R. Thoma, National Library of Medicine . . . . . [5307-01]

Image database clustering with SVM-based class personalization, B. H. Le Saux, N. Boujemaa, INRIA Rocquencourt (France) . . . . . [5307-02]

Feature-adaptive relevance feedback FA-RF for content-based image retrieval, A. I. Grigorova, F. G. De Natale, Univ. degli Studi di Trento (Italy) . . . . . [5307-03]

SESSION 2 . . . . . Tues. 11:00 am to 12:00 pm

Image Segmentation

Chair: **Shih-Fu Chang**, Columbia Univ.

Interactive segmentation with hidden object-based annotations: toward smart media, Y. Rytsar, S. V. Voloshynovskiy, F. Ehrler, T. Pun, Univ. de Genève (Switzerland) . . . . . [5307-04]

Entropy-based objective evaluation method for image segmentation, H. Zhang, J. Fritts, S. Goldman, Washington Univ. . . . . [5307-05]

Extraction of foreground objects from a MPEG2 video stream in rough indexing framework, J. Benois-Pineau, Univ. Bordeaux I (France); F. Manerba, R. Leonardi, Univ. degli Studi di Brescia (Italy) . . . . . [5307-06]

Lunch/Exhibition Break

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SESSION 3 . . . . . Tues. 1:40 to 3:00 pm

Video Processing

Chair: **David S. Doermann**, Univ. of Maryland/College Park

Combination of color and object outline-based method in video segmentation, Z. Sun, P. Fu, Jilin Univ. (China) . . . . . [5307-07]

News video mining supporting decision-making, Y. Xie, X. Luan, L. Wu, S. Lao, P. Xiao, National Univ. of Defense Technology (China) . . . . . [5307-08]

Robust camera calibration for sport videos using court models, D. Farin, S. Krabbe, W. Effelsberg, Univ. Mannheim (Germany); P. H. N. de With, LogicaCMG (Netherlands) and Univ. Eindhoven (Netherlands) . . . . . [5307-09]

Video copy detection using spatio-temporal matching, C. Kim, Epson Research and Development, Inc. . . . . [5307-10]

SESSION 4 . . . . . Tues. 3:30 to 5:10 pm

Audio Processing

Chairs: **Silvia Pfeiffer**, CSIRO Mathematical and Information Sciences (Australia); **Jonathan Foote**, FX Palo Alto Lab., Inc.

Layered home video indexing based on audio signals, T. Ogawa, Univ. of Tokyo (Japan) . . . . . [5307-11]

Note accurate audio segmentation based on MPEG-7, J. Wellhausen, RWTH-Aachen (Germany) . . . . . [5307-12]

Text alignment for automatic generation and correction of closed captions, C. M. Taskiran, T. Martone, E. J. Delp III, Purdue Univ. . . . . [5307-13]

Music database management with basic audio unit segmentation, Y. Shiu, C. H. Yeh, C.-C. J. Kuo, Univ. of Southern California . . . . . [5307-14]

Music identification with MPEG-7, H. Crysandt, RWTH-Aachen (Germany) . [5307-15]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Content-based video indexing and retrieval using radon transform and pattern matching,** M. Celenk, Q. Zhou, P. Wang, Ohio Univ. . . . . [5307-49]

✔ **UCID: an uncompressed color image database,** G. Schaefer, Nottingham Trent Univ. (United Kingdom); M. Stich, Nottingham Trent Univ. (United Kingdom) and Silesian Technical University (Poland) . . . . . [5307-50]

✔ **Attribute visualization and relevance feedback in the content-based image retrieval of medical images,** C. U. Ng, G. R. Martin, Univ. of Warwick (United Kingdom) . . . . . [5307-51]

✔ **Content standards for medical image metadata,** M. C. d'Ornellas, R. P. da Rocha, Univ. Federal de Santa Maria (Brazil) . . . . . [5307-52]

✔ **Flow estimation for motion analysis on compressed domain,** N. Kim, Chung-Ang Univ. (South Korea) . . . . . [5307-53]

✔ **Evolution query methods in medical image databases,** L. Li, Y. Liu, People's Univ. of China . . . . . [5307-54]

✔ **Fast dynamic adaptive keyframe setting in video coding,** Y. Yuan, Tsinghua Univ. (China); D. Feng, Univ. of Sydney (Australia); Y. Zhong, Tsinghua Univ. (China) . . . . . [5307-55]

✔ **Blurry frame detection and shot segmentation in colonoscopy videos,** J. Oh, S. Hwang, Univ. of Texas/Arlington; W. Tavanapong, Iowa State Univ.; P. C. de Groen, Mayo Clinic and Foundation; J. Wong, Iowa State Univ. . . . . [5307-56]

✔ **Automatic retrieval of 3D protein structures based on shape similarity,** C. Cui, J. Shi, Zhejiang Univ. (China) . . . . . [5307-57]

✔ **Video retrieval based on motion tracks of moving objects,** A. Chen, National Tsing Hua Univ. (Taiwan) . . . . . [5307-58]

✔ **Hierarchical content-based image retrieval by dynamic indexing and guided search,** J. You, K. H. Cheung, J. Liu, L. Guo, Hong Kong Polytechnic Univ. (Hong Kong) . . . . . [5307-59]

✔ **Design and implementation of a concept-based image retrieval system with edge description templates,** J. H. Choi, S. H. Park, S. J. Park, Electronics and Telecommunications Research Institute (South Korea) . . . . . [5307-60]

Wednesday 21 January

Plenary Presentation . . . . . 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 5 . . . . . Wed. 9:30 to 10:30 am

Search and Retrieval of Image Databases II

Chair: **Alan Hanjalic**, Technische Univ. Delft (Netherlands)

Image browsing with perceptual classification of correlated color temperature, S. Kim, D. Park, C. Y. Kim, Y. Seo, Samsung Advanced Institute of Technology (South Korea) . . . . . [5307-16]

New perspective on visual information retrieval, H. Eidenberger, Technische Univ. Wien (Austria) . . . . . [5307-17]

New method for visual descriptor evaluation, H. Eidenberger, Technische Univ. Wien (Austria) . . . . . [5307-18]

SESSION 6 . . . . . Wed. 11:00 am to 12:00 pm

Search and Retrieval of Video Databases I

Chair: **Nevenka Dimitrova**, Philips Research

Representation, indexing, and retrieval of moving objects, H. Ye, X. Sun, J. Gong, Wuhan Univ. (China) . . . . . [5307-19]

Fast video clip retrieval algorithm based on VA-file, F. Liu, D. Dong, X. Xue, Fudan Univ. (China) . . . . . [5307-20]

Retrieval of home video abstract using MPEG-7 spectral basis representations, H. Kim, N. Moreau, T. Sikora, Technische Univ. Berlin (Germany) . . . . . [5307-21]

Lunch/Exhibition Break

SESSION 7 . . . . . Wed. 1:40 to 3:00 pm

Semantic Image Classification

Chair: **Edward Y. Chang**, Univ. of California/Santa Barbara

Multilabel machine learning and its application to semantic scene classification, X. Shen, M. Boutell, Univ. of Rochester; J. Luo, Eastman Kodak Co.; C. Brown, Univ. of Rochester . . . . . [5307-22]

Using image transform-based bootstrapping to improve scene classification, J. Luo, Eastman Kodak Co.; M. Boutell, Univ. of Rochester; R. Gray, Eastman Kodak Co.; C. Brown, Univ. of Rochester . . . . . [5307-23]

Images at a glance: semantic image categorization based on scene structure, F. Long, Duke Univ.; H. Peng, Lawrence Berkeley National Lab.; D. D. Feng, Univ. of Sydney (Australia) . . . . . [5307-24]

Perceptual analysis for music segmentation, A. Chen, National Tsing Hua Univ. (Taiwan) . . . . . [5307-25]

SESSION 8 . . . . . Wed. 3:30 to 5:10 pm

Video Mining

Chair: **Ajay Divakaran**, Mitsubishi Electric Research Labs.

Video mining using combinations of unsupervised and supervised learning techniques *(Invited Paper),* A. Divakaran, K. Miyahara, K. A. Peker, R. Radhakrishnan, Z. Xiong, Mitsubishi Electric Research Labs. . . . . [5307-26]

Mining of association between discovered patterns and events in multiple metadata streams *(Invited Paper),* L. Xie, S. Chang, Columbia Univ.; A. Divakaran, H. Sun, Mitsubishi Electric Research Labs. . . . . [5307-27]

Mining tools for surveillance video *(Invited Paper),* N. Ghanem, D. S. Doermann, L. S. Davis, D. F. DeMenthon, Univ. of Maryland/College Park . . . . . [5307-28]

Validity weighted model vector-based retrieval of video *(Invited Paper),* J. R. Smith, IBM Thomas J. Watson Research Ctr. . . . . [5307-29]

Issues in mining video datasets *(Invited Paper),* S. D. Newsam, J. Tesic, L. Wang, B. S. Manjunath, Univ. of California/Santa Barbara . . . . . [5307-30]

Thursday 22 January

SESSION 9 . . . . . Thurs. 8:00 to 10:00 am

Semantic Video Classification

Chair: **Dragutin Petkovic**, San Francisco State Univ.

Commercial detection based on mining of semantic audio-visual labels, R. Radhakrishnan, Polytechnic Univ. and Mitsubishi Electric Research Labs.; A. Divakaran, K. Miyahara, Mitsubishi Electric Research Labs.; Z. Xiong, Univ. of Illinois/Urbana-Champaign and Mitsubishi Electric Research Labs. . . . . [5307-32]

Logo recognition in video by frame sequence classification, R. d. Hollander, A. Hanjalic, Technische Univ. Delft (Netherlands) . . . . . [5307-33]

Video genre classification using multimodal features, S. H. Jin, Y. M. Ro, Information and Communications Univ. (South Korea) . . . . . [5307-34]

Image features meaning for automatic key-frame extraction, A. Guerriero, Politecnico di Bari (Italy) . . . . . [5307-35]

Visual content extraction for automatic semantic annotation of video news, N. Boujemaa, F. Fleuret, V. Gouet, H. Sahbi, INRIA Rocquencourt (France) . . . . [5307-36]

Semantic video classification by using Gaussian mixture model and adaptive expectation-maximization algorithm, J. Fan, Univ. of North Carolina/Charlotte . . . . . [5307-37]

Conference 5307

SESSION 10 . . . . . Thurs. 10:30 to 11:50 am

Emerging Topics

Chair: **Simone Santini**, Univ. of California/San Diego

BioMedia: multimedia information system for biology research, education, and collaboration, D. Petkovic, San Francisco State Univ. . . . . [5307-38]

Evaluating the effectiveness of automatic PVR management, K. Mayer-Patel, W. Miaw, Univ. of North Carolina/Chapel Hill . . . . . [5307-39]

Mediating imaging data in a distributed system, S. Santini, A. Gupta, Univ. of California/San Diego . . . . . [5307-40]

Multiresolution image retrieval through fusion, V. Nikulin, G. Bebis, Univ. of Nevada/Reno . . . . . [5307-41]

Lunch Break

SESSION 11 . . . . . Thurs. 1:10 to 2:30 pm

Video Summarization

Chair: **Wolfgang Effelsberg**, Univ. Mannheim (Germany)

Home video summarization by shot characteristics and support vector machine, N. Cooharojananone, Univ. of Tokyo (Japan) . . . . . [5307-42]

Automatic movie skimming with cinematic syntax and tempo analysis, S. Lee, C. H. Yeh, C.-C. J. Kuo, Univ. of Southern California . . . . . [5307-43]

Customizing video streams of soccer matches, F. Aldershoff, T. Gevers, Univ. of Amsterdam (Netherlands) . . . . . [5307-44]

Automatic generation of video summaries for the Web, S. Kopf, D. Farin, T. Haenselmann, W. Effelsberg, Univ. Mannheim (Germany) . . . . . [5307-45]

SESSION 12 . . . . . Thurs. 2:30 to 3:30 pm

MPEG-7

Chair: **John R. Smith**, IBM Thomas J. Watson Research Ctr.

Automatic segmentation of speech using MPEG-7 audio descriptors in broadcast news audio material, H. Kim, T. Sikora, Technische Univ. Berlin (Germany) [5307-46]

Key frame extraction using MPEG-7 motion descriptors, R. Narasimha, Georgia Institute of Technology; A. Savakis, R. M. Rao, Rochester Institute of Technology; R. de Queiroz, Xerox Corp. . . . . [5307-47]

Harmonization of MPEG-7 XML descriptions and its applications, Y. Chen, X. Sun, C.-C. J. Kuo, Univ. of Southern California . . . . . [5307-48]

Panel Discussion . . . . . 4:00 to 5:00 pm

Emerging Promising Research Areas

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Conference 5308

Tuesday-Thursday 20-22 January 2004 • Proceedings Vol. 5308

Visual Communications and Image Processing 2004

In Cooperation with: **IEEE Circuits and Systems Society**

Conference Chairs: **Sethuraman Panchanathan**, Arizona State Univ.; **Bhaskaran Vasudev**, Epson Palo Alto Lab.

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Monday 19 January

A joint session will be held 3:30 to 4:50 pm with the Embedded Processors for Multimedia and Communications Conference (5309).

Tuesday 20 January

Plenary Presentation ..... 8:30 to 9:15 am

Digital Printing: An Image Processor's Perspective

Jan P. Allebach, Purdue Univ.

See pg. 6 for details.

Sessions 1–4 are Joint Sessions with the Embedded Processors for Multimedia and Communications Conference (5309)

Sessions 1 and 5 run concurrently.

SESSION 1 .....Tues. 9:30 to 10:40 am

Joint Session: Multimedia Technologies for Embedded Systems I

Mobile multimedia: market trends, architectures and implementation in devices *(Invited Paper),* R. Rajagopalan, Emuzed Inc. ..... [5308-01]

Half D1 MPEG-4 encoder on the BSP-15 DSP, L. Chen, Z. He, Sarnoff Corp. . [5308-02]

MPEG-4 advanced simple profile video encoding on an embedded multimedia system, S. Akramullah, G. Rajan, iVAST Inc. ..... [5308-03]

SESSION 5 .....Tues. 9:30 to 10:30 am

Image/Video Segmentation I

Joint space-time motion-based video segmentation and occlusion detection using multiphase level sets, M. Ristivojevic, J. Konrad, Boston Univ. ..... [5308-18]

Geometric model-based segmentation of the prostate and surrounding structures for image guided radiotherapy, X. Tang, Y. Jeong, R. Radke, Rensselaer Polytechnic Institute; G. T. Chen, Massachusetts General Hospital; D. M. Lovelock, Memorial Sloan Kettering Cancer Ctr.; B. Roysam, Rensselaer Polytechnic Institute . [5308-19]

Human body posture recognition using MPEG-7 descriptors, L. Goldmann, M. Karaman, T. Sikora, Technische Univ. Berlin (Germany) ..... [5308-20]

Sessions 2 and 6 run concurrently.

SESSION 2 ..... Tues. 11:00 am to 12:00 pm

Joint Session: Multimedia Technologies for Embedded Systems II

Resource-aware complexity scalability for mobile MPEG encoding, S. Mietens, Philips Research Labs. (Netherlands); P. H. N. de With, LogicaCMG (Netherlands) and Technische Univ. Eindhoven (Netherlands); C. Hentschel, Philips Research Labs. (Netherlands) ..... [5308-04]

Novel algorithm to reduce the complexity of quarter-pixel motion estimation, S. B. G. Pallapothu, R. Korada, Emuzed India Pvt., Ltd. (India) ..... [5308-05]

Video coding for decoding power constrained embedded devices, L. Lu, V. Sheinin, IBM Thomas J. Watson Research Ctr. ..... [5308-06]

SESSION 6 ..... Tues. 11:00 am to 12:00 pm

Image/Video Segmentation II

Multiple motion and occlusion segmentation with a multiphase level set method, Y. Shi, J. Konrad, W. C. Karl, Boston Univ. ..... [5308-21]

Segmenting focused objects using morphological filters and region merging, C. Kim, Epson Research and Development, Inc. ..... [5308-22]

Investigation of implicit active contours for scientific image segmentation, S. K. Weeratunga, C. Kamath, Lawrence Livermore National Lab. ..... [5308-23]

Lunch/Exhibition Break

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Conference 5308

Sessions 3 and 7 run concurrently.

SESSION 3 . . . . . Tues. 1:30 to 3:10 pm

Joint Session: Multimedia Technologies for Embedded Systems III

Power scalable video encoder for mobile devices based on collocated motion estimation, A. Bourge, J. Jung, C. Miro, Philips Digital Systems Labs. (France) . . . . . [5308-07]

Power-rate-distortion analysis and optimization for power aware embedded video compression, Z. He, Sarnoff Corp. . . . . [5308-08]

Compression of compound images and video for enabling rich media in embedded systems, A. Said, Hewlett-Packard Labs. . . . . [5308-09]

Layered Wyner-Ziv video coding, Q. Xu, Z. Xiong, Texas A&M Univ. . . . . [5308-10]

Optimal speech codec implementation on ARM9E (v5E arch) RISC processor for next-generation mobile multimedia, A. K. Bangla, M. K. Vinay, P. V. Suresh Babu, Emuzed India Pvt. Ltd. (India) . . . . . [5308-11]

SESSION 7 . . . . . Tues. 1:30 to 3:10 pm

Image/Video/Graphics Coding II

Rate-distortion optimized packetization for interactive light field streaming, C. Chang, B. Girod, Stanford Univ. . . . . [5308-24]

Using multisprites for minimizing MPEG-4 sprite coding-cost, D. Farin, Univ. Mannheim (Germany); P. H. N. de With, LogicaCMG (Netherlands) and Technische Univ. Eindhoven (Netherlands); W. Effelsberg, Univ. Mannheim (Germany) [5308-25]

Adaptive lossless video compression, S. Park, E. J. Delp III, Purdue Univ. . [5308-26]

Mask signal dection, separation, and in-painting for efficient video compression, Z. He, Univ. of Missouri/Columbia . . . . . [5308-27]

Block-based embedded color image and video coding, N. Nagaraj, GE India Technology Ctr. Pvt., Ltd. (India); W. A. Pearlman, Rensselaer Polytechnic Institute; A. Islam, Nokia Research Ctr. . . . . [5308-28]

Sessions 4 and 8 run concurrently.

SESSION 4 . . . . . Tues. 3:30 to 5:30 pm

Joint Session: Multimedia Technologies for Embedded Systems IV

Image-based positioning, route planning, and navigation, Y. Lu, E. J. Delp III, Purdue Univ. . . . . [5308-12]

Joint PHY and MAC power optimization for video transmission over wireless LAN, X. Lu, Polytechnic Univ.; Y. Chen, Philips Research Labs.; Y. Wang, Polytechnic Univ. . . . . [5308-13]

MPEG-7 meta-data enhanced encoder system for embedded systems, K. Asai, H. Nishikawa, Mitsubishi Electric Research Labs. (Japan); A. Divakaran, Mitsubishi Electric Research Labs. . . . . [5308-14]

Post-processing of compressed video using a unified metric for digital video processing, L. Boroczky, Y. Yang, Philips Research Labs. . . . . [5308-15]

Optimization of elliptic curve cryptography (ECC) techniques on embedded systems, Y. Hu, L. Huang, C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-16]

Exploiting temporal correlation with flexible block-size motion alignment for 3D wavelet coding, R. Xiong, Institute of Computing Technology (China); F. Wu, S. Li, Microsoft Research Asia (China); Z. Xiong, Texas A&M Univ.; Y. Zhang, Microsoft Research Asia (China) . . . . . [5308-17]

SESSION 8 . . . . . Tues. 3:30 to 5:30 pm

Image/Video/Graphics Coding II

Coding adaptive transforms, D. Lelescu, F. Bossen, DoCoMo Communications Labs. USA . . . . . [5308-29]

MINMAX rate control with a perceived distortion metric, Y. Sermadevi, M. Masry, S. S. Hemami, Cornell Univ. . . . . [5308-30]

Distributed source coding of multiview images, M. P. Tehrani, T. Fujii, M. Tanimoto, Nagoya Univ. (Japan) . . . . . [5308-31]

Lossless compression for three-dimensional images, X. Tang, W. A. Pearlman, Rensselaer Polytechnic Institute . . . . . [5308-32]

Mesh Slicer: a progressive coder of 3D polygonal meshes, J. Peng, C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-33]

Near-lossless compression of digital terrain elevation data, W. A. Pearlman, R. V. Panchagnula, Rensselaer Polytechnic Institute . . . . . [5308-34]

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Multispectral image fusion based on fractal features,** J. Tian, Institute of Acoustics (China); J. Chen, Beijing Institute of Technology (China); C. Zhang, Institute of Acoustics (China) . . . . . [5308-86]

✔ **Interpolative mode prediction for efficient MPEG-2 video encoding,** B. C. Song, K. W. Chun, Samsung Electronics Co., Ltd. (South Korea) . . . . . [5308-87]

✔ **Moving object detection using orthogonal Gaussian-Hermite moments,** Y. Wu, Univ. Michel de Montaigne Bordeaux 3 (France) . . . . . [5308-88]

✔ **Active illumination framework for creating interactive 3D media,** N. L. Chang, Hewlett-Packard Labs. . . . . [5308-89]

✔ **Spatially varying motion prediction algorithm for video codec,** M. Hong, J. W. Jeong, Soongsil Univ. (South Korea) . . . . . [5308-90]

✔ **Turbo trellis-coded modulation with two typical mapping strategies of 16QAM in image transmission,** Z. Bai, Shandong Univ. (China) . . . . . [5308-91]

✔ **Possibilistic clustering based MR brain image segmentation with accurate initialization,** Q. Liao, Tsinghua Univ. (China) and Univ. de Caen (China); Y. Deng, Tsinghua Univ. (China); W. Dou, S. Ruan, D. Bloyet, Univ. de Caen (France) . . . . . [5308-92]

✔ **Robust techniques for background subtraction in urban traffic video,** S. S. Cheung, C. Kamath, Lawrence Livermore National Lab. . . . . [5308-93]

✔ **Object-based image restoration for multilayer autofocusing,** K. Kim, S. Hwang, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . . . . . [5308-94]

✔ **Error-resilient video coding using adaptive weighted multiple reference frame method,** S. H. Kim, Seoul National Univ. (South Korea); Y. K. Kim, Hoseo Univ. (South Korea); S. Lee, Seoul National Univ. (South Korea) . . . . . [5308-95]

- ✔ **Robust camera motion estimation and classification for video analysis,** S. Lai, H. Chang, National Tsing Hua Univ. (Taiwan) . . . . . [5308-96]
- ✔ **Trade-off between picture resolution and quantization precision in video coding for embedded systems,** Y. Yuan, Tsinghua Univ. (China); D. Feng, Univ. of Sydney (Australia); Y. Zhong, Tsinghua Univ. (China) . . . . . [5308-97]
- ✔ **Early-stop and motion vector re-using for MPEG-2 to H.264 transcoding,** M. Kucukgoz, M. Sun, Univ. of Washington . . . . . [5308-98]
- ✔ **Using DC-based pattern code in the structure of a video compression scheme,** F. Ahmadianpour, M. O. Ahmad, Concordia Univ. (Canada) . . . . . [5308-99]
- ✔ **Scalable texture-based video coding,** D. Chavira-Martínez, S. Pateux, IRISA/INRIA (France) . . . . . [5308-100]
- ✔ **Hybrid image coding for real-time computer screen video transmission,** T. Lin, Peking Univ. (China); P. Hao, Peking Univ. (China) and Queen Mary, Univ. of London (China); C. Xu, J. Feng, Peking Univ. (China) . . . . . [5308-101]
- ✔ **Modeling the user preference on broadcasting contents using Bayesian belief networks,** S. Kang, Information and Communications Univ. (South Korea) . . . . . [5308-102]
- ✔ **Automated classification of female facial beauty by image analysis and supervised learning,** H. Gunes, M. Piccardi, T. Jan, Univ. of Technology/Sydney (Australia) . . . . . [5308-103]
- ✔ **Fast wavelet transform domain texture synthesis,** E. A. Edirisinghe, D. S. Wickramanayake, H. Bez, Loughborough Univ. (United Kingdom) . . . . [5308-104]
- ✔ **Camera-based man-machine interface for computer application control,** G. D. Morrison, Smart Technologies, Inc. (Canada) . . . . . [5308-105]
- ✔ **Effective quality of service for video streaming over networks,** Z. He, Univ. of Missouri/Columbia; C. W. Chen, Florida Institute of Technology . . . . . [5308-106]
- ✔ **Improved high-definition video by encoding at an intermediate resolution,** C. A. Segall, Pixonics; M. Elad, Stanford Univ.; P. Milanfar, Univ. of California/Santa Cruz . . . . . [5308-107]
- ✔ **Robust traffic event extraction from surveillance video,** A. Yoneyama, C. Yeh, C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-108]
- ✔ **Lossless compression of point-based data for 3D graphics rendering,** J. Sim, Seoul National Univ. (South Korea); C. Kim, Chinese Univ. of Hong Kong (Hong Kong); S. Lee, Seoul National Univ. (South Korea) . . . . . [5308-109]
- ✔ **Computation reduction for motion estimation in MPEG4 video encoders,** C. Chen, R. Li, Intel China (China) . . . . . [5308-110]
- ✔ **Accurate bit-rate and quality control for 3D multiview sequences,** J. Lim, K. Sohn, Yonsei Univ. (South Korea) . . . . . [5308-111]
- ✔ **Facial image compression using overcomplete transforms,** J. E. Vila-Forcen, O. Koval, S. V. Voloshynovskiy, Univ. de Genève (Switzerland) . . . . . [5308-112]
- ✔ **Adaptive search range decision algorithm for fast motion estimation,** M. Hong, W. S. Song, Soongsil Univ. (South Korea) . . . . . [5308-113]
- ✔ **Assessment of the compression efficiency of the MPEG-4 AVC specification,** W. De Neve, P. Lambert, S. Lerouge, R. Van de Walle, Univ. Gent (Belgium) . . [5308-114]
- ✔ **JPEG 2000 coding of textured parametric surfaces in three dimensions,** M. N. Gamito, M. S. Dias, ADETTI/ISCTE (Portugal) . . . . . [5308-115]
- ✔ **Image enhancement circuit using non-linear processing curve and constrained histogram range equalization,** S. Cvetkovic, Bosch Security Systems BV (Netherlands) and Technische Univ. Eindhoven (Netherlands); P. H. N. de With, LogicaCMG (Netherlands) and Technische Univ. Eindhoven (Netherlands) . . . . . [5308-116]
- ✔ **Bit-rate prediction for look-ahead coding with AVC,** M. Beermann, RWTH-Aachen (Germany) . . . . . [5308-117]
- ✔ **Watershed segmentation and region merging,** R. L. Pires, P. De Smet, W. Philips, Univ. Gent (Belgium) . . . . . [5308-118]
- ✔ **Analysis of multi-hypothesis motion-compensated prediction for error resilient video transmission,** W. Kung, Univ. of Southern California; C. Kim, Seoul National Univ. (South Korea); C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-119]
- ✔ **Multipath video transport scheme over wireless LANs,** H. Man, Stevens Institute of Technology . . . . . [5308-120]
- ✔ **Progressive compression of PointTexture images,** I. Song, Seoul National Univ. (South Korea); C. Kim, Chinese Univ. of Hong Kong; S. Lee, Seoul National Univ. (South Korea) . . . . . [5308-121]
- ✔ **Delaunay triangulation mesh based stereo image coding algorithm,** J. Han, Z. Lu, Xidian Univ. (China) . . . . . [5308-122]
- ✔ **Fast two-step search algorithm for half-pixel motion estimation,** B. Zhou, J. Chen, Shanghai Jiao Tong Univ. (China) . . . . . [5308-123]
- ✔ **Improvements on non-linear up-scaling by adapting to the local orientation,** J. A. Tegenbosch, P. M. Hofman, Philips Research Labs. (Netherlands) . . . . [5308-124]
- ✔ **Queue-based block matching algorithm for video compression and motion segmentation,** T. Chiew, Institute of Infocomm Research (Singapore) and Univ. of Bristol (United Kingdom) . . . . . [5308-125]
- ✔ **On-line smoothing for scalable media stream delivery,** K. Gao, W. Gao, S. He, Y. Zhang, Institute of Computing Technology (China) . . . . . [5308-126]
- ✔ **Optimal reconstruction value for DCT dequantization using Laplacian pdf model,** B. Lee, S. Kang, Ewha Womans Univ. (South Korea) . . . . . [5308-127]
- ✔ **Low-rate video coding with block reordering in wavelet domain,** P. Chang, T. Lu, National Central Univ. (Taiwan) . . . . . [5308-128]
- ✔ **Arithmetic coding with adaptive context-tree weighting for the H.264 video coders,** D. Hong, Columbia Univ.; M. van der Schaar, Univ. of California/Davis . . . . . [5308-129]
- ✔ **Layered unequal loss protection for progressive image transmission over packet loss channels,** X. Li, J. Cai, Nanyang Technological Univ. (Singapore) . [5308-130]
- ✔ **MPEG interlaced video transcoding for a networked video browsing system,** A. Shimizu, SANYO Electric Co., Ltd. (Japan) . . . . . [5308-131]
- ✔ **Edge degradation for objective video quality metrics,** C. Lee, T. Jung, S. Cho, W. Ahn, Yonsei Univ. (South Korea) . . . . . [5308-132]
- ✔ **Interpolation-free subpixel refinement for block-matching algorithm,** T. Chiew, Univ. of Bristol (United Kingdom) and Institute of Infocomm Research (Singapore); J. Chung-How, ProVision Communication Technologies, Ltd. (United Kingdom); D. Bull, N. Canagarajah, Univ. of Bristol (United Kingdom) . . . . . [5308-133]
- ✔ **Framework design on video coding system for error-prone heterogenous network,** W. Shen, Y. Chong, J. Xiao, Wuhan Univ. (China) and Firstlink Digital Technology Co., Ltd. (China); D. Li, Wuhan Univ. (China) . . . . . [5308-134]
- ✔ **Two-way decodable variable length data blocks for robust video transmission,** S. Gao, Nanyang Technological Univ. (Singapore) . . . . . [5308-135]
- ✔ **Tuning of perceptual technique for digital movie color restoration,** A. Rizzi, Univ. degli Studi di Milano (Italy); M. Chambah, Univ. de La Rochelle (France); D. Lenza, Univ. degli Studi di Milano (Italy); B. Besserer, Univ. de La Rochelle (France); D. Marini, Univ. degli Studi di Milano (Italy) . . . . . [5308-136]
- ✔ **Universal motion prediction,** Z. Li, E. J. Delp III, Purdue Univ. . . . . [5308-137]
- ✔ **Wireless FGS video transmission using adaptive mode selection and unequal error protection,** J. Wu, J. Cai, Nanyang Technological Univ. (Singapore) [5308-138]
- ✔ **Automatic calibration of multiple cameras on a non-planar ground for visual surveillance systems,** J. Jung, H. Ki, J. Shin, J. Paik, Chung-Ang Univ. (South Korea) . . . . . [5308-139]
- ✔ **Computation of discontinuous optical flow fields based on spatiotemporal bilateral filtering,** R. Feghali, A. Vincent, Communications Research Ctr. Canada (Canada) . . . . . [5308-140]
- ✔ **EBCOT coprocessing architecture for JPEG2000,** H. Zhang, J. Fritts, Washington Univ. . . . . [5308-141]
- ✔ **Hybrid scheme for visual window design with joint scene analysis and eye-gaze tracking for media encoding based on perceptual attention,** J. I. Khan, Kent State Univ. . . . . [5308-142]
- ✔ **Quality control for JPEG 2000,** H. Fang, Y. Chang, L. Chen, National Taiwan Univ. (Taiwan) . . . . . [5308-143]
- ✔ **Motion-compensated wavelet video coding using adaptive mode selection,** F. Zhai, T. N. Pappas, Northwestern Univ. . . . . [5308-144]
- ✔ **Low-level behavioral analysis of the JVT/AVC decoder,** P. Lambert, L. Eeckhout, R. De Sutter, K. De Bosschere, Univ. Gent (Belgium); R. Van de Walle, Univ. Gent (Belgium) and IMEC (Belgium) . . . . . [5308-145]

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Conference 5308

Wednesday 21 January

Plenary Presentation . . . . . 8:30 to 9:15 am

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See pg. 6 for details.

Sessions 9 and 13 run concurrently.

SESSION 9 . . . . . Wed. 9:30 to 10:30 am

Video Coding H.264 I

Improved H.264/AVC coding using long-term global motion compensation, A. Smolic, Y. Vatis, H. Schwarz, T. Wiegand, Fraunhofer Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) . . . . . [5308-35]

Effective H.264 P-frame encoding with fast intra/inter mode selection, C. Kim, Q. Li, C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-36]

Direct macroblock coding for predictive (P) pictures in the H.264 standard, A. M. Tourapis, Thomson Multimedia; F. Wu, S. Li, Microsoft Research Asia (China) . . . . . [5308-37]

SESSION 13 . . . . . Wed. 9:30 to 10:30 am

Scalable/Multiple-Description Image/Video Coding I

Transform-domain Wyner-Ziv codec for video, A. Aaron, S. Rane, E. Setton, B. Girod, Stanford Univ. . . . . [5308-52]

Content-based SNR-spatial-temporal scalability tradeoffs for MC SBC systems, Y. Wang, T. Ng, S. Chang, Columbia Univ.; M. v. d. Schaar, Univ. of California/ Davis . . . . . [5308-53]

Rate distortion analysis of layered video coding by leaky prediction, Y. Liu, Purdue Univ.; P. Salama, Indiana Univ.-Purdue Univ. Indianapolis; G. W. Cook, Indiana Univ.; E. J. Delp III, Purdue Univ. . . . . [5308-54]

Sessions 10 and 14 run concurrently.

SESSION 10 . . . . . Wed. 11:00 am to 12:00 pm

Video Coding H.264 II

Low-power H.264 video decoder with graceful degradation, A. Bourge, J. Jung, C. Miro, Philips Digital Systems Labs. (France) . . . . . [5308-38]

Implementation of H.264 encoder on general-purpose processors with hyper-threading technology, E. Li, Intel China (China) . . . . . [5308-39]

Fast prediction coding based optimized H.264 encoder for real-time video applications, J. Zhang, Y. He, S. Yang, Y. Zhong, Tsinghua Univ. (China) . . . [5308-40]

SESSION 14 . . . . . Wed. 11:00 am to 12:00 pm

Scalable/Multiple-Description Image/Video Coding II

Fully scalable video coding in multicast applications, S. Lerouge, P. Lambert, R. De Sutter, Univ. Gent (Belgium); R. Van de Walle, Univ. Gent (Belgium) and IMEC (Belgium) . . . . . [5308-55]

Temporal layered vs. multistate video coding, S. Ekmekci, T. Sikora, Technische Univ. Berlin (Germany) . . . . . [5308-56]

Interframe wavelet video coding with operating point adaptation, T. Rusert, RWTH-Aachen (Germany) . . . . . [5308-57]

Lunch/Exhibition Break

Sessions 11 and 15 run concurrently.

SESSION 11 . . . . . Wed. 1:30 to 3:10 pm

Motion Estimation/Motion Compensation I

True-motion estimation using feature correspondences, R. A. Braspenning, G. de Haan, Philips Research Labs. (Netherlands) . . . . . [5308-41]

Predictive motion estimation with global motion predictor, S. Sun, S. Lei, Sharp Labs. of America . . . . . [5308-42]

Statistical motion prediction with drift, Z. Li, E. J. Delp III, Purdue Univ. . . . [5308-43]

Globally optimal wavelet-based motion estimation using interscale edge and occlusion models, L. Sendur, Polytechnic Univ.; O. G. Guleryuz, Epson Palo Alto Lab. . . . . [5308-44]

Fast variable block size motion search for H.264, C. Kuo, M. Shen, C. J. Kuo, Univ. of Southern California . . . . . [5308-45]

SESSION 15 . . . . . Wed. 1:30 to 3:10 pm

Image/Video Transmission I

Systematic lossy forward error protection for error-resilient digital video broadcasting, S. D. Rane, A. Aaron, B. Girod, Stanford Univ. . . . . [5308-58]

Reference-based error concealment algorithm for wireless video, C. B. Adsumilli, S. K. Mitra, Univ. of California/Santa Barbara . . . . . [5308-59]

Error-resilient video coding performance analysis of motion JPEG2000 and MPEG-4, F. Dufaux, T. Ebrahimi, Swiss Federal Institute of Technology (Switzerland) and Emitall SA (Switzerland) . . . . . [5308-60]

Robust transmission of JPEG2000 codestreams over packet erasure channels, Z. Wu, A. Bilgin, L. Pu, M. W. Marcellin, Univ. of Arizona . . . . . [5308-61]

Error robustness evaluation of H.264/MPEG-4 AVC, T. Halbach, S. Olsen, Norwegian Univ. of Science and Technology (Norway) . . . . . [5308-62]

Sessions 12 and 16 run concurrently.

SESSION 12 . . . . . Wed. 3:30 to 5:30 pm

Motion Estimation/Motion Compensation II

Transversal versus lifting approach to motion-compensated temporal discrete wavelet transform of image sequences: equivalence and tradeoffs, J. Konrad, Boston Univ. . . . . [5308-46]

Segmentation in the loop: an iterative object-based algorithm for motion estimation, H. Blume, J. von Livonius, T. G. Noll, RWTH-Aachen (Germany) . . . . . [5308-47]

Reduced complexity genetic algorithm for motion estimation, R. Khanna, Intel Corp.; M. van der Schaar, Univ. of California/Davis . . . . . [5308-48]

Estimation of multiple motions by block matching using Markov random fields, I. Stuke, T. Aach, E. Barth, C. Mota, Univ. zu Lübeck (Germany) . . . . . [5308-49]

Video coding with lifted wavelet transforms and complementary motion-compensated signals, M. H. Flierl, Swiss Federal Institute of Technology (Switzerland) . . . . . [5308-50]

Adaptive windowing technique for variable block size motion compensation, S. Park, C. Kim, S. Lee, Seoul National Univ. (South Korea) . . . . . [5308-51]

SESSION 16 . . . . . Wed. 3:30 to 5:50 pm

Image/Video Transmission II

Collaborative image transmission over sensor network, M. W. Wu, C. W. Chen, Florida Institute of Technology . . . . . [5308-63]

Robust image and video transmission using a new joint source channel coding algorithm and dual adaptive OFDM, M. Farshchian, S. Cho, W. A. Pearlman, Rensselaer Polytechnic Institute . . . . . [5308-64]

Adaptive streaming of high-quality video over wireless LANs, P. van Beek, H. Pan, I. Sezan, S. Deshpande, Sharp Labs. of America . . . . . [5308-65]

Rate-distortion optimized video streaming with rich acknowledgments, J. Chakareski, B. Girod, Stanford Univ. . . . . [5308-66]

Decoder characterization for streaming video, O. Harmanci, Univ. of Rochester; A. M. Tekalp, Univ. of Rochester and Koc Univ. . . . . [5308-67]

Joint mesh-texture optimization for progressive transmission, S. Yang, M. Shen, C. J. Kuo, Univ. of Southern California . . . . . [5308-68]

Block turbo codes for efficient image transmission over wireless channels, S. Zaibi, M. Ammar, K. Amis, R. Pyndiah, S. Saoudi, École Nationale Supérieure des Télécommunications Bretagne (France) . . . . . [5308-69]

Thursday 22 January

SESSION 17 . . . . . Thurs. 8:50 to 10:10 am

Image/Video Processing I

Motion blur reduction for LCD displays: motion compensated inverse filtering, M. A. Klompenhouwer, L. J. Velthoven, Philips Research Labs. (Netherlands) . . . [5308-70]

Generalized sampling and application to de-interlacing, C. Ciuhu, G. de Haan, Philips Research Labs. (Netherlands) . . . . . [5308-71]

Sub-pixel accuracy motion compensated temporal filtering in overcomplete wavelet domain with perfect reconstruction, J. C. Ye, Philips Research USA; M. van der Schaar, Univ. of California/Davis; Y. Andreopoulos, Vrije Univ. Brussel (Belgium) . . . . . [5308-72]

Optimization of the predict operator in lifting-based motion compensated temporal filtering, G. Pau, École Nationale Supérieure des Télécommunications (France) . . . . . [5308-73]

SESSION 18 . . . . . Thurs. 10:40 am to 12:00 pm

Image/Video Processing II

Content-adaptive up-scaling of chrominance using classification of luminance and chrominance data, M. Zhao, Technische Univ. Eindhoven (Netherlands); P. M. Hofman, Philips Research Labs. (Netherlands); G. de Haan, Technische Univ. Eindhoven (Netherlands) and Philips Research Laboratories Eindhoven (Netherlands) . . . . . [5308-74]

Motion detection in color image sequence and shadow elimination, J. Shen, Univ. Michel de Montaigne Bordeaux 3 (France) . . . . . [5308-75]

Y/C separation of composite color video signals using samples with non-opposite sub-carrier phases, C. N. Cordes, G. de Haan, Philips Research Labs. (Netherlands) . . . . . [5308-76]

Motion deblurring based on time-evolution of simultaneous nonlinear reaction-diffusion, T. Saito, Kanagawa Univ. (Japan) . . . . . [5308-77]

Lunch Break

SESSION 19 . . . . . Thurs. 1:30 to 3:10 pm

Image and Video Applications II

Closed loop dialog model of face-to-face communication with a photo-real virtual human, B. Takacs, Digital Elite Inc. . . . . [5308-78]

Multistage facial feature extraction for accurate face alignment, F. Zuo, Technische Univ. Eindhoven (Netherlands); P. H. N. de With, LogicaCMG (Netherlands) and Technische Univ. Eindhoven (Netherlands) . . . . . [5308-79]

Face re-orientation in video conferencing by assuming normal distributed depth, B. Yip, J. S. Jin, Univ. of Sydney (Australia) . . . . . [5308-80]

Digital item for digital human memory, J. Song, Electronics and Telecommunications Research Institute (South Korea) . . . . . [5308-81]

Super resolution recovery in a multicamera environment, G. Caner, A. M. Tekalp, W. Heinzelman, Univ. of Rochester . . . . . [5308-82]

SESSION 20 . . . . . Thurs. 3:30 to 4:30 pm

Image and Video Applications II

Compressed domain technique for color matching in video mosaic, M. Lee, M. Shen, C.-C. J. Kuo, Univ. of Southern California . . . . . [5308-83]

Multispectral image compression for high-quality color reproduction using JPEG2000, R. Mase, Y. Kawasaki, Tokyo Institute of Technology (Japan); Y. Murakami, T. Obi, M. Yamaguchi, N. Ohyama, Tokyo Institute of Technology (Japan) and Telecommunications Advancement Organization (Japan) . . . . . [5308-84]

Model-based quality enhancement of scalable video, G. Feideropoulou, B. Pesquet-Popescu, École Nationale Supérieure des Télécommunications (France) . . . [5308-85]

Best Student Paper Awards

At this meeting, awards will be presented for the two best papers submitted by students. To qualify for these awards, each consisting of a cash prize and a plaque, the candidate must be the principal author. A letter from the student's advisor stating that the major work was done by the student must accompany the final manuscript in order to be considered by the award committee.

IS&T and SPIE gratefully acknowledge DoCoMo Communications USA Labs. Inc. and Microsoft Research China for generously sponsoring these awards.

Young Investigator Award

An award will be given for the best paper submitted by a young researcher who has graduated within five years from the date of the meeting and is not currently enrolled in a graduate program. A photocopy of the researcher's most current diploma and a letter from the researcher requesting that his/her paper be considered must be submitted with the final manuscript, certifying he/she meets the qualifications for the award.

IS&T and SPIE gratefully acknowledge IBM Research for generously sponsoring this award.

Conference 5309

Monday-Tuesday 19-20 January 2004 • Proceedings Vol. 5309

Embedded Processors for Multimedia and Communications

Conference Chairs: **Subramania I. Sudharsanan**, Queen's Univ. (Canada); **Michael Bove, Jr.**, MIT Media Lab.; **Sethuraman Panchanathan**, Arizona State Univ.

Monday 19 January

SESSION 1 . . . . . Mon. 8:40 to 10:00 am

Architectures

Code compression for VLIW embedded processors, E. Piccinelli, R. Sannino, STMicroelectronics (Italy) . . . . . [5309-01]

Design and implementation of a fully programmable MPEG-2 transport demultiplexer for a STB application on DM642, R. M. Reddy, S. Arora, Texas Instruments Inc. . . . . [5309-02]

Programmable inner-product enhanced associative processor array, S. C. Balam, D. Schonfeld, Univ. of Illinois/Chicago . . . . . [5309-03]

Low-power VLSI implementation for variable length decoder in MPEG-1 Layer III, T. Tsai, C. Liu, W. Chen, National Central Univ. (Taiwan) . . . . . [5309-04]

SESSION 2 . . . . . Mon. 10:30 am to 12:00 pm

Emerging Standards

Latest video standards: where do all the extra cycles go? *(Invited Paper),* J. E. Fritts, R. Steiling, B. Packman, D. Balasubramanian, Washington Univ. . . . . [5309-05]

Low-power high-performance 2D discrete cosine transform coprocessor for H.264 video compression standard, P. P. Dang, STMicroelectronics . . . . . [5309-06]

DSP platform-based JPEG2000 encoder with fast EBCOT algorithm, T. Tsai, National Central Univ. (Taiwan) . . . . . [5309-07]

Analyzing effects of cache in H.264 decoder, C. Huang, C. Peng, J. Li, Institute of Computing Technology (China) . . . . . [5309-08]

Lunch Break

SESSION 3 . . . . . Mon. 1:30 to 3:00 pm

Scalable Architectures

Design of multimedia software and future system architectures *(Invited Paper),* P. H. N. de With, LogicaCMG (Netherlands) and Technische Univ. Eindhoven (Netherlands); E. G. Jaspers, Philips Research Labs. (Netherlands) . . . . . [5309-09]

Scalable transform accelerator for multimedia communications, D. Akopian, Nokia Corp. (Finland); S. Agaian, Univ. of Texas/San Antonio; J. Takala, Tampere Univ. of Technology (Finland) . . . . . [5309-10]

Combining the quantized color instruction set and loop unrolling on portable video processing systems, J. Kim, D. S. Wills, Georgia Institute of Technology . . . [5309-11]

Complexity scalable motion compensated wavelet video encoding, A. Strauss, Intel Corp.; M. van der Schaar, Univ. of California/Davis . . . . . [5309-12]

SESSION 4 . . . . . Mon. 3:30 to 4:50 pm

Embedded Systems

Joint Session with the Visual Communications and Image Processsing Conference (5310)

Graphics hardware for gradient-based motion estimation, F. Kelly, A. Kokaram, Trinity College Dublin (Ireland) . . . . . [5309-13]

Video processing on a flexible heterogeneous architecture, E. B. Bellers, J. G. Janssen, S. Rathnam, Philips Semiconductors . . . . . [5309-14]

Reconfigurable hardware/software cosimulation platform for media processor, H. Wu, P. Liu, Q. Yao, Zhejiang Univ. (China) . . . . . [5309-15]

Web surveillance system using platform-based design, S. Lin, National Central Univ. (Taiwan) . . . . . [5309-16]

Tuesday 20 January

A Joint Session will be held with the Visual Communications and Image Processing 2004 Conference (5310) Sessions 1–4, Tuesday.

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Novel kind of DSP design method based on IP core,** Q. Yu, P. Liu, X. Hong, J. Chen, W. Wang, Zhejiang Univ. (China) . . . . . [5309-17]

✔ **High-performance motion compensation design of H.264 decoder for HD video streams,** C. Huang, R. Wang, J. Li, Institute of Computing Technology (China) . . . . . [5309-18]

✔ **High-parallel architecture for H.264/MPEG-4 AVC motion estimation,** C. Huang, S. Li, Institute of Computing Technology (China) . . . . . [5309-19]

✔ **Compiler support for reducing the register file complexity in media processors,** X. Ju, C. Shi, Q. Yao, Zhejiang Univ. (China) . . . . . [5309-20]

✔ **Inner-product enhanced associative processor array,** S. C. Balam, D. Schonfeld, Univ. of Illinois/Chicago . . . . . [5309-21]

See p. 71 to order.

Conference 5310

Tuesday-Thursday 20-22 January 2004 • Proceedings Vol. 5310

Optical Security and Counterfeit Deterrence Techniques V

Conference Chair: **Rudolf L. van Renesse**, VanRenesse Consulting (Netherlands)

Program Committee: **Sara E. Church**, Bank of Canada; **James M. Jonza**, 3M Co.; **Malcolm R. M. Knight**, De La Rue International Ltd. (United Kingdom); **Ian M. Lancaster**, Reconnaissance International Ltd. and International Hologram Manufacturers Association (United Kingdom); **Hiroyuki Matsumoto**, NHK Spring Co., Ltd. (Japan); **John W. Mercer**, U.S. Dept. of State; **Elisabeth Schulz**, European Central Bank (Germany); **Sybrand Spannenburg**, Joh. Enschedé Security Printing B.V. (Netherlands); **Wayne R. Tompkin**, OVD Kinegram Corp. (Switzerland)

Tuesday 20 January

✔ Posters-Tuesday

Posters will be placed on display after 9:00 am in San Jose Marriott: San Jose Ballroom. A poster session, with authors present at their posters, will be held Tuesday evening, 5:30 to 7:00 pm.

✔ **Computer-generated holograms recorded in bacteriorhodopsin,** F. Guessous, T. Juchem, N. A. Hampp, Phillips-Univ. Marburg (Germany) . . . . . [5310-41]

✔ **Study of chalcogenide glass based reflecting holographic marks for optical security,** L. I. Muravsky, Karpenko Physical-Mechanical Institute (Ukraine); S. O. Kostyukevych, Institute of Semiconductor Physics (Ukraine) and SPIE/Ukr (Ukraine); T. I. Voronyak, Karpenko Physical-Mechanical Institute (Ukraine); P. E. Shepeliavyi, Institute of Semiconductor Physics (Ukraine) . . . . . [5310-42]

✔ **Novel online security system based on rare-earth doped micro glass beads,** S. Officer, R. Prabhu, P. Pollard, C. Hunter, The Robert Gordon Univ. (United Kingdom); G. A. Ross, NCR FSG Ltd. (United Kingdom) . . . . . [5310-43]

✔ **Recording peculiarities of the security holograms with the hidden images,** S. B. Odinokov, Bauman Moscow State Technical Univ. (Russia); V. I. Bobrinev, Moscow Institute of Radiotechnics, Electronics (Russia); D. S. Lushnikov, I. K. Tsiganov, Bauman Moscow State Technical Univ. (Russia) . . . . . [5310-44]

✔ **Polygram technology in optical security,** V. I. Girnyk, A. V. Kononov, Optronics, Ltd. (Ukraine); I. S. Borisov, Kyiv Taras Shevchenko Univ. (Ukraine) . . . . [5310-45]

✔ **Elimination of artifacts in encrypted binary images by modified digital halftoning technique,** H. Wang, J. Sung, National Taiwan Normal Univ. (Taiwan) . . . [5310-46]

✔ **Lifetime studies of security inks using a novel gonio-spectrometer with in situ ageing capability,** M. Emerich, E. Rosenberg, Technische Univ. Wien (Austria); H. Deinhammer, S. Paleczek, P. Fajmann, D. Schwarzbach, Oesterrreichische Banknoten- und Sicherheitsdruck GmbH (Austria) . . . . . [5310-47]

Wednesday 21 January

Plenary Presentation
Plenary Speaker

Wednesday . . . . . 8:30 to 9:15 am

Security is Not Just for Money Anymore

Annette Jaffe, Annette Jaffe Consulting

See pg. 6 for details.

SESSION 1 . . . . . Wed. 9:30 to 10:30 am

Currency I

Chair: **Sara E. Church**, Bank of Canada

Perception and detection of counterfeit currency in Canada: note quality, training, and security features, R. M. Klein, J. J. Christie, S. Gadbois, Dalhousie Univ. (Canada) . . . . . [5310-01]

Comparative analysis of public opinion research in the U.S. and Canada, L. Setlakwe, Bank of Canada; L. A. Dinunzio, U.S. Dept of the Treasury Bureau of Engraving and Printing . . . . . [5310-02]

Security through chips in banknotes, M. Perron, Banque de France (France) [5310-03]

SESSION 2 . . . . . Wed. 11:00 am to 12:00 pm

Currency II

Chair: **Elisabeth Schulz**, European Central Bank (Germany)

Survey among professional cash handlers on their knowledge of the Euro banknotes' security features, O. Strube, European Central Bank (Germany) [5310-04]

Latest developments in on- and off-line inspection of bank notes during production, S. C. Brown, KBA-Giori SA (Switzerland) . . . . . [5310-05]

New security features and their impact on low-cost note readers *(Invited Paper),* R. R. Bernardini, Mars Electronics International . . . . . [5310-06]

Lunch/Exhibition Break

SESSION 3 . . . . . Wed. 1:30 to 2:30 pm

Analysis and Evaluation

Chair: **Malcolm R. M. Knight**, De La Rue International Ltd. (United Kingdom)

Analysis of counterfeits and public survey results as design input, S. E. Church, L. Setlakwe, Bank of Canada (Canada) . . . . . [5310-07]

Probabilistic risk assessment for comparative evaluation of security features, A. Saksena, D. Lucarelli, Johns Hopkins Univ. . . . . [5310-08]

Proposal of qualitative classification for security devices, K. Yamamotoya, H. Matsumoto, NHK Spring Co., Ltd. (Japan) . . . . . [5310-09]

SESSION 4 . . . . . Wed. 2:30 to 4:00 pm

Biometrics

Chair: **Rudolf L. van Renesse**, VanRenesse Consulting (Netherlands)

Chain perspective on biometrics and identity fraud as its challenge *(Invited Paper),* J. Grijpink, Ministry of Justice (Netherlands) . . . . . [5310-10]

Vulnerability analysis of iris recognition, T. Matsumoto, M. Hirabayashi, Yokohama National Univ. (Japan) . . . . . [5310-11]

Modulated digital images for biometric and other security applications, L. D. McCarthy, R. A. Lee, G. F. Swiegers, CSIRO (Australia) . . . . . [5310-12]

Conference 5310

SESSION 5 . . . . . Wed. 4:00 to 5:40 pm

Ink and Printing I

Chair: **John W. Mercer**, U.S. Dept. of State

Multifunctional optical security features based on bacteriorhodopsin, N. A. Hampp, M. Neebe, T. Juchem, Phillips-Univ. Marburg (Germany); M. Wolperdinger, Munich Innovative Biomaterials GmbH (Germany); M. Geiger, A. Schmuck, Agfa-Gevaert AG (Germany) . . . . . [5310-13]

Microstructural lines involving luminescence, K. Shimada, National Printing Bureau (Japan) . . . . . [5310-14]

New digital anti-copy/scan and verification technologies, G. K. Phillips, Verify First Technologies . . . . . [5310-15]

New security system for ID certificates in IT society, H. Nagashima, K. Saito, National Printing Bureau (Japan) . . . . . [5310-16]

Development of an image analysis system that can detect fraudulent alterations made to printed images, J. Tchan, London College of Printing (United Kingdom) . . . . . [5310-17]

Security Exhibition . . . . . 7:00 to 9:30 pm

Thursday 22 January

SESSION 6 . . . . . Thurs. 8:30 to 9:50 am

Ink and Printing II

Chair: **James M. Jonza**, 3M Co.

Information embedding using two-layer conjugate screening, Z. Fan, Xerox Corp. . . . . [5310-18]

Digital authentication with copy detection patterns, J. Picard, MediaSec Technologies . . . . . [5310-19]

Direct laser engraving of intaglio printing plates, H. Deinhammer, D. Schwarzbach, P. Fajmann, F. Loos, Oesterrreichische Banknoten- und Sicherheitsdruck GmbH (Austria) . . . . . [5310-20]

NotaMark industrial laser marking system: a new security marking technology, V. G. Moreau, KBA-Giori SA (Switzerland) . . . . . [5310-21]

SESSION 7 . . . . . Thurs. 9:50 to 11:30 am

Digital Watermarking and Machine Vision

Chair: **Sybrand Spannenburg**, Joh. Enschedé Security Printing B.V. (Netherlands)

Generalization of the digital watermarking paradigm, A. Herrigel, DCT AG (Switzerland) . . . . . [5310-22]

Full spectrum image coding for security document marking, H. Oltmans, Joh. Enschedé Security Printing B.V. (Netherlands) . . . . . [5310-23]

Detectors for imaging, T. M. Jagielinski, D. Yang, J. Olson, M. Yount, San Diego Magnetics, Inc. . . . . [5310-24]

Commercial anticounterfeit products using machine vision, P. J. Smith, P. O'Doherty, C. Luna, Fraudhalt Ltd. (Ireland); S. McCarthy, Steorn Ltd. (Ireland) . . . . . [5310-25]

SESSION 8 . . . . . Thurs. 11:30 am to 12:10 pm

Optically Variable Devices I

Chair: **Ian M. Lancaster**, Reconnaissance International (United Kingdom)

Color-shifting features for optically variable devices, W. R. Tompkin, A. Schilling, R. Staub, OVD Kinegram Corp. (Switzerland) . . . . . [5310-26]

Multilayer polymeric color-shifting polarizer films, J. M. Jonza, A. D. Dubner, 3M Co. . . . . [5310-27]

Lunch Break

SESSION 9 . . . . . Thurs. 1:30 to 2:10 pm

Optically Variable Devices II

Chair: **Ian M. Lancaster**, Reconnaissance International (United Kingdom)

Designing holograms for security, R. James, M. Long, D. Newcomb, Pacific Holographics, Inc. . . . . [5310-28]

Concept of printable holograms through the alignment of diffractive pigments, A. Argoitia, S. Chu, Flex Products, Inc. . . . . [5310-29]

SESSION 10 . . . . . Thurs. 2:10 to 3:10 pm

Optically Variable Devices III

Chair: **Wayne R. Tompkin**, OVD Kinegram Corp. (Switzerland)

Diffractive second-line security features for optically variable devices, A. Schilling, W. R. Tompkin, R. Staub, OVD Kinegram Corp. (Switzerland) . . . . . [5310-30]

Integration of contrasting technologies into advanced optical security devices, P. G. Coombs, R. W. Phillips, A. Argoitia, V. P. Raksha, Flex Products, Inc. . . . . [5310-31]

New color shifting security device, F. Moia, Rolic Research Ltd. (Switzerland) . . . . . [5310-32]

SESSION 11 . . . . . Thurs. 3:30 to 6:10 pm

Micro and Nano Optics

Chair: **Hiroyuki Matsumoto**, NHK Spring Co., Ltd. (Japan)

Unison™ microoptic security film, R. Steenblik, M. Hurt, Nanoventions, Inc.[5310-33]

Virtual imaging, D. Dunn, R. Krasa, J. M. Jonza, 3M Co. . . . . [5310-34]

Nanobarcodes™ particles as covert security tags for documents and product security, S. G. Penn, Nanoplex Technologies, Inc. . . . . [5310-35]

Embossing of optical document security devices, S. Muke, Note Printing Australia . . . . . [5310-36]

Standby Presentations

New low-resolution and robust digital watermarking technique for the personalization of visa or other travel documents, A. Herrigel, DCT AG (Switzerland) . . . . . [5310-37]

SmartID: a new approach for the integrity verification of analogue and digital documents, A. Herrigel, DCT AG (Switzerland) . . . . . [5310-38]

Lower cost high security nanostructures for anticounterfeiting applications *(Invited Paper),* R. A. Lee, CSIRO (Australia) . . . . . [5310-39]

Individual computer generated holograms as data carrier for authentification and track and trace applications, S. Noehte, C. Dietrich, S. Borgsmueller, M. Gerspach, S. Scheibenstock, K. Schulte-Wieking, R. Thomann, Tesa Scribos GmbH (Germany) . . . . . [5310-40]

Short Course of Related Interest

SC087 Optical Document Security (van Renesse) Tuesday 1:30 to 5:30 pm, *p. 63*

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Proceedings Volume 5310

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Short Course Index

Capture and Display

Sunday

Monday

Digital Systems and Engineering

Sunday

Monday

Tuesday

Wednesday

Data, Internet, and Multimedia

Sunday

Tuesday

Wednesday

Capture and Display

Stereoscopic Display Application Issues

When correctly implemented, stereoscopic 3D video displays can provide significant benefits in many areas, including endoscopy and other medical imaging, remote-control vehicles and telemanipulators, stereo 3D CAD, molecular modelling, 3D computer graphics, 3D visualization, and video-based training. This course conveys a concrete understanding of basic principles and pitfalls that should be considered in transitioning from 2D to 3D displays, and in testing for performance improvements. The course demonstrates a range of stereoscopic hardware and 3D imaging/display principles, emphasizing key issues in an ortho-stereoscopic video display setup, and showing video from a wide variety of applied stereoscopic imaging systems.

LEARNING OUTCOMES

This course will enable you to:

- list critical human factors guidelines for stereoscopic display configuration and implementation
- calculate optimal camera focal length, separation, display size, and viewing distance to achieve a desired level of depth acuity
- calculate comfort limits for focus/fixation mismatch and on-screen parallax values as a function of focal length, separation, convergence, display size, and viewing distance factors
- set up a large-screen stereo display system using AV equipment readily available at most conference sites, for slides and for full-motion video
- evaluate the trade-offs among currently available stereoscopic display technologies for your proposed applications
- list the often-overlooked side-benefits of stereoscopic displays that should be included in a cost/benefit analysis for proposed 3D applications
- avoid common pitfalls in designing tests to compare 2D vs. 3D displays
- calculate and demonstrate the distortions in perceived 3D space due to camera and display parameters
- design and set up an orthostereoscopic 3D imaging/display system
- explain the projective geometry involved in stereo modelling
- enumerate the problems, and the solutions, for converting stereoscopic video across video standards such as NTSC to PAL
- work with 3D Digital Video (DV) using a non-linear editing system and know how to create 3D DVDs
- describe the trade-offs among currently available stereoscopic display system technologies and determine which will best match a particular application.

INTENDED AUDIENCE

This course is designed for engineers, scientists, and program managers involved with video display systems for applications such as: medical imaging and endoscopic surgery, simulators and training systems, teleoperator systems (remote-control vehicles and manipulators), computer graphics, 3D CAD systems, data-space exploration and visualization, and virtual reality.

INSTRUCTORS

John Merritt is a display systems consultant at The Merritt Group, Williamsburg, MA, with over 25 years experience in the design and human-factors evaluation of stereoscopic video displays for telepresence and telerobotics, scientific visualization, and medical imaging.

Andrew Woods is a research engineer at Curtin University's Centre for Marine Science and Technology, Perth, Western Australia, with over 10 years of experience working on the design, application, and evaluation of stereoscopic video equipment for teleoperation, industrial and entertainment applications.

Course level: Intermediate
SC060 CEU .65 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

Preregister by Short Course (SC) Number

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Use of CCD and CMOS Sensors in Visible Imaging Applications

This course will describe the imaging capabilities of visible sensors and illustrate their use with examples as varied as a commercial color scanning Telecine application and multispectral satellite imaging. The methodology for configuring and specifying a visible imaging system will be described, including the role of charge-coupled device (CCD), and complementary metal-oxide-silicon (CMOS) focal plane technologies.

LEARNING OUTCOMES
This course will enable you to:
- understand the fundamentals of CCD and CMOS imaging operation, pixel signal formation, charge-to-voltage conversion, multiplexing and the formation of the video signal
- compare and contrast CCD, CMOS and charge injection device (CID) visible imaging pixel and array architectures
- describe the processing functions of the video signal chain through analog-to-digital conversion
- describe signal propagation through a visible sensor and define the key imager/camera noise components
- define the key modulation transfer function (MTF) components of a visible imaging system
- analyze system imaging capability by the joint use of the system MTF and signal-to-noise ratio using an imaging simulation approach
- describe in detail an example of tailoring a CCD-based imaging system for motion-picture to high definition television (HDTV) signal conversion (Telecine)
- list important technical criteria for specifying the design, fabrication, and verification for state-of-the-art visible imaging devices
- access a bibliography on CCDs, visible imaging devices, and other related subjects
- access an appendix that describes a detailed example of tailoring of a visible sensor system for a multispectral pushbroom satellite imaging application
- have access to an appendix that describes image formation, signal manipulation and processing, and noise effects for intensified (low-light level) imaging systems

INTENDED AUDIENCE
Engineers, scientists, and managers who are interested in utilizing CCD, CMOS or CID sensors in advanced camera and imaging applications will benefit from this class.

INSTRUCTOR
Terrence Lomheim holds the position of Distinguished Engineer at The Aerospace Corp. He has 25 years of hardware and analysis experience in visible and infrared electro-optical systems, focal plane technology, and applied optics, and has authored and co-authored 37 publications in these technical areas. He is a Fellow of the SPIE.

Course level: Introductory
SC068 CEU .35 $200 / $235 USD
Monday 8:30 am to 12:30 pm

Effective Color Computing

This course will give an overview of the color concepts used in the computer world today, illustrated with practical examples and computer demonstrations. This course translates theoretical color concepts into practical knowledge useful to the application developer. It is structured in three parts: color perception (trichromatic color vision, metamerism, color generation), color analysis (clustering and segmentation), and color reproduction (device dependent color, halftoning, gamut mapping, ICC profile, CMM). Computer animation is used for illustration of color spaces, 3D histograms, devices gamut, gamut mapping. Halftoning examples are presented for several screening methods (stochastic screening, several error diffusion variants, pulse density modulation and mixed techniques). Color management system architecture is discussed and the ICC profile specifications for accurate color reproduction are explained.

LEARNING OUTCOMES
This course will enable you to:
- describe the differences between the color as it is perceived by humans and processed by computer
- explain intuitive representation of color spaces (CIEXYZ, RGB, CMYK, HSV, HSL, CIELAB, CIELUV) and chromaticity diagrams (CIE 1931 and 1976) and understand their utility in color computing
- identify the performances and limits of several clustering algorithms for color analysis
- describe gamut differences, and compare several gamut mapping techniques
- classify halftoning techniques, and summarize their advantages and limitations
- explain how a color management system operates based on ICC profiles.

INTENDED AUDIENCE
Engineers, scientists and managers involved in designing color applications or functions to effectively solve color problems in computer applications will benefit from this course. Participants should have some familiarity with color imaging and computer systems.

INSTRUCTOR
Gabriel Marcu is Senior Scientist in ColorSync group, at Apple Computer. His achievements are in color reproduction on displays and desktop printing (characterization/calibration, halftoning, gamut mapping, ICC profiling). Dr. Marcu is responsible for color calibration and characterization of Apple display products. He has taught seminars and short courses on color topics for Shizuoka University/ Japan, UC Berkeley, EMI Cambridge/UK, and various IS&T, SPIE and SID conferences. He is the recipient of the IS&T Service Award in 2001. Since 1998 he has been serving as co-chair of the Electronic Imaging Conference on Color Imaging: Processing, Hardcopy, and Applications, and was general co-chair for the IS&T/ SID 11th Color Conference in Scottsdale, Arizona, in 2003.

Course level: Advanced
SC075 CEU .35 $200 / $235 USD
Monday 8:30 am to 12:30 pm

Introduction to CCD and CMOS Imaging Sensors and Applications

Development and application status of CCD and CMOS imaging technologies are reviewed. General theory and operation for each technology are studied. Fundamental performance limits behind major sensor operations are discussed (i.e., charge generation, charge collection, charge transfer, and charge measurement). Performance differences between CMOS and CCD imaging arrays are covered. We will discuss operation principles behind popular commercial and scientific CMOS pixel architectures (e.g., photo diode, photo gate, pinned diode, charge share, etc.). Various array readout schemes are examined (e.g., frame transfer, interline transfer, full frame, progressive scan, rolling shutter, snap, etc.). We will also talk about backside illuminated arrays for UV, EUV and x-ray applications; high QE frontside illuminated sensors (phosphor coated, transparent gate, virtual phase, thin gate, etc.); deep depletion CCDs, ultra large CMOS and CCD arrays; high speed/ low noise parallel readout sensors. We will describe the photon transfer technique in measuring performance and calibrating camera and chip systems (e.g., signal-to-noise, linearity, full well, read noise, dynamic range, QE sensitivity, ISO, responsivity, dark current, and fixed pattern noise). Charge transfer mechanisms are outlined. Carrier diffusion, pixel cross-talk, MTF and color performance are reviewed. We will review correlated double sampling theory used to achieve low noise performance. Various on-chip and off-chip noise sources are discussed (reset, white, flicker, RTS, dark current, cosmic rays, spurious charge, luminescence, image lag, amplifier, quantizing, electrical interference, etc.). There will be a brief review of radiation and ESD damage. Image defects, shorts, device yield, popular chip foundries, chip cost; custom designed and off-the-shelf sensors are discussed. We will conclude with a look at future research and development trends for each technology.

LEARNING OUTCOMES
This course will enable you to:
- describe operating CMOS and CCD arrays and camera systems for commercial and scientific imaging applications
- explain how CCD and CMOS arrays are designed, fabricated, tested and calibrated
- know more about how to apply test methodologies and performance standards
- list specifications and requirements to select a sensor for your imaging application
- understand performance differences between CMOS and CCD technologies
- understand how video signals are processed for optimum signal-to-noise performance
- discuss current and future imaging technologies and applications

INTENDED AUDIENCE
This course is for scientists, engineers, and managers involved with high performance CCD and CMOS imaging sensors and camera systems.

INSTRUCTOR
James Janesick is the director of the CMOS/CCD advanced development group for Sarnoff Corporation. Previously he was at Conexant Systems Inc. developing CMOS imaging arrays for commercial applications. He was also technology director of Pixel Vision Inc. for five years developing high speed backside illuminated CCDs for scientific and cinema cameras. Prior to this Mr. Janesick was with the Jet Propulsion Laboratory for 22 years where as group leader he designed scientific CCDs and support electronics utilized in various NASA space-borne and astronomical ground based imaging systems. He has authored 75 publications and has contributed to many NASA Tech Briefs and patents for various CCD and CMOS innovations. He received NASA medals for Exceptional Engineering Achievement in 1982 and 1992.
Course price includes the textbook, *Scientific Charge Coupled Devices* (SPIE, 2001), by James Janesick.

Course level: Introductory
SC504 CEU .65 $425 / $500 USD
Sunday 8:30 am to 5:30 pm

Color Considerations for Liquid Crystal Displays

This tutorial discusses and illustrates the most important factors of color rendering in Thin-Film Transistor Liquid Crystal Displays (TFT-LCD). Factors such as: technology, luminance/brightness, color gamut, gain function, white point, gray tracking, color model and color dependency on the viewing angle are discussed. Several TFT-LCD technologies such as Twisted Nematic (TN), In-Plane Switching (IPS) and Super IPS are discussed. The importance of color management (including calibration and ICC characterization) for accurate color control is explained and the analytical versus empirical color models are compared. The influence of viewing conditions and adaptation in the evaluation of the displayed color is highlighted. The role of measurement and interpretation of data (including gamut visualization and comparison) is demonstrated.

LEARNING OUTCOMES
This course will enable you to:
- understand the difference between TN, IPS and super display technologies
- compare the color performance of TN, IPS and Super IPS display technologies and understand the limitations in compensating for color differences between them
- understand the influence of luminance level on brightness and the perceived color gamut
- evaluate the role of gamma correction and its precise control of the color on the screen
- understand the chromaticity variation of the TN primaries with the input level and how to compensate for it in the color model
- describe viewing flare and explain how to compensate for it in the color model
- understand what gray tracking is and know how to control it using the existing video card lookup tables
- explain how to control the white point of the display and how to simulate a different target
- judge the suitability of analytical and empirical color models for different TFT-LCD technologies
- explain the calibration and the characterization processes for a TFT-LCD panel.

INTENDED AUDIENCE
This course is intended for engineers, scientists and managers confronting color issues in TFT-LCDs.

INSTRUCTOR
Gabriel Marcu is Senior Scientist in the ColorSync group, at Apple Computer. His achievements are in color reproduction on displays and desktop printing (characterization/calibration, halftoning, gamut mapping, ICC profiling). Dr. Marcu is responsible for color calibration and characterization of Apple display products. He has taught seminars and short courses on color topics for Shizuoka University/Japan, UC at Berkeley, EMI Cambridge/UK, and various IS&T, SPIE and SID conferences. Dr. Marcu is the recipient of the IS&T Service Award in 2001. Since 1998 he has been serving as co-chair of the Electronic Imaging Conference on Color Imaging: Processing, Hardcopy, and Applications (El09) and was general co-chair for the IS&T/SID 11th Color Imaging Conference in Scottsdale, Arizona, in 2003.

Course level: Introductory
SC516 CEU .35 $200 / $235 USD
Monday 1:30 to 5:30 pm

Color Imaging with Visible Image Sensors

This course will describe the principles, key technologies, and applications of color imaging using visible image sensors (CCD, CMOS). The course will: briefly overview the theory of human color perception; discuss the relevant television-based standards which apply to broadcast color video signals; discuss the evolution of color CCD and CMOS camera architectures and associated analog and digital signal processing techniques including those used to process color-filter array video signals; overview imager technology basics for digital still camera applications, and review the MPEG compression standard for High Definition Television.

LEARNING OUTCOMES
This course will enable you to:
- understand the basics of human color perception and how this is quantified for color video broadcast applications using the CIE color standards
- describe the National Television System Committee (NTSC) color signal encoding scheme (e.g. the interleaving of luminance and chrominance signals, setting of the chrominance sub-carrier frequency and signal bandwidths, formation of the three "transmission" primaries based on luminance and color-difference signals etc.)
- overview the PAL and SECAM color transmission standards; understand the architecture, operation, and signal processing of three and two sensor chip color cameras, including gamma correction, color correction, color-difference matrix operations, temporal/spatial filtering, and NTSC encoding
- understand the architecture and operation of single CCD or CMOS chip color cameras including: color filter arrays (CFA) formats using primary (red, green, blue) and complementary (cyan, magenta, yellow) filter elements, CFA signal demultiplexing, and other operations unique to CFA-based cameras
- access a fairly detailed appendix on the history, standards development, and technical methods (e.g. MPEG-2 compression) associated with high-definition television (HDTV)
- understand the sensor and optical formats and technology drivers for digital still camera applications
- access a bibliography on a wide variety of color imaging topics.

INTENDED AUDIENCE
Engineers, scientists and managers who are interested in color imaging and non-broadcast multicolor imaging applications will benefit from this class.

INSTRUCTOR
Terrence Lomheim is a Distinguished Engineer at The Aerospace Corp., in El Segundo, California. He has 25 years of hardware and analysis experience in visible and infrared electro-optical systems, focal plane technology, and applied optics and has authored and co-authored 37 publications in these technical areas. He is Fellow of the SPIE.

Course level: Intermediate
SC528 CEU .35 $200 / $235 USD
Monday 1:30 to 5:30 pm

Principles of Digital Color Management

The principal objectives of color management are to represent, control, and communicate color within and among color-imaging systems. Numerous color-management methods, attempting to meet these objectives, have claimed to provide "device-independent" color, and therefore to be appropriate for all imaging systems and applications. In practice, however, none of these attempts has proven completely successful. This course will set forth the basic principles required to understand successful color imaging and color management.

Color fundamentals will be explored as they relate specifically to the design of imaging media, devices, and color-management systems. Topics will include image capture, signal processing, and image display. A number of important perceptual phenomena will be demonstrated. The color properties of various imaging media and devices will be investigated, and the relevance of all these topics to color management will be discussed.

The capabilities and limitations of several methods for managing color will be considered. A "universal" color-management paradigm will then be described which, together with its unique appearance-based color encoding, offers a comprehensive solution to the difficult problems of managing color in today's complex electronic and hybrid color-imaging systems.

Preregister by Short Course (SC) Number

Preregister today to guarantee your participation.

See p. 71 to register.

1st price = SPIE Member; 2nd price = Nonmember
CEU = Continuing Education Unit

LEARNING OUTCOMES
This course will enable you to:
- understand the fundamental color-science principles underlying various color-imaging media and devices
- understand why images from various types of media differ fundamentally in their basic color properties, and the impact these differences have on digital color management
- list and compare the capabilities and limitations in the technologies used in various types of color-managed systems
- describe the properties of a universal color-management paradigm
- differentiate the universal paradigm's appearance-based representation from other color-encoding methods
- understand how the universal paradigm can be translated to practical systems

INTENDED AUDIENCE
Scientists, engineers, and others interested in and involved with color-imaging or color-management products, devices, or systems will benefit from this class. Participants should have some familiarity with colorimetry and color-imaging systems.

INSTRUCTOR
Thomas Madden is a Research Associate and Group Leader in the Imaging Science Division at Eastman Kodak Company. He holds numerous patents in the fields of color management and imaging technology. He is a contributing author to two textbooks on color science and color imaging, and is co-author of the textbook *Digital Color Management: Encoding Solutions* on which this tutorial is based. He is an award-winning instructor and has contributed to numerous publications and technical symposia in the U.S., Canada, and Europe.

Course level: Intermediate
SC592 CEU .35 $200 / $235 USD
Monday 1:30 to 5:30 pm

Digital Systems and Engineering

Applied Morphological Image Analysis Techniques

This course is designed as a very practical and applications-oriented overview of morphological image analysis. Morphology refers here to the study of shapes and structures in images, using a rigorous mathematical framework that translates into efficient and robust algorithms. The methodology was originally designed for quantitative analysis of materials, but as new morphological operations and methods were invented, morphology grew exponentially more useful in a wide range of application areas. It is now recognized as an essential toolbox for many image analysis applications including exploitation, acquisition and tracking, and machine vision.

Starting from the basic concepts of erosions and dilations, the course will gradually move on to increasingly advanced and useful operations such as openings and closing, granulometries, skeletons, and watersheds. These tools, described in a manner that is both intuitive and detailed, are shown to be incredibly useful for complex image segmentation and feature extraction tasks. Examples of application, taken from remote sensing, forward looking infrared imagery, industrial inspection, oceanography, sonar and radar data analysis, medical imaging, etc., will be described throughout the course. Practical issues of algorithm design, automatic parameter calibration, system robustness, and efficient implementation will also be covered.

LEARNING OUTCOMES
This course will enable you to:
- list and compare the benefits of the morphological approach to image analysis and segmentation
- identify and intuitively describe the morphological operators that are useful for a variety of image analysis tasks
- predict the sequence of image transformations that should be used to elegantly and robustly solve your image analysis problems
- implement fast morphological algorithms using some of the latest techniques developed
- probe further any particular topic using the comprehensive and extensively illustrated set of course notes and bibliography provided

INTENDED AUDIENCE
This tutorial is intended for anyone (engineer, academic, student, etc.) with concrete image analysis needs, or simply wishing to learn about recent advanced image analysis techniques. It will be especially useful to designers and developers of algorithms for fast and robust image analysis systems. This course is a practical, problem-solving oriented course, therefore no particular background is required. Some basic notions of image analysis and morphology could be an advantage, but are not essential.

INSTRUCTOR
Luc Vincent holds a PhD in Mathematical Morphology and has been working in image analysis and machine vision for 15 years. He is a recognized expert in the field, with over 60 publications, and has served as a consultant to many organizations. He spent a good part of his career at Xerox, most recently as area manager in the Palo Alto Research Center. He is presently Vice President of Engineering for Soligence, a VC backed startup focusing on imaging satellite.

Course level: Advanced
SC063 CEU .65 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

Introduction to Image Processing and Recognition using Neural Networks, Wavelets, and Statistical Techniques

Image processing and recognition is one of the important applications of information systems. This course is aimed at people interested to learn practical applications of image processing techniques applied to real-time applications including biomedical image processing and image recognition problems. This course will review fundamentals of digital image processing, imaging systems, image recognition, and statistical filtering for image processing; fundamentals of wavelet transforms for image processing; fundamentals of neural networks for image processing; and recent advances in image recognition techniques. The course will present examples of applications of these techniques in real-time pattern recognition, target tracking, classification, and real-time biometrics recognition.

LEARNING OUTCOMES
This course will enable you to:
- learn the fundamentals of image processing
- know more about the fundamentals of wavelet transforms for image processing
- learn the fundamentals of neural networks for image processing
- understand the fundamentals of image recognition, object tracking, and data classification
- discover the fundamentals of statistical filtering for image processing and recognition
- learn applications to biomedical image processing
- discover the recent advances in image processing and recognition
- recognize applications to biometrics recognition
- evaluate whether image processing and recognition systems are a good candidate for your information systems
- distinguish what types of image processing and recognition systems are suitable for the applications described
- describe metrics for evaluation of image processing and recognition systems

INTENDED AUDIENCE
This course is intended for engineers, physicists, biomedical engineers, computer scientists, physicians, and managers who are interested in learning about fundamentals of digital image processing, biomedical image processing applications, neural networks for image processing, wavelet transforms, statistical filters for image processing, image recognition, real-time pattern recognition systems, and applications including image tracking, classification, high speed image processing systems, real-time image processing, and biometrics image processing.

INSTRUCTOR
Bahram Javidi , Distinguished Professor of Engineering at the University of Connecticut, is a Fellow of IEEE, OSA, and SPIE, and was appointed an NSF Presidential Young Investigator. He has published over 250 technical articles including over 60 invited papers.

Course level: Introductory
SC189 CEU .65 $355 / $430 USD
Monday 8:30 am to 5:30 pm

Short Courses

Neural Network Applications in Image Processing

This course provides a broad introduction to the basic concepts of artificial neural networks and its applications in image processing. A large number of neural network architectures and their training algorithms are reviewed. Examples of neural network architectures covered in this course are single layer perceptrons, multilayer perceptrons, time-delay neural networks, Kohonen feature maps, learning vector quantization, radial basis function and Hopfield neural networks. Applications that are covered are object and pattern recognition, object inspection, classifiers, handwritten word and digit recognition, automatic target recognition, and image compression.

LEARNING OUTCOMES
This course will enable you to:
- understand the fundamental concepts of artificial neural networks techniques
- distinguish between the classical pattern recognition algorithms and the neural network techniques
- compare the relative merits of various neural networks, i.e., single layer perceptrons, multilayer perceptrons, time-delay neural networks, Kohonen feature maps, learning vector quantization, radial basis function
- explain supervised and unsupervised training algorithms
- describe the typical applications of neural networks to image processing problems
- identify the most appropriate neural network algorithm for a particular image processing application.

INTENDED AUDIENCE
This course is intended for managers, engineers, computer scientists and graduate students who are interested in disciplines, such as signal and image processing, and optics. Engineers and scientists interested in acquiring basic technical knowledge in the area of neural networks and its applications in vision will benefit from this course.

INSTRUCTOR
Nasser Nasrabadi is a senior research scientist (ST) at U.S. Army Research Laboratory (ARL). He is also an adjunct professor in the Electrical and Computer Engineering Department at the Johns Hopkins University. He is a Fellow of IEEE and SPIE. He is actively engaged in research in image processing, neural networks, automatic target recognition, and video compression and its transmission over high speed networks. He has published over 200 papers in journals and conference proceedings. He has been an associate editor for the IEEE Transactions on Image Processing, IEEE Transactions on Circuits and Systems for Video Technology, and he is currently an associate editor for the IEEE Transactions for Neural Networks.

Course level: Introductory
SC491 CEU .65 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

How to Select the Right Image Sensor for Your Application

This course describes the full range of area-imager architectures with a focus on commercially available interline CCDs and CMOS imagers, and discusses their performance characteristics and implementation in various applications including: consumer imaging, industrial and security imaging, scientific and medical imaging and professional photography and entertainment imaging. Practical examples provide attendees with the knowledge and skills required to meaningfully compare sensor options in specific applications.

LEARNING OUTCOMES
This course will enable you to:
- describe differences in architecture, performance, and functionality between full frame CCD, interline CCD, and CMOS image sensors
- describe the performance limitations of today's commercially available CCDs and CMOS imagers
- compare image sensors with different architectures from various manufacturers in ways that are meaningful and application-specific
- convert between different quantities and units used by various manufacturers to specify imager performance
- use an understanding of high-volume imager production testing techniques to relate sensor specifications to application-specific measures of performance
- relate radiometric and photometric imager specifications
- determine base ISO and noise-based ISO for digital imaging systems and identify the most useful measure of sensitivity for your application.

INTENDED AUDIENCE
This course is appropriate for engineers and managers involved in the evaluation and procurement of image sensors and the development of digital imaging systems. It would also benefit marketing and business development professionals who would like to survey digital imaging applications and compare the competitive advantages of different types of image sensors in those applications.

INSTRUCTOR
Gloria Putnam is Applications Engineering Manager at Eastman Kodak Company, Image Sensor Solutions, where she assists product developers with the selection of image sensors and development of cameras for applications ranging from radiography to consumer photography.

Course level: Introductory
SC494 CEU .35 $200 / $235 USD
Wednesday 1:30 to 5:30 pm

Practical MTF Metrology for Digital Cameras and Scanners

This is a theory-to-practice course on MTF metrology for digital imaging devices and systems using standardized slanted-edge measurement protocols of ISO 12233, ISO 16067-1, and ISO 16067-2. Though the theory behind MTF and its components is well established, practical metrology issues frequently limit measurement precision, accuracy, and utility. How the ISO protocols are applied to several types of image acquisition systems and field conditions will be explained using results from actual measurements. Time permitting, the evaluation of participants' own image capture devices may be performed.

LEARNING OUTCOMES
This course will enable you to:
- explain the underlying principles that allow slanted-edge MTF evaluation
- determine how to unambiguously audit manufacturer's/vendor's resolution claims
- gain knowledge of how to manage chaotic or non-linear data
- interpret MTF morphology due to image processing, and directional or optical field variations
- identify methods and means of target availability, cost, characterization, and design
- use publicly available and certified MTF evaluation software tools.

INTENDED AUDIENCE
Although technical in content, this course is intended for a wide audience: image scientists, quality engineers and others charged with evaluating or modeling digital camera and scanner performance. No background in MTF evaluation will be assumed, although some familiarity with basic concepts of imaging systems and measurement error will be helpful.

INSTRUCTORS
Peter Burns has been at Kodak for the past twenty years, working in image evaluation, system modeling and image processing. Previously he was with Xerox Corp. He has taught several imaging courses at Kodak, SPIE and IS&T technical conferences, and as an adjunct professor at the Center for Imaging Science, RIT.
Don Williams works in Imaging Research and Development at Kodak. His work at Kodak focuses on quantitative signal and noise performance metrics for digital capture imaging devices and imaging system simulations. He co-leads the TC42 standardization efforts for digital print scanner (ISO 16067-1) and digital film scanner (ISO 16067-2) resolution measurement.

Course level: Intermediate
SC513 CEU .65 $355 / $430 USD
Monday 8:30 am to 5:30 pm

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CEU = Continuing Education Unit

Software Engineering for Imaging Engineers

This course is designed to provide a modern, engineering framework for the specification, design, coding, testing, and maintenance of image processing software and systems. In particular, the focus is on imaging systems as a special case of software, thereby providing a common framework and language of discourse for imaging engineers of all backgrounds. This common framework, in turn, should lead to more reliable and economical software for the attendee's organization.

LEARNING OUTCOMES
This course will enable you to:
- use standardized frameworks to communicate about software and its artifacts
- improve your organization's practices in software specification, design, production and testing of industrial strength software
- manage all aspects of the software production process with improved ability
- select materials for more in-depth study of various aspects of software engineering practice.

INTENDED AUDIENCE
This course is intended to help those in industry, who, though practicing as software engineers, have had little or no formal training in software engineering. The typical participant will have an undergraduate degree in mathematics, engineering, a physical science or the equivalent experience. Some experience in working on a software project team either as a requirements writer, designer, developer, tester or manager would be helpful, but is not essential. No experience in programming in any particular language is assumed. It would be helpful if the attendee had a mathematical background at least embracing calculus, but this is not essential since most of software engineering does not involve deep formulaic principles.

INSTRUCTOR
Phillip Laplante is Associate Professor of Software Engineering at Penn State's Great Valley Graduate Center. He has been involved in the development and design of real-time systems and imaging systems for more than 20 years. Dr. Laplante has published 17 books, including in 2003 the textbook "Software Engineering for Image Processing Systems" from CRC Press on which this course is based. He has also written numerous papers related to real-time systems, real-time imaging and software engineering and has authored and taught many courses for SPIE and IS&T. He holds a B.S., M.Eng., and PhD from Stevens Institute of Technology and an MBA from the University of Colorado.

Course level: Introductory
SC527 CEU .65 $355 / $430 USD
Tuesday 8:30 am to 5:30 pm

Image and Video Compression: Standards and Trends

Digital image and video compression is a current focus of both research and international standardization. Recently developed standards such as JPEG, H.261, MPEG-1, MPEG-2, H.263 and MPEG-4, and emerging standardization projects such as JPEG2000 and H.264 (a.k.a. JVT, AVC, or MPEG4 part 10) reflect the state-of-the-art in visual content coding techniques. They are an important factor for facilitating interoperability among various imaging systems as well as for deploying the technology widely and in a cost-effective manner.

This course is an introduction to the basic concepts as well as the state-of-the-art techniques and standards used in image and video compression. It includes a comprehensive description of the technical aspects, scope, and performance of the current and emerging standards such as the DCT-based lossy JPEG, the wavelet-based JPEG2000, and the MPEG family of standards. Many image and video examples complement the technical descriptions. A live demo of JPEG2000 over a 64kbps line and a comparison demo of the H.264 and MPEG2 video compression algorithms are also included.

LEARNING OUTCOMES
This course will enable you to:
- understand the advantages of using image and video compression algorithms through a detailed review of many product examples
- learn the technical details of the DCT-based lossy JPEG algorithm, and assess its performance by viewing many image examples
- understand the proper selection of JPEG user-defined parameters after a guided exercise
- understand the algorithmic principles of the wavelet-based JPEG2000 emerging standard and its novel features over the existing JPEG standard
- understand the algorithmic principles of the various MPEG algorithms used in CD-I, DVD, digital television, digital cinema and HDTV
- describe the main differences in scope and technical detail between the various MPEG-1, MPEG-2, and MPEG-4 standards

INTENDED AUDIENCE
Scientists, engineers, managers and product planners who need to understand the capabilities of state-of-the art image and video compression techniques and standards will benefit from this course. No prior image compression knowledge or experience is assumed. Although not essential, some basic mathematical skills would help with full understanding of the basic concepts of the discrete cosine transforms and wavelets.

INSTRUCTOR
Majid Rabbani has 25 years of experience in digital imaging. He is an Eastman Distinguished Fellow and the manager for the image compression and digital video processing technology areas within Eastman Kodak Research Labs. He is also an adjunct Associate Professor at Rochester Institute of Technology (RIT). He is the recipient of the 1988 Kodak C. E. K. Mees Award and the co-recipient of two Emmy Engineering Awards in 1990 and 1996. He continues to be a key participant at the International JPEG organization since its inception and he also represents Kodak at the Digital Cinema group of MPEG. He is the co-author of the book "Digital Image Compression Techniques" published in 1991. In collaboration with SPIE, he has created six video/CDROM courses in the area of digital imaging for corporate training. Dr. Rabbani is a Fellow of SPIE, a Fellow of IEEE, and a Kodak Distinguished Inventor.

Course level: Intermediate
SC589 CEU .65 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

Advanced Digital Image Processing Techniques

This course discusses some of the advanced algorithms in the emerging field of digital image processing. In particular, it familiarizes the audience with the understanding, design, and implementation of advanced algorithms in the areas of image enhancement, image restoration or deblurring, and digital image watermarking. Some of the applications include medical imaging, digital cameras, digital photofinishing, professional photography, forensic imaging, and astronomical imaging. Numerous image examples complement the technical descriptions.

LEARNING OUTCOMES
This course will enable you to:
- explain the various advanced techniques used in image enhancement such as various adaptive contrast enhancement techniques (e.g., adaptive histogram equalization, Pizer, Wallis, etc.), adaptive sharpening techniques (e.g., nonlinear unsharp masking), and noise removal (e.g., selective averaging, median filtering, etc.)
- explain the various techniques used in image deblurring (restoration) such as inverse filtering, Wiener filtering, CLS and MAP filtering, projection unto convex sets (POCS)
- explain the basic techniques for invisible digital image watermarking used for copyright protection, metadata tagging, security, authentication, etc.
- assess the performance and effectiveness of the various techniques by viewing many image examples

INTENDED AUDIENCE
Scientists, engineers, and managers who need to understand and/or apply the techniques employed in digital image enhancement, deblurring, or invisible image watermarking in various products in a diverse set of applications such as medical imaging, professional and consumer imaging, forensic imaging, etc. will benefit from this course. Some prior knowledge of linear system theory (e.g., Fourier transforms) and digital filtering would be helpful.

INSTRUCTOR
Majid Rabbani has 25 years of experience in digital imaging. He is an Eastman Distinguished Fellow and the manager for the image compression and digital video processing technology areas within Eastman Kodak Research Labs. He is also an adjunct Associate Professor at Rochester Institute of Technology (RIT). He is the recipient of the 1988 Kodak C. E. K. Mees Award and the co-recipient of two Emmy Engineering Awards in 1990 and 1996. He continues to be a key participant at the International JPEG organization since its inception and he also represents Kodak at the Digital Cinema group of MPEG. He is the co-author of the book "Digital Image Compression Techniques" published in 1991. In collaboration with SPIE, he has created six video/CDROM courses in the area of digital imaging for corporate training. Dr. Rabbani is a Fellow of SPIE, a Fellow of IEEE, and a Kodak Distinguished Inventor.

Course level: Advanced
SC590 CEU .65 $355 / $430 USD
Monday 8:30 am to 5:30 pm

Digital Video Basics: Analog and Digital TV Basics and Signal Processing

Digital television is about re-invention of the television industry via digital technology, just like digital computer re-invented the computing and documenting industries. This course is about Analog and Digital TV basics and relevant signal processing. The course covers the fundamental technology that lies at the heart of video compression, high definition television (HDTV), and Digital TV in general. It is recommended as an introductory course.

LEARNING OUTCOMES
This course will enable you to:
- understand the basics of how analog video is digitalized, carried, and tested
- describe the processing functions of the video signal chain through analog-to-digital conversion
- understand in more detail the processes involved in video encoding and decoding
- explain the underlying principles of the color space and colorimetry, gamma processing, etc.
- identify common problems with digital video quality, their causes, and solutions
- learn basic analog and digital video standards, principles standards are based on and terminology

INTENDED AUDIENCE
Although technical in content, this course is intended for a wide audience. The course is designed for scientists, engineers, analysts, and technical managers involved in the design, specification, implementation, manufacturing, marketing, or evaluation of digital video products or systems and others who wish to acquire knowledge of the digital video technology field.

INSTRUCTOR
Jordan Isailovic is a scientist at JRI Technology and the California State University. He is author of *Videodisc and Optical Memory Technologies* and *Videodisc Systems: Theory and Applications*. He has authored numerous technical articles and holds several patents on digital information storage techniques and video signal processing, including the channel code named after him, 'Jordan code'. He presented an engineering course on videodisc technology in January 1982 and taught graduate courses on videodisc and optical memories (CD, CD-ROM, etc.). He also wrote four manuscripts: *Optical Compact Systems*, *Advanced Digital Systems Design*, *Guide to Frame Grabber Design*, and *Multimedia PC Architecture and Design*. Currently, Dr. Isailovic is consulting in the fields of video compression and digital cinema: evaluating/testing compression techniques, proposing system designs, participating in standards committees on digital cinema, etc.

Note: A pre-homework assignment will be made available to participants a few weeks before course date.

Course level: Introductory
SC591 CEU .65 $355 / $430 USD
Monday 8:30 am to 5:30 pm

Data, Internet, and Multimedia

Color Imaging on the Internet

The enormous possibilities and widespread connectivity offered by the Internet and the World Wide Web has spawned multiple ways of exchanging and communicating color images. The Internet is an evolving communication system, where uses, technologies, and applications are continuously introduced by a plethora of players. Its functionality, reliability, scaling properties, and performance limits are largely unknown-albeit they span wide gamuts from optic fiber to wireless connections and from game consoles to palmtop devices, etc. To be successful in Internet imaging, users and developers must design systems in a top-down approach. The goal of this short course is to sort out the available standard methods so that attendees will become familiar with the different possibilities for Internet imaging; the trade-offs, issues and dependencies of each; how and when each is used; and their system implications. To this end, we systematically present the standard methods for color encoding, image compression, file formatting, protocols, and applications.

LEARNING OUTCOMES
This course will enable you to:
- understand the subtleties of the current and emerging methods for Internet image exchange
- hear from insiders what trends are being contemplated by the various standardization bodies
- learn where to find information about new standardization efforts
- develop a precise and systematic understanding of the principles of color encoding, image compression, file formatting, protocols, and Internet imaging applications
- understand the differences between the various methods for each imaging function
- understand how the different methods for Internet imaging are interrelated.

INTENDED AUDIENCE
This course is intended for those who use or plan to use the Internet for exchanging images; work with images transmitted or received via the Internet; integrate Internet-sourced images in their workflows and systems; or simply want to know what all the fuss is about and how it will affect them.

INSTRUCTORS
Giordano Beretta is with the Internet Printing and Imaging Systems Project at Hewlett-Packard (HP). He did his graduate work in computational geometry at ETH, before joining Xerox PARC in 1984. At Xerox he worked on color reproduction and printing, implemented color and imaging standards, and invented color design tools. After working in strategic planning and intellectual property management, and becoming the Technical Advisor for Color at Canon, he joined HP, where he is currently working on custom publishing solutions for small and medium businesses. He was co-chair of the 2000 and 2004 Electronic Imaging Symposia, 2000-2002 EI Internet Imaging Conferences, 1997-1999 EI Color Imaging Conferences, and serves as an HP Alternate on the U.S. MPEG committee. He is a fellow of the IS&T and SPIE.
Rob Buckley is a Research Fellow with the Xerox Architecture Center in Webster, NY. He did his graduate work on gamut compression and color image coding at MIT, before joining Xerox PARC in 1981. At Xerox he has worked on color reproduction and printing, developed color and imaging standards, and managed a color imaging research group. He coauthored the TIFF-FX file format standard for Internet Fax and is the Xerox Principal on the U.S. JPEG 2000 committee. He edited the IS&T Recent Progress volume on "Color Management and Communication", co-chaired the IS&T/SID 2nd Color Imaging Conference and is on the Program Committee of the EI Internet Imaging Conference. He is a Member of the ISCC Board of Directors.

Course level: Advanced
SC083 CEU .35 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

An Introduction to Cryptography and Digital Watermarking with Applications to Imaging, Video, and Multimedia Systems

This course will present an overview of recent work in modern encryption techniques. The course will also overview recent advances in image, video, audio watermarking. The course will describe block cipher systems (e.g. DES and AES) and public key systems (e.g. RSA) along with authentication techniques. The course will also describe digital watermarking techniques that include both spatial, spectral, and temporal watermarking algorithms.

Particular emphasis will be placed on how encryption and watermarking can be used in the context of the protection of imaging, video, and multimedia systems. The unique nature of these new technologies relative to intellectual property rights will be presented.

LEARNING OUTCOMES
This course will enable you to:
- define the basics of cryptography and be able to describe how these techniques could be useful in your own work
- know how encryption techniques can be used for the protection and authentication of data
- explain the basics of digital watermarking and how these techniques can be used to protect intellectual property rights.

INTENDED AUDIENCE
The course is intended for engineers and scientists who work in the imaging and/or multimedia fields and who are interested in the area of data security. Students should have an undergraduate degree in science or engineering.

INSTRUCTOR
Edward J. Delp is a Professor of Electrical and Computer Engineering at Purdue University. His research interests are in the areas of image and video processing and multimedia systems. Prof. Delp has developed and taught a graduate level course on multimedia security at Purdue for the past 10 years.

Course level: Advanced
SC084 CEU .35 $355 / $430 USD
Sunday 8:30 am to 5:30 pm

Optical Document Security

This half-day course gives an overview of a wide variety of optical security features ranging from classic optically invariable devices, such as watermarks and intaglio printing, via tilt images, fluorescence and digital anti-copy devices to optically variable devices, based on diffraction and interference. Their basic physical principles are treated and their first and second line inspection properties are discussed. Genuine and counterfeit documents will be used as illustrations.

LEARNING OUTCOMES
This course will enable you to:
- understand the basic physical principles of optical security features
- discuss physical, physiological and psychological aspects of security features
- develop insight into the advantages and limitations of security features
- know digital defenses against copying
- understand the basics of security design and evaluation, including the development sequence of a security product, the iterative structure of the design process and security modeling
- recognize the basic terminology of document security.

INTENDED AUDIENCE
This presentation is aimed at a wide segment of the document and product security community, including management, technical personnel and technicians. A general understanding of basic optics, but no prior experience in document security, is required.

INSTRUCTOR
Rudolf L. van Renesse was a senior research engineer with TNO Institute of Applied Physics (The Netherlands) for 35 years and established Van Renesse Consulting in 2002, to provide independent services in the area of document and product security. He is the editor and co-author of the textbook "Optical Document Security", and teaches international courses on document security at the Dutch College for Criminal Investigation and Crime Control, and at the biannual SPIE Conferences on Optical Security and Counterfeit Deterrence Techniques in San Jose.

Course level: Advanced
SC087 CEU .35 $200 / $235 USD
Tuesday 1:30 to 5:30 pm

Characterization and Prediction of Image Quality

This course explains how to evaluate the quality of an image using numerical scales and physical standards; and how to predict the distribution of quality that would be produced by a pictorial imaging system under conditions of actual customer use. A framework is presented for conducting calibrated, extensible psychometric research so that results from different experiments can be rigorously integrated to construct predictive software using Monte Carlo simulations. Development of generalized objective metrics correlating with perceptual attributes based on psychometric data is discussed in detail and a number of examples of practical applications to product design are provided.

LEARNING OUTCOMES
This course will enable you to:
- establish a numerical scale of image quality that is anchored to physical standards
- design, implement, and analyze calibrated psychometric experiments
- develop generalized objective metrics correlating with perceptual attributes
- predict the overall quality of images from a knowledge of their individual attributes
- integrate the results from different psychometric studies into software models
- apply the predictions of image quality modeling to practical product design problems

INTENDED AUDIENCE
This course is intended for scientists, engineers, analysts, and managers involved in the design, engineering, manufacturing, marketing, or evaluation of imaging products or systems. Participants should be familiar with the function and basic properties of color imaging systems. A rudimentary knowledge of statistics and elementary calculus would be helpful.

INSTRUCTORS
Brian Keelan obtained a Ph.D. in chemistry from the California Institute of Technology in 1986. Since then, he has worked in the research laboratories of Eastman Kodak Company, where his efforts have focused on predictive computer modeling, image quality metrics, and psychometrics. He is the author of *Handbook of Image Quality: Characterization and Prediction* (Marcel Dekker, 2002, ISBN 0-8247-0770-2).
Paul Kane received the M.S. in optics from the University of Rochester in 1985, and has been with Eastman Kodak since 1986. He is currently a Research Associate in the Imaging Science Division, where he is group leader of the System Image Quality Modeling Group.
Karin Topfer received her Masters degree in physics from Dresden University of Technology in 1983 and a Ph.D. in photophysics from Dresden University of Technology in 1985. Since 1993, she has worked at Eastman Kodak Company, first in the UK, and later in Rochester, NY. In recent years, her work has primarily focused on image quality modeling and psychophysics, including color quality.
Richard Wheeler, Jr. obtained a B.S. degree in chemistry and systems engineering from the Rochester Institute of Technology. As a research scientist with Eastman Kodak Company his work during the past 25 years has contributed to the conception and design of numerous imaging products and systems, and has resulted in 16 U.S. patents.

Course level: Intermediate
SC593 CEU .65 $355 / $430 USD
Wednesday 8:30 am to 5:30 pm

Preregister by Short Course (SC) Number

Preregister today to guarantee your participation.
See p. 71 to register.
1st price = SPIE Member; 2nd price = Nonmember
CEU = Continuing Education Unit

General Information

ELECTRONIC IMAGING 2004

San Jose Convention Center
408 S. Almaden Boulevard, San Jose, CA 95110

San Jose Marriott Hotel
301 S. Market Street, San Jose, CA 95113

Registration Location and Information Hours

Tutorial Registration Only

San Jose Marriott Hotel, San Jose Ballroom Foyer

Sunday, January 18, 2004 ..... 7:00 am to 4:00 pm

Thereafter, all registrations are at
San Jose Convention Center

Monday through Thursday ..... 7:00 am to 4:00 pm

Preregistration/Registration

SAVE MONEY! Register with payment by December 17 and save $100. Early registration with payment enables attendees quick pickup of registration materials. To preregister for the meeting, use the online registration form or return the registration form on p. XX with your payment to IS&T, 7003 Kilworth Lane, Springfield, VA 22151 USA by December 17, 2003. For those registering AFTER December 17, please ADD $100 to the total registration fee.

Full conference registration includes: Admittance to the conferences, poster sessions and the exhibition, coffee breaks, dessert in the exhibition hall, the Electronic Imaging Symposium Reception, and EI proceedings as applicable under the specific registration plans (see registration form on page 71 of this program). EI proceedings purchased as part of your registration plan include any applicable tax and shipping charges.
Short Course only registration includes your selected short course(s), course notes, coffee breaks, and admittance to the exhibition.

Speakers Audiovisual Desk Hours

San Jose Convention Center. Ballroom A Concourse

Monday through Thursday ..... 7:30 am to 4:30 pm

Speakers who have requested to use LCD projection from their laptop, 35mm slide projection, a VHS video player, or an overhead projector are encouraged to preview their materials at the Audiovisual Desk prior to their presentation. Speakers who have requested special equipment beyond the standard equipment noted here are asked to report to the Audiovisual Desk upon arrival at the meeting to confirm equipment requests. Speakers will be responsible for delivering visual materials to the conference room and may retrieve their presentation materials from the room monitor in the conference room immediately following the session.

Short Course Notes

Short courses will take place in various meeting rooms at the San Jose Convention Center and the San Jose Marriott Hotel. Your room assignment will be given to you with a ticket in your registration materials. Registrants for short courses must exchange each course ticket received for their course notes in the course meeting room at the beginning of the class.

All-Conference Reception

Wednesday, January 21 ..... 7:30 pm to 9:30 pm

Plan to join us for this great opportunity to get to know your Electronic Imaging colleagues. All attendees are invited to relax, and enjoy a pleasant evening with friends old and new!

Poster Session

San Jose Marriott: San Jose Ballroom

Tuesday 20 January ..... 5:30 to 7:00 pm

Conference attendees are invited to the poster session. Authors of poster papers will be on hand during these sessions to answer questions and provide in-depth discussion concerning their papers. Attendees are requested to wear their conference registration badges to the poster sessions.

Authors can set up posters after 10:00 am on Tuesday. Poster supplies (pushpins) will be available in the San Jose Marriott: San Jose Ballroom. Other supplies can be obtained from the Speakers' Audio Visual Desk.

Posters can be previewed during the days of the events before the formal poster sessions begin at 5:30 pm.

Authors must remove their papers at the conclusion of the poster reception for that day. It is the author's responsibility to remove their posters immediately after the session. Papers not removed will be considered unwanted and will be discarded. The Societies assume no responsibility for posters left up after the end of each night's poster reception.

Exhibition Hours

Tuesday 20 January ..... 10:00 am to 5:00 pm

Wednesday 21 January ..... 10:00 am to 4:00 pm

Leading Electronic Imaging companies showcase the latest products and technologies in the industry. The current exhibitor list and floor plan is available on-line at www.electronicimaging.org.

There is no charge to visit the exhibition hall; however, a registration badge is required for admittance. On-site registration is available for exhibition-only visitors.

For information about exhibiting at this symposium, please contact, SPIE Exhibitions Manager at sales@spie.org; telephone 360-676-3290; fax: 360-647-1445; Web: www.spie.org/exhibitions/ei

Messages for Attendees

Messages for attendees at Electronic Imaging 2004 Symposium can be left by calling the IS&T/SPIE Message Center at 408-271-6100. Messages will be taken during registration hours Monday through Thursday. On Sunday only, messages will be received at the San Jose Marriott Hotel registration desk, 408-280-1300 (ask for EI 2004). Attendees should check the message boards at the message center on a daily basis to receive their messages.

IS&T Bookstore and Membership Booth

Monday through Thursday ..... Open during registration hours

IS&T publishes a variety of books to meet your needs. Proceedings of past IS&T conferences including Digital Printing Technologies, Color Imaging as well as Recent Progress series books will be available. IS&T also distributes selected titles from cooperating publishers of science and technology books in the imaging field. Information about upcoming IS&T conferences and IS&T membership benefits, sample journals, and newsletters are available.

SPIE Bookstore and Membership Booth

Monday through Thursday ..... Open during registration hours

SPIE publishes a variety of technical books designed to meet diverse research, reference, and educational needs. Proceedings of SPIE technical conferences from this and related meetings may be purchased at the bookstore. Also available are related books in the SPIE PRESS Series, including Tutorial Texts, Milestone Series of Selected Reprints, Critical Reviews in Science & Technology, and Monographs & Handbooks.

Video/Digital Recording Policy

For copyright reasons, video or digital recording of any conference session, short course, or poster session is strictly prohibited without written prior consent from each specific presenter to be recorded. Individuals not complying with this policy will be asked to leave a given session and to surrender their film or disc. It is the responsibility of the presenter to notify the conference sponsors if such consent is given.

Online Recruiting and Career Services

SPIEWorks, SPIE's career website, has been developed to serve the specific employment and recruiting needs of optics, photonics, and imaging professionals.

Membership in SPIE is not required.

EMPLOYERS: Hire Minds.

Hiring is a risky proposition. Finding talented high-tech professionals is a difficult undertaking. SPIEWorks helps you target a skilled group of professionals so post a job today! For more information, contact Robert Dentel or Dave Baggenstos at 360 715 37 05 or email sales@spieworks.com

CANDIDATES: Apply Your Mind.

It's never too early to start planning your career. Regardless of your status, whether your at the end of your studies or just starting out, with plans to stay in academic research or go into industry, you'll want to explore your employment options. Visit SPIEWorks to learn more about the careers available to those with a degree in engineering, optics or a related discipline. Post your qualifications online, browse job opportunities, and register for email notifications, or participate in SPIEWorks Career Expos.

spieworks.com

Cash Cart with Breakfast Breads, Snacks and Quick Lunch

Breakfast Service
San Jose Convention Center, Concourse 1 Lobby
Tuesday through Thursday . . . . . 7:30 to 8:30 am

Luncheon & Snack Service
San Jose Convention Center, Concourse 1 Lobby
Monday . . . . . 11:00 am to 2:30 pm

San Jose Convention Center, Exhibit Hall
Tuesday and Wednesday . . . . . during exhibit hours.

The Cash Cart will offer breakfast breads, yogurt, fruit, coffee, juice and other beverages each morning of the conference. Luncheon and snack service will include deli-style sandwiches, salads, snacks and pastries, and beverage.

Attendees will need to make their own breakfast and lunch arrangements for Monday and Thursday.

Copy & Computer Services Center San Diego Copy Center

Monday through Thursday during registration hours copy services will be available for symposium attendees. The rates are 5 cents/copy and $1 per transparency. Located near registration in the San Jose Convention Center.

Child Care

A few child-sitting services available in San Jose are as follows.

1. Bay Area 2nd MOM Inc., Hotel Nanny Service, Toll Free Phone: 1-888-926-3666, or (650) 858-2469, ext. 109. Fax: (650) 493-6598, E-mail: info@2ndmom.com or www.2ndmom.com
2. Sitters Unlimited: Toll Free Phone: (408) 452-0225, E-mail: rfosorio@peoplepc.com or www.sittersunlimited.com

Note: IS&T/SPIE does not imply an endorsement or recommendation of these services. They are provided on an "information-only" basis for your further analysis and decision. Other services may be available.

Driving to the Meeting

280 Southbound (from San Francisco or Stanford)
280 South to the Vine Street/Almaden Avenue exit
Turn left onto Almaden Boulevard
Convention Center will be on the right

101 Southbound (from San Francisco or Palo Alto)
101 South to the Guadalupe Parkway/87 Exit
Continue on Guadalupe Parkway.
Take Park Avenue/San Carlos Street exit, turn left.
Turn right on Almaden Boulevard.
Convention Center is on your left.

17/880 Southbound (from Berkeley and Oakland)
17/880 South to the Coleman Exit
Turn left on Coleman Avenue and continue on Coleman.
Coleman becomes Market Street (toward downtown San Jose).
Cross San Carlos Street.
Convention Center is on your right.

101 Northbound (from Gilroy or Los Angeles)
101 North to San Jose
Take the 85 North exit towards downtown San Jose.
Merge onto 87 North.
Take the San Carlos Street/Auzerais Avenue exit.
Turn right onto Woz Way.
Turn left onto S. Almaden Boulevard.
Convention Center will be on the right.

Parking

San Jose Marriott - Onsite parking available for $18 per day, $4. per hour.

Alternate Parking Downtown San Jose
Visit the VTA website www.sjdowntownparking.com. The map shows the location of additional parking facilities in close proximity to the convention center for lots offering convention center hourly parking rates or $15 to $18 maximum per day.

Travel Information

Air Travel

United Airlines is offering special meeting fares for all attendees of the Electronic Imaging Meeting who use United's Special Meeting Desk to book their reservations. Book early and take advantage of the discounted fares that give you the greatest savings!

Several pricing options are purchasable based upon your dates of travel to the meeting. You may choose a 5% discount off the lowest applicable fare or a 10% discount off the unrestricted coach fare, when tickets are purchased 0 days in advance. An additional 5% discount will apply when you purchase your tickets at least 30 days in advance of your travel date. Or you may choose Area Pricing, which are set air fare prices based upon geographical locations. Discounts apply on all United, and United Express domestic flights.

United does not offer International discounts for passengers departing from other countries due to International Tariff Restrictions. United can offer international discounts outbound from the United States. United will provide to attendees of the meeting, round trip transportation on any true United international flights (not partnered with another airline) at fares with either a 10% discount off the lowest applicable fare (excluding first class) or 15% off the unrestricted coach fare, when tickets are purchased 0 days in advance. An additional 5% discount will apply when tickets are purchased at least 30 days in advance of the travel date.

You or your travel agent must call United's Specialized meeting Reservations Center, a toll-free number at 1-800-521-4041 and provide the agent with the Meeting ID Number 511CV. Dedicated reservationists are on duty 7 days a week, 8:00 am to 10:00 pm EST. Book early to take advantage of promotional fares that give you the greatest discount. Mileage Plus members receive full credit for all miles flown to this meeting.

United's convenient schedule and discounted fares are available when you or your travel agent:

* Call United Airlines at 1-800-521-4041, from Canada or the United States
* Give them the Meeting ID number 511CV
* Identify the SPIE meeting you are attending

Discounts apply on United Airlines Travel conducted between January 12 - January 30, 2004.

Car Rental

Hertz Car Rental has been selected as the official car rental agency for this Symposium. To reserve a car, identify yourself as a Electronic Imaging Meeting attendee using the Hertz Meeting Code CV# 029B0005.

In the United States call 1-800-654-2240.

In Canada call 1-800-263-0600, or 1-416-620-9620 in Toronto.

In Europe and Asia call the nearest Hertz Reservation Center or travel agent. Outside of these areas call 1-405-749-4434.

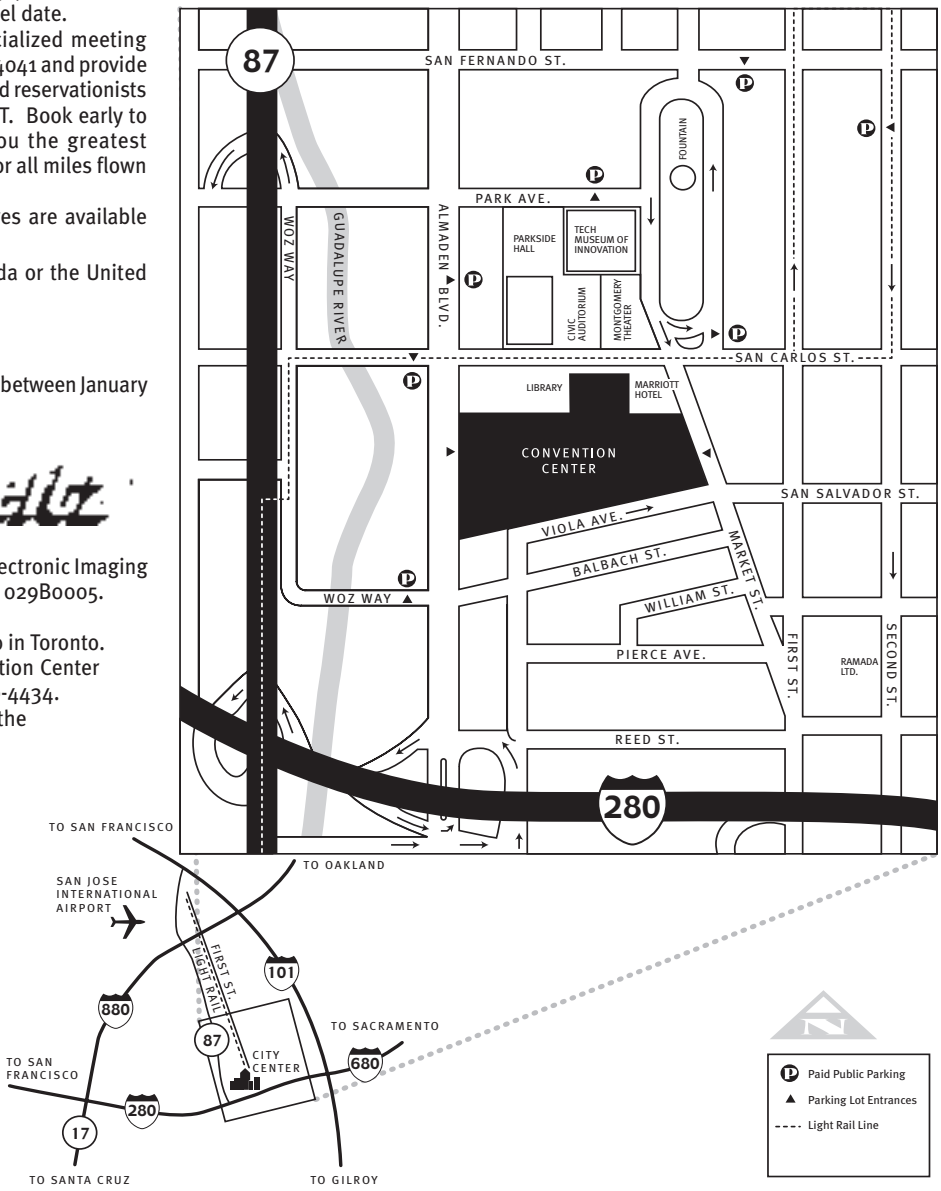
Or Book on-line at www.hertz.com by following the links through 9 easy steps starting with "Get a Quote - Reserve a Car" through step 7 where the "Meetings and Conventions" prompt requests the Convention (CV) # 029B0005 to receive the convention rates or lower rates which may be available at the time. In step 8, select "I want Hertz to find the lowest rate". Step 9 summarizes the entire reservation and quotes a rate. The rate presented is derived from searching multiple discount plans and special offers to find the best rate at the time, given applicable constraints.

Discount Convention Rates as follows:

	Daily	Weekend	Weekly
Economy (2DR):	$39.99	$23.99	$142.99
Compact (4DR):	$49.99	$26.99	$157.99
Mid-size (2/4DR):	$55.99	$29.99	$192.99
Sporty (2DR)	$57.99	$32.99	$202.99
Full-size (4DR):	$61.99	$34.99	$207.99
Towncar:	$84.99	$69.99	$327.99
Minivan:	$64.99	$59.99	$302.99

Rates include free unlimited mileage and are guaranteed one week before through one week after the actual meeting dates, subject to car availability. Advance reservations are recommended as some cities sell out early during popular times of the year. Blackout dates may apply. At the time of reservation booking, these rates will automatically be compared to Hertz published rates, assuring that you are quoted the best comparable rate.

Standard rental qualifications apply. Taxes, vehicle licensing fees, tax reimbursement/transportation fees and optional items, such as refueling, are extra.



Transportation from San Jose Airport to San Jose Marriott Hotel

The San Jose Convention Center and the San Jose Marriott Hotel are located three miles from the San Jose International Airport (www.sjc.org). The South and East Bay Airport Shuttle, (408) 225-4444, will deliver to specific San Jose hotels from the San Jose Airport for $22.00 for the first person and $7.00 for each additional person in the same group, one way (credit cards, cash & local checks accepted). From a courtesy phone in the baggage area dial #66; you will be given instructions as to where to board the shuttle, which usually arrives within 15 minutes from the time of your call. Rates are current from August, 2003 - rates are subject to change without notice.

Taxi fare from San Jose International Airport is approximately $15-$20 (one way) to downtown San Jose Hotels, approximately 4 miles.

Transportation from San Francisco Airport

The San Jose Convention Center is one hour from San Francisco International Airport. Transportation options from San Francisco International Airport to downtown San Jose hotels consist of:

- Taxicab from San Francisco Airport to downtown San Jose Hotels approximately $110 (one-way)
- San Francisco Limousine Service, Lincoln executive town car flat rate $82 (+ 15% tax & gratuity) to downtown San Jose Hotels. Town car holds 3-4 people, Reservations required, cash or credit cards accepted (no checks). In USA call 1-650-877-0909, outside USA call 001-650-877-0909, 24 hrs/day, 7 days/wk, book on-line at www.sfolimousine.com
- The South and East Bay Shuttle directly to the San Jose International Airport (see below)

The South and East Bay Airport Shuttle

The South and East Bay Shuttle runs between the San Francisco International Airport and the San Jose Airport. The fare is $30.00 for the first person and $7.00 for each additional person in your group. Rates are subject to change without notice. Credit cards, cash or checks accepted. The trip takes approximately 1 hour and 15 minutes. Call from the baggage area DEPARTURE LEVEL at either airport (408) 225-4444 and the shuttle will pick you up within 15 minutes.

Free AIRPORT FLYER to/from San Jose International Airport

The free VTA/SJC AIRPORT FLYER #10 Bus departs for San Jose International Airport daily from 5:00 am until midnight - weekdays every 12 minutes, weekends every 15 minutes. Catch the Airport Flyer at VTA's Metro/Airport Light Rail stop and at the Santa Clara Caltrain Bus Station.

Light Rail to Convention Center

Local attendees to the symposium and those staying at hotels outside of walking distance are encouraged to make use of the excellent, inexpensive commuter light rail systems. The San Jose Convention Center is adjacent to the light rail line that extends from South San Jose to North San Jose. From the San Jose International Airport take the free Airporter Flyer and transfer to the Metro/Airport Light Rail Station (see light rail fares below). Go southbound (headsign reads Santa Teresa) and get off at the Convention Center stop.

Light rail transit stations connect with a number of bus routes. See the Downtown San Jose map for location in relationship to the convention center and the hotels. For more information on light rail stops, connections, and transit times, please call Santa Clara Valley Transportation Authority (VTA) Information Call Center at (408) 321-2300. The Call Center is staffed Monday through Friday, 5:30 am to 8:00 pm, and weekends, 7:30 am to 4:00 pm. Automated schedule information is available 24 hours a day by calling the same number. You may also find this information on the web at www.vta.org.

Fares: Effective August, 2003, the adult single-ride fare for regular service buses and light rail is $1.50. A single-ride ticket purchased at a ticket vending machine (TVM) is valid on light rail for two hours. An adult Day Pass is $4.50. Day passes are valid for unlimited rides on both light rail and regular service buses for a one-day period and can be purchased from your bus operator or light rail ticket vending machines. Rates are subject to change without notice.

Park and Ride

VTA Light Rail connects downtown with South San Jose and North San Jose and many stations provide ample parking for those who want to park and ride. To see a full listing of Park and Ride lots, visit www.vta.org and click on "Schedules, Maps & Fares" and then "Park and Ride Lots." It is complimentary to park at the Park and Ride lots.

Since parking at the Convention Center can be quite congested at times, try the Park and Ride alternative transportation method, utilizing VTA's complimentary Park & Ride parking lots to commute to the Convention Center. Maximum free regular Park & Ride parking is limited to 72 hours.

Park & Ride, with directions to the Convention Center:

From the north, park in the Evelyn Park-and-Ride Lot in Mountain View. Board the eastbound Tasman light rail with the headsign "1-880/Milpitas". Get off at the Baypointe Station and transfer to the Guadalupe Line with the headsign "Santa Teresa". Get off at the Convention Center Station.

From the south, park in the Santa Teresa Park-and-Ride lot located at the Santa Teresa Light Rail Station. Board the light rail with the headsign "Baypointe" and get off at the Convention Center Station.

From the west, park at the Valco Fashion Park Park-and-Ride lot. Board the eastbound Route 23, with the headsign "Downtown San Jose", and get off at the Convention Center Station.

From the east, park in the Capitol and Alum Rock Avenue Park-and-Ride lot. Board the southbound Route 64, with the headsign "Almaden Light Rail Station". Get off at the Market Street and Santa Clara Station, which is two blocks away from the Convention Center.

DASH (Downtown Area Shuttle)

Attendees may also use the DASH (Downtown Area Shuttle) to reach the Convention Center. The DASH operates free service between the San Jose Diridon CalTrain Bus Station and downtown San Jose, Monday through Friday, from 6:15 am to 6:55 pm every 10 minutes. Extra morning commute shuttles provide service every 5 minutes. For DASH routes and parking lots http://www.sjdowntownparking.com/ptransit.htm. For more information, call The VTA Information Call Center at (408) 321-2300.

Convention Center Parking

Parking at the San Jose Convention Center from 6am to 6pm is $10 per day with no in-and-out privileges. After 6pm, parking is $4. Day passes are available for $20 with all day in and out privileges. An attendant is on duty until 9:30 pm Monday-Friday. Cars can exit anytime during the day or evening, however, there is no overnight parking. Parking citations are usually given after 2:00 am allowing people to exit from theatres, clubs, etc.

Hotel Reservation Form

Accommodations

Headquarters Hotel: **The San Jose Marriott Hotel**
301 South Market Street
San Jose, California

The Headquarters Hotel for EI 2004 is the San Jose Marriott Hotel located adjacent to the San Jose Convention Center. A block of rooms at special convention rates has been reserved for meeting attendees. Room rates are $155 for single or double rooms. THE CONVENTION RATES WILL NOT BE HONORED AFTER THE CUTOFF DATE OF December 17, 2003. Convention rates are subject to limited availability. Rates listed are subject to an occupancy tax, currently 10.045%.

RESERVE YOUR HOUSING IMMEDIATELY!

Reserve online and save time:

www.electronicimaging.org

All reservations for accommodations for this conference are to be coordinated by the San Jose Housing Bureau. Please do not call IS&T or SPIE to arrange for hotel accommodations. To reserve a room you may reserve on-line, mail, fax, or e-mail the San Jose Housing Bureau. All reservation must reach the San Jose Housing Bureau by 17 December 2003 to ensure room reservation at the reduced group rate. The hotel reserves the right to charge the Market Rate for rooms that are booked after the cutoff date and for rooms once the arrival date has been missed.

ON-LINE RESERVATIONS: www.electronicimaging.org

Accessing the facilities: EI 2004 will take place in the San Jose Convention Center and the San Jose Marriott Hotel. Conveniently located in downtown San Jose, the San Jose Convention Center fronts on San Carlos Street at the intersection of San Carlos and Market Streets. The San Jose Marriott is located at 301 South Market Street. Please see the map for locations.

Housing Reservation Form

IS&T/SPIE's Electronic Imaging 2004 • January 18 to 22, 2004

Headquarters Hotel, The San Jose Marriott Hotel, San Jose, California
(Reservations Deadline - December 17, 2003)

Sleeping room reservations should be made ON-LINE, or by mailing this form to the San Jose Convention Center Housing Manager or sending it via Email or FAX as detailed below. Please telephone for information or to notify us of changes in your date or plans only: 408-792-4168

Name _____

No. in party_____ Sharing with _____

Company _____

Mailing Address _____

_____

Telephone _____

Fax _____

Email _____

Arrival Date_____ Time _____

Departure Date _____

A special block of rooms at a discounted rate is being held for IS&T/SPIE attendees at The San Jose Marriott Hotel (located adjacent to the San Jose Convention Center at 301 South Market Street) for the nights of January 17 through January 23, 2004. The discounted rate will also be extended for 3 days before and after these dates if space is available. Reservations will be assigned on a priority basis to the EI '04 group provided they are received by December 17, 2003. Please reserve as soon as possible - in the event that accommodations at the Marriott are not available, comparable reservations will be made at another San Jose hotel.

Note that a deposit equal to one night's room and tax must accompany your reservation request. Deposits can be made using a check or a major credit card number, expiration date and signature. The housing bureau will confirm your reservation directly to you.

Payment Method:

❑ Check # _____ made payable to SJCVB

❑ American Express ❑ MasterCard ❑ VISA

Card# _____

Exp. Date _____

Authorization
Signature _____

In the event of cancellation, 72 hours notice must be made in writing to the hotel so that you may receive a full refund of your deposit, individuals who do not show and do not cancel will be charged one night room plus tax. Check in time is 3:00 p.m. Check out time is 12:00 noon. There is no charge for children under 18 years when sharing a room with their parents.

Please reserve my room as indicated:

❑ Single (one bed, one person) - $155
❑ Double (one bed, two people) - $155
❑ Double/Double (two beds, two people) - $155
❑ Triple (two beds, three people) - $175
❑ Quad (two beds, four people) - $185

Notes: Plus tax, currently 10.045 % per day. Room rate includes a minimal rebate to the sponsoring Societies to partially offset the costs of EI '04 function space.

❑ Smoking ❑ Non-Smoking
❑ Special requirements in accordance with the American Disabilities Act.

Send this form to:
San Jose Housing Manager
Attn: IS&T/SPIE's EI'04
125 S. Market Street, Suite 300, San Jose, CA 95113 USA

ON-LINE RESERVATIONS: www.electronicimaging.org
E-MAIL: EIo4@sanjose.org; FAX: 408-293-3705

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Science and Technology

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Vol#	Title (Editor)	Prepublication Price
5289	**Liquid Crystal Materials, Devices, and Applications X and Projection Displays X** (L.-C. Chien/M. H. Wu)	$70
5290	**Practical Holography XVIII: Materials and Applications** (T. H. Jeong/H. I. Bjelkhagen)	$80
5291	**Stereoscopic Displays and Virtual Reality Systems XI** (A. J. Woods/J. O. Merritt/M. T. Bolas)	$90
5292	**Human Vision and Electronic Imaging IX** (B. E. Rogowitz/T. N. Pappas)	$80
✔5293	**Color Imaging IX: Processing, Hardcopy, and Applications** (R. Eschbach/G. G. Marcu)	$80
✔5294	**Image Quality and System Performance** (Y. Miyake/R. Rasmussen)	$60
5295	**Visualization and Data Analysis 2004** (R. F. Erbacher/P. C. Chen/J. C. Roberts/M. T. Gröhn/K. Börner)	$60
✔5296	**Document Recognition and Retrieval XI** (E. H. Barney Smith/J. Hu/J. Allan)	$53
5297	**Real-Time Imaging VIII** (N. Kehtarnavaz/P. A. Laplante)	$60
5298	**Image Processing: Algorithms and Systems III** (E. R. Dougherty/J. T. Astola/K. O. Egiazarian)	$100
5299	**Computational Imaging II** (C. A. Bouman/E. L. Miller)	$70
5300	**Vision Geometry XII** (L. J. Latecki/D. M. Mount/A. Y. Wu)	$53
5301	**Sensors and Camera Systems for Scientific, Industrial, and Digital Photography Applications V** (M. M. Blouke/N. Sampat/R. J. Motta)	$90
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