



PROCEEDINGS

SPIE—The International Society for Optical Engineering

Imaging Technologies and Applications

Robert J. Heaston

Chair/Editor

19 March 1992

Chicago, Illinois

Sponsored by

Chicago Regional Chapter of SPIE—The International Society for Optical Engineering
Optical Society of Chicago
BEA Electro-Optics, Inc.
Illinois Institute of Technology
IIT Research Institute
Imaging Technology Consultants
Sony Corporation of America
Sid Bass & Associates, Inc.
Laser Focus

Published by

SPIE—The International Society for Optical Engineering



Volume 1778

SPIE (The Society of Photo-Optical Instrumentation Engineers) is a nonprofit society dedicated to the advancement of optical and optoelectronic applied science and technology.

Contents

- vii *Organizing Committee*
ix *Introduction*

Keynote Address

- 2 **Optics: the next generation [1778-72]**
R. J. Heaston, IIT Research Institute/GACIAC.

Session I Medical Imaging

- 14 **Modeling human heart based on cardiac tomography [1778-01]**
S. Chen, K. R. Hoffmann, C. Chen, J. D. Carroll, Univ. of Chicago.
- 19 **Application of artificial neural networks in mammography for the diagnosis of breast cancer [1778-02]**
Y. Wu, M. L. Giger, K. Doi, C. E. Metz, R. M. Nishikawa, C. J. Vyborny, R. A. Schmidt, Kurt Rossmann Labs. for Radiologic Image Research/Univ. of Chicago.
- 28 **Method of extracting signal area and signal thickness of microcalcifications from digital mammograms [1778-03]**
Y. Jiang, R. M. Nishikawa, M. L. Giger, K. Doi, R. A. Schmidt, C. J. Vyborny, Kurt Rossmann Labs. for Radiologic Image Research/Univ. of Chicago.
- 37 **Super-resolution in positron emission tomography [1778-04]**
M. N. Wernick, C. Chen, Univ. of Chicago.
- 40 **Comparison study for photon attenuation compensation in SPECT reconstruction [1778-05]**
X. Pan, J. Liu, C. Chen, W. H. Wong, Univ. of Chicago.
- 44 **Quantitative analysis of functional dynamic images using knowledge-based factor analysis [1778-06]**
J. T. Yap, Univ. of Chicago; J. D. Treffert, Siemens Gammasonics Inc.; C. Chen, M. Cooper, Univ. of Chicago.
- 47 **Motion identification and correction schemes for ultrafast CT flow studies [1778-07]**
C. J. Wolfkiel, Univ. of Illinois/Chicago.
- 52 **Enhancing the cytomorphological deformation with color image processing [1778-08]**
S. T. Bow, J. Zhang, X. Wang, Northern Illinois Univ.

Session II Advances in Micro-Imaging

- 66 **Micromachined electron source [1778-09]**
D. A. Crewe, D. Perng, S. E. Shoaf, A. D. Feinerman, Univ. of Illinois/Chicago.

- 78 **High-throughput electron-beam lithography [1778-10]**
A. D. Feinerman, D. A. Crewe, D. Perng, S. E. Shoaf, Univ. of Illinois/Chicago; A. V. Crewe, Univ. of Chicago.
- 90 **Micromachined thermionic emitter [1778-11]**
D. Perng, D. A. Crewe, S. B. Lee, A. D. Feinerman, Univ. of Illinois/Chicago.
- 99 **Scan system for the subangstrom STEM [1778-12]**
S. Ruan, O. H. Kapp, Univ. of Chicago.
- 103 **Automatic field emission tip conditioning system for the subangstrom resolution STEM [1778-13]**
S. Ruan, O. H. Kapp, Univ. of Chicago.
- 107 **Nanolithography with metal halides [1778-14]**
H. M. Jaeger, Univ. of Chicago; H. R. Borsje, S. Radelaar, Delft Institute of Microelectronics and Submicron Technology (Netherlands).
- 112 **Recent progress with atomic-force microscopy in biology: molecular resolution imaging of cell membranes, constituent biomolecules, and microcrystals [1778-15]**
M. F. Arnsdorf, R. Lal, Univ. of Chicago.
- 117 **Analysis of STEM images on a RISC workstation with an APL interface [1778-16]**
O. H. Kapp, S. Ruan, Univ. of Chicago.

Session III Electronic Imaging

- 122 **Application of "off-the-shelf" hardware for machine vision [1778-22]**
J. E. Beving, Computer Controlled Machines.
- 128 **Automatic measurement of ham composition using image processing [1778-17]**
J. Jia, Nanyang Technological Univ. (Singapore); A. P. Schinckel, Purdue Univ.
- 135 **Design of a 6,032 element TDI CCD imager [1778-24]**
S. J. Strunk, J. R. McMacken, S. R. Kamasz, W. D. Washkurak, S. G. Chamberlain, DALSA Inc. (Canada); J. A. Lund, W. R. Pfister, Recon Optical, Inc.
- 142 **Algorithm to generate a succinct description for a complex graphic [1778-19]**
S. T. Bow, J. Sa, Northern Illinois Univ.
- 154 **Material characterization and defect inspection in ultrasound images [1778-21]**
C. Zmola, A. C. Segal, Univ. of Illinois/Chicago; B. Lovewell, Y. Mahdavieh, J. Ross, C. Nash, General Electric Corp.
- 160 **Fast Fourier transform method for shadow moiré fringe pattern analysis [1778-20]**
S. A. Guralnick, E. S. Suen, G. Jin, Illinois Institute of Technology.

Session IV Image Processing

- 170 **Displacement field estimation using a coupled Gauss-Markov model [1778-28]**
J. C. Brailean, A. K. Katsaggelos, Northwestern Univ.

- 182 **Image coding via morphological transformations: a lossless approach [1778-29]**
M. Charif-Chefchaouni, D. Schonfeld, Univ. of Illinois/Chicago.
- 187 **Priority subband image coding [1778-35]**
S. S. Yu, N. P. Galatsanos, Illinois Institute of Technology; Y. G. Huang, Audio Digital Imaging Inc.
- 196 **Image quality metrics for halftone images [1778-26]**
T. Mitsa, Univ. of Iowa.
- 208 **Nonorthogonal image expansion by restoration with application to template matching [1778-37]**
J. Ben-Arie, K. R. Rao, Illinois Institute of Technology.
- 221 **Depth perception based on fusion of stereo images [1778-32]**
C. Yeh, Wayne State Univ.
- 226 **Filling regions using a crack code boundary description [1778-27]**
R. Grzeszczuk, S. L. Eddins, T. A. DeFanti, Univ. of Illinois/Chicago.
- 238 **Constructing long edge segments for object recognition [1778-31]**
B. D. Mielke, N. Shrikhande, Central Michigan Univ.
- 247 **Decision making strategies in contour tracing [1778-30]**
C. Stanek, N. Shrikhande, G. Hu, Central Michigan Univ.
- 259 *Author Index*