

TECHNICAL PROGRAM

1995 IEEE Workshop on Charge-Coupled Devices and Advanced Image Sensors

April 20-22, 1995

All the talks will be held at the Learning Center meeting room.

WEDNESDAY, APRIL 19

Directors II Meeting Room

7:00 pm - 9:00 pm

Workshop Registration

THURSDAY, APRIL 20

8:30 am

Opening Remarks

T. Cole (JPL Chief Technologist)

E. R. Fossum (Chairman)

J. Nakamura (Technical Program Chairman)

Session 1. Small / Mid Sized CCDs

Chairmen A. Theuwissen and T. Kuroda

8:45

A Low-Noise, Highly-Sensitive, 1", 2.2 Mpixel FT-CCD Imager for High-Definition Applications

E. Roks, A. J. Theuwissen, H. L. Peek, M. J. van de Steeg, P. G. Centen, J. T. Bosiers, D. W. Verbugt, and E. A. de Koning
Philips Imaging Technology, The Netherlands

9:30

1/4 Inch NTSC Format Hyper-D range IL-CCD

H. Komobuchi, A. Fukumoto, T. Yamada, Y. Matsuda*, and T. Kuroda*
Central Research laboratory, Matsushita Electric Industrial Co., Ltd., Japan
* Kyoto Research Laboratory, Matsushita Electronics Corporation, Japan

10:00

COFFEE BREAK

10:30

A Modular, High Performance, 2 μ m CCD-BiCMOS Process Technology and Linear CCD Sensor with On-Chip Electronics

R. M. Guidash, P. P. K. Lee, J. M. Andrus, A. S. Ciccarelli, H. J. Erhardt, J. R. Fischer, E. J. Meisenzahl, R. H. Philbrick, T. J. Kenney, and R. Kannegundla

Microelectronics Technology Division, Eastman Kodak Company

11:00 *Design Options for 1/4"-FT-CCD pixels*
J. T. Bosiers, E. Roks, H. L. Peek, Y. A. Boersma, J. M. van der Heyden
Philips Imaging Technology, The Netherlands

11:30 *A 1/3-inch 330k Square-Pixel Progressive-Scan IT-CCD*
T. Yamaguchi, T. Okutani, K. Mitsui, M. Takagi, K. Takeda, Y. Sone,
T. Imanishi, and Y. Hiroshima
Picture Component Division, Matsushita Electronics Corporation

12:00 **LUNCH**

Session 2. Large Area CCDs

Chairman S. G. Chamberlain

1:30 pm *Back-Illuminated Wafer-Scale CCD Imager*
B. E. Burke, J. A. Gregory, R. W. Mountain, B. B. Kosicki, H. C. Clark,
P. J. Daniels, V. S. Dolat, T. L. Lind, A. H. Loomis, and D. J. Young
Lincoln Laboratory, Massachusetts Institute of Technology

2:00 *Large Area High Resolution CCD Imaging Devices*
R. Bredthauer, P. Vu, R. Potter, B. Mathews*
Loral Fairchild Imaging Sensors, * Loral Fairchild Systems

2:30 **COFFEE BREAK**

3:00 *Mega Pixel CCD Image Sensor Technology*
S. G. Chamberlain, S. R. Kamasz, C. R. Smith, and W. D. Washkurak
DALSA Inc., Canada

3:30 *Some Early Imaging Results with a 4096x4096-Element X-Ray Image Sensor*
R. Dyck, S. Onishi, D. Wen, Y. Abedini, D. Xiao, A. Sayed, M. Sayag, and
A. Karellas*
Loral Fairchild Imaging Sensors, * University of Mass. Medical Center

4:00 **BREAK**

Session 3. Poster Session

Chairman N. Teranishi

4:15 *A Switched CCD Electrode Programmable Photodetector*
B. Washkurak and S. Chamberlain
DALSA Inc., Canada

4:20 *A New Analytical MTF Model and its Applications*
E. G. Stevens, J. P. Lavine, H. J. Erhardt, and R. H. Philbrick
Microelectronics Technology Division, Eastman Kodak Company

4:25 *Optimum Design for a 2-Phase CCD*
Y. Kawakami, T. Yamada, N. Mutoh, K. Orihara, and N. Teranishi
Microelectronics Research Laboratories, NEC Corporation, Japan

- 4:30 *2-D Modeling of Charge Coupled Devices: Optimum Design and Operation for Maximum Charge Handling Capability*
J. Pinter, J. Bishop, J. Janesick*, and T. Elliott*
Loral Fairchild Imaging Sensors, * Jet Propulsion Laboratory
- 4:35 *Simulation for 3-Dimensional Optical and Electrical Analysis of CCD*
H. Mutoh
Link Research Corporation, Japan
- 4:40 *3-Dimensional Numerical Analysis of Deep Depletion Charge-Coupled Devices*
M. H. Kim, J. Fothergill, and A. Holland*
Department of Engineering, University of Leicester, UK
* Department of Physics and Astronomy, University of Leicester, UK
- 4:45 *Simulation of High Density CCD Imager Structures*
G. Yang, C. Ye, and W. F. Kosonocky
Electronic Imaging Center, New Jersey Institute of Technology
- 4:50 *A Mega-Pixel Resolution Digital Still Camera*
W-H. Chan, C-F. Chou, and N-Y. Hu
Industrial Technology Research Institute, Taiwan, ROC
- 4:55 *A Real-Time Digital Signal Processor for Use with the Interline Transfer Color CCD Imager*
S-S. Wang, C-H. Wu, and N-Y. Hu
Image Processing Department, Industrial Technology Research Institute, Taiwan, ROC
- 5:00 *Near-Infrared Imaging Applications with InGaAs*
G. H. Olsen, M. J. Cohen, M. J. Lange, S. R. Forrest*, D. S. Kim*, Y. Soo*, W. F. Kosonocky**
Sensors Unlimited, * Princeton University,
**New Jersey Institute of Technology
- 5:05 *Source-Follower-Type Image Sensor Driven From Back Electrodes*
H. Shiraki
NEC Corporation, Japan
- 5:10 *An Active Pixel Sensor Fabricated Using CMOS/CCD Process Technology*
P. P. K. Lee, R. C. Gee*, R. M. Guidash, T-H. Lee, and E. R. Fossum*
Microelectronics Technology Division, Eastman Kodak Company
* Jet Propulsion Laboratory
- 5:15 *A CMOS Active Pixel Image Sensor with Amplification and Reduced Fixed Pattern Noise*
Z. Zhou, S. E. Kemeny, B. Pain, R. C. Gee and E. R. Fossum
Jet Propulsion Laboratory
- 5:20 *CMOS Active Pixel Sensor Array with Programmable Multiresolution Readout*
S. Kemeny, B. Pain, R. Panicacci, L. Matthies, and E. Fossum
Jet Propulsion Laboratory

5:25 *On-Chip Current-Mode Focal Plane Signal Processing for a CMD Image Sensor*
J. Nakamura, B. Pain,* and T. Nomoto**
Olympus America Inc. * Jet Propulsion Laboratory
** Olympus Optical Co., Ltd., Japan

5:30 **RECEPTION, POSTER VIEWING**

7:00 **DINNER**

FRIDAY, APRIL 21

Session 4. Smart Sensors

Chairman T. H. Lee

8:15 am *On Sensor Video Compression*
K. Aizawa, H. Ohno, Y. Egi, T. Hamamoto, M. Hatori, and J. Yamazaki*
University of Tokyo, Dept. of Elec. Eng., * NHK, Sci. and Tech. Res. Labs,
Japan

8:45 *New Massively Parallel Technique for Global Operations in Embedded Imagers*
V. Brajovic and T. Kanade
The Robotics Institute, Carnegie Mellon University

9:15 *A Road-Following Computational-Sensor Prototype*
A. Gruss
Computer Science Department, Carnegie Mellon University

9:45 *Integration-Time Based Computational Image Sensors*
R. Miyagawa and T. Kanade
The Robotics Institute, Carnegie Mellon University

10:15 **COFFEE BREAK**

Session 5. Active Pixel Sensors

Chairmen J. Hyncek and W. F. Kosonocky

10:45 *A CMD Image Sensor -An Approach to High-Resolution Imaging*
T. Nakamura, K. Matsumoto, and T. Nomoto
Olympus Optical Co., Ltd., Japan

11:15 *Active Pixel CMOS Image Sensor with On-Chip Non-Uniformity Correction*
N. Ricquier and B. Dierickx
IMEC, Belgium

11:45 **LUNCH**

- 1:15 pm** *Application Specific Image Sensors*
A. Dickinson
AT&T Bell Laboratories
- 1:45** *CMOS FPA with Multiplexed Pixel Level ADC*
B. Fowler, A. E. Gamal, and D. Yang
Information Systems Laboratory, Stanford University
- 2:15** *CMOS Digital Camera With Parallel Analog-to-Digital Conversion Architecture*
A. Dickinson, S. Mendis, D. Inglis, K. Azadet, and E. Fossum*
AT&T Bell Laboratories, * Jet Propulsion Laboratory
- 2:45** **COFFEE BREAK**
- 3:15** *High Speed CMOS Binary Active Pixel Image Sensor*
R. Panicacci, S. E. Kemeny, P. D. Jones, C. Staller, and E. R. Fossum
Jet Propulsion Laboratory
- 3:45** *Comparison of CCD and CMOS Pixels for a Wide Dynamic Range Area Imager*
S. Decker and C. G. Sodini
Department of Electrical Engineering and Computer Science
Massachusetts Institute of Technology
- 4:15** *Future Prospects for CMOS Active Pixel Image Sensors*
E. R. Fossum and P. H. S. Wong*
Jet Propulsion Laboratory, * IBM Research Center

Session 6. Discussion Session

Chairmen E. R. Fossum and J. Nakamura

5:00 All participants

6:30 **DINNER - Banquet**

SATURDAY, APRIL 22

Session 7. Catch-All

Chairmen Y-J. Yu and G. Weckler

8:00 am *Novel CCD Magnetic Field Sensors*
G. Haigh and S. Munroe
Analog Devices, Inc.

8:30 *Back Thinned CCD's for Direct Electron Imaging*
A. Reinheimer, M. Blouke, and G. Williams
Scientific Imaging Technologies, Inc.

- 9:00** *Ultraviolet and Visible Response of Delta-Doped CCDs*
S. Nikzad, M. E. Hoenk, P. J. Grunthner, F. J. Grunthner, J. R. Janesick,
M. Fattahi*, R. Winzenread*, and H-F. Tseng*
Jet Propulsion Laboratory, * EG&G Reticon
- 9:30** **COFFEE BREAK**
- 10:00** *Optimization of CCD Output Amplifier for SN Ratio Improvement*
T. Nakano, N. Mutoh, and N. Teranishi
Microelectronics Research Laboratories, NEC Corporation, Japan
- 10:30** *Random Noise and Fixed Pattern Noise in STACK-CCD Imager*
S. Ohsawa and Y. Matsunaga
ULSI Research Laboratories 3, TOSHIBA Corporation, Japan
- 11:00** *Large Format A-Si:H 2-Dimensional Array as Imaging Devices*
X. D. Wu, R. A. Street, R. Weisfield, D. Begelsen, W. Jackson, D. Jared,
S. Ready, and R. Apte
Xerox Palo Alto Research Center
- 11:45** **CONCLUSIONS**