

# Jörg Kramer

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## EDUCATION:

**Ph.D., Physics** May 1993  
*Swiss Federal Institute of Technology Zurich (ETHZ), Switzerland*  
External Ph.D. student of ETHZ at Paul Scherrer Institute Zurich  
(PSIZ), Switzerland.

*Thesis Title:* Photo-ASICs: integrated optical metrology systems with industrial CMOS technology

*Advisors:* Henry Baltes (ETHZ), Peter Seitz (PSIZ)

**M.S., Physics** October 1988  
*Imperial College of Science and Technology, London, UK*  
Graduate course in Applied Optics

*Project Title:* Recovery of randomly moving two-dimensional objects from photon-limited images

*Advisor:* J. C. Dainty

**Diploma (with honors), Physics** March 1987  
*Swiss Federal Institute of Technology Zurich, Switzerland*

*Project Title:* Investigations on planar waveguides and optical bistability

*Advisor:* Walter Lukosz

## RESEARCH EXPERIENCE:

**Research Project** from 1996  
*Swiss Federal Institute of Technology / University of Zurich, Switzerland*  
Design and test of integrated visual sensors and sensory data processing circuits and application to autonomous perception-action systems.

**Postdoctoral Research Project** 1993–96  
*California Institute of Technology, Pasadena, CA, USA*  
Design and test of different types of integrated optical velocity sensors using analog VLSI technology.

**Thesis Research Project** 1989–93  
*Paul Scherrer Institute Zurich, Switzerland*  
Design, construction and test of camera for 3D data acquisition in real time. Design and test of integrated optical systems for metrology applications using VLSI technology.

**Graduate Research Project** 1987–88  
*Imperial College of Science and Technology, London, UK*  
Conception and implementation of computer algorithm for reconstruction of a moving 2D object with four degrees of freedom (2D translation, rotation, scale) from a series of images with low photon counts.

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### RESEARCH EXPERIENCE (continued):

- Undergraduate Research Project** 1987  
*Swiss Federal Institute of Technology Zurich, Switzerland*  
 Characterization of planar optical waveguides with external grating couplers and investigated observed optical bistability effects.
- Project for Swiss Youth Research Contest** 1982  
 Derivation of formula for the calculation of generalized Bell numbers.

### TEACHING EXPERIENCE:

- Lectures** on Neuromorphic Analog VLSI Systems from 1997  
*Swiss Federal Institute of Technology Zurich, Switzerland*
- Teaching Assistant** for undergraduate courses 1989–92  
*Swiss Federal Institute of Technology Zurich, Switzerland*
- Physics
  - Nuclear and Particle Physics
- Teaching Assistant** for undergraduate course 1987  
*Swiss Federal Institute of Technology Zurich, Switzerland*
- Analysis

### GRANTS AND AWARDS:

- Postdoctoral Fellowship** 1993–94  
*Swiss National Research Council*
- Gladys Locke Award** October 1988  
*Imperial College of Science and Technology, London, UK*  
 Awarded annually for best overall result of project and exams in Applied Optics course leading to M.S. degree.
- Graduate Exchange Studentship** 1987–88  
*Imperial College of Science and Technology, London, UK*
- Swiss Youth Research Contest Award** 1982  
 Only Swiss-German contribution to obtain highest rating.

### LANGUAGE SKILLS:

- Fluent in: German, French, English
- Basic knowledge of: Spanish, Italian, Russian

### REFERENCES:

References available upon request.

**Jörg Kramer****SELECTED PUBLICATIONS:**

W. Lukosz, V. Briguët and J. Kramer, **External grating couplers on planar waveguides: linear and nonlinear coupling and optical bistability**, *Opt. Commun.* 69 (1988) 121-127.

J. C. Dainty and J. Kramer, **Photon-limited imaging of randomly moving objects**, *Proc. SPIE* 1038 (1989) 400-404.

J. Kramer, P. Seitz and H. Baltes, **Industrial CMOS technology for the integration of optical metrology systems (photo-ASICs)**, *Sensors and Actuators A* 34 (1992) 21-30.

J. Kramer, P. Seitz and H. Baltes, **Inexpensive range camera operating at video speed**, *Appl. Opt.* 32 (1993) 2323-2330.

J. Kramer, P. Seitz, E. F. Steigmeier, H. Auderset, B. Delley and H. Baltes, **Light-emitting devices in industrial CMOS technology**, *Sensors and Actuators A* 37-38 (1993) 527-533.

P. Seitz, D. Leipold, J. Kramer and J. M. Raynor, **Smart optical and image sensors fabricated with industrial CMOS/CCD semiconductor processes**, *Proc. SPIE* 1900 (1993) 30-39.

J. Kramer, P. Seitz and H. Baltes, **Planar distance and velocity sensor**, *IEEE J. Quantum Electronics* 30 (1994) 2726-2730.

G. Indiveri, J. Kramer and C. Koch, **Parallel analog VLSI architectures for computation of heading direction and time-to-contact**, in D. S. Touretzky, M. C. Mozer, M. E. Hasselmo (eds.), *Advances in Neural Information Processing Systems* 8, MIT, Cambridge, MA, USA, 1996, pp. 720-726.

J. Kramer, **Compact integrated motion sensor with three-pixel interaction**, *IEEE Trans. Pattern Anal. Machine Intell.* 18 (1996) 455-460.

J. Kramer, R. Sarpeshkar and C. Koch, **Analog VLSI motion discontinuity detectors for image segmentation**, in *Proc. 1996 IEEE Int. Symp. on Circuits and Systems (ISCAS '96)*, IEEE, Piscataway, NJ, USA, 1996, vol. II, pp. 620-623.

R. Sarpeshkar, J. Kramer, G. Indiveri and C. Koch, **Analog VLSI architectures for motion processing: from fundamental limits to system applications**, *Proc. IEEE* 84 (1996) 969-987.

G. Indiveri, J. Kramer and C. Koch, **System implementations of analog VLSI velocity sensors**, *IEEE Micro* 16 (1996) 40-49.

**Jörg Kramer****SELECTED PUBLICATIONS (continued):**

J. Kramer, R. Sarpeshkar and C. Koch, **Pulse-based analog VLSI velocity sensors**, *IEEE Trans. Circuits and Systems II*, 44 (1997) 86-101.

J. Kramer and G. Indiveri, **Neuromorphic vision sensors and preprocessors in system applications**, *Proc. SPIE* 3410 (1998) 134-146.

G. Indiveri, A. M. Whatley and J. Kramer, **Reconfigurable neuromorphic VLSI multi-chip system applied to visual motion computation**, in *Proc. 7th Int. Conf. Microelectronics for Neural, Fuzzy, and Bio-Inspired Systems (MicroNeuro '99)*, IEEE Computer Society, Los Alamitos, CA, USA, 1999, pp. 37-44.

G. Indiveri, R. Mürer and J. Kramer, **Active vision using an analog VLSI model of selective attention**, *IEEE Trans. Circuits and Systems II*, 48 (2001) 492-500.

S.-C. Liu, J. Kramer, G. Indiveri, T. Delbrück, T. Burg and R. J. Douglas, **Orientation-selective aVLSI spiking neurons**, *Neural Networks* 14 (2001) 629-643.

J. Kramer, **An on/off transient imager with event-driven, asynchronous read-out** in *Proc. 2002 IEEE Int. Symp. on Circuits and Systems (ISCAS '02)*, IEEE, Piscataway, NJ, USA, 2002, to be published.

**PATENTS:**

R. Sarpeshkar, J. Kramer and C. Koch, **Pulse domain neuromorphic integrated circuit for computing motion**, *U.S. Patent No.* 5,781,648 (1998).

J. Kramer, **Integrated semiconductor motion sensor**, *U.S. Patent No.* 5,998,780 (1999).