

# Jan Neumann

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## Education

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University of Maryland, College Park, Maryland, 1997–present  
Ph.D. candidate in Computer Science, expected date of completion August 2004  
Dissertation Title: *Eye Design in the Space of Light Rays*  
M.S. in Computer Science, May 2001  
University of Lübeck, Lübeck, Germany, 1994–1997  
Vordiplom in Computer Science, Minor: Medicine, October 1996

## Awards and Honors

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Dissertation Fellow, University of Maryland, 2003–2004  
Computer Science Research Fellow, University of Maryland, 1997–1999  
Fellow, German National Scholarship Foundation, 1994–2000  
*Awarded to top 1% of all German university students*

## Research Interests

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- Signal-processing based design and analysis of multi-perspective camera systems ranging from small insect-eye like compound eyes to large dynamic, distributed camera networks.
- Multi-perspective image processing applications in vision, graphics and robotics (Immersive environments, pervasive computing, navigation, 3D shape and motion capture).
- Geometry and statistics of the time-varying space of light rays.
- Applications of MEMS-technology in camera design (mini-cameras, micro-mirrors and light guides).
- Probabilistic multi-resolution representations for 3D shape and motion information.
- Fundamental principles of biological eye design and visual information processing.

## Research Experience

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**Doctoral Research:** Computer Science Department, University of Maryland, 1997–present  
(Advisor: Dr. Yiannis Aloimonos)

- Studied the imaging properties of multi-perspective camera assemblies by analyzing the geometry and statistics of the time-varying space of light rays
- Defined metrics for optimal camera design with regard to 3D motion estimation and 3D photography
- Invented new vision algorithms for 3D motion estimation and 3D photography that utilize multi-perspective images
- Developed new approaches to capture and analyze the 3D shape and motion of humans and objects using a network of up to 64 cameras
- Applied geometrical and statistical methods to track and analyze independently moving objects in videos as part of the DARPA Video Analysis and Content Exploitation (VACE) and Video Verification of Identity (VIVID) projects

**Undergraduate Research:** Institute for Computer Engineering, University of Lübeck, 1995–1997  
(Advisor: Dr. Erik Mähle)

- Built a biologically inspired control system for robot navigation based on visual input

## Teaching Experience

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**Instructor:** *3D Photography and Inverse Rendering* (CMSC828Z) ([www.videogeometry.com/CMSC828Z](http://www.videogeometry.com/CMSC828Z))

Computer Science Department, University of Maryland, 2002

- Delivered weekly two-hour lectures about topics in computer vision, image processing and computer graphics
- Designed graduate level syllabus and projects; advised and evaluated students

**Co-Instructor:** *Interpretation of Pictorial Information* (CMSC 733)

Computer Science Department, University of Maryland, 2001

- Full responsibility for graduate level computer vision class while substituting for a professor

**Teaching Assistant:** *Image Processing* (CMSC427) and *Interpretation of Pictorial Information* (CMSC733)

Computer Science Department, University of Maryland, 1998-present

- Delivered two to three lectures a semester about multi-view geometry, camera design, 3D reconstruction from images, and 3D motion estimation
- Designed and supervised student projects

**Teaching Assistant:** *Calculus I and II*

Mathematics Department, University of Lübeck, 1995–1997

- Graded exams and homework
- Delivered weekly instruction

## Professional Activities and Affiliations

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### Referee:

ACM Transactions of Graphics

The Visual Computer

IEEE International Conference of Computer Vision (2001,2003)

IEEE Conference of Computer Vision and Pattern Recognition (2000,2001,2003,2004)

European Conference on Computer Vision (2000,2002,2004)

International Conference on Pattern Recognition (2000,2002,2004)

### Memberships:

Association for Computing Machinery (ACM)

ACM Special Interest Group Graphics (SIGGRAPH)

Institute of Electrical and Electronics Engineers (IEEE)

IEEE Computer Society

German Society for Pattern Recognition (DAGM)

German Scholars Organization

## Publications

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(available on the web at [www.videogeometry.com/publications.htm](http://www.videogeometry.com/publications.htm))

### Journals

- (1) *A Hierarchy of Cameras for 3D Photography*. Jan Neumann, Cornelia Fermüller and Yiannis Aloimonos. *Computer Vision and Image Understanding*, in press, 2004.
- (2) *Plenoptic video geometry*. Jan Neumann and Cornelia Fermüller. *The Visual Computer*, 19(6), pages 395-404, 2003.
- (3) *Spatio-temporal stereo using multi-resolution subdivision surfaces*. Jan Neumann and Yiannis Aloimonos. *International Journal of Computer Vision*, 47(1/2/3), pages 181-193, 2002.
- (4) *Integration of local and global shape analysis for logo classification*. Jan Neumann, Hanan Samet, and Aya Soffer. *Pattern Recognition Letters*, 23(12), pages 1449-1457, 2002.

## Publications (cont.)

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### Peer-reviewed Conferences and Workshops

- (1) *3D Ego motion estimation using compound eye sensors* Jan Neumann and Yiannis Aloimonos. accepted at the 5. Workshop Dynamic Perception 2004. Tübingen, November 18-19, 2004
- (2) *Compound Eye Sensor for 3D Ego Motion Estimation*. Jan Neumann, Cornelia Fermüller, Yiannis Aloimonos and Vladimir Brajovic. accepted at the 2004 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Sendai, Japan, September 2004
- (3) *Eye Design in the Plenoptic Space of Light Rays*. Jan Neumann, Cornelia Fermüller and Yiannis Aloimonos. International Conference on Computer Vision, Vol. 2, pages 1160-1167, Nice, France, October 2003.
- (4) *Polydioptric Camera Design and 3D Motion Estimation*. Jan Neumann, Cornelia Fermüller and Yiannis Aloimonos. IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Vol. II, pages 294-301, Madison, WI, June 2003.
- (5) *Polydioptric cameras: New eyes for structure from motion*. Jan Neumann, Cornelia Fermüller, and Yiannis Aloimonos. In DAGM Symposium, volume 2449 of Lecture Notes of Computer Science, pages 618-625, Zürich, Switzerland, September 2002. Springer, Berlin.
- (6) *A hierarchy of cameras for 3d photography*. Jan Neumann, Cornelia Fermüller, and Yiannis Aloimonos. In 1st Symposium on 3D Processing, Visualization, and Processing (3DPVT), pages 2- 11, Padova, Italy, June 2002.
- (7) *Eyes from eyes: New cameras for structure from motion*. Jan Neumann, Cornelia Fermüller, and Yiannis Aloimonos. In IEEE Workshop on Omni-directional Vision 2002 (in conjunction with European Conference on Computer Vision 2002), pages 19-26, Copenhagen, Denmark, June 2002.
- (8) *Spatio-temporal stereo using multi-resolution subdivision surfaces*. Jan Neumann and Yiannis Aloimonos. Stereo and Multi-Baseline Vision Workshop 2001, Kauai, Hawaii, pages 103-110, December 2001
- (9) *Spatio-temporal analysis of human faces using multi-resolution subdivision surfaces*. Jan Neumann and Yiannis Aloimonos. In DAGM Symposium, pages 61-68, September 2001.
- (10) *Integration of local and global shape analysis for logo classification*. Jan Neumann, Hanan Samet, and Aya Soffer. In Visual Form 2001: Proceedings of the 4th International Workshop on Visual Form (IWVF4), Lecture Notes in Computer Science 2059, pages 769-778. Springer, Berlin, 2001.
- (11) *Introducing the tool of 3D motion fields to the study of action*. Jan Neumann and Yiannis Aloimonos. In Proc. Human Motion Analysis Workshop , Austin, Texas, pages 25-32, December 2000.
- (12) *Animated heads: From 3d motion fields to action descriptions*. Jan Neumann, Cornelia Fermüller, and Yiannis Aloimonos. In Proc. 1st International Workshop on Deformable Models, Geneva, Switzerland, November 2000.
- (13) *A new framework for multi-camera structure from motion*. Jan Neumann, C. Fermüller, and Yiannis Aloimonos. In DAGM Symposium, pages 75-82, Kiel, Germany, September 2000.
- (14) *Multi-camera networks: Eyes from eyes*. Cornelia Fermüller, Yiannis Aloimonos, Patrick Baker, Robert Pless, Jan Neumann, and Brad Stuart. In Proc. IEEE Workshop on Omni-directional Vision, pages 11-18. IEEE Computer Society, Hilton Head, SC, June 2000.

### Book Chapters

- (1) *Animated heads*. Jan Neumann, Cornelia Fermüller, and Yiannis Aloimonos. In D. Thalmann, editor, Deformable Avatars. pages 1-11, Kluwer, 2001.

## References

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