

Stanford



Marc Levoy

VMware Founders Professor in Computer Science and Professor of Electrical Engineering, Emeritus

Bio

BIO

Levoy's current interests include the science and art of photography, computational photography, light field sensing and display, and applications of computer graphics in microscopy and biology.

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Computer Science

HONORS AND AWARDS

- Member, National Academy of Engineering (2022)
- Fellow, Association for Computing Machinery (2007)

PROGRAM AFFILIATIONS

- Symbolic Systems Program

PROFESSIONAL EDUCATION

- PhD, University of North Carolina , Computer Science, Electrical Engineering (1989)

LINKS

- Personal Stanford web page: <http://graphics.stanford.edu/~levoy/>

Publications

PUBLICATIONS

- **Wave optics theory and 3-D deconvolution for the light field microscope** *OPTICS EXPRESS*
Broxton, M., Grosenick, L., Yang, S., Cohen, N., Andelman, A., Deisseroth, K., Levoy, M.
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- **The Frankencamera: An Experimental Platform for Computational Photography** *COMMUNICATIONS OF THE ACM*
Adams, A., Jacobs, D. E., Dolson, J., Tico, M., Pulli, K., Talvala, E., Ajdin, B., Vaquero, D., Lensch, H. P., Horowitz, M., Park, S. H., Gelfand, N., Baek, et al
2012; 55 (11): 90-98
- **Application of Zernike polynomials towards accelerated adaptive focusing of transcranial high intensity focused ultrasound** *MEDICAL PHYSICS*
Kaye, E. A., Hertzberg, Y., Marx, M., Werner, B., Navon, G., Levoy, M., Pauly, K. B.
2012; 39 (10): 6254-6263
- **Unstructured Light Fields** *COMPUTER GRAPHICS FORUM*
Davis, A., Levoy, M., Durand, F.

2012; 31 (2): 305-314

• **CMOS Image Sensors With Multi-Bucket Pixels for Computational Photography** *IEEE JOURNAL OF SOLID-STATE CIRCUITS*

Wan, G., Li, X., Agranov, G., Levoy, M., Horowitz, M.

2012; 47 (4): 1031-1042

• **Applications of Multi-Bucket Sensors to Computational Photography.** *Stanford Computer Graphics Laboratory Technical Report 2012-2*

Wan, G., Horowitz, M., Levoy, M.

2012

• **Focal stack compositing for depth of field control** *Stanford Computer Graphics Laboratory Technical 2012-1*

Jacobs, David, E., Baek, J., Levoy, M.

2012

• **Digital Video Stabilization and Rolling Shutter Correction using Gyroscopes** *Stanford Computer Science Tech Report CSTR 2011-03*

Karpenko, A., Jacobs, David, E., Baek, J., Levoy, M.

2011

• **Experimental Platforms for Computational Photography** *IEEE COMPUTER GRAPHICS AND APPLICATIONS*

Levoy, M.

2010; 30 (5): 81-87

• **The Frankencamera: An Experimental Platform for Computational Photography** *ACM TRANSACTIONS ON GRAPHICS*

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• **Recording and controlling the 4D light field in a microscope using microlens arrays** *JOURNAL OF MICROSCOPY*

Levoy, M., Zhang, Z., McDowall, I.

2009; 235 (2): 144-162

• **Gaussian KD-Trees for Fast High-Dimensional Filtering** *ACM SIGGRAPH Conference 2009*

Adams, A., Gelfand, N., Dolson, J., Levoy, M.

ASSOC COMPUTING MACHINERY.2009

• **Gaussian KD-Trees for Fast High-Dimensional Filtering**

Adams, A., Gelfand, N., Dolson, J., Levoy, M.

2009

• **Wigner Distributions and How They Relate to the Light Field** *IEEE International Conference on Computational Photography (ICCP)*

Zhang, Z., Levoy, M.

2009

• **Flexible Multimodal Camera Using a Light Field Architecture** *IEEE International Conference on Computational Photography (ICCP)*

Horstmeyer, R., Euliss, G., Athale, R., Levoy, M.

2009

• **Computational Photography on Large Collections of Images** *COMMUNICATIONS OF THE ACM*

Levoy, M.

2008; 51 (10): 86-86

• **Combining confocal imaging and descattering** *Eurographics Symposium on Rendering 2008*

Fuchs, C., Heinz, M., Levoy, M., Scidel, H., Lensch, H. P.

WILEY-BLACKWELL.2008: 1245-53

• **Spatially Adaptive Photographic Flash** *Technical Report 612, ETH Zurich, Institute of Visual Computing*

Adelsberger, R., Ziegler, R., Levoy, M., Gross, M.

2008; 612

• **Veiling glare in high dynamic range imaging** *ACM SIGGRAPH 2007 Conference*

Talvala, E., Adams, A., Horowitz, M., Levoy, M.

ASSOC COMPUTING MACHINERY.2007

- **Synthetic aperture focusing using dense camera arrays** *Workshop on Advanced 3D Imaging for Safety and Security held in Conjunction with the International Conference on Computer Vision and Pattern Recognition*
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SPRINGER.2007: 159-?
- **Veiling Glare in High Dynamic Range Imaging**
Talvala, E. (., Adams, A., Horowitz, M., Levoy, M.
2007
- **General Linear Cameras with Finite Aperture** *Eurographics Symposium on Rendering (EGSR)*
Adams, A., Levoy, M.
2007
- **Light fields and computational imaging** *COMPUTER*
Levoy, M.
2006; 39 (8): 46-?
- **Light field microscopy** *ACM TRANSACTIONS ON GRAPHICS*
Levoy, M., Ng, R., Adams, A., Footer, M., Horowitz, M.
2006; 25 (3): 924-934
- **Reconstructing Occluded Surfaces using Synthetic Apertures: Stereo, Focus and Robust Measures**
Vaish, V., Szeliski, R., Zitnick, C., L., Kang, S. B., Levoy, M.
2006
- **Symmetric Photography : Exploiting Data-sparseness in Reflectance Fields**
Garg, G., Talvala, E. (., Levoy, M., Lensch, Hendrik, P.A.
2006
- **Light Field Microscopy**
Levoy, M., Ng, R., Adams, A., Footer, M., Horowitz, M.
2006
- **Fragments of the City: Stanford's Digital Forma Urbis Romae Project**
Koller, D., Trimble, J., Najbjerg, T., Gelfand, N., Levoy, M.
2006
- **Computer-aided Reconstruction and New Matches in the Forma Urbis Romae**
Koller, D., Levoy, M.
2006
- **High performance imaging using large camera arrays** *ACM SIGGRAPH 2005 Conference*
Wilburn, B., Joshi, N., Vaish, V., Talvala, E. V., Antunez, E., Barth, A., Adams, A., Horowitz, M., Levoy, M.
ASSOC COMPUTING MACHINERY.2005: 765-76
- **Dual photography** *ACM SIGGRAPH 2005 Conference*
Sen, P., Chen, B., Garg, G., Marschner, S. R., Horowitz, M., Levoy, M., Lensch, H. P.
ASSOC COMPUTING MACHINERY.2005: 745-55
- **Protecting 3D graphics content** *COMMUNICATIONS OF THE ACM*
Koller, D., Levoy, M.
2005; 48 (6): 74-80
- **High-speed videography using a dense camera array** *26th International Congress on High-Speed Photography and Photonics*
Wilburn, B., Joshi, N., Vaish, V., Levoy, M., Horowitz, M.
SPIE-INT SOC OPTICAL ENGINEERING.2005: 913-920
- **Synthetic Aperture Focusing using a Shear-Warp Factorization of the Viewing Transform**
Vaish, V., Garg, G., Talvala, E. (., Antunez, E., Wilburn, B., Horowitz, M., Levoy, M.

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- **High Performance Imaging Using Large Camera Arrays**

Wilburn, B., Joshi, N., Vaish, V., Talvala, E. (., Antunez, E., Barth, A., Levoy, M.
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- **Light Field Photography with a Hand-Held Plenoptic Camera** *Stanford University Computer Science Tech Report CSTR*

Ng, R., Levoy, M., Brédif, M., Duval, G., Horowitz, M., Hanrahan, P.
2005: 2005-02

- **Interactive Deformation of Light Fields**

Chen, B., Ofek, E., Shum, H., Levoy, M.
2005

- **Dual Photography**

Sen, P., Chen, B., Garg, G., Marschner, S., Horowitz, M., Levoy, M.
2005

- **Protected interactive 3D graphics via remote rendering** *Annual Symposium of the ACM SIGGRAPH*

Koller, D., Turitzin, M., Levoy, M., Tarini, M., Croccia, G., Cignoni, P., Scopigno, R.
ASSOC COMPUTING MACHINERY.2004: 695–703

- **Synthetic aperture confocal imaging** *Annual Symposium of the ACM SIGGRAPH*

Levoy, M., Chen, B., Vaish, V., Horowitz, M., McDowall, I., Bolas, M.
ASSOC COMPUTING MACHINERY.2004: 825–34

- **High-speed videography using a dense camera array** *Conference on Computer Vision and Pattern Recognition*

Wilburn, B., Joshi, N., Vaish, V., Levoy, M., Horowitz, M.
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- **Protected Interactive 3D Graphics Via Remote Rendering**

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2004

- **Synthetic aperture confocal imaging** *ACM Transactions on Graphics*

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- **High Speed Video Using a Dense Camera Array**

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- **Using plane plus parallax for calibrating dense camera arrays** *Conference on Computer Vision and Pattern Recognition*

Vaish, V., Wilburn, B., Joshi, N., Levoy, M.
IEEE COMPUTER SOC.2004: 2–9

- **Interactive design of multi-perspective images for visualizing urban landscapes** *IEEE Visualization 2004 Conference*

Roman, A., Garg, G., Levoy, M.
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- **Geometrically stable sampling for the ICP algorithm** *4th International Conference on 3-D Digital Imaging and Modeling (3-DIM 2003)*

Gelfand, N., Ikemoto, L., Rusinkiewicz, S., Levoy, M.
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- **A Hierarchical Method for Aligning Warped Meshes**

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- **A hierarchical method for aligning warped meshes** *4th International Conference on 3-D Digital Imaging and Modeling (3-DIM 2003)*

Ikemoto, L., Gelfand, N., Levoy, M.

IEEE COMPUTER SOC.2003: 434–441

- **Unwrapping and visualizing cuneiform tablets** *IEEE COMPUTER GRAPHICS AND APPLICATIONS*

Anderson, S. E., Levoy, M.
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- **Real-time 3D model acquisition** *SIGGRAPH 2002 Meeting*

Rusinkiewicz, S., Hall-Holt, O., Levoy, M.
ASSOC COMPUTING MACHINERY.2002: 438–46

- **Filling holes in complex surfaces using volumetric diffusion** *1st International Symposium on 3D Data Processing Visualization and Transmission*

Davis, J., Marschner, S. R., Garr, M., Levoy, M.
IEEE COMPUTER SOC.2002: 428–438

- **Order-Independent Texture Synthesis** *Technical Report TR-2002-01, Computer Science Department, Stanford University*

Wei, L., Levoy, M.
2002

- **Texture synthesis over arbitrary manifold surfaces** *SIGGRAPH 2001*

Wei, L. Y., Levoy, M.
ASSOC COMPUTING MACHINERY.2001: 355–360

- **Streaming QSplat: A Viewer for Networked Visualization of Large, Dense Models**

Rusinkiewicz, S., Levoy, M.
2001

- **An Assessment of Laser Range Measurement of Marble Surfaces**

Godin, G., Beraldin, J., Angelo, Rioux, M., Levoy, M., Cournoyer, L., Blais, F.
2001

- **Efficient variants of the ICP algorithm** *3rd International Conference on 3-D Digital Imaging and Modeling*

Rusinkiewicz, S., Levoy, M.
IEEE COMPUTER SOC.2001: 145–152

- **A practical model for subsurface light transport** *SIGGRAPH 2001*

Jensen, H. W., Marschner, S. R., Levoy, M., Hanrahan, P.
ASSOC COMPUTING MACHINERY.2001: 511–518

- **Untitled** *COMPUTER GRAPHICS-US*

Levoy, M.
2000; 34 (3): 4-4

- **Error in volume rendering paper was in exposition only** *IEEE COMPUTER GRAPHICS AND APPLICATIONS*

Levoy, M.
2000; 20 (4): 6-6

- **The digital Michelangelo project: 3D scanning of large statues** *Computer Graphics Annual Conference*

Levoy, M., Pulli, K., Curless, B., Rusinkiewicz, S., Koller, D., Pereira, L., Ginzton, M., Anderson, S., Davis, J., Ginsberg, J., Shade, J., FULK, D.
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- **Digitizing the Forma Urbis Romae** *Siggraph Digital Campfire on Computers and Archeology*

Levoy, M.
2000

- **QSplat: A multiresolution point rendering system for large meshes** *Computer Graphics Annual Conference*

Rusinkiewicz, S., Levoy, M.
ASSOC COMPUTING MACHINERY.2000: 343–352

- **Fast texture synthesis using tree-structured vector quantization** *Computer Graphics Annual Conference*

Wei, L. Y., Levoy, M.

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- **The digital Michelangelo project** *COMPUTER GRAPHICS FORUM*
Levoy, M.
1999; 18 (3): XV-XVIII
- **A Volumetric Method for Building Complex Models from Range Images**
Curless, B., Levoy, M.
1996
- **Light Field Rendering**
Levoy, M., Hanrahan, P.
1996
- **Fitting Smooth Surfaces to Dense Polygon Meshes**
Krishnamurthy, V., Levoy, M.
1996
- **Better optical triangulation through spacetime analysis** *5th International Conference on Computer Vision*
Curless, B., Levoy, M.
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- **Feature-Based Volume Metamorphosis**
Lerios, A., Garfinkle, Chase, D., Levoy, M.
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- **3D Painting on Scanned Surfaces**
Agrawala, M., Beers, A., Levoy, M.
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- **Polygon-Assisted JPEG and MPEG Compression of Synthetic Images**
Levoy, M.
1995
- **PARALLEL VISUALIZATION ALGORITHMS - PERFORMANCE AND ARCHITECTURAL IMPLICATIONS** *COMPUTER*
Singh, J. P., Gupta, A., Levoy, M.
1994; 27 (7): 45-55
- **Fast Volume Rendering Using a Shear-Warp Factorization of the Viewing Transformation**
Lacroute, P., Levoy, M.
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- **Zippered Polygon Meshes from Range Images**
Turk, G., Levoy, M.
1994
- **Spreadsheets for Images**
Levoy, M.
1994
- **Frequency Domain Volume Rendering**
Totsuka, T., Levoy, M.
1993
- **Volume Rendering on Scalable Shared-Memory MIMD Architectures**
Nieh, J., Levoy, M.
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- **Volume Rendering using the Fourier Projection-Slice Theorem**
Levoy, M.

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- **Efficient Ray Tracing of Volume Data** *ACM Transactions on Graphics*
Levoy, M.
1990; 9 (3): 245-261
- **A Hybrid Ray Tracer for Rendering Polygon and Volume Data** *IEEE Computer Graphics and Applications*
Levoy, M.
1990; 10 (2): 33-40
- **Volume Rendering in Radiation Treatment Planning**
Levoy, M., Fuchs, H., Pizer, Stephen, M., Rosenman, J., Chaney, Edward, L., Sherouse, George, W.
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- **Gaze-Directed Volume Rendering**
Levoy, M., Whitaker, R.
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- **Volume Rendering by Adaptive Refinement** *The Visual Computer*
Levoy, M.
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- **Display of Surfaces from Volume Data** *IEEE Computer Graphics and Applications*
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- **The Use of Points as a Display Primitive** *UNC-Chapel Hill Computer Science Technical Report*
Levoy, M., Whitted, T.
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- **Area Flooding Algorithms** *SIGGRAPH 1981 Two-Dimensional Computer course notes.*
Levoy, M.
1981
- **Merging and Transformation of Raster Images for Cartoon Animation**
Wallace, Bruce, A.
1981
- **Synthetic Texturing Using Digital Filters**
Feibusch, E., Levoy, M., Cook, R.
1980
- **A Color Animation System Based on the Multiplane Technique**
Levoy, M.
1977