

ANAT LEVIN

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Education & Academic Appointments:

2022-Current: Professor, Department of Electrical and Computer Engineering, Technion.

2016-2022: Associate Professor (tenured), Department of Electrical and Computer Engineering, Technion.

2014-2016: Associate Professor (tenured), Department of Mathematics and Computer Science, The Weizmann Institute of Science.

2009-2014: Senior Scientist (a.k.a. assistant professor), Department of Mathematics and Computer Science, The Weizmann Institute of Science.

2007-2008: Postdoctoral Associate, MIT CSAIL.
Advisor: Prof. William T. Freeman.

2002-2006: Ph.D.(*summa cum laude*), Computer Science, The Hebrew University of Jerusalem.
Thesis title: "Learning and inference in low level vision".
Thesis Advisor: Prof. Yair Weiss.

2001: M.Sc.(*summa cum laude*), Computer Science, The Hebrew University of Jerusalem.
Thesis title: "On rigid and non-rigid shape invariants for image understanding purposes".
Thesis Advisor: Prof. Amnon Shashua.

1998-2000: B.Sc.(*summa cum laude*), Hebrew University of Jerusalem.
Majors: Mathematics and Computer Science.

Research Interests:

Computational Imaging, Optics, Computer Vision, Computer Graphics and Image Processing.

Awards: Best student paper finalist at the Optica imaging congress 2024.
Eurographics Outstanding Technical Contributions Award, 2024.

Technion's Morton and Beverley Rechler Prizes for Excellence in Research 2024

Blavatnik Award, The New York Academy of Sciences, 2018. Awarded annually to one Israeli young scientist among all physical sciences.

Technion Academic Excellence Prize, 2017.

M. Bruno Memorial Award, Rothschild Foundation, 2015. Awarded annually to four Israeli scientists in all fields of natural, human, social and medical sciences

M. L. Levinson Prize, Weizmann Institute Scientific Council, 2015.

PAMI Young Researcher Award, 2013. Awarded at IEEE CVPR to outstanding computer vision researchers.

Krill Prize, Wolf Foundation, 2013.

Eurographics Young Researcher Award, 2010.

Pazy Memorial Award, 2009. Most outstanding BSF-supported project in mathematics and computer science for the year 2009.

TR35 Young Innovator Award, MIT's Technology Review, 2009. Recognizing exciting inventions and research by innovators under the age of 35.

Best Paper Award Runner-Up, IEEE CVPR (Conf. on Computer Vision and Pattern Recognition), 2009.

Alon Fellowship, Israel Council for Higher Education, 2009.

AI's 10 to Watch, 2008. 10 top young researchers selected by the IEEE Intelligent Systems magazine.

The Sara Lee Schupf Post-Doctoral Award, Weizmann Institute, 2007.

Best Paper Award Runner-Up, IEEE CVPR (Conf. on Computer Vision and Pattern Recognition), 2007.

Max Shlumiuk Award for Excellent Ph.D. Dissertations, Hebrew University.

Ph.D. *summa cum laude*.

Longuet-Higgins Best Paper Award at ECCV (European Conference on Computer Vision), 2006.

Kaye Innovation Award, Hebrew University, 2005. For innovations with high commercial potential.

Ben Wegbreit Best Student Paper Award Finalist, NIPS (Neural Information Processing Systems), 2002.

Horowitz fellowship for Ph.D students, Hebrew University.

Grants:

2024-2027 ISF (Israel Science Foundation), no. 563/24
“Computational wavefront shaping: theory and practice.”

2023-2028 **ERC** (European Research Council) Consolidator Grant, no. 101043471.
Computational tissue imaging using speckle correlation.

2021-2023 NSF-BSF (U.S. National Science Foundation — US–Israel Binational Science Foundation), no. 2008123/2019758.
“Computational imaging with speckle correlations for material analysis.”
Joint with I. Gkioulekas, CMU.

2021-2025 ISF (Israel Science Foundation), no. 1947/20.
“Wide range spatial light modulation using a logarithmic DMD cascade.”

2016-2021 **ERC** (European Research Council) Starting Grant, no. 635537.
“Exploiting light and material interaction.”

2015-2018 ISF (Israel Science Foundation).
“Passive light sensitive displays.”

2013-2015 Intel ICRI-CI
“Understanding and utilizing natural image statistics.” Joint with M. Elad, B. Nadler and Y. Weiss.

2011-2015 **ERC** (European Research Council) Starting Grant, no. 259091.
“Understanding, designing and analyzing computational cameras.”

2010-2013 BSF (USA-Israel Binational Science Foundation), no. 2008155.
“Computational all focus imaging using light field analysis.”
Joint with W. Freeman and F. Durand, MIT.
Awarded the Pazy memorial award as the most outstanding BSF-supported project in mathematics and computer science for the year 2009.

2009-2011 ISF (Israel Science Foundation), Legacy program, no. 1993/08.
“Simplifying computer vision by novel camera and decoding algorithms.”

Professional Activities:

Program Chair ICCP 2025.

Associate Editor: International Journal of Computer Vision, 2012-2013.

Area Chair: IEEE ICCV, 2013. ACM SIGGRAPH (called PC), 2014, 2017, 2020, 2021, 2023, 2024.

Program committee: IEEE CVPR 2006-2015, IEEE ICCV 2007-2011, ECCV 2008-2014, IEEE ICCP 2009-2024.

Poster Chair: IEEE ICCP, 2021.

Reviewer: ACM SIGGRAPH 2005-2022, ACM Trans. on Graphics, IEEE Trans. on PAMI, IEEE Trans. on Image Processing, ERC, ISF, BSF grant foundations.

Teaching: Algorithms and applications in Computer Vision, 2020- 2024.
Computational Photography, 2017- 2024.
Introduction to Computer Vision, 2009- 2010.
Advanced Topics in Computer Vision, 2010- 2015.
Introduction to Statistical Inference and Learning, 2011, 2012, 2013.
Advanced Topics in Computational Photography and Optics, Spring 2014.

Journal Publications:

1. D. Aizik, A. Levin. “Non-invasive and noise-robust light focusing using confocal wavefront shaping”. *Nature Communications*, 2024.
2. C. Bar, I. Gkioulekas, A. Levin “Efficient Monte Carlo simulation of spatiotemporal speckles and their correlations”. *Optica*, 2023
3. W. Chen, M. OToole, A. Sankaranarayanan, A. Levin “Enhancing Speckle Statistics for Imaging Inside Scattering Media”. *Optica*, 2022.
4. D. Aizik, I. Gkioulekas, A. Levin. “Fluorescent Wavefront Shaping Using Incoherent Iterative Phase Conjugation”. *Optica*, 2022.
5. Z. Wertheimer, C. Bar, A. Levin. “Towards Machine Learning for Heterogeneous Inverse Scattering in 3D Microscopy”. *Optics Express*, 2022.
6. M. Alterman, C. Bar, I. Gkioulekas, A. Levin. “Imaging with local speckle intensity correlations: theory and practice”. *ACM Transactions on Graphics*, 2021.
7. R. Chang, A. Levin, V. Kumar, A. Sankaranarayanan. “Towards Occlusion-Aware Multifocal Displays”. *SIGGRAPH, ACM Transactions on Graphics*, 2020.
8. A. Kotwal, A. Levin, I. Gkioulekas. “Probing Coherent Transmission and Incoherent Transport Using Coded Coherence Interferometry”. *SIGGRAPH, ACM Transactions on Graphics*, 2020.
9. C. Bar, I. Gkioulekas, A. Levin. “Rendering Near-Field Speckle Statistics in Scattering Media”. *SIGGRAPH Asia, ACM Transactions on Graphics*, 2020.
10. C. Bar, M. Alterman, I. Gkioulekas, A. Levin. “A Monte Carlo Framework for Rendering Speckle Statistics in Scattering Media”. *SIGGRAPH, ACM Transactions on Graphics*, July 2019.
11. N. Efrat, P. Didyk, M. Foshey, W. Matusik, A. Levin. “Cinema 3D: Large Scale Automultiscopic Display”. *SIGGRAPH, ACM Transactions on Graphics*, July 2016.
12. I. Gkioulekas, A. Levin, F. Durand, T. Zickler. “Micron-scale Light Path Decomposition Using Interferometry”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2015.

13. D. Glasner, T. Zickler, A. Levin. “A Reflectance Display”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2014.
14. I. Gkioulekas, S. Zhao, K. Bala, T. Zickler and A. Levin “Inverse Volume Rendering with Material Dictionaries”. *SIGGRAPH Asia, ACM Transactions on Graphics*, Nov 2013
15. A. Levin, D. Glasner, Y. Xiong, F. Durand, W. Freeman, W. Matusik, T. Zickler. “Fabricating BRDFs at High Spatial Resolution Using Wave Optics”. *SIGGRAPH, ACM Transactions on Graphics*, July 2013.
16. A. Levin, Y. Weiss, F. Durand and W. T. Freeman. “Understanding and Evaluating Blind Deconvolution Algorithms”. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 2011.
17. A. Levin, S. Hasinoff, P. Green, F. Durand, W. T. Freeman. “4D Frequency Analysis of Computational Cameras for Depth of Field Extension”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2009.
18. A. Levin and Y. Weiss. “Learning to Combine Bottom-Up and Top-Down Segmentation”. *International Journal of Computer Vision*, Jan 2009.
19. A. Levin, A. Rav-Acha and D. Lischinski. “Spectral Matting”. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Oct 2008.
20. A. Levin, P. Sand, T. S. Cho, F. Durand, W. T. Freeman. “Motion-Invariant Photography”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2008.
21. A. Levin, R. Fergus, F. Durand and W. T. Freeman. “Image and Depth from a Conventional Camera with a Coded Aperture”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2007.
22. A. Levin, D. Lischinski and Y. Weiss. “A Closed Form Solution to Natural Image Matting”. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Feb 2008.
23. A. Levin and Y. Weiss. “User Assisted Separation of Reflections from a Single Image Using a Sparsity Prior”. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Sep 2007.
24. A. Zomet, A. Levin, S. Peleg and Y. Weiss “Seamless Image Stitching in the Gradient Domain”. *IEEE Transactions on Image Processing*, April 2006.
25. A. Levin, D. Lischinski and Y. Weiss. “Colorization using Optimization”. *SIGGRAPH, ACM Transactions on Graphics*, Aug 2004.

Peer-Reviewed Conference Papers:

1. WY Chen, AC Sankaranarayanan, A Levin, M O’Toole “Coherence As Texture-Passive Textureless 3D Reconstruction by Self-interference”. *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2024
2. A. Kotwal, A. Levin, I. Gkioulekas “Swept-angle synthetic wavelength interferometry”. *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023

3. A. Kotwal, A. Levin, I. Gkioulekas “Passive Micron-scale Time-of-Flight with Sunlight Interferometry”. *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, 2023
4. S. Monin, A. Sankaranarayanan, A. Levin “Analyzing phase masks for wide tendue holographic displays”. *IEEE International Conference on Computational Photography (ICCP)*, 2022
5. S. Monin, A. Sankaranarayanan, A. Levin “Exponentially-wide etendue displays using a tilting cascade”. *IEEE International Conference on Computational Photography (ICCP)*, 2022
6. M. Alterman, E. Saiko, A. Levin “Direct acquisition of volumetric scattering phase function using speckle correlations”. SIGGRAPH Asia 2022
7. C. Bar, M. Alterman, I. Gkioulekas, A. Levin. “Single scattering modeling of speckle correlation”. *IEEE International Conference on Computational Photography (ICCP)*, May 2021.
8. W. Chen, A. Levin, M. O'Toole, A. Sankaranarayanan. “Wave Design for Wavefront Sensing”. *IEEE International Conference on Computational Photography (ICCP)*, May 2021.
9. K. Shem-Tov, S. Bangaru, I. Gkioulekas, A. Levin. “Towards Reflectometry from Interreflections”. *IEEE International Conference on Computational Photography (ICCP)*, Apr 2020.
10. I. Gkioulekas, A. Levin, T. Zickler. “An Evaluation of Computational Imaging Techniques for Heterogeneous Inverse Scattering”. *European Conference on Computer Vision (ECCV)*, Oct 2016.
11. A. Levin, H. Maron, M. Yarom. “Passive Light and Viewpoint Sensitive Display of 3D Content”. *IEEE International Conference on Computational Photography (ICCP)*, May 2016.
12. V. Holodovski, Y. Y. Schechner, A. Levin, A. Levis, A. Aides. “In-situ multi-view multi-scattering stochastic tomography”. *IEEE International Conference on Computational Photography (ICCP)*, May 2016.
13. T. Xue, M. Rubinstein, N. Wadhwa, A. Levin, F. Durand, and W.T. Freeman. “Refraction Wiggles for Measuring Fluid Depth and Velocity from Video”. *European Conference on Computer Vision (ECCV)*, Sep 2014.
14. N. Efrat, D. Glasner, S. Apartsin, B. Nadler, and A. Levin. “Accurate Blur Models vs. Image Priors in Super-Resolution ”. *IEEE International Conference on Computer Vision (ICCV)*, Dec 2013.
15. A. Levin, B. Nadler, F. Durand, and W. T. Freeman. “Patch Complexity, Finite Pixel Correlations and Optimal Denoising.”. *European Conference on Computer Vision (ECCV)*, Oct 2012.
16. S. W. Hasinoff, A. Levin, P. R. Goode, and W. T. Freeman. “Diffuse Reflectance Imaging with Astronomical Applications”. *IEEE International Conference on Computer Vision (ICCV)*, Nov 2011.
17. A. Levin and B. Nadler. “Natural Image Denoising: Optimality and Inherent Bounds”. *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2011.

18. A. Levin, Y. Weiss, F. Durand and W. T. Freeman. "Efficient Marginal Likelihood Optimization in Blind Deconvolution". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2011.
19. A. Levin. "Analyzing Depth from Coded Aperture Sets". *European Conference on Computer Vision (ECCV)*, Sep 2010.
20. A. Levin and F. Durand. "Linear View Synthesis Using a Dimensionality Gap Light Field Prior". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2010.
21. T. S. Cho, A. Levin, F. Durand, and W. T. Freeman. "Motion Blur Removal with Orthogonal Parabolic Exposures". *IEEE International Conf. on Computational Photography (ICCP)*, April 2010.
22. A. Levin, Y. Weiss, F. Durand and W. T. Freeman. "Understanding and Evaluating Blind Deconvolution Algorithms". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2009. **Best paper award runner up.**
23. A. Levin, W. T. Freeman and F. Durand. "Understanding Camera Trade-offs Through a Bayesian Analysis of Light Field Projections". *European Conference on Computer Vision (ECCV)*, Oct 2008.
24. A. Levin, A. Rav-Acha and D. Lischinski. "Spectral Matting". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2007. **Best paper award runner up.**
25. A. Levin. "Blind Motion Deblurring Using Image Statistics". *Advances in Neural Information Processing Systems (NIPS)*, Dec 2006.
26. A. Levin, D. Lischinski and Y. Weiss. "A Closed Form Solution to Natural Image Matting". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2006.
27. A. Levin and Y. Weiss. "Learning to Combine Bottom-Up and Top-Down Segmentation". *European Conference on Computer Vision (ECCV)*, May 2006. **Longuet-Higgins best paper award.**
28. A. Levin and R. Szeliski. "Visual Odometry and Map Correlation". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2004.
29. A. Levin, A. Zomet and Y. Weiss. "Separating Reflections from a Single Image Using Local Features". *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, June 2004.
30. A. Levin and Y. Weiss. "User Assisted Separation of Reflections from a Single Image Using a Sparsity Prior". *European Conference on Computer Vision (ECCV)*, May 2004.
31. A. Levin, A. Zomet, S. Peleg and Y. Weiss. "Seamless Image Stitching in the Gradient Domain". *European Conference on Computer Vision (ECCV)*, May 2004.
32. A. Levin, P. Viola and Y. Freund. "Unsupervised Improvement of Visual Detectors using Co-Training". *IEEE International Conference on Computer Vision (ICCV)*, Oct 2003.

33. A. Levin, A. Zomet and Y. Weiss. “Learning How to Inpaint from Global Image Statistics”. *IEEE International Conference on Computer Vision (ICCV)*, Oct 2003.
34. A. Levin, A. Zomet and Y. Weiss. “Learning to Perceive Transparency from the Statistics of Natural Scenes”. *Advances in Neural Information Processing Systems (NIPS)*, Dec 2002. **Finalist for the Ben-Wegbreit best student paper award.**
35. A. Shashua and A. Levin. “Ranking with Large Margin Principle: Two Approaches”. *Advances in Neural Information Processing Systems (NIPS)*, Dec 2002.
36. A. Levin and A. Shashua . “Principal Component Analysis Over Continuous Subspaces and Intersection of Half-spaces”. *European Conference on Computer Vision (ECCV)*, May 2002.
37. A. Levin and A. Shashua. “Revisiting Single-view Shape Tensors: Theory and Applications”. *European Conference on Computer Vision (ECCV)*, May 2002.
38. A. Shashua A. Levin and S. Avidan. “Manifold Pursuit: A New Approach to Appearance Based Recognition”. *Int. Conf. on Pattern Recog. (ICPR)*, Aug 2002.
39. A. Shashua and A. Levin. “Linear Image Coding for Regression and Classification using the Tensor-rank Principle”. *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, Dec 2001.
40. A. Levin L. Wolf and A. Shashua. “Time-varying Shape Tensors for Scenes with Multiply Moving Points”. *IEEE Conf. on Computer Vision and Pattern Recognition (CVPR)*, Dec 2001.
41. A. Shashua and A. Levin. “Multi-frame Infinitesimal Motion Model for the Reconstruction of (Dynamic) Scenes with Multiple Linearly Moving Objects”. *IEEE International Conference on Computer Vision (ICCV)*, July 2001.

Peer-Reviewed Abstracts:

1. C Bar, I Gkioulekas, A Levin “Efficient Monte Carlo simulation of speckles with physically-correct spatio-temporal statistics”. *SPIE, Adaptive Optics and Wavefront Control for Biological Systems X, PC128510G*, 2024
2. D Aizik, A Levin “Non-invasive and noise-robust confocal wavefront shaping”. *SPIE, Adaptive Optics and Wavefront Control for Biological Systems X, PC1285104*, 2024
3. D. Aizik, I. Gkioulekas, A. Levin “Rapid fluorescent wavefront shaping using incoherent power iterations”. *SPIE, Adaptive Optics and Wavefront Control for Biological Systems IX 12388, 49-51*, 2023.
4. W.Y. Chen, M. O’Toole, A.C. Sankaranarayanan, A. Levin “Enhancing speckle statistics for imaging inside scattering tissue”. *SPIE, Adaptive Optics and Wavefront Control for Biological Systems IX 12388, 25-26*, 2023.

5. M. Alterman, E. Saiko, A. Levin “Acquiring the phase function of volumetric scattering materials using speckle correlation”. *SPIE, Adaptive Optics and Wavefront Control for Biological Systems IX 12388*, 52-54, 2023.
6. S. Monin, A.C. Sankaranarayanan, A. Levin “Exponentially expanding tendue of displays with a tilting cascade”. *SPIE, Practical Holography XXXVII: Displays, Materials, and Applications 12445*, 76-78, 2023.
7. M. Alterman, E. Saiko, A. Levin “Direct phase function acquisition using speckle correlations”. *Frontiers in Optics + Laser Science* , 2022
8. M. Alterman, C. Bar, I. Gkioulekas, A. Levin “Imaging Inside Tissue Using Speckle Statistics”. *Biophotonics Congress: Biomedical Optics, Optical Tomography and Spectroscopy, OW3D. 7*, 2022
9. M. Alterman, C. Bar, I. Gkioulekas, A. Levin. “Near-field imaging inside scattering layers”. *OSA Computational Optical Sensing and Imaging*, June 2021.
10. C. Bar, M. Alterman, I. Gkioulekas, A. Levin. “A single scattering analysis of speckle correlation”. *OSA Computational Optical Sensing and Imaging*, June 2021.
11. C. Bar, M. Alterman, I. Gkioulekas, A. Levin. “Monte-Carlo Simulation of the Memory Effect in Random Media Beyond the Diffusion Limit”. *SPIE/OSA European Conference on Biomedical Optics*, June 2019.
12. C. Bar, M. Alterman, I. Gkioulekas, A. Levin. “Exploiting Speckle Statistics in Random Media Beyond the Diffusion Limit”. *OSA Computational Optical Sensing and Imaging*, June 2019.