

# Elias Nehme

Curriculum Vitae, 17/06/2024

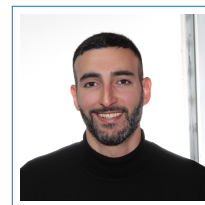
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## Education

- 2018–2024 **Ph.D. Candidate in Electrical Engineering (Direct Track)**, *Technion - IIT*.  
○ Thesis: "Deep Computational Imaging: Optimal sensing, reconstruction, and uncertainty quantification".  
○ Supervised by Prof. Tomer Michaeli and Prof. Yoav Shechtman.
- 2011–2016 **B.Sc. in Biomedical Engineering**, *Technion - IIT*.

## Professional Experience

- 2021–2022 **Verily (Google Life Sciences)**, *Haifa*.  
Research Scientist Intern.
- 2017–2018 **Magentiq Eye**, *Haifa*.  
Image Processing and Deep Learning Engineer.
- 2017–2018 **Inspiring Vision**, *Haifa*.  
Software and Algorithm Developer.
- 2015–2016 **The Laboratory for Synthetic Biology and Bio-electronics**, *Haifa*.  
Research Assistant.
- 2014–2015 **Hospitech Respiration & Rambam Medical Center**, *Haifa*.  
Clinical Trials Assistant.

## Teaching Experience

- 2017–2023 **Teaching Assistant**, *Technion*.  
○ Lab Writing: Undergraduate lab on "Diffusion Models", EE045107.  
○ T.A. in charge: "Statistical Methods in Image Processing", EE048954.  
○ T.A. in charge: "Algorithms and Applications in Computer Vision", EE046746.  
○ T.A. in charge: "Computational Optical Imaging", BME336547.  
○ T.A. in charge: "Analysis of Biological Signals", BME336208.  
○ Lab Instructor: Undergraduate lab on "Digital Systems", BME335002.

## Fellowships, Awards, and Honors

- 2022–2023 **Jacobs-Qualcomm Fellowship in 3D Imaging and Reconstruction**, *Technion*.  
2022 **Excellent Paper Award**, *MLIS-TCE Conference, Israel*.  
2021 **VATAT Prize in Data Science, Machine Learning and Intelligent Systems**, *Technion*.  
2020–2021 **Jacobs-Qualcomm Fellowship in 3D Imaging and Reconstruction**, *Technion*.  
2019 **VATAT Prize in Data Science, Machine Learning and Intelligent Systems**, *Technion*.  
2019 **Best Poster Award**, *Quantitative Bio-Imaging Conference, France*.  
2018–2019 **Excellent TA Award**, *Biomedical Engineering, Technion*.  
2018 **Lev-Margulis Memorial Prize**, *Israeli Society for Microscopy (ISM) Conference, Tel Aviv*.  
2016 **Dean Excellence Award**, *Biomedical Engineering, Technion*.

## Publications

### Journal Publications

1. **N. Opatovski\***, **E. Nehme\***, **A. Parizat**, **O. Alalouf**, and **Y. Shechtman**, "Depth-enhanced high throughput microscopy by compact PSF engineering", *Nature Communications*, 15(1), 4861 (2024).  
\*N. Opatovski and E. Nehme contributed equally to this work.

2. **D. Xiao, R. Orange, N. Opatovski, A. Parizat, E. Nehme, O. Alalouf, and Y. Shechtman**, “Large-FOV 3D localization microscopy by spatially variant point spread function generation”, *Science Advances*, 10(10), eabc3656 (2024).
3. **O. Goldenberg, B. Ferdman, E. Nehme, Y.S. Ezra, and Y. Shechtman**, “Learning Optimal Multicolor PSF Design for 3D Pairwise Distance Estimation”, *Intelligent Computing*, 2022, 0004 (2022).
4. **T. Naor, Y. Nogin, E. Nehme, B. Ferdman, L.E. Weiss, O. Alalouf, and Y. Shechtman**, “Quantifying cell-cycle-dependent chromatin dynamics during interphase by live 3D tracking”, *iScience*, 25(5), 104197 (2022).
5. **A. Saguy, F. Jünger, A. Peleg, B. Ferdman, E. Nehme, A. Rohrbach, and Y. Shechtman**, “Deep-ROCS: from speckle patterns to superior-resolved images by deep learning in rotating coherent scattering microscopy”, *Optics Express*, 29(15), 23877-23887 (2021).
6. **A. Saguy, T.N. Baldering, L.E. Weiss, E. Nehme, C. Karathanasis, M.S. Dietz, M. Heilemann, and Y. Shechtman**, “Automated Analysis of Fluorescence Kinetics in Single-Molecule Localization Microscopy Data Reveals Protein Stoichiometry”, *The Journal of Physical Chemistry B*, 125 (22), 5716-5721 (2021).
7. **E. Nehme\*, B. Ferdman\*, L.E. Weiss, T. Naor, D. Freedman, T. Michaeli, and Y. Shechtman**, “Learning optimal wavefront shaping for multi-channel imaging”, *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 43(7), 2179-2192 (2021).  
\*E. Nehme and B. Ferdman contributed equally to this work.
8. **R. Orange, E. Nehme, L.E. Weiss, B. Ferdman, O. Alalouf, and Y. Shechtman**, “3D printable diffractive optical elements by liquid immersion”, *Nature Communications*, 12(1), 1-6 (2021).
9. **L. von Chamier, R.F. Laine, J. Jukkala, C. Spahn, D. Krentzel, E. Nehme, M. Lerche, S. Hernández-Pérez, P.K. Mattila, E. Karinou, S. Holden, A.C. Solak, A. Krull, T. Buchholz, M.L. Jones, L.A. Royer, C. Leterrier, Y. Shechtman, F. Jug, M. Heilemann, G. Jacquemet, and R. Henriques**, “Democratising deep learning for microscopy with ZeroCostDL4Mic”, *Nature Communications*, 12(1), 1-18 (2021).
10. **R. Gordon-Soffer, L.E. Weiss, R. Eshel, B. Ferdman, E. Nehme, M. Bercovici, and Y. Shechtman**, “Microscopic scan-free surface profiling over extended axial ranges by point-spread-function engineering”, *Science Advances*, 6(44), eabc0332 (2020).
11. **B. Ferdman, E. Nehme, L.E. Weiss, R. Orange, O. Alalouf, and Y. Shechtman**, “VIPR: Vectorial Implementation of Phase Retrieval for fast and accurate microscopic pixel-wise pupil estimation”, *Optics Express*, 28(7), 10179-10198 (2020).
12. **E. Nehme, D. Freedman, R. Gordon, B. Ferdman, L.E. Weiss, O. Alalouf, R. Orange, T. Michaeli, and Y. Shechtman**, “DeepSTORM3D: dense 3D localization microscopy and PSF design by deep learning”, *Nature Methods* 17(7), 734-740 (2020).
13. **N. Granik, L.E. Weiss, E. Nehme, M. Levin, M. Chein, E. Perlson, Y. Roichman, and Y. Shechtman**, “Single particle diffusion characterization by deep learning”, *Biophysical Journal* 117, 185-192 (2019).
14. **E. Nehme, L.E. Weiss, T. Michaeli, and Y. Shechtman**, “Deep-STORM: super-resolution single-molecule microscopy by deep learning”, *Optica* 5, 458-464 (2018).  
  - Research highlighted in *Nature Methods*: R. Strack, “Deep learning advances super-resolution imaging”, *Nature Methods* 15, 403 (2018).

#### Peer-reviewed Conference Proceedings

1. **O. Yair, E. Nehme, and T. Michaeli**, “Uncertainty visualization via low-dimensional posterior projections”, To appear in *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, June 17-21, (2024).
2. **E. Nehme, O. Yair, and T. Michaeli**, “Uncertainty quantification via neural posterior principal components”, *Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS)*, December 12-14, (2023).
3. **E. Nehme\*, B. Ferdman\*, L.E. Weiss, T. Naor, D. Freedman, T. Michaeli, and Y. Shechtman**, “Learning optimal wavefront shaping for multi-channel imaging”, *IEEE International Conference on Computational Photography (ICCP)*, May 23-25, (2021).

\*Selected for a Special Issue of *IEEE Transactions on Pattern Analysis and Machine Intelligence*.

## Preprints

1. **E. Nehme, R. Mulayoff, and T. Michaeli**, “Hierarchical uncertainty exploration via feedforward posterior trees”, arXiv, 10.48550/2405.15719, (2024).
2. **G. Volpe, C. Wählby, L. Tian, M. Hecht, A. Yakimovich, K. Monakhova, L. Waller, I.F. Sbalzarini, C.A. Metzler, M. Xie, K. Zhang, I.C.D. Lenton, H. Rubinsztein-Dunlop, D. Brunner, B. Bai, A. Ozcan, D. Midtvedt, H. Wang, N. Sladoje, J. Lindblad, J.T. Smith, M. Ochoa, M. Barroso, X. Intes, T. Qiu, L. Yu, S. You, Y. Liu, M.A. Ziatdinov, S.V. Kalinin, A. Sheridan, U. Manor, E. Nehme, O. Goldenberg, Y. Shechtman, H.K. Moberg, C. Langhammer, B. Špačková, S. Helgadottir, B. Midtvedt, A. Argun, T. Thalheim, F. Cichos, S. Bo, L. Hubatsch, J. Pineda, C. Manzo, H. Bachimanchi, E. Selander, A. Homs-Corbera, M. Fränz, K. de Haan, Y. Rivenson, Z. Korczak, C.B. Adiels, M. Mijalkov, D. Veréb, Y. Chang, J.B. Pereira, D. Matuszewski, G. Kylberg, I. Sintorn, J.C. Caicedo, B.A. Cimini, M.A.L. Bell, B.M. Saraiva, G. Jacquemet, R. Henriques, W. Ouyang, T. Le, E. Gómez-de-Mariscal, D. Sage, A. Muñoz-Barrutia, E.J. Lindqvist, and J. Bergman**, “Roadmap on deep learning for microscopy”, arXiv, 10.48550/2303.03793, (2023).

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## Conferences

### Talks

1. **Invited Talk**, “Visualizing reconstruction uncertainty in imaging inverse problems”, Hebrew University of Jerusalem Vision Seminar, Jerusalem, Israel, Jun 16, 2024.
2. **Invited Talk (Virtual)**, “Visualizing reconstruction uncertainty in imaging inverse problems”, AstraZeneca Center for Artificial Intelligence, Cambridge, UK, Jun 14, 2024.
3. **Invited Talk**, “Quantifying and visualizing reconstruction uncertainty for imaging”, Artificial Intelligence for Imaging, Sant Carles de la Rapita, Tarragona, Spain, May 26-Jun 01, 2024.
4. **Invited Talk**, “Towards intelligent microscopes with deep learned optics”, AI for Scientific Data Analysis, Chalmers University of Technology, Gothenburg, Sweden, May 31-Jun 01, 2023.
5. **Paper Talk**, “Learning optimal wavefront shaping for multi-channel imaging”, IEEE International Conference on Computational Photography 2021, Leonardo Hotel, Haifa, Israel, May 23-25, 2021.
6. **Plenary Award Lecture**, “DeepSTORM3D: deep learning for dense 3D localization microscopy”, Quantitative Biolmaging 2020, Mathematical Institute at the University of Oxford, Oxford, UK, January 6-9, 2020.
7. **Journal Club**, “Deep-STORM: super-resolution single-molecule microscopy by deep learning”, Prof. Gabriela Schlau-Cohen’s group, Chemistry Department, Massachusetts Institute of Technology, Boston, Massachusetts, United States of America, August 31, 2018.
8. **Plenary Award Lecture**, “Deep-STORM: super-resolution single-molecule microscopy by deep learning”, Israeli Society for Microscopy 2018, Dan Panorama Hotel, Tel Aviv, Israel, June 20, 2018.

### Poster Presentations

1. **E. Nehme, O. Yair, and T. Michaeli**, “Uncertainty quantification via neural posterior principal components”, Thirty-seventh Conference on Neural Information Processing Systems (NeurIPS), New Orleans, Louisiana, United States of America, Dec 15, 2023.
2. **E. Nehme, L.E. Weiss, D. Freedman, T. Michaeli, and Y. Shechtman**, “Deep learning for dense single-molecule localization microscopy”, Learning for Computational Imaging Workshop in conjunction with ICCV 2019, Seoul, South Korea, Nov 2, 2019.
3. **E. Nehme, D. Freedman, T. Michaeli, and Y. Shechtman**, “DeepSTORM3D: deep learning for dense 3D localization microscopy”, Quantitative Biolmaging 2019, Rennes, France, Jan 9-12, 2019.
4. **E. Nehme, L.E. Weiss, T. Michaeli, and Y. Shechtman**, “DeepSTORM: super-resolution single-molecule microscopy by deep learning”, NANO IL, International convention center, Jerusalem, Israel, Oct 9-11, 2018.

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## Patents

1. **Y. Shechtman, B. Ferdman, N. Opatovski, E. Nehme and R. Kedem**, “Lens system for wavefront modulation”, WO2022259243A1, (2022).

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## Extracurricular Activities and Academic Service

- 2019-2021 **Teachers Qualification Program**, *Israel's Ministry of Education & Biomedical Engineering, Technion-IIT*.  
Basics of biological signal and image processing delivered to electronics high school teachers.
- 2018-Present **Reviewer**, *Optics Express, Biomedical Optics Express, Optica, Nature Scientific Reports, Patterns, CVPR, and NeurIPS*.
- 2015 **Students Semester Representative**, *Biomedical Engineering, Technion-IIT*.
- 2013-2014 **Nachshon Coordinator**, *The Center of Educational Technology (CET) & Perach*.  
Supervising a group of 60 tutors, each one mentoring a group of 2-3 students from peripheral high schools for the 5-unit curriculum in mathematics.