

# Or Sharir

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**EDUCATION**      **Hebrew University of Jerusalem, Israel**      2014-2021  
**Ph.D.** (direct track) in Computer Science  
**Advisor:** Prof. Amnon Shashua

**Hebrew University of Jerusalem, Israel**      2009-2013  
**B.Sc.** in Physics, Mathematics, and Computer Science

**RESEARCH EXPERIENCE**      **Postdoctoral Scholar, California Institute of Technology**      2021-Present  
**Department of Computing + Mathematical Sciences**  
**Advisors:** Prof. Anima Anandkumar and Prof. Garnet Chan

## PUBLICATIONS

1. **O. Sharir**, A. Shashua, G. Carleo, "Neural tensor contractions and the expressive power of deep neural quantum states", *Physical Review B (PRB)*, 2022 (Impact Factor = 3.908)
2. Y. Levine, N. Wies, **O. Sharir**, H. Bata, A. Shashua, "Limits to Depth Efficiencies of Self-Attention", *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.
3. Y. Levine, B. Lenz, O. Dagan, D. Padnos, **O. Sharir**, S. Shalev-Shwartz, A. Shashua, Y. Shoham, "SenseBERT: Driving Some Sense into BERT", *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020.
4. **O. Sharir**, Y. Levine, N. Wies, G. Carleo, A. Shashua, "Deep Autoregressive Models for the Efficient Variational Simulation of Many-body Quantum Systems", *Physical Review Letters (PRL)*, 2020 (Impact Factor = 9.227)
5. Y. Levine, **O. Sharir**, N. Cohen, A. Shashua, "Quantum Entanglement in Deep Learning Architectures", *Physical Review Letters (PRL)*, 2019 (Impact Factor = 9.227)
6. Y. Levine, **O. Sharir**, A. Shashua, "Benefits of Depth for Long-Term Memory of Recurrent Networks", *International Conference on Learning Representations (ICLR), Workshop Track*, 2018
7. **O. Sharir**, A. Shashua, "On the Expressive Power of Overlapping Architectures of Deep Learning", *International Conference on Learning Representations (ICLR)*, 2018 (Acceptance rate = 36.0%)
8. **O. Sharir**, A. Shashua, "Sum-Product-Quotient Networks", *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2018 (Acceptance rate = 33.2%)
9. N. Cohen, **O. Sharir**, A. Shashua, "On the Expressive Power of Deep Learning: A Tensor Analysis", *Conference on Learning Theory (COLT)*, 2016 (Acceptance rate = 31.7%)
10. N. Cohen, **O. Sharir**, A. Shashua, "Deep SimNets", *Conference on Computer Vision and Pattern Recognition (CVPR)*, 2016 (Acceptance rate = 29.9%)

## PREPRINTS

1. **O. Sharir**, A. Anandkumar, "Incrementally-Computable Neural Networks: Efficient Inference for Dynamic Inputs", *arXiv:2307.14988*, 2023. (appeared at the *Efficient Systems for Foundation Models Workshop @ ICML 2023*)
2. **O. Sharir**, G. K. Chan, A. Anandkumar, "Towards Neural Variational Monte Carlo That Scales Linearly with System Size", *arXiv:2212.11296*, 2022. (also appeared at the *AI4Science Workshop @ NeurIPS 2022*)

3. Y. Levine, **O. Sharir**, A. Ziv, A. Shashua, "On the Long-Term Memory of Deep Recurrent Networks", *arXiv:1710.09431v2*, 2018
4. N. Cohen, **O. Sharir**, Y. Levine, R. Tamari, D. Yakira, A. Shashua, "Analysis and Design of Convolutional Networks via Hierarchical Tensor Decompositions", *arXiv:1705.02302*, 2017
5. **O. Sharir**, R. Tamari, N. Cohen, and A. Shashua, "Tensorial Mixture Models", *arXiv:1610.04167*, 2016

## WHITE PAPERS

1. O. Lieber, **O. Sharir**, B. Lenz, Y. Shoham, "Jurassic-1: Technical details and evaluation", AI21 Labs, 2021.
2. Y. Zeldes, D. Padnos, **O. Sharir**, B. Peleg, "Technical Report: Auxiliary Tuning and its Application to Conditional Text Generation", AI21 Labs, 2020.
3. **O. Sharir**, B. Peleg, Y. Shoham, "The Cost of Training NLP Models: A Concise Overview", AI21 Labs, 2020.

## BOOK CHAPTERS

1. Y. Levine, **O. Sharir**, N. Cohen, A. Shashua, "Bridging Many-Body Quantum Physics and Deep Learning via Tensor Networks", *Mathematical Aspects of Deep Learning*, Cambridge University Press. 2022.
2. Y. Levine, N. Wies, **O. Sharir**, N. Cohen, A. Shashua, "Tensors for Deep Learning Theory: Analyzing Deep Learning Architectures via Tensorization", *Tensors for Data Processing: Theory, Methods and Applications*, Academic Press. 2022.

## INVITED TALKS

1. "Incrementally-Computable Neural Networks: Efficient Inference for Dynamic Inputs", Celebrating the AI Revolution Conference, Hebrew University of Jerusalem, May 2023.
2. "Incrementally-Computable Neural Networks for the Variational Simulation of Quantum Many-Body Systems", AI-Week 2023, Tel Aviv University, Feb 2023.
3. "The expressiveness of neural networks for quantum state representation", Machine Learning Augmented Sampling for the Molecular Sciences workshop at CECAM, May 2022.
4. "Autoregressive Simulation of Many-body Quantum Systems", Haifa ML Meetup, Feb 2020.
5. "Autoregressive Simulation of Many-body Quantum Systems", Deep Learning for Physics Seminar Series, Princeton Center for Theoretical Science, Oct 2019.
6. "Autoregressive Simulation of Many-body Quantum Systems", (spotlight talk) workshop on "Theory of Deep Learning: Where next?", Institute for Advanced Studies, Oct 2019.
7. "Autoregressive Simulation of Many-body Quantum Systems", Machine Learning Seminar, New York University, October 2019.
8. "Autoregressive Simulation of Many-body Quantum Systems", DOLCIT Seminar Series at California Institute of Technology, September 2019.
9. "Autoregressive Simulation of Many-body Quantum Systems", workshop on "AI and Tensor Factorization for Physical, Chemical, and Biological Systems", September 2019.
10. "On the Suitability of Neural Networks for the Simulation of Quantum Many-body Systems", 16<sup>th</sup> International Conference on Approximation Theory, May 2019.
11. "Deep autoregressive models for the efficient variational simulation of many-body quantum systems", special Quantum Information seminar, Technion - Israel Institute of Technology, April 2019.
12. "Deep autoregressive models for the efficient variational simulation of many-body quantum systems", Machine Learning seminar, Technion - Israel Institute of Technology, March 2019.
13. "On the Expressive Power of ConvNets and RNNs as a Function of their Architecture", PixelClub seminar series, Technion - Israel Institute of Technology, January 2019.

14. "On the Expressive Power of ConvNets and RNNs as a Function of their Architecture", Machine Learning seminar series, Bar Ilan University, May 2018.
15. "On the Expressive Power of Overlapping Architectures of Deep Learning", Haifa ML Meetup, March 2018.
16. "On the Expressive Power of Overlapping Architectures of Deep Learning", Deep Learning Summer School Contributed Talk, June 2017.
17. "Expressive Efficiency and Inductive Bias of Convolutional Networks", Machine Learning Israel Seminar Meetup, May 2017.
18. "The Expressive Efficiency of the Architectural Attributes of Convolutional Networks", Theory Lunch at Princeton, Apr 2017.

<b>REVIEWER</b>	ICLR	2019,2021-2023
	AISTATS	2021-2022
	Journal of Approximation Theory	2017-2018,2021
	NeurIPS (Best Reviewer 2019 - top 8.5%)	2018-2023
	ICML	2019-2020
	JMLR	2018-2019
	UAI	2018
	COLT	2018
	CVPR'17 Tensor Methods in Computer Vision Workshop	2017

<b>TEACHING EXPERIENCE</b>	<b>Undergraduate Engineering Senior Projects:</b> Advisor on ML projects.	2016-2020
	<b>Image Processing Course:</b> TA in charge of homework assignments.	2015-2019
	<b>Advanced Seminar in Deep Learning:</b> Organizer.	2016-2018
	<b>Computer Vision Course:</b> Grader.	2015-2016
	<b>Algorithms Course:</b> Grader.	2014-2014

<b>INDUSTRY EXPERIENCE</b>	<b>AI21 Labs (<a href="https://ai21.com">https://ai21.com</a>):</b> Research Scientist	2019-2021
	<b>Three Tall Guys (<a href="https://threetallguys.com">https://threetallguys.com</a>):</b> Co-founder and CTO We created <i>Here-a-Story</i> , an iPhone app for sharing audio stories about places.	2013-2014
	<b>Freelance iOS Developer</b> Select projects: <ul style="list-style-type: none"> <li>• <b>MySongbook:</b> An iOS app for viewing and managing chord sheets for songs. Developed and sold by myself with nearly 50,000 sales.</li> <li>• <b>HomeStyler:</b> An iOS and Android augmented reality app for interior design. Contract work for Autodesk. Developed the core augmented reality experience of placing furniture into rooms photographed by the user. Built a simple 3D engine with pure OpenGL, combined with input from the accelerometer to orient the objects.</li> </ul>	2009-2016