Zeev Kalyuzhner | AI Researcher in Electrical Engineering

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Senior AI Research Scientist with a PhD in Electrical Engineering and AI, specializing in the intersection of artificial intelligence, nano-optics, neuroscience, and biomedicine. Recognized for expertise in developing deep learning models for advanced biomedical imaging and sensing, including the non-invasive detection of physiological states via speckle pattern analysis. Demonstrated success in translating innovative AI-driven photonic methods into peer-reviewed publications and patents. Adept at applying computational image analysis and machine learning to redefine disease subtypes, with a strong foundation in algorithm optimization and interdisciplinary collaboration.

Education

Bar-Ilan University / Ph.D. in Electrical Engineering and AI
2021 - 2026

- Thesis: Advanced AI and photonic methods for biomedical sensing (Advisor: Prof. Zeev Zalevsky, Dean of Engineering)
- Research topics: Artificial intelligence, nano-optics, neuroscience, and biomedicine.

Bar-Ilan University / MS in Electrical Engineering and AI
2020 - 2021

- Thesis: Photonic human identification based on deep learning of back-scattered laser speckle patterns

The Open University / MS in Computer Science
2018 - 2020

- Specialization in machine learning and computer vision.
- Thesis: Deep learning model optimization on a time-series signal.
- Final Project: Optical machine for human sensing using a deep learning model.

Holon Institute of Technology / BS in Computer Science
2014 - 2017
- Final Project: Desktop Application Dashboard using deep learning, GIS, and AWS

Teaching

Tel-Aviv University & The Open University / Faculty Lecturer
2022 - PRESENT

- Deliver comprehensive academic courses in the Faculty of Engineering and the Department of Computer Science.
- Curate and teach core curriculum, including "Introduction to Artificial Intelligence" (20551), "Operating Systems"(20594), and "Defensive System Programming" (20937).

Research & Industry Experience

Wix / Lead AI Researcher
2022 - PRESENT

- Spearhead end-to-end research initiatives at the intersection of data science, AI systems, and cybersecurity.
- Design and implement advanced detection algorithms and conduct comprehensive statistical and ML-based analysis for data-driven threat modeling.
- Serve as a dedicated AI researcher for the executive team, delivering strategic insights and methodological guidance on high-impact AI initiatives.
- Author comprehensive research policies for the responsible and secure use of Large Language Models (LLMs), addressing model risk, data privacy, and threat mitigation.
- Develop academic study materials and lead advanced training methodologies for the internal data science team.

Cognyte (formerly a Verint company) / Lead AI Researcher
2019 - 2022

- Led end-to-end research PoCs, overseeing research design, execution, methodological development, and statistical analysis.
- Invented and developed SoTA few-shot object detection and segmentation methods, resulting in a pending patent.
- Engineered SoTA algorithms for complex, large-scale intelligence data analysis, including OSINT and SIGINT.
- Analyzed complex network traffic to extract critical intelligence insights.
- Mentored junior researchers, fostering a rigorous academic approach to problem-solving within the research team.

Apester / Deep Learning Researcher
2018 - 2019

- Directed the research and development of dedicated sentiment and intent algorithms, managing problem definition and annotation methodologies.
- Applied unsupervised learning algorithms and collaborative filtering approaches using TensorFlow to solve complex personalization challenges.

Dragontail Systems LTD / Deep Learning Researcher
2017 - 2018

- Constructed advanced deep learning classification algorithms for object detection and recognition, utilizing distortion correction, image rectification, and gradient thresholding techniques.
- Designed content-based image classification and segmentation systems.

Photomyne / Deep Learning Engineer
2016 -2017

- Researched and built robust classification and segmentation models, managing the end-to-end pipeline from data preparation to validation using Caffe and TensorFlow frameworks. (link)

Publications

- **Kalyuzhner, Z**., Levitas, O., Kalichman, F., Jacobson, R., & Zalevsky, Z. (2019). Photonic human identification based on deep learning of back-scattered laser speckle patterns. *Optics Express*, *27*(24), 36002-36010. (link)

- **Kalyuzhner, Z.**, Agdarov, S., Bennett, A., Beiderman, Y., & Zalevsky, Z. (2021). Remote photonic sensing of blood oxygen saturation via tracking of anomalies in micro-saccades patterns. *Optics Express*, *29*(3), 3386-3394.(link)

- **Kalyuzhner, Z.**, Agdarov, S., Orr, I., Beiderman, Y., Bennett, A., & Zalevsky, Z. (2022). Remote photonic detection of human senses using secondary speckle patterns. *Scientific Reports*, *12*(1), 1-9.(link)

- **Kalyuzhner, Z.**, Agdarov, S., Beiderman, Y., Bennet, A., Beiderman, Y., & Zalevsky, Z. (2024). Remote and low-cost intraocular pressure monitoring by deep learning of speckle patterns. *Journal of Biomedical Optics*, *29*(3), 037003-037003. (link)

- **Kalyuzhner, Z.**, Zalevsky, Z. (2024). Leveraging Machine Learning for Advanced Biomedical Imaging: Insights from Speckle Pattern Analysis. In: Gogoi, A., Mazumder, N. (eds) Biomedical Imaging. Biological and Medical Physics, Biomedical Engineering. Springer, Singapore. (link)

- Raviv, T., **Kalyuzhner, Z.**, & Zalevsky, Z. (2024). Machine Learning Models for a Novel Optical Memory Approach. *ACS omega*, *9*(51), 50838-50843. (link)

- Shteinberg, O., Agdarov, S., Beiderman, Y., Bonneh, Y. S., Ziv, I., **Kalyuzhner, Z.**, & Zalevsky, Z. (2025). Microsaccades tracking by secondary speckle pattern analysis. *Journal of biophotonics*, *18*(12), e202400184. (link)

- Segal, N., **Kalyuzhner, Z.**, Agdarov, S., Beiderman, Y., Beiderman, Y., & Zalevsky, Z. (2025). AI-powered remote monitoring of brain responses to clear and incomprehensible speech via speckle pattern analysis. *Journal of Biomedical Optics*, *30*(6), 067001-067001. (link)

- **Kalyuzhner, Z.**, Agdarov, S., Beiderman, Y., Beiderman, Y., & Zalevsky, Z. (2025). Visual cortex speckle imaging for shape recognition. *Scientific Reports*, *15*(1), 42690. (link)

Conferences

- **Zeev Kalyuzhner**, Yafim Beiderman, Sergey Agdarov, and Zeev Zalevsky "Wearable vs. contact-free photonic bio-sensors and their application to SARS-CoV-2 symptoms detection", Proc. SPIE PC11979, Frontiers in Biological Detection: From Nanosensors to Systems XIV, PC1197904 (4 March 2022); (link)

- Cyber Week 2023, Academic Perspectives on Cybersecurity Challenges Track (link)

- AI Week 2024, BioMed Track (link)

- IMVC 2025 (link)

Patents

- System and method for monitoring biomechanical characteristics of an eye (link)

- System and method for tracking cellular devices (link)

- System and method for few-shot learning (link)

- System and method for estimating properties associated with routers (link)

- System and method for identifying services with which encrypted traffic is exchanged (link)

Public Service and Community Engagement

Magshimim AI Program (Israel National Cyber Directorate): Mentored high school students in AI and cybersecurity, guiding talented youth in advanced concepts to foster early excellence and civic responsibility in future tech leaders. (link)

MesayaaTech: Mentoring and managing IDF reservists transitioning to high-tech careers, providing personalized guidance and professional development to leverage military experience into civilian tech roles. (link)

Kama-Tech: Managing the Data Science track for integrating ultra-Orthodox (Haredi) communities into Israel's high-tech sector, overseeing curriculum development, delivering lectures, and collaborating with tech companies to provide training and career pathways for inclusion. (link)

Languages

Hebrew - Native language | **English** – Fluent