

Zahra Khodakarami

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Education

Ph.D. in Bioengineering, University of Pennsylvania (GPA: 3.97/4) *Aug 2023 - Present*

Advisor: Dr. Paul Yushkevich

Research: Medical Image Processing, Image Segmentation and Registration, Generative AI (Gen AI), Machine Learning (ML)

B.Sc. in Software Engineering, University of Isfahan (GPA: 3.5/4) *Sep 2014 - Jun 2019*

Publications and Peer-reviewed Abstracts

- **Zahra Khodakarami**, et al., Assessing white matter hyperintensities on matched antemortem and postmortem MRI. *Alzheimer's association international conference (AAIC) 2025* [Abstract].
- Emma P Fischer, **Zahra Khodakarami**, et al., Exploring the Influence of SSDOH and Self-Identified Race on Resilience and Vulnerability using Machine Learning for NACC UDS. *Alzheimer's association international conference (AAIC) 2025* [Abstract].
- Chinmayee Athalye, ..., **Zahra Khodakarami**, et al., Operationalizing postmortem pathology-MRI association studies in Alzheimer's disease and related disorders with MRI-guided histology sampling. *Acta Neuropathologica Communications*, 2025.
- Valerie Lohner, ..., **Zahra Khodakarami**, et al., Machine learning applications in vascular neuroimaging for the diagnosis and prognosis of cognitive impairment and dementia: a systematic review and meta-analysis. Accepted: *Alzheimer's Research & Therapy*, 2025.
- Shakiba Hooshi, **Zahra Khodakarami**, et al., AI-powered disease progression prediction in Multiple Sclerosis using Magnetic Resonance Imaging: A Systematic Review and Meta-Analysis. Accepted: *Neurological Research*, 2025.
- Omid Nejati Manzari, ..., **Zahra Khodakarami**, et al., DenUnet: enhancing dental image segmentation through edge and body fusion. *Multimedia Tools and Applications* 2024.

Research Experiences

- **Quantifying Myelin Loss in Histology and Linking it to White Matter Hyperintensities in MRI** *Jun 2024 - Present*
 - Develop **the first** *in vivo* neuroimaging biomarker for diagnosis and targeted treatment of myelin loss.
 - Register *in vivo* flair, *ex vivo* T2 MRI, and histology images into the same space by using greedy registration, and rotation and scaling invariant template matching.
 - replicate neuro-pathologists' myelin loss rating by 90% accuracy.
 - Assess white matter hyperintensities on matched *in vivo* and *ex vivo* brain MRIs. presented in **Alzheimer's association international conference (AAIC) 2025**.
- **Longitudinal Neuroimaging Abnormality Tracker** [*This product is being developed*] *Jan 2025 - Present*
 - Build voxel-level MRI difference mask tool that enables clinicians to monitor abnormalities such as cerebral amyloid angiopathy.
 - Generate reports with volumetric measurements by using image processing and LLM APIs.
 - Complete primary market research for angel investors in "Disciplined Entrepreneurship" format.
- **Alzheimer's Disease (AD) Subtype Discovery** [*under review*] *May 2025 - Jul 2025*
 - Lead a data analysis in a 144-autopsy Cohort; clustering neurofibrillary-tangle densities and measuring cortex:hippocampus ratios to identify a novel "idiotypic-susceptible" subtype.
 - link the findings to corticobasal syndrome and MAPT/APOE genotypes.
 - Improve the accuracy of AD categorization by 20%.

Industrial Experiences

Co-Founder and Product Manager — BlueBee — A startup for providing a real-time, ML-powered product recommendation in mobile marketing of online shops' campaigns as a SaaS offering. *Feb 2022 - Aug 2023*

- Optimize click-through rate in the suggested bundles and products in mobile marketing by **25% for \approx 300K users**
- Plan product development and acquire customers road-map in addition to do market research.
- Pitch and **raise fund** in pre-seed stage for developing MVP from Diginext Co. (70M Iranian Toman)

Founder and Manager — BZContent — An online service provider for boosting online visibility and conversions through data-driven web search, and social media strategies. *Aug 2019 - jun 2022*

- Lead and manage a **team of 12** for delivering website development, SEO, Content creation and related services
- Generate **10 times** of revenue in the last year compared to the first year.
- Manage 50+ projects, with \approx **70% client retention**.

Leadership and Mentorship

Deputy director for Inter-school Partnership Fund (IPF) *Aug 2024 – Present*
An executive role within the Graduate and Professional Student Assembly (GAPSA) at the University of Pennsylvania

Screened and approved IPF applications, ensuring eligibility and coordinating grant payouts to qualifying schools.

Summer Student Mentor *May 2025 – Present*
Mentoring a master student in the lab on a project focused on automatic detection of different cell types from gigapixel histology slides has achieved 90% accuracy so far

Graduate Applicant Application Mentor *Oct 2023 – Apr 2025*
Parsa Parirokh Recieved admission for the bioengineering program in Stanford and UPenn and joined Penn program for fall-2025.

Workshop Organizer in DEMON Network *Apr 2022 – Apr 2023*
Organized and moderated a 2-day DEMON Network workshop “AI for Neuroimaging & Big-Data Dementia Research” for early-career researchers; secured 6 of 10 expert speakers, including FreeSurfer lead Dr. Martin Reuter.

Honors & Awards

- Selected participant & travel grant awardee in Frameshift Immuno Engineering Technology Training & Case Competition — (Johns Hopkins) *July 2024*
- The Social Impact winner in “Generative AI Hackathon 2024” (University of Pennsylvania) *Feb 2024*
- 12th Place in ACM International Collegiate Programming Contest (Asia Region) *Dec 2015*

Teaching Experiences

Python Instructor — Penn GEMS Summer Camp *Jun 2024*
Taught image processing in Python to 7–9th grade students during a week-long STEM program

Teaching Assistance — University of Isfahan *Jan 2016 – Jun 2016*
Automata and Language Theory, Instructor: Dr. B. Zamani

Teaching Assistance — University of Isfahan *Sep 2016 – Dec 2016*
Designing Algorithms, Instructor: Dr. B. Shahgholi Ghahfarokhi

Skills

- **Coding** : Python, PyTorch, TensorFlow, Hugging Face Transformers, Java, C++, SQL, MATLAB, Docker, Git, CUDA, Bash, R
- **Tools**: c3d, Freesurfer, ITK-Snap, Fiji (ImageJ), NLTK, scikit-learn, Pandas, OpenCv, PIL, nltk, MONAI
- **Cloud and APIs**: Amazon Web Services (AWS), Google Cloud, Vertex AI ,AI Foundry, AI Studio, Kubernetes, OpenAI, Anthropic Claude, Google Gemini, Meta Llama

Coursework and Workshops

Selected Graduate Courses — University of Pennsylvania

Aug 2023 – May 2025

Applied Machine Learning, Biomedical image analysis, Advanced topics in geometric deep learning, Current Alzheimer's disease and related dementia concepts, Biomedical Data science Research and statistics, Applied Engineering Entrepreneurship

Deep Learning Summer School — Neuromatch Academy

July 2022

Crossing Divides around the Globe with Deep Listening — British Council, BBC

May 2022