Mahan Pouromidi

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Highlights of Qualification

- Master's graduate in Biomedical Engineering (GPA: 3.97/4.0) with expertise in medical imaging and computer vision.
- First-author publication accepted at SPIE Medical Imaging 2025; experience developing multimodal vision–language models.
- Strong theoretical and programming background in mathematics, optimization, Python, and C++.

Education

McMaster University — Hamilton, Ontario
Master of Applied Sciences in Biomedical Engineering (GPA: 3.97/4.0) — ***Sep 2022 – Sep 2024***

- Master's Thesis: An Investigation of Advanced Deep Learning-Based Automated Models for Tumor Segmentation in Whole-Body PET/CT Images (Supervisor: Dr. Ashirbani Saha)
- Selected Coursework: Information theoretic methods in trustworthy machine learning applications: **A**, Research methodologies in basic health sciences: $\mathbf{A}^+$, Biomedical Engineering 2: $\mathbf{A}^+$

Amirkabir University of Technology — Tehran, Tehran
Bachelor of Science in Electrical Engineering (GPA: 3.6/4.0) — ***Sep 2017 – Mar 2022***

- Bachelor's Thesis: Fire Detection Using Neural Networks and Thermal (Supervisor: Dr. Amir Jahanshahi)
- Selected Coursework: Machine learning: **A**, Computational, intelligence: **A**, Numerical analysis: $\mathbf{A}^+$, Engineering Mathematics: $\mathbf{A}^+$, Calculus: $\mathbf{A}^+$

Honors

- Ranked within the top 0.5% in the university entrance exam among around 150,000 participants. [Summer 2017]
- Granted admission to study a second major (offered to students with a high GPA, selected by Exceptional Talents Office) [Spring 2018]

Publications

- **Pouromidi, M.**, et al. Is segmentation performance of deep-learning models affected by cancer type? A performance analysis on PET/CT. *SPIE Medical Imaging* 2025. (Link)
- **Pouromidi, M.**, Bayasi, N., Yousefirizi, F., Rahmim, A. *Report-Guided Vision–Language Segmentation for PSMA PET/CT*. Manuscript in preparation for submission to *Journal of Nuclear Medicine* or *European Journal of Nuclear Medicine and Molecular Imaging* (EJNMMI), 2025.

Online Courses & Certifications

Deep Learning Specialization — **Issued: January 2022**
DeepLearning.AI (Coursera)

- Neural networks, regularization/optimization, CNNs, sequence models.

Linear Algebra — **Issued: Dec 2021**
Imperial College London (Coursera)

- Matrix algebra for ML; vector spaces, eigenvalues/eigenvectors.

Fundamentals of Digital Image and Video Processing — **Issued: May 2021**
Northwestern University (Coursera)

- Sampling, filtering, transforms; core computer vision and medical imaging basics.

MIT 6.006: Data Structures & Algorithms — **Audited**
MIT OpenCourseWare

- Asymptotic analysis, hashing, heaps/graphs, dynamic programming, dynamic programming.

Experiences

Machine Learning Scientist | *LLMs, Generative AI, Cloud Integration* **June 2025 – Present**
BC Cancer *Vancouver, BC*

- Designed and implemented a hybrid visual-language system to boost tumor detection accuracy in medical imaging, resolving issues with false predictions and imprecise boundaries for enhanced diagnostic precision.
- Conducted rigorous comparative analyses between a baseline image model and four language-enhanced variants, delivering unbiased evaluations to pinpoint superior setups for practical use.
- Achieved **80%** lower false positives and sharper detection boundaries (**75%** improved HD95 score), empowering clinicians with quicker, more reliable insights to elevate patient care.
- Developing AI agents with human-in-the-loop reinforcement learning for patient survival forecasting, integrating adaptive algorithms to optimize personalized treatment plans and exploring web-based prototypes for clinical deployment using full-stack tools.

Software Developer | *Full-Stack Development, Real-Time Systems, Database Design* **Jul 2024 – Feb 2025**
Biophotonics Lab *Hamilton, Ontario*

- Developed a secure, low-latency streaming solution for dual camera feeds, integrating encryption and authentication to facilitate dependable real-time data transmission with reduced delays.
- Designed robust database schemas and secure APIs for efficient data management, enhancing logging and performance in operational interfaces.
- Optimized server rendering techniques to cut load times, improving user interactions in monitoring tools and enabling fluid data displays.

Graduate Research Assistant | *AI Model Development, Optimization* **Sep 2022 – Sep 2024**
McMaster University *Hamilton, Ontario*

- Evaluated and compared AI architectures for 3D PSMA PET/CT segmentation, achieving top performance metrics on challenging datasets and creating reusable pipelines for consistent training and testing.
- Optimized model components for faster inference (**35%** faster, **25%** less memory), addressing computational bottlenecks to facilitate practical deployment in clinical settings.
- Wrote a first-author paper, managing end-to-end experiments and visuals to communicate findings effectively and advance field knowledge.

Undergraduate Research Assistant | *Data Curation, Model Building, Performance Analysis* **Mar 2021 – Mar 2022**
Amirkabir University of Technology *Tehran, Tehran*

- Boosted fire detection accuracy by **10%** through custom model development, reducing false alarms with higher precision.
- Assembled and refined a high-quality dataset for reproducible training pipelines, establishing standards and processes to eliminate errors and ensure robust model reliability.
- Deployed the optimized model on Jetson Nano hardware with IP cameras for real-time inference via ONVIF protocol, ensuring seamless operational integration.

Algorithm Developer | *Software Optimization, Validation* **Apr 2021 – Dec 2021**
NABZ Group *Tehran, Tehran*

- Advanced heart attack detection and cardiac oversight by deriving critical features from ECG signals and compiling in-depth documentation of leading ML, DL, and AI approaches, laying groundwork for subsequent developments.
- Engineered noise-reduction algorithms for ECG data, boosting accuracy by **15%** and speed by **40%** to enable real-time monitoring in medical devices.
- Explored advanced techniques for signal enhancement, identifying viable options for integration to improve system robustness in healthcare applications.
- Validated algorithms against diverse datasets, producing benchmarks and visuals to confirm effectiveness and guide future improvements.

Projects

(Genesis AI Hackathon) NeuroLens (Link) | *AI Agents, Real-Time Processing, Cloud Deployment*

- Created an assistive AI tool for visually impaired individuals, merging object recognition and text reading with voice feedback to promote independence in daily navigation.
- Optimized backend communication for near-instant responses, ensuring fluid interactions during demonstrations and practical use.
- Configured specialized AI components to handle task routing, visual analysis, and audio conversions, solving accessibility challenges effectively.

MedChatBot: A Medical Chatbot Assistant (Link) | *GenAI Integration, Vector Search, Full-Stack App*

- Developed a context-aware medical assistant system using a large Q&A database, providing accurate responses to user inquiries and aiding in health information access
- Built efficient data retrieval mechanisms to quickly match queries with relevant content, enhancing response relevance and speed.
- Integrated backend services with a user-friendly interface, enabling interactive sessions and improving overall usability for medical consultations.

Technical Skills

- **Machine Learning & Deep Learning:** PyTorch, TensorFlow, MONAI, scikit-learn, PyTorch Lightning, ONNX; experience with multimodal and representation learning, self-supervised learning, and transfer learning.
- **Computer Vision & Biomedical Imaging:** CNNs, Vision Transformers, SAM, U-Net/SegResNet architectures, image segmentation, registration, preprocessing, and 3D volumetric data handling.
- **Natural Language & Multimodal Models:** Transformers, BERT, CLIP, LLaMA, cross-attention fusion, vision–language integration, and report-guided medical image analysis.
- **Programming & Tools:** Python (NumPy, pandas, matplotlib), C/C++, Git, Linux, Docker, and REST APIs for research prototyping.
- **Cloud & Computational Infrastructure:** AWS (EC2, S3, SageMaker), GPU/DP training, mixed precision, reproducible pipelines.