

# Masoud Khani

PhD. Student

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## EDUCATION

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- **Ph.D. Candidate in Biomedical and Health Informatics** Milwaukee, WI, USA  
*University of Wisconsin–Milwaukee* *Sep. 2021 – Present*
  - Research focus: **Artificial Intelligence in Healthcare, Machine Learning, Explainable AI (XAI), Large Language Models (LLMs), and Biomedical Data Science.**
  - Dissertation research focuses on developing **interpretable and predictive AI methods using longitudinal electronic health record (EHR) data** for clinical risk prediction and decision support.
  - GPA: **3.9/4.0.**
- **Master of Science in Computer Science** Milwaukee, WI, USA  
*University of Wisconsin–Milwaukee* *Jan. 2020 – Aug. 2021*
  - Thesis: *Medical Image Segmentation Using Machine Learning.*
  - Research focus: **deep learning, computer vision, and medical image segmentation**, with applications to automated wound analysis.
  - GPA: **3.6/4.0.**
- **Bachelor of Software Engineering** Tehran, Iran  
*Tehran Azad University* *Sep. 2014 – Jun. 2018*
  - Thesis title: Fall Detection in Elderly with Smartphones via Machine Learning Techniques.
  - GPA: 3.5.

## RESEARCH & PROFESSIONAL EXPERIENCE

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- **Research Assistant** Milwaukee, WI, USA  
*University of Wisconsin–Milwaukee, Biomedical Data and Language Processing Lab* *Sep. 2021 – Present*
  - Conduct research in **machine learning, explainable AI (XAI), large language models (LLMs), and biomedical informatics**, developing predictive models from large-scale longitudinal electronic health record (EHR) data.
  - Develop machine learning and deep learning methods for **clinical risk prediction and disease trajectory modeling**, including applications in fall risk, pancreatic cancer, vestibular disorders, and other clinical outcomes.
  - Design **interpretable AI and LLM-based frameworks** for temporal risk-factor discovery, patient-level prediction interpretation, and extraction of clinically meaningful insights from complex healthcare data.
  - Lead computational components of interdisciplinary studies, including **cohort design, feature engineering, statistical analysis, model development and validation**, and contribute to peer-reviewed publications and conference presentations.
- **Engineer I** Milwaukee, WI, USA  
*Medical College of Wisconsin* *Jun. 2025 – Sep. 2026*
  - Engineered and maintained the **intracranial electrophysiology recording system** for human epilepsy studies, integrating neural recording hardware, microwire electrodes, acquisition systems, and experimental equipment to support high-fidelity neuronal recordings.
  - Optimized **recording configurations, hardware connectivity, signal routing, and system synchronization**, and performed technical troubleshooting and validation to ensure reliable neural data acquisition during patient experiments.

- Conducted research on **single-neuron activity and human memory** using intracranial recordings from patients with epilepsy, investigating neuronal responses during behavioral and memory-related experimental tasks.
  - Developed computational workflows for **neural signal processing and spike sorting**, including artifact removal, spike detection, clustering, and analysis of single-neuron activity from intracranial microwire recordings.
- **Doctoral Teaching Assistant / Lecturer** Milwaukee, WI, USA  
*University of Wisconsin–Milwaukee, Big Data & Healthcare Informatics* *Aug. 2023 – May. 2025*
    - Teach undergraduate and graduate coursework in **Big Data and Healthcare Informatics**, covering machine learning, data analytics, healthcare data, and computational methods.
    - Develop lectures, programming assignments, laboratory exercises, and course materials emphasizing practical applications of data science and AI.
    - Mentor students on research and course projects involving **machine learning, programming, data analytics, and biomedical informatics**.
- **Research Data Scientist Intern** Milwaukee, WI, USA  
*Medical College of Wisconsin, Clinical & Translational Science Institute / Rey Lab* *Jun. 2023 – Aug. 2023*
    - Developed Python-based computational methods for **spike sorting and single-neuron analysis** using human intracranial electrophysiological recordings.
    - Implemented and extended components of the **WaveClus3** workflow in Python for neural spike detection and clustering.
    - Developed signal-processing methods for **artifact detection and removal**, improving the quality of neural recordings from patients with epilepsy.
    - Evaluated spike detection and clustering results to improve the **accuracy and reproducibility of neuronal unit identification**.
- **Project Assistant** Milwaukee, WI, USA  
*University of Wisconsin–Milwaukee, Northwestern Mutual Data Science Institute* *Jan. 2021 – May 2022*
    - Analyzed university enrollment and academic data to characterize participation and trends in data science education.
    - Developed and maintained an open-source repository of **data science resources and applications** across academic disciplines.

## PUBLICATIONS

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### Peer-Reviewed Journal Articles and Conference Proceedings

1. **Explainable AI Reveals Temporal Risk Pathways in Fall Prediction: Extracting Clinical Insights from Multi-Horizon Machine Learning Models.** Khani, M., Friedland, D. R., Widlansky, M., Harris, M. S., Adams, J., Fan, L., Oh, H., Lu, Q., & Luo, J. *GeroScience*. 2026. DOI: 10.1007/s11357-026-02117-x.
2. **Sequential Pattern Transformer (SPT): A Generative and Interpretable Framework for Predicting Disease Trajectories.** Shalmani, M. A.\*, Khani, M.\*, Taleban, A., Yi, Z., Fink, J. T., Weber, C. E., Lu, Q., & Luo, J. *Neural Computing and Applications*. 2026. DOI: 10.1007/s00521-025-11695-4.
3. **From Food Deserts to Nutritional Equity: Exposing Socioeconomic Drivers of Hypertension.** Yi, Z., Khani, M., Shalmani, M. A., Taleban, A., Fink, J. T., Frediani, R. F., & Luo, J. *Journal of Nutritional Science*. 2026;15:e9. DOI: 10.1017/jns.2025.10067.

4. **Correlation Between Life Stress and Tinnitus Severity.** Mumm, B., Friedland, D., Adams, J., **Khani, M.**, Luo, J., & Osinski, K. *Otology & Neurotology*. 2026;47(2):221–226. DOI: 10.1097/MAO.0000000000004721.
5. **Tumoral Skin Invasion Is an Independent Predictor of Rapid Recurrence in Head and Neck Cancer.** Memon, A. A., Khalil, M., Villarreal Espinosa, O., Said, I., Yang, E., Adams, J. A., Friedland, D. R., **Khani, M.**, Luo, J., Kuehn, R., Frei, A., Foeckler, J., Akakpo, K., Massey, B., Stadler, M., Wong, S., Himburg, H. A., Awan, M. J., Bruening, J., & Zenga, J. *Head & Neck*. 2026;48(2):535–542. DOI: 10.1002/hed.70066.
6. **Risk Prediction and Interpretation for Fall Events Using Explainable AI and Large Language Models.** Luo, J., **Khani, M.**, Adams, J., Lu, Q., O'Connor, K., & Friedland, D. R. In: *Proceedings of the 2025 9th International Conference on Medical and Health Informatics (ICMHI '25)*. 2025:270–277. DOI: 10.1145/3761712.3761774.
7. **LLMCARE: Early Detection of Cognitive Impairment via Transformer Models Enhanced by LLM-Generated Synthetic Data.** Zolnour, A., Azadmaleki, H., Haghbin, Y., Taherinezhad, F., Nezhad, M. J. M., Rashidi, S., **Khani, M.**, Taleban, A., Sani, S. M., Dadkhah, M., Noble, J. M., Bakken, S., Yaghoobzadeh, Y., Vahabie, A.-H., Rouhizadeh, M., & Zolnoori, M. *Frontiers in Artificial Intelligence*. 2025;8:1669896. DOI: 10.3389/frai.2025.1669896.
8. **Assessment of Anesthetic Modalities in Otologic Surgery.** Bao, P. H., Friedland, D. R., Adams, J. A., Freed, J. K., **Khani, M.**, & Luo, J. *Otology & Neurotology Open*. 2025;5(3):e075. DOI: 10.1097/ONO.0000000000000075.
9. **The Impact of Socioeconomic Factors on Pancreatic Cancer Care Utilization.** **Khani, M.**, Shalmani, M. A., Taleban, A., Tsai, S., Nataliansyah, M., Aldakkak, M., & Luo, J. *PLoS ONE*. 2025;20(5):e0320518. DOI: 10.1371/journal.pone.0320518.
10. **Cardiovascular Risk Factors Drive Mortality in Patients with Inflammatory Bowel Disease-A Propensity-Matched US National Database Study.** Patel, P., Iqbal, O., Mohananey, D., Bajwa, S., **Khani, M.**, Luo, J., Stein, D. J., Hashash, J. G., Mansoor, E., Cross, R. K., Kochhar, G., & Sinh, P. *The American Journal of Gastroenterology*. 2025;120(10):S355–S356. DOI: 10.14309/01.ajg.0001134072.68624.46.
11. **Increased Risk of Cardiovascular Events in Patients with Inflammatory Bowel Disease Is Primarily Driven by Presence of Cardiovascular Risk Factors and Prior Coronary Artery Disease.** Patel, P., Iqbal, O., Mohananey, D., Bajwa, S., **Khani, M.**, Luo, J., Stein, D. J., Hashash, J. G., Mansoor, E., Cross, R. K., Kochhar, G. S., & Sinh, P. *Gastroenterology*. 2025;169(1):S1214–S1215. DOI: 10.1053/j.gastro.2025.03.034.
12. **Advancing Personalized Healthcare: Leveraging Explainable AI for BPPV Risk Assessment.** **Khani, M.**, Luo, J., Shalmani, M. A., Taleban, A., Adams, J., & Friedland, D. R. *Health Information Science and Systems*. 2025;13(1):1. DOI: 10.1007/s13755-024-00317-3.
13. **Increased Healthcare Utilization in Patients with Tinnitus.** Kim, M., Friedland, D. R., Adams, J. A., **Khani, M.**, & Luo, J. *International Tinnitus Journal*. 2024;28(2):251–255. DOI: 10.5935/0946-5448.20240036.
14. **Inflammatory Bowel Disease Is Associated with Increased Risk of Cardiovascular Events but Not Mortality: Data from a Large US National Database.** Bajwa, S., Patel, P., Iqbal, O., Mohananey, D., **Khani, M.**, Luo, J., Stein, D. J., Hashash, J. G., Mansoor, E., Cross, R. K., & Sinh, P. *The American Journal of Gastroenterology*. 2024;119(10S):S760–S761.
15. **Biologics and JAK Inhibitors Decrease Major Cardiovascular Events (MACE) in IBD Patients: Data from a Large National Cohort.** Patel, P., Iqbal, O., Mohananey, D., Bajwa, S., **Khani, M.**, Luo, J., Stein, D. J., Hashash, J. G., Mansoor, E., Cross, R. K., & Sinh, P. *Gastroenterology*. 2024;166(5):S172. DOI: 10.1016/S0016-5085(24)00887-4.

16. **Anti-TNF Medications but Not JAK Inhibitors Are Associated with Increased Risk of Venous Thromboembolism: Data from a Large National Cohort.** Iqbal, O., Patel, P., Mohananey, D., Bajwa, S., **Khani, M.**, Luo, J., Stein, D. J., Hashash, J. G., Mansoor, E., Cross, R. K., & Sinh, P. *Gastroenterology*. 2024;166(5):S1120. DOI: 10.1016/S0016-5085(24)03423-4.
17. **Evaluation of Social Determinants of Health on Dysphagia Care Pathways at a Tertiary Care Facility.** Zaghloul, M. M., Bock, J. M., Blumin, J. H., Friedland, D. R., Adams, J. A., Tong, L., Osinski, K. I., **Khani, M.**, & Luo, J. *The Laryngoscope*. 2024;134(3):1139–1146. DOI: 10.1002/lary.31040.
18. **A Risk Identification Model for Detection of Patients at Risk of Antidepressant Discontinuation.** Zolnour, A., Eldredge, C. E., Faiola, A., et al., including **Khani, M.** *Frontiers in Artificial Intelligence*. 2023;6:1229609. DOI: 10.3389/frai.2023.1229609.
19. **Association Between Body-Mass Index, Patient Characteristics, and Obesity-Related Comorbidities Among COVID-19 Patients: A Prospective Cohort Study.** Tong, L., **Khani, M.**, Lu, Q., Taylor, B., Osinski, K. I., & Luo, J. *Obesity Research & Clinical Practice*. 2023;17(1):47–57. DOI: 10.1016/j.orcp.2022.12.003.
20. **Impacts of Socioeconomic Status on Dentoalveolar Trauma.** Feller, C. N., Adams, J. A., Friedland, D. R., **Khani, M.**, Luo, J., & Poetker, D. M. *WMJ*. 2023;122(1):32–37.

## Preprints and Thesis

1. **MCWs (MiCroWire Sorter): A New Framework for Automated and Reliable Spike Sorting in Human Intracerebral Recordings.** Betancourt, A.\*, **Khani, M.\***, Brahma, T., Chaure, F. J., Hauder, C., Mathew, S., Dominguez Zesati, A. S., Lew, S., Gupta, K., & Rey, H. G. *bioRxiv*. 2025. DOI: 10.1101/2025.07.09.663285.
2. **Socioeconomic Disparities for Healthcare Utilization of Senior Adult Falls in Southeast Wisconsin, 2020–2022.** Tong, L., **Khani, M.**, Taylor, B., Osinski, K., Adams, J. A., Friedland, D. R., & Luo, J. *medRxiv*. 2023. DOI: 10.1101/2023.04.24.23289062.
3. **Medical Image Segmentation Using Machine Learning.** **Khani, M.** Master's thesis, University of Wisconsin–Milwaukee, 2021. ProQuest Publication No. 28719752.

## Scholarly Reviews

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- *American Medical Informatics Association(AMIA), 2024 Symposium*
- *American Medical Informatics Association(AMIA), 2024 Informatics Summit*
- *American Public Health Association(APHA), 2024 Annual Meeting and Expo*
- *Applied Clinical Informatics*
- *Journal of Medical Internet Research(JMIR) Public Health and Surveillance*
- *Journal of Medical Internet Research(JMIRx Med)*
- *Journal of Medical Internet Research(JMIRx Med)*
- *Journal of Medical Internet Research(JMIR AI)*

## PROGRAMMING SKILLS

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- **Machine Learning Techniques:** TensorFlow, PyTorch, Kersa, Sci-kit learn, LangChain
- **Languages:** Python 3, R , Java
- **Database:** MySQL, PostgreSQL , SQL Server
- **Big Data:** Spark, Dask, Rapids, Ray

AWARDS AND FELLOWSHIPS

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|-----------------------------------------------------------------------------------|----------------|
| NMDSI Student Scholars Award, Northwestern Mutual Data Science Institute(\$ 7500) | 2024 - 2026    |
| Team member, CTSI Pilot-BERD Methodological Innovation, awarded by NIH            | 2024 - present |
| Team member, Advancing Healthier Wisconsin, awarded by NIH                        | 2021 - present |
| Reviewer Award for the AMIA Informatics Summit                                    | 2024           |
| Graduate Student Travel Award(\$ 1500)                                            | May 2024       |
| Chancellor's Graduate Student Award (\$ 1200)                                     | April 2024     |
| Chancellor's Graduate Student Award (\$ 6000)                                     | January 2020   |