Mohammed Baharoon

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Website | Scholar | LinkedIn | GitHub

Education

Harvard University — Boston, MA
Doctor of Philosophy, AI in Medicine Track, Biomedical Informatics — 2026 – 2030

Harvard Medical School — Boston, MA
Master of Medical Science, Biomedical Informatics — 2024 – 2026

Harvard Medical AI (HMAI) Group Founder and President

TF for BMIF203/BMI702: Foundations of AI in Medicine, Spring 2026

Penn State University — World Campus, PA
Bachelor of Science, Software Engineering — 2021 – 2026

King Saud bin Abdulaziz University for Health Sciences — Riyadh, Saudi Arabia
Bachelor of Health Informatics, Rank: 1/26 — 2019 – 2023

Google DSC Founder and Lead, TEDx Technical Lead

Publications

[1] **Baharoon, M.**, Ma, J., Fang, C., Toma, A., & Wang, B. (2026). Exploring the Design Space of 3D MLLMs for CT Report Generation. Medical Image Computing and Computer Assisted Intervention – MICCAI 2025 (pp. 237–246). Springer Nature Switzerland.

[2] **Baharoon, M.**, Raissi, S., Jun, J. S., Heintz, T., Alabbad, M., Alburkani, A., ... & Rajpurkar, P. (2025). RadGame: An AI-Powered Platform for Radiology Education. Proceedings of the Machine Learning for Health (ML4H). Demo Oral Spotlight.

Also presented at ECR 2026 Oral (Accepted); Harvard DBMI Science Day 2025; MIT–MGB AI Cures 2025.

[3] **Baharoon, M.**, Luo, L., Moritz, M., Kumar, A., Kim, S. E., Zhang, X., ... & Rajpurkar, P. (2025). Rexgroundingct: A 3d chest ct dataset for segmentation of findings from free-text reports. arXiv preprint arXiv:2507.22030. Under review at NEJM AI.

[4] **Baharoon, M.**, Luo, L., Moritz, M., Kumar, A., Kim, S. E., Zhang, X., ... & Rajpurkar, P. (2025). State-of-the-Art Text-Prompted Medical Segmentation Models Struggle to Ground Chest CT Findings. In Machine Learning for Healthcare Conference. PMLR.

[5] **Baharoon, M.**, Klein, J., & Michels, D. (2025). Harmony: A Joint Self-Supervised and Weakly-Supervised Framework for Learning General Purpose Visual Representations. Transactions on Machine Learning Research.

[6] Banerjee, O., Kernbach, J., Kim, S., Acosta, J., Alomaish, A., Alghamdi, R., Alomaish, H., **Baharoon, M.**, Zhang, X., & Rajpurkar, P. (2025). Beyond the Scanner: A Benchmark for Medical Photograph Understanding. Under review at Medical Imaging with Deep Learning.

[7] Ma, J., Yang, Z., Kim, S., Chen, B., **Baharoon, M.**, Fallahpour, A., ... & Wang, B. (2025). Medsam2: Segment anything in 3d medical images and videos. arXiv preprint arXiv:2504.03600. Under review at Nature Biomedical Engineering.

[8] Sambara, S., Kim, S. E., Zhang, X., Luo, L., Johri, S., **Baharoon, M.**, ... & Rajpurkar, P. (2025). 3DReasonKnee: Advancing Grounded Reasoning in Medical Vision Language Models. Pacific Symposium on Biocomputing.

[9] Acosta, J., Adams, S., Kernbach, J., Hardy, R., Kim, S. E., Luo, L., Johri, S., **Baharoon, M.**, & Rajpurkar, P. (2025). Voice-guided Orchestrated Intelligence for Clinical Evaluation (VOICE): A Voice AI Agent System for Prehospital Stroke Assessment. International Conference on Artificial Intelligence for Medicine, Health, and Care.

[10] Ma, J., Kim, S., Li, F., **Baharoon, M.**, Asakereh, R., Lyu, H., & Wang, B. (2024). Segment Anything in Medical Images and Videos: Benchmark and Deployment. https://arxiv.org/abs/2405.14239/.

[11] **Baharoon, M.**, Almatar, H., Alduhayan, R., Aldebasi, T., Alahmadi, B., Bokhari, Y., ... & Aljouie, A. (2024). HyMNet: A multimodal deep learning system for hypertension prediction using fundus images and cardiometabolic risk factors. Bioengineering, 11(11), 1080.

[12] **Baharoon, M.**, Qureshi, W., Ouyang, J., Xu, Y., Aljouie, A., & Peng, W. (2023). Towards General Purpose Vision Foundation Models for Medical Image Analysis: An Experimental Study of DINOv2 on Radiology Benchmarks. https://arxiv.org/abs/2312.02366.

Research Experience

Harvard Medical School — Boston, MA
Research Assistant - PI: Prof. Pranav Rajpurkar — Feb 2025 – Present

- ⋆ Led a team of 15 radiologists and medical students to construct ReXGroundingCT, the first dataset to link free-text findings to 3D chest CT segmentation, which is **under review at NEJM AI** and has been downloaded more than 3,000 times.
- ⋆ Adapted MedSAM2 for text prompts and benchmarked SoTA 3D segmentation models including SegVol, SAT, and MedSAM2 on ReXGroundingCT, revealing a large performance gap in grounding free-text findings; **published findings in MLHC 2025.**
- ◇ Created RadGame, an AI-powered educational platform for radiology trainees. A user study of 18 medical students showed a 30–60% performance improvement across reporting and localization tasks; **published findings in ML4H 2025**.

Legend: ⋆ Chest CT Grounding ◇ AI-Powered Medical Education.

MIT Computer Science & Artificial Intelligence Laboratory (CSAIL) Cambridge, MA
Research Assistant - PI: Prof. Regina Barzilay Oct 2024 – Feb 2025

- Trained deep learning models for chest CT intra-subject deformable registration, enabling longitudinal tracking of lung nodule morphology.
- Designed a three-stage pipeline for lung nodule segmentation on LDCT, integrating nodule detection, confidence-based classification, and final segmentation using the cropped detected region.

Vector Institute for Artificial Intelligence Toronto, Canada
Research Intern - PI: Prof. Bo Wang May 2024 – Aug 2024

- Proposed two novel radiology report enhancement methods that perform additional inferences using models trained to answer finding-specific questions, boosting CT report generation performance by over 10% on the GREEN score; **published findings in MICCAI 2025.**
- Achieved 2nd place in MICCAI's 2024 AMOS-MM competition for medical report generation and visual question answering using CT scans.
- Co-developed a semi-automatic ground-truth generation pipeline using MedSAM2 and evaluated the model across different modalities (CT, MRI, Echocardiogram); co-authored the MedSAM2 paper which is under review at **Nature Biomedical Engineering**.

King Abdullah University of Science and Technology (KAUST) Thuwal, Saudi Arabia
Research Intern - PI: Prof. Dominik L. Michels December 2023 – May 2024

- Developed Harmony, a multi-objective weakly-supervised and semi-supervised learning paradigm that learns general purpose visual representations across tasks, outperforming CLIP, MaskCLIP, DetailCLIP, SLIP, and SILC; **published in TMLR.**
- Introduced a CLIP soft-target self-distillation method within Harmony that replaces the identity-matrix supervision with learned target distributions, addressing the one-to-one correspondence limitation of CLIP.

Fatima Fellowship Remote
Research Fellow - Mentor: Dr. Wei Peng Jun 2023 – December 2023

- Evaluated the robustness and generalizability of DINOv2 in the medical domain, conducting over 200 experiments across diverse modalities (X-ray, CT, and MRI), tasks (classification, segmentation), and in low and high data settings; shared findings in a pre-print.

King Abdullah International Medical Research Center Riyadh, Saudi Arabia
Research Intern - PI: Prof. Abdulrhman Aljouie Oct 2022 – Mar 2023

- Devised HyMNet: a multimodal deep learning systems that combine fundus photographs with demographic information to predict hypertension; **published findings in Bioengineering.**

Awards, Honors, and Achievements

- Custodian of the Two Holy Mosques Scholarship, Ministry of Education, 160k USD 2024
- Nominated for Prince Faisal bin Bandar Award for Excellence and Creativity 2023
- Google CSRMP Scholar, Google Research Class 2022B
- The President Walker Award, Penn State University 2022

Teaching and Talks

- Teaching Fellow at Harvard Medical School for the BMIF203/BMI702: Foundations of AI in Medicine graduate course, supervising projects related to computer vision and medical imaging. *Boston, Spring 2026*
- Featured as a guest on the 2nd episode of the Pixels 2 Patients podcast, discussing my work on ReXGroundingCT and RadGame. *Remote, 2025*
- Created educational videos reaching over 30,000 views on YouTube, @Al-Jawhar. *Remote, 2023–Present*
- Taught a 4-day course titled "Introduction to Programming with Python" to 35 students at King Saud bin Abdulaziz University for Health Sciences. *Riyadh, 2023*

- Led a 2-day introductory course on machine learning for 20 students at King Saud bin Abdulaziz University for Health Sciences. *Riyadh, 2023*
- Presented a lecture on deep learning applications to over 400 participants during an online Artificial Intelligence Bootcamp. *Remote, 2022*
- Delivered a talk on computer vision with TensorFlow to over 200 attendees via Zoom as part of Google Developer Student Club events. *Remote, 2022*

Academic Service

Reviewer

- *Medical Image Analysis* (Elsevier) *2025*
- *Expert Systems with Applications* (Elsevier) *2025*
- *Machine Learning for Health (ML4H) Conference* *2025*

Skills

Programming: Python, PyTorch, C++, JavaScript, React, Django, PHP, HTML, CSS.
Research: Deep Learning, Computer Vision, Multimodal Machine Learning, Self-Supervised Learning, Medical AI.
Technologies: Linux, Git, Docker, Edge Computing (NVIDIA Jetson).