Basar Demir

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My research spans computer vision, multimodal medical image analysis, and LLM alignment and safety, with a focus on foundation models, diffusion models, and reinforcement learning.

Education

University of California, San Diego — California, USA
*Doctor of Philosophy in **Computer Science*** — *Aug. 2025 – June 2027 (expected)*
- Transferred from UNC Chapel Hill with Prof. Marc Niethammer.

University of North Carolina at Chapel Hill — North Carolina, USA
*Master of Science in **Computer Science*** | GPA: **4.00**/4.00 — *Aug. 2022 – Aug. 2025*

Istanbul Technical University — Istanbul, Turkey
*Bachelor of Science in **Computer Engineering*** | GPA: **3.91**/4.00 — *Sept. 2018 – July 2022*
- Ranked **2nd among 149** students in the faculty.

Research Experience

Research Assistant | *UC San Diego / UNC Chapel Hill* — *Aug. 2022 – Present*
- Develop multimodal medical **image registration and segmentation** methods with applications to **disease progression prediction** and atlas construction.
- Collaborate with researchers at Stanford, NVIDIA, Harvard, and Memorial Sloan Kettering.
- Member of the Biomedical Image Analysis Group, advised by Prof. Marc Niethammer.

Research Scientist Intern | *Meta – Superintelligence Labs* — *June 2026 – Sept. 2026*
- Developed **GRPO methods** that improve **counterfactual fairness** and **calibration** of LLMs.
- Received an **Outstanding** performance rating, which is the highest rating awarded to interns.
- Mentors: Chirag Nagpal, Emily Shen, and Ankit Jain.

Research Scientist Intern | *Meta – GenAI* — *May 2025 – Aug. 2025*
- Developed a **training-free concept-erasure method** for text-to-image diffusion models.
- Mentors: Harihar Subramanyam, Wei Chu, Jun Niu, Ankit Jain, and Rachad Alao.

Research Intern | *United Imaging Intelligence America* — *May 2024 – Aug. 2024*
- Developed a **self-supervised conditional diffusion method** for medical image denoising.
- Mentors: Yikang Liu, Shanhui Sun, and Terrence Chen.

Publications

Medical Image Registration

- **uniAtlas: Training-Free Universal Multimodal Atlas Building**
  B. Demir, W. T. Kwan, S. Chattopadhyay, . . . , M. Niethammer. 2026.
- **How Useful Are Vision Foundation Model Features for Disease Progression Prediction?**
  B. Demir, S. Chattopadhyay, . . . , M. Niethammer. CV4Clinic @ **CVPR** 2026. **Best Paper** [Paper]
- **multiGradICON: A Foundation Model for Multimodal Medical Image Registration**
  B. Demir, L. Tian, . . . , M. Niethammer. WBIR @ **MICCAI** 2024. **Best Oral** [Paper] [Code]
- **Multimodal Image Registration Guided by Few Segmentations from One Modality**
  B. Demir and M. Niethammer. **MIDL** 2024. [Paper] [Code]
- **uniGradICON: A Generalizable and Transferable Foundation Model for Medical Image Registration**
  L. Tian, H. Greer, B. Demir, . . . , M. Niethammer. **Medical Image Analysis**, accepted 2026. [Code]
- **Comparing B-spline and uniGradICON-AI Foundational Deformable Image Registration Methods: Evaluating the Tradeoff Between Accuracy and Speed**
  A. Shastri, B. Demir, R. Salkin, . . . , K. N. K. Murthy. **SPIE Medical Imaging** 2026. [Paper]
- **Guiding Registration with Emergent Similarity from Pre-trained Diffusion Models**
  N. Tursynbek, H. Greer, B. Demir, M. Niethammer. **MICCAI** 2025. **Oral** [Paper] [Code]

LLM Alignment & RL

- **Aligning Language Models Towards Counterfactual Invariance**
  B. Demir*, E. Shen*, K. S. Vepuri, . . . , C. Nagpal. 2026. [Paper]
- **MaD-RL: Matching Distributions for Calibrating LLMs with Reinforcement Learning**
  S. Kulkarni*, K. S. Vepuri*, B. Demir*, . . . , C. Nagpal. 2026. [Paper] [Meta AI Post]

Segmentation

- **Uncertainty-Aware Spatio-Semantic Contextual Prompts for Multimodal Medical Segmentation**
  S. Chattopadhyay, B. Demir, M. Niethammer.
  MICCAI 2026. **Early Acceptance, Top 9%** [Paper] [Code]
- **On Robustness of Foundational 3D Segmentation Models to Imprecise Prompts**
  S. Chattopadhyay, B. Demir, M. Niethammer.
  ISBI 2026. **Oral** [Paper] [Code]
- **UniMedMICS: Generalizing Training-free Universal Multimodal In-Context 3D Medical Image Segmentation**
  S. Chattopadhyay, Y. Jin, B. Demir, M. Niethammer.
  WACV 2027.
- **MedSegQC: A Data-driven Approach for Quality Assessment of 3D Medical Image Segmentation**
  S. Chattopadhyay, B. Demir, Y. Jin, M. Niethammer. 2026.

Restoration & Evaluation

- **DiffDenoise: Self-Supervised Medical Image Denoising with Conditional Diffusion Models**
  B. Demir, Y. Liu, X. Chen, . . . , S. Sun. 2025. [Paper]
- **Embedding-Based Image Generation Evaluation Metrics Are Not Enough**
  Y. Jin, B. Demir, S. Chattopadhyay, T. Fletcher, M. Niethammer. 2026.

Software & Open Source

uniGradICON / multiGradICON [GitHub] [PyPI]

- Implemented the training and fine-tuning code for medical image registration.
- Maintain the GitHub repository (**200+ stars**) and PyPI package (**30K downloads**).

SlicerUniGradICON [GitHub]

- Developed a 3D Slicer extension for uniGradICON and multiGradICON.

Honors & Awards

Outstanding Internship Performance, Meta
Best Paper Award, CV4Clinic Workshop @ CVPR
Best Oral Award, WBIR Workshop @ MICCAI
Ranked 2nd in the Faculty, Istanbul Technical University
Runner-Up, FAIR Workshop @ MICCAI

Academic Service

Conference Reviewer: CVPR, NeurIPS, MICCAI, MIDL, IPMI.
Journal Reviewer: IEEE Transactions on Biomedical Engineering (TBME).

Additional Experience

Software Engineering Intern | *Getir* *June 2021 – Sept. 2021*

- Built Node.js/MongoDB microservice endpoints for GetirFood; reduced review endpoint latency by 25% with Redis caching.

Chair | *ITU ACM Student Chapter* *Aug. 2020 – June 2021*

- Led a 350+ member chapter; organized seven technical workshop series, five career events, and a national programming contest attracting 1,053 applicants.

Algorithms Course Lead & Instructor | *ITU ACM* *Feb. 2020 – May 2020*

- Taught a six-week C++ course on graph algorithms, dynamic programming, and data structures to 40+ participants.