Amirhossein **Kazerouni**

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Education

Iran University of Science and Technology (IUST)   *Tehran, Iran*

B.S. in Electrical Engineering   *Sep. 2017 - Feb. 2022*

- **GPA:** 17.95/20 (3.85/4)
- **Thesis topic:** Design, Simulation, and Construction of an Autonomous Vehicle with Environment Perception, Planning, and Control Capabilities.
  (Thesis Grade: 20/20) — **Supervisor:** Dr. Saeed Shamaghdari, Associate Professor at IUST

Publications

1. **INCODE: Implicit Neural Conditioning with Prior Knowledge Embeddings**
   Amirhossein Kazerouni, Reza Azad, Alireza Hosseini, Dorit Merhof, Ulas Bagci
   Published in **IEEE/CVF WACV 2024** (**Paper**, **GitHub**, **Project Page**)

2. **Diffusion models in medical imaging: A comprehensive survey**
   Amirhossein Kazerouni, Ehsan K. Aghdam, Moein Heidari, Reza Azad, Mohsen Fayyaz, Ilker Hacihaliloglu, Dorit Merhof
   Published in **Medical Image Analysis Journal (2023)** (**Paper**, **GitHub**)

3. **Beyond Self-Attention: Deformable Large Kernel Attention for Medical Image Segmentation**
   Reza Azad, Leon Niggemeier, Michael Huttemann, Amirhossein Kazerouni, Ehsan K. Aghdam, Yury Velichko, Ulas Bagci, Dorit Merhof
   Published in **IEEE/CVF WACV 2024** (**Paper**, **GitHub**)

4. **Laplacian-former: Overcoming the limitations of vision transformers in local texture detection**
   Reza Azad, Amirhossein Kazerouni, Babak Azad, Ehsan Khodapanah Aghdam, Yury Velichko, Ulas Bagci, Dorit Merhof
   Published in **MICCAI 2023 (Early accepted)** (**Paper**, **GitHub**)

5. **Unlocking Fine-Grained Details with Wavelet-Based High-Frequency Enhancement in Transformers**
   Reza Azad, Amirhossein Kazerouni, Alaa Sulaiman, Afshin Bozorgpour, Ehsan Khodapanah Aghdam, Abin Jose, Dorit Merhof
   Published in **MLMI @ MICCAI 2023** (**Paper**, **GitHub**)

6. **DermoSegDiff: A Boundary-Aware Segmentation Diffusion Model for Skin Lesion Delineation**
   Afshin Bozorgpour*, Yousef Sadegheih*, Amirhossein Kazerouni*, Reza Azad, Dorit Merhof
   Published in **PRIME @ MICCAI 2023** (**Paper**, **GitHub**)

7. **Self-supervised Semantic Segmentation: Consistency over Transformation**
   Sanaz Karimijafarbigloo, Reza Azad, Amirhossein Kazerouni, Yury Velichko, Ulas Bagci, Dorit Merhof
   Published in **CVAMD @ IEEE/CVF ICCV 2023** (**Paper**, **GitHub**)

8. **Implicit Neural Representation in Medical Imaging: A Comparative Survey**
   Amirali Molaei, Amirhossein Aminimehr, Armin Tavakoli, Amirhossein Kazerouni, Bobby Azad, Reza Azad, Dorit Merhof
   Published in **CVAMD @ IEEE/CVF ICCV 2023** (**Paper**, **GitHub**)

9. **Advances in Medical Image Analysis with Vision Transformers: A Comprehensive Review**
   Reza Azad, Amirhossein Kazerouni, Moein Heidari, Ehsan Khodapanah Aghdam, Amirali Molaei, Yiwei Jia, Abin Jose, Rijo Roy, Dorit Merhof
   Published in **Medical Image Analysis Journal (2023)** (**Paper**, **GitHub**)

10. **HiFormer: Hierarchical Multi-scale Representations Using Transformers for Medical Image Segmentation**
    Moein Heidari*, Amirhossein Kazerouni*, Milad Soltany*, Reza Azad, Ehsan Khodapanah Aghdam, Julien Cohen-Adad, Dorit Merhof
    Published in **IEEE/CVF WACV 2023** (**Paper**, **GitHub**)

11. **DAE-Former: Dual Attention-guided Efficient Transformer for Medical Image Segmentation**
    Reza Azad, Rene Arimond, Ehsan Khodapanah Aghdam, Amirhossein Kazerouni, Dorit Merhof
    Published in **PRIME @ MICCAI 2023** (**Paper**, **GitHub**)

12. **MMCFormer: Missing Modality Compensation Transformer for Brain Tumor Segmentation**
    Sanaz Karimijafarbigloo, Reza Azad, Amirhossein Kazerouni, Dorit Merhof
    Published in **MIDL 2023 (Oral presentation)** (**Paper**, **GitHub**)

13. **MS-Former: Multi-scale Self-guided Transformer for Medical Image Segmentation**
    Sanaz Karimijafarbigloo, Reza Azad, Amirhossein Kazerouni, Dorit Merhof
    Published in **MIDL 2023 (Oral presentation)** (**Paper**, **GitHub**)

14. **Foundational Models in Medical Imaging: A Comprehensive Survey and Future Vision**
    Bobby Azad, Reza Azad, Sania Eskandari, Afshin Bozorgpour, Amirhossein Kazerouni, Islem Rekik, Dorit Merhof
    Published on arXiv preprint arXiv:2310.18689 (2023) (**Paper**, **GitHub**)

15. **An Intelligent Modular Real-Time Vision-Based System for Environment Perception**
    Amirhossein Kazerouni, Amirhossein Heydarian, Milad Soltany, Aida Mohammadshahi, Abbas Omidi, Saeed Ebadollahi
    Published in **ML4AD @ NeurIPS 2022** (**Paper**, **GitHub**, **Workshop Page**)

16. **Ensemble Neural Representation Networks**
Milad Soltany Kadarvish, Hesam Mojtahedi*, Hossein Entezari Zarch*, **Amirhossein Kazerouni****, Alireza Morsali, Azra Abtahi, Farokh Marvasti*
Published on arXiv preprint arXiv:2110.04124 (2021) (**Paper**, **GitHub**)

    * *denotes equal contribution.*

Research Interests

- Computer Vision
- Deep Learning
- Machine Learning
- Computer Graphics
- Medical Image Analysis
- Diffusion Models
- Transformers
- Autonomous Driving

Honors & Awards

2022	**Ranked 3rd** among 41 students who chose Control as a subfield	*IUST, Iran*
2022	**Ranked 4th** among 127 Electrical Engineering students	*IUST, Iran*
2021	**Ranked 1st** team in the national Rahneshan competitions for autonomous vehicles	*INEF, Iran*
2021	**Ranked 2nd** team in FIRA World Cup Competitions in Autonomous Cars League	*FIRA, Iran*
2015	**Ranked 1st** team in the A-lympiad National Mathematical Competition	*Iran*
2016	**Hold a diploma** from the A-lympiad World Mathematical Competition	*Utrecht University, Netherlands*
2017	**Ranked within the top 1%** among approximately 148,000 participants in the National University Entrance Exam	*Iran*

Skills

Programming	Python, MATLAB, C/C++, Latex, Familiar with HTML, CSS, PHP
AI Tools/ Libraries	PyTorch, TensorFlow, OpenCV, NPM (NumPy - Pandas - Matplotlib), etc.
Tools	Linux, Git

Research Experience

Remote Research Assistant   *Aachen, Germany*
RWTH AACHEN UNIVERSITY — SUPERVISOR: PROF. DORIT MERHOF AND REZA AZAD   *2022 - Present*
- Worked on Transformers, Diffusion models, and Implicit Neural Representations.

Remote Machine Learning and Computer Vision Researcher   *Montreal, Canada*
DGSCULPTOR   *2021 - 2023*
- Worked on the "Ensemble Neural Representation Networks" paper and proposed a novel suboptimal ensemble architecture for Implicit Neural Representations (INRs).
- Worked on using Transformers for the image super-resolution task.

AI Researcher   *IUST, Iran*
AI AND CONTROL LAB — SUPERVISOR: PROF. SAEED SHAMAGHDARI   *2019 - 2021*
- Worked on "Fusion-Based 3D Shape Analysis in a Noisy Environment" project.

Computer vision Researcher   *Tehran, Iran*
UNIVERSITY OF TEHRAN, INEF— SUPERVISOR: PROF. MOHAMMAD ALI AKHAEE, ASSOCIATE PROFESSOR AT THE UNIVERSITY OF TEHRAN   *2019 - 2020*
- Worked on "Statistical and Semantic Analysis of Football Game" project.

Teaching Experience

Teaching Assistant of "Principles of Mechatronics"   *IUST, Iran*
INSTRUCTOR: PROF. SAEED SHAMAGHDARI   *Spring 2021*

Working Experience

CEO and Co-founder   *IUST, Iran*
AIR (ARTIFICIAL INTELLIGENCE AND ROBOTICS) CENTER   *2020 - 2022*
- Teaching and mentoring Deep Learning, Machine Learning, and Python courses.

Professional Services

EAAI   Journal Reviewer for Engineering Applications of Artificial Intelligence

Major Projects

Automatic Parallel Parking (Link, GitHub)
INEF, Iran

National Rahneshan Competitions
2021

- Implemented a parallel parking system that includes path planning, path tracking, and parallel parking.

Statistical and Semantic Analysis of Football Game (GitHub, Website)
Tehran, Iran

Supervisor: Prof. Mohammad Ali Akhaee
2019 - 2020

- Created the bird's eye view of the soccer field by predicting the homography matrix using GANs.
- Created a Telegram bot with PHP to collect voice data to create a voice spotting dataset.

Fusion-Based 3D Shape Analysis in a Noisy Environment Using Stereo Camera
IUST, Iran

Supervisor: Prof. Saeed Shamaghdari
2019 - 2021

- Proposed a fusion-based multi-stage approach that performs 3D shape analysis on vehicles to measure the amount of load protrusion.

Design, Simulation, and Construction of an Autonomous Vehicle with Environment Perception, Planning, and Control Capabilities
IUST, Iran

Supervisor: Prof. Saeed Shamaghdari
Sep. 2021

- Designed and built a toy self-driving car from scratch.

Autonomous Car Simulation Based on AVIS Engine (GitHub)
FIRA, Iran

FIRA World Cup Competitions
Summer 2021

- Developed an autonomous car having control and environment perception capabilities.

Languages

English   **IELTS (Academic):** (Listening: 8, Reading:7, Speaking:6.5, Writing:6.5, **Overall:7**), **C1 Proficiency**
Persian   **Native**