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

Moein Heidari*, **Amirhossein Kazerouni***, Milad Soltany*, Reza Azad, Ehsan Khodapanah Aghdam, Julien Cohen-Adad, and Dorit Merhof (2023). **HiFormer: Hierarchical multi-scale representations using transformers for medical image segmentation**. In ***Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision (WACV)***, pages 6202–6212 (**Paper**, **GitHub**)

Amirhossein Kazerouni, Amirhossein Heydarian, Milad Soltany, Aida Mohammadshahi, Abbas Omidi, and Saeed Ebadollahi (2022a). **An Intelligent Modular Real-Time Vision-Based System for Environment Perception**. ***Accepted*** *in* ***NeurIPS 2022 Workshop*** *on Machine Learning for Autonomous Driving* (**Paper**, **GitHub**, **Workshop Page**)

Amirhossein Kazerouni, Ehsan Khodapanah Aghdam, Moein Heidari, Reza Azad, Mohsen Fayyaz, Ilker Hacihaliloglu, and Dorit Merhof (2022b). **Diffusion Models for Medical Image Analysis: A Comprehensive Survey**. *Submitted to* ***Medical Image Analysis Journal*** (**Paper**, **GitHub**)

Milad Soltany Kadarvish*, Hesam Mojtahedi*, Hossein Entezari Zarch*, **Amirhossein Kazerouni***, Alireza Morsali, Azra Abtahi, and Farokh Marvasti (2021). **Ensemble Neural Representation Networks**. *Submitted to* ***Neural Processing Letters Journal*** (**Paper**, **GitHub**)

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

Sanaz Karimijafarbigloo, Reza Azad, **Amirhossein Kazerouni**, and Dorit Merhof (2023). **MS-Former: Multi-scale Self-guided Transformer for Medical Image Segmentation**. *Submitted to* ***MIDL 2023 Conference***

Reza Azad, Rene Arimond, Ehsan Khodapanah Aghdam, **Amirhossein Kazerouni**, and Dorit Merhof (2023a). **DAE-Former: Dual Attention-guided Efficient Transformer for Medical Image Segmentation**. *Submitted to* ***MIDL 2023 Conference*** (**Paper**, **GitHub**)

***** *denotes equal contribution.*

Research Interests

- Computer Vision
- Deep Learning
- Machine Learning
- Computer Graphics
- Medical Image Processing
- 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

Research Assistant — *Aachen, Germany*

RWTH Aachen University — Supervisor: Prof. Dorit Merhof and Reza Azad — *2022 - Present*

- Worked on Transformers and Diffusion models, which resulted in three conference papers and two survey papers.
- Currently, I am working on using Diffusion Models in the medical field.

Machine Learning and Computer Vision Researcher — *Montreal, Canada*

DGSculptor — *2021 - Present*

- Worked on the "Ensemble Neural Representation Networks" paper and proposed a novel suboptimal ensemble architecture for Implicit Neural Representation (INR).
- Currently, I am working on using Transformers for Super-Resolution.

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 — *INEF, University of Tehran, Tehran*

University of Tehran — 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.

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 (Link, GitHub, Website) — *INEF, 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 (Link) — *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 (Link) — *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 (Link, GitHub) — *FIRA, Iran*

FIRA World Cup Competitions — *Summer 2021*

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

Persian-OCR (Link, GitHub) — *Iran*

Personal project — *Mar. 2021 - Jun. 2021*

- Developed software in Python that lets you label your desired language words with AI.

Languages

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

Persian **Native**