

# NIKAN DOOSTI



- **Status:** MSc, Deep Learning Engineer
- **Tech:** PyTorch, Python, Numpy, Scipy, SKlearn
- **Fields:** Deep Learning, Visual Computing, Computer Graphics

## Summary

I am a final-year master's student in computer engineering at IUST focusing on *applications of artificial intelligence in science*. Furthermore, I was mainly focused on classic and deep computer vision particularly *image processing* and applications of machine learning in technology. Generally *I highly appreciate interdisciplinary work* between AI and science and actualize *digital twin*.

## Experience

Jul, 2020 - Mar, 2021

**Research Assistant (Remote)**

**Max Planck Institute for Informatics**

This was my first mutlidisciplinary work which led to publication of my first-ever academic paper at ACM Symposium on Computational Fabrication (SCF21)!

- Studying numerical simulation methods such as Finite Element Method (FEM) for solving Topology Optimization (TO) problem
- Studying and reproducing recent papers in implicit neural representation, neural radiance fields, neural PDEs, and Fourier neural operators
- Stuyding different projection(activation)/smoothing filters and their effect on optimization and mesh-based solutions
- Developing a novel frequency aware model to solve TO in fully self-supervised manner via neural fields

Supervisor: Dr. Vahid Babaei (Computational manufacturing researcher at Max Planck Institute for Informatics and group leader at AIDAM)

Aug, 2016 - Jun, 2020

**Freelancer**

**Independent**

To help with the expenses and learn more, during my study in BSc and earlier stages of MSc, I was working as a freelancer partially.

- Occasionally teaching university courses as a private tutor
- Designing, participating and implementing evolutionary algorithms such as genetics for routing problem in university research projects
- Designing, participating and implementing classical computer vision and deep learning based models for different topics from reading car plates, image classification, counting objects, etc.

## Publications and Talks

Publications:

- Doosti, Nikan, Julian Panetta, and Vahid Babaei. "Topology Optimization via Frequency Tuning of Neural Design Representations." In *Symposium on Computational Fabrication*, pp. 1-9. 2021 (Abstract/PDF)

Invited Talks:

- Doosti, Nikan. 2022. "Neural Design Representations." Toronto Geometry Colloquium. March 4, 2022. [toronto-geometry-colloquium.github.io](https://toronto-geometry-colloquium.github.io). (Video-Poster)

## Education

Aug, 2019 - Present

**MSc Computer Engineering**

**Iran University of Sc. and Tech. (IUST)**

Awards:

- Full tuition fee waiver
- Overall grades (so far): 17.17/20
- Accepted as an exceptional talent (no entry exam)

Thesis: Toward super-resolution neural topology optimization (in progress)

Supervisor: Dr. Nasser Mozayani (Associate professor of department of computer engineering)

#### Awards:

- Full tuition fee waiver
- Overall grade: 18.63/20 (Ranked **3rd**)
- Exceptional talent at Department of Computer Engineering

#### Teacher assistant experience:

- Advanced programming (Head TA), instructor: *Dr. Mirroshandel*, Fall 2018
- Algorithms, instructor: *Dr. Shakeri*, Spring 2017
- Algorithms (Head TA), instructor: *Dr. Shakeri*, Fall 2018
- Computational Intelligence (Head TA), instructor: *Dr. Shakeri*, Spring 2018

My primary responsibilities as the TA were assessing and designing assignments and teaching as the head TA.

### Selected Projects

2017	Paper Implementation	Open Source
Sole open source implementation of <i>Using Genetic Algorithms for Multi-depot Vehicle Routing (Ombuki-Berman et al. 2009)</i> via Python as part of <i>Computational Intelligence</i> course. ( <a href="https://github.com/Nikronic/Optimized-MDVRP">github.com/Nikronic/Optimized-MDVRP</a> )		
2019	Paper Implementation	Open Source
Sole open source implementation of <i>Deep Context-aware Descreening and Rescreening of Halftone Images (Kim, T.H et al. 2018)</i> via PyTorch. This was the my first-ever PyTorch project. ( <a href="https://github.com/Nikronic/Deep-Halftoning">github.com/Nikronic/Deep-Halftoning</a> )		
<ul style="list-style-type: none"> <li>➤ <u>CoarseNet</u>: Modified U-Net as a low-pass filter to remove halftone patterns</li> <li>➤ <u>DetailsNet</u>: A GAN for improving details</li> <li>➤ <u>EdgeNet</u>: A simple CNN to extract Canny edge features to preserve details</li> <li>➤ <u>Halftoning Algorithms</u>: Implementation of some of the halftone algorithms provided in digital color halftoning books as the ground truth</li> </ul>		

### Voluntary Activities

Oct, 2018 - Present	Lecturer	Rasht School of AI ( <a href="https://schoolofai.ir">schoolofai.ir</a> )
School of AI is a community of passionate people about learning and teaching AI, mostly enabled by students from different fields of study. In this community, we would like to personalize learning paths and create a network to learn more about machine learning and deep learning and their applications. All sessions are free and recordings are available publicly. ( <a href="https://github.com/rasht-school-of-ai">github.com/rasht-school-of-ai</a> )		
Sep, 2020- Aug, 2021	Maintainer and Developer	IUST Projects ( <a href="https://iust-projects.ir">iust-projects.ir</a> )
IUST Projects is an open GitHub organization with a focus on showcasing and maintaining projects created at Iran University of Science and Technology. This <i>organization is maintained by its true owners, the students of any institute</i> . This was an attempt to overcome the siloed culture of univeristy and show that everyone can be competitive and improve in a engagning and friendly environment. ( <a href="https://github.com/iust-projects">github.com/iust-projects</a> ) Topics: Imbalance learning, ensembles, feature extraction, NN architectures, Hough transform, edge detection, shape fitting, Fourier/Cosine transform, geometrical/textural feature engineering, and <u>more</u> )		
Nov, 2018 - Present	Member	PyTorch Discuss Forum
Since the day I started deep learning with PyTorch, I started reading topics around my questions and tried to answer questions that I was not familiar with which helped me to dive deeper into the framework, learn many of hacks and return the favor! At the time of writing, <i>I've visited the forum for 851 days, 563 posted replies, 3000 read topics and 184 solutions (All-time 15th)</i> ( <a href="https://discuss.pytorch.org/u/nikronic/summary">discuss.pytorch.org/u/nikronic/summary</a> )		

### Languages

- Persian: Native
- English: Proficient

### References

Available upon request.