

Nikan Doosti (Legal name: Mohammad Doostilakhani)

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EDUCATION

- **Aalto University** Espoo, Finland
Mar 2025 - present
 - *Doctor of Science (Technology) in Mechanical Engineering*
 - **Thesis:** AI-assisted Product Development
- **Iran University of Science and Technology (IUST)** Tehran, Iran
Aug 2019 - Dec 2022
 - *Master of Science in Computer Engineering - Artificial Intelligence*
 - **Thesis:** High Resolution Neural Topology Optimization via Differentiable Physics Engine (code)
 - **Defense:** Achieved **maximum thesis score** (20.5/20) accompanied with a peer-reviewed publication
 - **Honors:** Selected as an **Exceptional Talent** ($\leq 300/15000$) for direct admission to a **top-3 national university**
- **University of Guilan (UoG)** Rasht, Iran
Aug 2015 - Aug 2019
 - *Bachelor of Science in Computer Engineering*
 - **Thesis:** Descreening and Rescreening of Halftone Images via Data-Driven Deep Learning Methods (code)
 - **Honors:** Graduated **3rd** out of 55 (GPA: 18.64/20); **First-Class Honors** and **Distinction for thesis research.**

RESEARCH INTERESTS

- Computer Graphics
- Machine Learning
- Inverse Problems
- Geometry processing
- Computational Fabrication
- Physics-based Simulation

PUBLICATIONS

- [Under review] Multimodal Ensemble Detection and Self-Healing of Defects in Laser-based Powder Bed Fusion. **Nikan Doosti**, Olli Nyrhilä, Jan Akmal. Additive Manufacturing, 2025.
- Topology Optimization via Frequency Tuning of Neural Design Representations. **Nikan Doosti**, Julian Panetta, Vahid Babaei. ACM Symposium on Computational Fabrication (SCF), 2021. (Publisher, Code)

TALKS

- [Invited] "Complementary Benefits of MPM Modality for AM Quality Monitoring." **Electro Optical Systems (EOS) GmbH**. Krailling, Germany and Turku, Finland. Technical Talk. January, 2026.
- [Invited] "Neural Design Representations" **Toronto Geometry Colloquium** (TGC) advised by Prof. Alec Jacobson - University of Toronto. Technical Talk (virtual). March, 2022. (Length: 10 mins., Video)
- "Topology Optimization via Frequency Tuning of Neural Design Representations." **SCF 2021**. Technical Paper Presentation (virtual). October, 2021. (Length: 15 mins., Video)

RESEARCH EXPERIENCE

- Full-time Graduate Researcher** Espoo, Finland
- **Aalto University** Mar 2025 - Present
 - Materials to Products Group (M2P) and Aalto Digital Design Lab (ADDLAB)*
 - Project Overview: Real-time defect detection and compensation in laser-based powder bed fusion (PBF-LB) through multimodal neural fusion of non-destructive, cheap, and widely available in-situ monitoring sensors, verified through lab experimentation
 - Supervisors: Supervised by **Prof. Jan Akmal** from M2P and **Olli Nyrhilä** from Electro Optical Systems (EOS GmbH).

- Outcome: **First researcher to demonstrate the complementary benefit of MPM modality** for print quality monitoring, leading to a paper under review in Additive Manufacturing journal, being **invited to present the findings to EOS's global R&D teams** following strong endorsement from EOS's senior inventor and researchers.
- Method: Laser parameters were systematically varied to induce defects in PBF-LB. In-situ images were acquired using **near-infrared, sCMOS-based optical tomography and dual-photodiode melt-pool monitoring**. We developed a **multimodal ensemble learning** approach that leverages these widely used yet independent modalities and demonstrates **complementary cross-modal confidence**. Defects spanning up to seven layers were healed. .

Full-time Graduate Researcher

Saarbrücken, Germany

Jul 2020 - Mar 2021

- **Max Planck Institute for Informatics (MPII)**

Artificial Intelligence aided Design and Manufacturing Group

- Project Overview: Novel self-supervised neural design representation for obtaining the optimum design as an inverse problem, showcased in topology optimization
- Supervisors: Supervised by **Dr. Vahid Babaei** from MPII and **Prof. Julian Panetta** from the University of California, Davis, USA.
- Outcome: Resulted in a paper published and presented at the **ACM Symposium on Computational Fabrication 2021**. Among very few master's students whose thesis led to a publication in a highly regarded venue.
- Method: Utilized **physics-informed deep learning** by integrating analytical **physical simulators of PDE-constrained density-based topology optimization** into **neural fields**, enabling **generative continuous design** through sub-voxel (pixel) tuning .

Undergraduate Research Assistant

Rasht, Iran

Sep 2018 - Aug 2019

- **University of Guilan**

Computer Engineering Group

- Project Overview: Worked on descreening and rescreening of halftone images via supervised deep learning methods
- Supervisors: Supervised by **Prof. Mahdi Aminian** and **Dr. Vahid Babaei** from MPII.
- Outcome: On top of deep study of visual computing, I became a top contributor of PyTorch forum, getting invited to the PyTorch Conference

TEACHING EXPERIENCE

- **Head Teaching Assistant - Advanced Programming (AP)**

Supervisor: Dr. Ghasem Mirroshandel - University of Guilan

Aug 2018 - Feb 2019

- **Head Teaching Assistant - Algorithms Design (AD)**

Supervisor: Dr. Mojtaba Shakeri - University of Guilan

Aug 2018 - Feb 2019

- **Head Teaching Assistant - Computational Intelligence (CI)**

Supervisor: Dr. Mojtaba Shakeri - University of Guilan

Feb 2018 - Jul 2018

Developed lectures for Java, gave recitation lectures, held office hours, designed and graded homework assignments, gave recitation lectures, and evaluated final projects in AP course (~60 students). Gave recitation lectures, graded homework assignments, and created programming tasks for AD (~60 students) and CI (~40 students) courses (partial materials).

COMMUNITY AND VOLUNTARY ACTIVITIES

Top Contributor

- **Official PyTorch Forum**

2018 - 2022

Official forum with 60K+ members and developers of the PyTorch

- Ranked 15th (top 0.02%) as an active and helpful contributor with 183 solutions and 566 posts (profile)
- Publicly praised by Thomas Viehmann (author, *Deep Learning with PyTorch*) for insightful posts (source)
- Resulted in being awarded three consecutive, fully-waived invitations to the exclusive PyTorch Developer/Ecosystem Day and conference by the core team

Organizer and Mentor

- *IUST Projects*

2019 - 2021

An Open and Free Organization For Sharing Ideas, Showcasing Projects, and Mentoring Students

- Mentored junior students in preparation for going through the MSc thesis process, from ideation to publishing, and job hunting. Few are now senior backend developers (feedback available upon request).

Mentor and Lecturer

- *Rasht School of AI*

2018 - 2021

An Open and Free Organization For Introducing AI and Mentorship (meetup materials)

Teacher

- *Independent work*

2023 - 2024

Teaching Math and Programming to Underprivileged Teenagers in Low-income Regions

INDUSTRIAL EXPERIENCE

Founder and Engineer

Tehran, Iran

- *AI Venture (toy example)*

Aug 2023 - Jul 2024

Specializing in Automated Document Image Analysis

- Problem: Many small to medium companies, **lack structured data pipelines** and use their own specific layout for their documents which degrades inter-company interactions.
- Method: Developed an automated document image analysis platform to **transform unstructured, denormalized documents into accessible, structured data**, semantically searchable. Then a **no-code/low-code configuration system** for domain-expert intuition integration and a **human-in-the-loop review process** for quality control and compliance of the business logic was developed.
- Outcome: **Secured a pre-seed grant** (=84X of monthly minimum wage) and **first commercial client** in quality control inspection of a bicycle factory, however bureaucratic challenges ended this venture.

Full-time Machine Learning Engineer

Karaj, Iran

- *Panafor*

Apr 2022 - Jan 2024

Specializing in Data-driven Decision Making for Business Optimization

- Problem: Growing customer volume made expert assignment inefficient; a real-time system was needed to identify high-value customers and route them to the right experts.
- Outcome: Decreased personnel error by 10% as a result of applicant prioritization. The **comprehensive screening process automation** (text/voice) coupled with filtering calls based on the complexity of inquiries, **reduced manual workload by 40%**. Furthermore, Oversaw the development of a proprietary data extraction and preprocessing pipeline, resulting in a **35% reduction in poor-quality data**. Finally, I established myself as the primary person for onboarding and training new team members.

Summer Intern

Tehran, Iran

- *Matris Corporation*

June 2018 - August 2018

Specializing in hardware inspection of manufactured personal computers

TECHNICAL SKILLS

Deeply Involved:

Python, PyTorch, Tensorflow, Git, Windows, Linux/Debian, MLFlow, DVC, Pandas, Sklearn, ExplainableAI, Sphinx Doc

Have Experience With:

Docker, DevOps, CI/CD, Slurm, PostgreSQL, FastAPI, Shell, Latex

SELECTED AWARDS AND CERTIFICATES

- Accepted in MSc program as a **National Exceptional Talent**, with **Tuition Waiver** at IUST 2019
- **Ranked 3rd** among BSc graduates in Computer Engineering, with **Tuition Waiver** at UoG 2019
- Selected to participate in the Deep Learning Summer School at Gdańsk University of Technology 2020
- PyTorch Conference/Developer/Ecosystem Day registration **scholarship and invitation (3x)** 2019-21
- MOOC including Coursera ML and DL specialization, NYU DLSP, and many more. -

LANGUAGE SKILLS

- English: TOEFL 108 (Reading: 30, Listening: 27, Speaking: 23, Writing: 28)
- Persian: Native

REFEREES

Prof. Jan Akmal (Assistant Professor)	Espoo, Finland
• <i>Role: PhD supervisor</i> <i>Aalto University</i>	<i>jan.akmal@aalto.fi</i>
Dr. Vahid Babaei (Senior Researcher & Group Leader)	Saarbrücken, Germany
• <i>Role: Research project supervisor</i> <i>Max Planck Institute for Informatics</i>	<i>vbabaei@mpi-inf.mpg.de</i>
Prof. Mahdi Aminian (Assistant Professor)	Rasht, Iran
• <i>Role: Bachelor's thesis supervisor and instructor</i> <i>University of Guilan, Rasht</i>	<i>mahdi.aminian@gilan.ac.ir</i>