

Nikan Doosti

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EDUCATION

- **Iran University of Science and Technology (IUST)** Tehran, Iran
Master of Science in Computer Engineering - Artificial Intelligence & Robotics Aug 2019 - Jul 2022
 - **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
Bachelor of Science in Computer Engineering Aug 2015 - Aug 2019
 - **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** with outstanding thesis evaluation

RESEARCH INTERESTS

- Machine Learning
- Digital Fabrication
- Computer Graphics
- Physics-based Simulation
- Geometric Modeling (emerging interest)

PUBLICATIONS

- X-LIMP: XCT-validated learning for in-situ monitoring of part porosity and properties in laser-based powder bed fusion. **Nikan Doosti**, Tharindu Pas Hennadige, Veli Viisanen, Jukka Simola, Jukka Kuva, Jan Akmal. [Materials & Design](#), 2026. (under review)
- Multimodal ensemble defect detection and self-healing in laser-based powder bed fusion. **Nikan Doosti**, Olli Nyrhilä, Jan Akmal. [Materials & Design](#), 2026. ([Publisher](#))
- 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 Keynote] "XCT-validated learning for in-situ monitoring." **Foundation for Aalto University Science and Technology**. Scientific Keynote (*Competitively selected in the **top 7.4%** of all departmental PhD candidates and RAs, as the departmental representative*). October, 2026. (Length: 15 mins.)
- [Invited] "Complementary Benefits of OT/MPM Imaging Sensors for AM Quality Monitoring." **Electro Optical Systems (EOS) GmbH**. Germany and Finland. Technical Talk (virtual). December, 2025. (Length: 60 mins.)
- [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](#))

SELECTED AWARDS AND HONORS

- **Shortlisted in the AI-DOC** PhD program, among top-30 of 3,200+ applicants (two cycles) 2024
- **First-Class Honors** in BSc and MSc at UoG and IUST with **outstanding thesis** evaluations 2019,22
- MSc admission as an **Exceptional Talent** (top-300 of ~ 15000), 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 awards (3 $\times$)**, including invitation 2019-21
- MOOC including Coursera ML and DL specialization, NYU DLSP, and many more. -

RESEARCH EXPERIENCE

Graduate Researcher

Espoo, Finland

- *Aalto University & Electro Optical Systems (EOS Finland Oy)*

Mar 2025 - Present

Materials to Products Group (M2P) and Aalto Digital Design Lab (ADDLAB)

- Project Overview: Defect detection and compensation in laser-based powder bed fusion (PBF-LB) via multimodal neural fusion of cost-effective, commercial-grade in-situ monitoring sensors, supervised by **Prof. Jan Akmal** at M2P and **Olli Nyrhilä** from Electro Optical Systems (EOS GmbH).
- Method: Laser parameters were systematically varied to induce defects in PBF-LB. Developed a **multimodal ensemble learning framework** fusing Near-Infrared (NIR) optical tomography and dual-photodiode MeltPool Monitoring (MPM) data. This approach establishes complementary cross-modal confidence to detect and heal defects spanning up to seven layers.
- Outcome: **Demonstrated long overlooked complementary monitoring benefit of MPM sensors** as cost-effective, accessible quality monitoring module. **Invited to present the findings to EOS GmbH's global R&D team** following strong endorsement from EOS's senior inventor.

Graduate Researcher

Saarbrücken, Germany

- *Max Planck Institute for Informatics (MPII)*

Jul 2020 - Mar 2021

Artificial Intelligence aided Design and Manufacturing Group (AIDAM)

- Project Overview: Novel **self-supervised neural design representation** for obtaining the optimum design as an inverse problem, showcased in topology optimization, supervised by **Dr. Vahid Babaei** at MPII and **Prof. Julian Panetta** from the University of California, Davis, USA.
- 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** exploration through sub-voxel (pixel) tuning .
- 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.

Undergraduate Research Assistant

Rasht, Iran

- *University of Guilan*

Sep 2018 - Aug 2019

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

TECHNICAL SKILLS

Python, PyTorch, TensorFlow, NumPy, Sklearn, Linux, Git, LaTeX, EOSPrint

Agentic workflow, Slurm, Docker, Shell, Reproducible ML workflows (MLflow, DVC), DevOps

INDUSTRIAL EXPERIENCE

Founder and Engineer

Tehran, Iran

- *AI Venture (toy example)*

Aug 2023 - Jul 2024

Developed human-in-the-loop AI, integrating formalized domain expertise into document image analysis

Full-time Machine Learning Engineer

Karaj, Iran

- *P4 Holding*

Sep 2022 - Jan 2024

Applied LLM APIs, and ML-based tabular decision support to assist human domain experts

Full-time Junior Data Scientist

Karaj, Iran

- *P4 Holding*

Apr 2022 - Aug 2022

Specializing in customization of tourism packages and trips

Summer Intern

Tehran, Iran

- *Matris Corporation*

Jun 2018 - Aug 2018

Specializing in hardware inspection of manufactured personal computers

TEACHING EXPERIENCE

- **Teaching Assistant - ADD Basics: Additive manufacturing (AAN-C2012)**
Supervisor: [Prof. Jan Akmal](#) - Aalto University Spring 2026
- **Teaching Assistant - Practical Work Training with 3D-printers (ENG-A1009)**
Supervisor: [Prof. Mika Salmi](#) - Aalto University Spring 2026
Guided students through digital fabrication workflows from 3D models to physical prototypes, including slicing, parameter setup, fabrication constraints, and iterative prototyping in AAN-C2012 and ENG-A1009 course (~40 students).
- **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
- **Teaching Assistant - Data Structure**
[Dr. Ghasem Mirroshandel](#) - University of Guilan Feb 2016 - Jul 2016
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

- **Onboarding Buddy** M2P Group - Aalto University
Onboarding Buddy for new research group members Fall 2025 - Present
- **Academic Tutor** Aalto University
Academic Tutor for doctoral researchers and undergrads interest in research Spring 2026 - Present
- **Public Engagement Demonstrator** Open Otaniemi Day
Organized the most-engaging public research booth on digital fabrication, via animated drawing Spring 2026
- **Top 0.02% Forum Contributor ([my profile](#))** Official PyTorch Forum
A helpful contributor with 183 solutions and 566 posts, and praised by Thomas Viehmann ([source](#)) 2018 - 2022
- **Organizer and Mentor** IUST Projects
An open and free organization for embracing diverse thoughts, showcasing projects, and mentoring students 2019 - 2021
- **Mentor and Lecturer** Rasht School of AI
An open and free organization for introducing AI and mentorship to undergrads ([meetup materials](#)) 2018 - 2021
- **Teacher** Independent
Teaching math and programming to underprivileged teenagers in low-income regions 2023 - 2024

MENTORING AND STUDENT SUPERVISION

- MEng thesis co-supervisor (industry collaboration): [Valtteri Anttila](#) (AI-compatible RFQ pipeline), [Hugo Österbacka](#) (digital product development)
- Mentor: [Xinyi Yin](#) (03.2026 -), [Mohammad Hossein Fakouri](#) (04.2026 -), [Zahra Dehghani](#) (08.2022 -)

LANGUAGE SKILLS

- English: TOEFL 108
- Persian/Gilaki: Native (Bilingual)