Nikan Doosti

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Education

- **Iran University of Science and Technology (IUST)** — Tehran, Iran
  Master of Science in Computer Engineering - Artificial Intelligence — *Aug 2019 - Dec 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** and **Distinction for thesis** research.

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, 2021. (Publisher, Code)

Talks

- [Invited] "Neural Design Representations" **Toronto Geometry Colloquium** advised by Prof. Alec Jacobson - University of Toronto. March 4, 2022. toronto-geometry-colloquium.github.io. (Length: 10 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, drawing recognition from the inventor, leading to a paper under review in **Additive Manufacturing** journal, and featured in discussions among EOS's research team.
  - 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. I 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
  Max Planck Institute for Informatics (MPII) — *Jul 2020 - Mar 2021*
  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, and independently collaborated with a well-respected research institute.
- 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

- ***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 **Dr. 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.
  - Couple of the mentees from the start of master's, started working as senior backend developer in large software companies (feedback available upon request)

Mentor and Lecturer

- *Rasht School of AI* *2018 - 2021*
  An Open and Free Organization For Introducing AI and Mentorship
  - Held lectures around classical and neural-based digital image processing (Slides)

- Mentored students who were interested in artificial intelligence and its applications

Teacher

- *Independent work* *2023 - 2024*
  Teaching Math and Programming to Underprivileged Teenagers in Low-income Regions
  - Held weekly discussion sessions to teach math and programming
  - Provided mentorship to a select few on pursuing college degrees in STEM fields

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: As the number of customers grows, assigning experts to each one becomes critical, as only a few result in contracts. An "smart operator" that can monitor all customers in real-time, identify high-value ones, and assign experts based on their fitness would help prevent wasted effort.
  - Method: Customer inputs were first screened, with text converted to categorical data via an LLM API and voice converted to text via Automatic Speech Recognition. Using this processed data, high-potential customers were identified through tabular machine learning methods. The results and their reasoning were then reported to the human domain expert via explainable AI, after which experts were engaged only with the most likely customers.
  - 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 Scripting, HTML/CSS, Latex

Research Interests

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

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 the 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