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 score** during defense on *Oct 22, 2022* with **GPA of 17.17/20.00**
  - **IUST:** This university is one of the most prestigious in the country, being in **top-4** consistently.
- **University of Guilan (UoG)** — Rasht, Iran
  Bachelor of Science in Computer Engineering — *Aug 2015 - Aug 2019*
  - **Project:** Descreening and Rescreening of Halftone Images via Data-Driven Deep Learning Methods (code)
  - **Class Rank:** Graduated **3rd** out of 55 with a **GPA of 18.64/20.00**

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. (ACM, code)

Talks

- "Neural Design Representations." **Toronto Geometry Colloquium Advised by Alec Jacobson** - University of Toronto. March 4, 2022. toronto-geometry-colloquium.github.io. (Length: 10 mins., Video)

Research Experience

Max Planck Institute for Informatics — Saarbrücken, Germany

- ***Research Assistant (remote)*** — *Jul 2020 - Mar 2021*
  Artificial Intelligence aided Design and Manufacturing Group
  - Project Overview: **Neural Design Representation**: Novel self-supervised neural method for obtaining the optimum design showcased in Topology Optimization
  - Supervisors: Supervised by **Dr. Vahid Babaei** and collaborated with **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 **sub-voxel (pixel) filtering** to control the smoothness of designs without the need for explicit smoothing filters
  - Details: Applied analytical physics and classical numerical methods, such as Finite Element Methods (FEM), to simulate the objective function. Additionally, explored various neural architectures and reproduced their results, from convolutional neural networks to modern neural fields, to study the potential of deep learning for design representation.
  - Interdisciplinary Work: Successfully navigated and **mastered uncharted domains** beyond my primary field, including topics in mechanical engineering with no prior experience.
  - Experimentation: Managed **large-scale experiments** by extending logging solutions such as MLFlow for model, experiment, config, and report **versioning and tracking**, integrated into Slurm workload manager on compute cluster, particularly enabling **easy follow-up near deadline**.
  - Collaboration: **Shared PyTorch expertise** with group members, focusing on low-level internals and **optimizing workflows with Slurm clusters**.
  - Manuscript Development: **Prepared all figures** and contributed approximately **65% to the manuscript**. Also, I oversaw all **administrative tasks** related to the paper's publication, including **handling revisions** and addressing **peer review feedback**.
  - Outcome: Resulted in a paper published and presented at the **ACM Symposium on Computational Fabrication 2021** (see Publications). Additionally, I was among the few master's students whose thesis led to a publication in a highly regarded venue.

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*

Taught Java in AP, designed and graded assignments, and **evaluated final projects**. Held **weekly Q&A sessions**, graded assignments, and **created programming tasks** for AD and CI courses (partial materials).

Community and Voluntary Activities

Member

- *Official forum with +50K members and authors of the PyTorch* *2018 - 2022*
  Official PyTorch Forum
  - A top member (15th) with 183 solutions and 566 posts (summary)
  - Commended by Thomas Viehmann, author of *Deep Learning with PyTorch* book for insightful posts
  - Invited twice to attend the PyTorch Developers Conference, a limited-capacity event

Organizer and Mentor

- *An Open and Free Organization For Sharing Ideas, Showcasing Projects, and Mentoring Students* *2019 - 2021*
  IUST Projects
  - Attempted to challenge the university's siloed culture through open scientific/general discussions
  - Mentored junior students in preparation for going through the M.Sc thesis process, from ideation to publishing, and also job hunting.
  - One of the mentorees from the start of master's, recently started working as a senior backend developer in a large software company (feedback available upon request)

Mentor and Lecturer

- *An Open and Free Organization For Introducing AI and Mentorship* *2018 - 2021*
  Rasht School of AI
  - Held lectures around classical and neural-based digital image processing (Slides)
  - Mentored one student who were interested in artificial intelligence and its applications

Teacher

- *Teaching Math and Programming to Underprivileged Teenagers in Low-income Regions* *2023 - 2024*
  Independent work
  - Held weekly 1.5-hour sessions to teach math and programming
  - Provided mentorship to a select few on pursuing college degrees in STEM fields

Work Experience

Self-Funded AI Venture Tehran, Iran

- ***Founder and Engineer*** *Mar 2024 - Jul 2024*
  Specializing in Automated Document Image Analysis
  - The problem: Many small to medium companies, **lack structured data pipelines** and use their own specific layout for their documents which degrades inter-company interactions.
  - Developed an automated document image analysis platform to **transform unstructured, denormalized documents into accessible, structured data**, semantically searchable.
  - Created a **no-code/low-code configuration system** for easy customization and business logic validation
  - Outcome and Insights: While the venture **did not achieve commercial success**, it provided valuable learnings:

* Impact of **infrastructural inertia** toward data standardization
* Effects of **regulatory environments** on innovation
* **Bureaucratic preferences** for transparency prevention in process management

Panafor Karaj, Iran

- ***Full-time Machine Learning Researcher*** *Apr 2022 - Jan 2024*
  Specializing in Data-driven Decision Making for Business Optimization
  - The 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.
  - The method:
    * Screen customer input (text converted to categorical data via LLM API, voice to text via Automatic Speech Recognition)
    * Identify high-potential customers using tabular machine learning methods, including XGBoost.
    * Report fitness to the human domain expert via explainable AI, prototyped using Gradio.
    * Engage experts only with the most likely customers.
  - Impact: Decreased personnel error by 10%, and I established myself as **the primary person for onboarding and training** new team members.
  - The **comprehensive screening process automation** (text/voice) coupled with filtering calls based on the complexity of inquiries, **reduced manual workload by 40%.**
  - Oversaw the development of a proprietary data extraction and preprocessing pipeline, resulting in a **35% reduction in poor-quality data**.
  - Exhibited **proactive problem-solving** by **manually preparing years of "analog data" within the first 2.5 months**, a critical task which I prioritize over my role-specific duties to ensure project success.
  - **Managed a 15,000-line codebase**, ensuring maintainability and performance. **Designed 7 modules, with 3 adopted by other projects**, enhancing reusability and impact.

Technical Skills

Deeply Involved:	Python, PyTorch, Tensorflow, Git, Windows, Linux/Debian, MLFlow, DVC, Pandas, Sklearn, ExplainableAI, Sphinx Doc, "why you should solve a problem on top of how"
Have Experience With:	Docker, DevOps, CI/CD, Slurm, PostgreSQL, FastAPI, Shell Scripting, HTML/CSS, Latex

Research Interests

- Deep Learning; Physics-Informed Deep Learning
- Computer Graphics, Physics-based Simulation, and Inverse Design
- AI for Engineering and Health; Computational Fabrication, and Drug Design

Awards and Certificates

- Awarded for **dedication and leadership** at Panafor 2023
- Completed **training in Workplace Professionalism**, Organizational Behavior, etc. 2023
- Accepted in M.Sc program as a **National Exceptional Talent**, with **Tuition Waiver** at IUST 2019
- **Ranked 3rd** among B.Sc graduates in Computer Engineering, with **Tuition Waiver** at the UoG 2019
- Participated in the Deep Learning Summer School at Gdańsk University of Technology 2020
- Invited twice to attend the PyTorch Developers Conference -
- MOOC including Coursera ML and DL Specializaion (Andrew Ng), NYU DLSP (Alf Canziani), etc. -

Referees

Dr. Vahid Babaei (Research Scientist) — Saarbrücken, Germany
- *Role: Research project supervisor* — *vbabaei@mpi-inf.mpg.de*
  Max Planck Institute for Informatics

Prof. Julian Panetta (Assistant Professor) — Davis, USA
- *Role: Research project supervisor* — *jpanetta@ucdavis.edu*
  University of California, Davis

Dr. Mojtaba Shakeri (Research Scientist) — Los Angeles, USA
- *Role: Undergraduate mentor and instructor* — *mojtaba.shakeri@gmail.com*
  MercuryGate (prev. Assistant Professor at University of Guilan, Rasht, Iran)