Kasra Davoodi

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RESEARCH INTERESTS

- Deep Learning
- Machine Learning
- Robotics
- Computer Vision
- Multimodal Learning
- Signal Processing

EDUCATION

K. N. Toosi University of Technology — Tehran, Iran
B. Sc. in Electrical Engineering — 2020 – 2025

GPA: A+ (17.95/20 - TOP 6% of my entrance)
Bachelor Project: "Segmentation of ICH in Brain CT Scans via Innovative Deep Learning Methods"
Supervisor: Dr. **Amirhossein Nikoofard**

RESEARCH EXPERIENCE

K. N. Toosi University of Technology — Tehran, Iran
Research Assistant (Dr. Amirhossein Nikoofard, Dr. Mahdi Aliyari at APAC) — October 2023 - present

• **Project**: **Classification and Segmentation of ICH in Brain CT scans.**

- Developing DL models to diagnose bleeding lesions in brain CT scan.
- Developed pipelines using PyTorch and SMP libs, leveraging Google Colab.
- Tuned hyper-parameter to optimize model performance.
- Gathered dataset through a cooperation with clinics.
- Mentored fellow researchers in writing and technical aspects of AI projects/papers.

K. N. Toosi University of Technology — Tehran, Iran
Research Assistant (Dr. Hossein Hosseini-Nejad, at Zistel company) — Dec 2022 - Sep 2023

• **Project**: **Clinical Pulse Oximeter Enhancement**.

- Developed novel algorithm for SPO2 and Heart rate assessment in PPG Signal.
- Implemented the algorithm on nRF and STM32 microcontrollers.
- Optimized device performance through debugging and algorithm development.
- Applied ML approaches to classify low-quality signals in PPG.

INDUSTRIAL EXPERIENCE

Parto Dadeh Company:
Intern (under the supervision of Mr. Arash Malek and Mr. Kaveh Manafi)
Project: Software Design for a Telecommunication Device

- Developed full-stack application using QT.
- Applied OOP principles and advanced C++ libs for sophisticated software development.
- GUI design for a low-end display.

AryaVakav Company:
Intern (under the supervision of Mr. Arash Karimi)
Project: Designing an AI-driven controlling assistance in factories using machine learning.

- Performed data cleaning and analysis from PLC devices.
- Feature extraction & selection process and ML model development.

(NOTE: I Strongly Encourage You to Explore my **Webpage (click)** for detailed technical information of my Publications and projects.)

PUBLICATIONS

• **Conference Papers:**

1. *1. Hoseyni, M., **Davoodi, K**., Pakdaman, F., Aliyari Shoorehdeli, M., & Nikoofard, A. (2024). "Comprehensive Hyperparameter Tuning to Enhance Deep Learning Performance for Intracranial Hemorrhage Classification in Head CT Scans." In Proceedings of the Iranian International Conference on Biomedical Engineering (ICBME), Tehran, Iran*. **Published at IEEE (click for credential)**

• **Journal Papers:**

*2. Ghafari, Z., **Davoodi, K**., Katoozian, D., & Hosseini-Nejad, H. (2025). "An Innovative Approach for Beat Detection and Quality Assessment in Photoplethysmography (PPG) Signals" (**Revision – Nature Scientific Reports**).*

3. Hasani, Z., Mahdavimoghdam, M., Mohammadi, R., Shirmohammadi, Z., Nikoofard, A.*, Nikahd, E., & **Davoodi, K**. (2024). "A Deep Reinforcement Learning-Based Mechanism for Throughput Enhancement in Wireless Sensor Networks" **Published at Nature Scientific Reports (click for credential)**

• **In preparation / Archive:**

*4. **Davoodi, K**., Hoseyni, M., Khoramdel, J., Barati, R., Mortazavi, R., Nikoofard, A., Aliyari Shoorehdeli, M., & Hatam Parikhan, J. (2025). "Hemorica: A Comprehensive CT Scan Dataset for Automated Brain Hemorrhage Classification, Segmentation, and Detection" (Waiting for Ethical Code to Publish).*

5. **Davoodi, K**., Hoseyni, M., Khoramdel, J., Nikoofard, A., & Aliyari Shoorehdeli, M. (2024). "A Federative Approach to Enhance the Performance and Clinical Generalizability of Intracranial Hemorrhage Segmentation Using an Innovative Deep Learning Methodology" (***In preparation**; expected submission within four months*).

PROJECTS

Computer Vision:

• **ICH Brain CT Segmentation via Deep Learning**
Developing an AI-driven assistant for ICH diagnosis in medical centers. This project is a joint with "Iran Medical University". [APAC Research Group]

• **ICH Brain CT Classification via Deep Learning**: Tuned a generalizable set of hyper-parameters, enhancing ResNet, VGG16, DenseNet, and MobileNet, modeling the clinical scenarios. [APAC Research Group]

• **Preparation of a ICH Dataset with multiple types of annotation**. Led preparation, cleaning, and evaluation of multi-annotation ICH dataset; contributed to data analysis. [APAC Research Group]

• **Autonomous Driving – Vehicle & Human Detection**: Utilized YOLOv8s for live vehicle and human detection with preprocessing, augmentation, class balancing, weighted loss. [NeuroMatch Academy]

• **License Plate Recognition**: Designed a six-step educational project for a computer vision course as a TA, focusing on deep learning fundamentals for students, from labeling to CNN design [CV course]

• **Chessboard digitalization**: Developed a four-step method using CNN and YOLOv5 to map chessboard arrangements to digital images. [CV course]

Machine Learning:

• **Quality Assessment of PPG Signals**: Merging a XGBoost model with the peak/valley detection as a pre-process, eliminating low-quality segments from the signal. The whole package can be used as a preprocessing module for further applications. [Zistel Company]

• **Prediction of metallization percentage of sponge Iron**: Performed a preprocessing
Process on the data along with feature engineering to develop a machine learning model for the prediction. [Aryavakav Company]

• **Built ML models to predict bank customer behavior** (classification & regression). [Principles of Intelligent Systems course]

Signal Processing:

• **Heart Rate & SpO2 Detection**: Developed a lightweight, adaptive, 4-step peak/valley detection algorithm for medical grade calculation of heart rate & SpO2. Deployed the code on STM32 and nRF microcontrollers [Zistel Company]

Software:	• **Developed a telecommunication application** (backend + frontend) with C++ (QT framework), capable of multi-channel transmit and receive. [Parto Dadeh Company]
Selected Course Projects:	• **AM Modulator Design**: Designed and assembled a Gilbert circuit AM modulator using Altium Designer, including PCB printing and lab assembly. *(*May 2024 – Electronics 3 Lab*)* • **Designed a graphical Tetris game** with features such as a menu, rankings, different game modes, and color themes. (May 2022 – fundamental of C programming **- Top Project of the Class***)*

TECHNICAL & RESEARCH SKILLS

Programming skills	Computer Vision	Embedded systems	Research Skills
• Python, C, C++, Matlab	• Image processing – OpenCV, PIL	• STM32, nRF, AVR	• Literature Review
• Pandas, SQL, Seaborn	• Deep Learning – CNNs, ViTs, YOLO	• Filtering, Real Time Analysis	• Documentation
• QT, Cube MX	• Fine-Tuning & Evaluation	• Algorithm Design	• Task Management
• GIT	• PyTorch, Scikit-learn, Hugging Face	• System Optimization	• Team Work

IELTS & COURSE CERTIFICATES

English: **IELTS Score = 8.0** (Listening = 9.0, speaking = 7.5, Reading = 8.5, writing = 7.0). **click for report form**
Deep Learning Course and Project (128 hours - Neuromatch Academy – July 2024). **View Credential**

TEACHING EXPERIENCE

- Head TA for "**Fundamentals of Computer Programming**." Dr. Behrooz Nasihatkon
- TA for "**Fundamentals of Computer Vision**." Dr. Behrooz Nasihatkon
- Head TA for "**Electronics 1**." Dr. Amir Masoud Sodagar
- Co-Head TA for "**Electronics 2**." Dr. Ebrahim Nadimi
- TA for "**Electronics 1**." Dr. Amir Masoud Sodagar
- TA for "**Fundamentals of Computer Programming**." Dr. Hamed Khanmirza

VOLUNTARY WORK

Manager of Education Section in IEEE KNTU Student Branch

- Led the IEEE KNTU Education Section, organizing workshops, courses, and seminars.
- Received recognition by Prof. Granpayeh in recognition of exceptional performance and team leadership (View certification of appreciation).
- Created multiple part-time jobs for graduate instructors.
- Delivered both technical and soft skills training for undergraduates.