Kasra Davoodi

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RESEARCH INTERESTS

Artificial Intelligence, Computer Vision, Biomedical Signals, Data Science, Embedded Systems, Wearable Devices
Autonomous Driving,

EDUCATION

K. N. Toosi University of Technology — Tehran, Iran
2020 – 2025

B. Sc. in Electrical Engineering,
GPA: A+ (3.84/4 - TOP 6% of my entrance)
GPA: A+ (3.89/4 - Top 3% of my entrance – last 2 years)
Bachelor Project: "Segmentation & Classification of ICH in Brain CT Scan via Deep Learning"
Supervisor: Prof. Amirhossein Nikoofard

RESEARCH EXPERIENCE

K. N. Toosi University of Technology — Tehran, Iran
Research Assistant (with Prof. Amirhossein Nikoofard, at APAC Research Group) — October 2023 - present

- **Project**: Classification and Segmentation of ICH in Brain CT scans.
- Conducted literature review (~80 articles) and tuned hyper-parameters via grid search.
- Hyper-parameter tuning via a grid search based on dataset characteristics and output metrics trend. (teamwork)
- Utilized Hugging Face and PyTorch SMP for pre-trained models, with training on Google Colab.
- Collaborated with physicians to gather a balanced dataset; led weekly progress meetings
- Provided assistance for academic articles in related fields.

K. N. Toosi University of Technology — Tehran, Iran
Research Assistant (with Prof. Hossein Hosseini-Nejad, at Zistel company) — Jan 2023 - Sep 2023, Aug 2024 – Nov 2024

- **Project**: Improving pulse oximeter precision and reliability.
- Developed lightweight signal processing algorithms in MATLAB and implemented on STM32 & nRF microcontrollers
- Conducted literature review on PPG signal peak/valley detection and collected hospital datasets.
- Studied hardware modules for seamless software-hardware integration
- Applied ML approaches (SVM, XGBoost, KNN, DT) to classify low-quality PPG signals.

INDUSTRY EXPERIENCE

Parto Dadeh Company: — Tehran, Iran
June 2022 – Dec 2022

- Internship, learning **C++** and **QT framework**.
- Focusing on **object-oriented programming** in application designing.
- Involved in designing both **GUI** and **backend** for a telecommunication device used in fire stations.
- Got familiar with the industry atmosphere.
- Learned basics for 2 months, after that, I Worked there for 3 months as an **intern**.
- Dramatic Improvement in my understanding of programming.

CERTIFICATES

English: **IELTS Score = 8.0** (Listening = 9, speaking = 7.5, Reading = 8.5, writing = 7). click for report form
Deep Learning Course and Project (128 hours - Neuromatch Academy – July 2024). View Credential

PUBLICATIONS

Conference Papers

1. Mohammad Hoseyni, Kasra Davoodi¸ Fatemeh Pakdaman, Mahdi Aliyari shoorehdeli, Amirhossein Nikoofard*, "Comprehensive Hyperparameter Tuning to Enhance Deep Learning Performance for Intracranial Hemorrhage Classification in Head CT Scans" *Int. Conf. Biomedical Engineering. (ICBME)*, Tehran, Iran. (**accepted, oral presentation in December**), June 2024

Journal papers

2. Zahra Ghafari, Kasra Davoodi¸ Danial Katoozian, Hossein Hosseini-Nejad*, "An Innovative Approach for Beat Detection and Quality Assessment in PPG Signals", (**under review**).

3. Zahra Hasani, Maryam Mahdavimoghdam, Razieh Mohammadi, Zahra Shirmohammadi, Amirhossein Nikofard*, Eesa Nikahd, Kasra Davoodi, "Deep Reinforcement Learning-based Mechanism to Improve the Throughput of WSNs", (**under review**).

4. Mohammad Hosseini, Kasra Davoodi, Fatemeh Pakdaman, Amirhossein Nikofard*, "Advanced Classification and Segmentation of ICH in Brain CT Scans via Using a Two-Step Deep Learning Approach and Fuzzy Decision Policy", (**in preparation**).

PROJECTS

Biomedical Engineering:

• **ICH Brain CT Segmentation via Deep Learning (July 2024** – present)
Developed a two-step model (CNN and sequential) using PyTorch for ICH lesion segmentation in collaboration with Iran Medical University (R&D phase)

• **ICH Brain CT Classification (Dec 2023 – Jun 2024, Accepted Paper at ICBME 2024)**: Developed a ResNet50-based deep learning model with preprocessing, augmentation, and weighted BCE loss for healthy/ICH classification

• **Quality assessment via PPG Signals (under review paper)**: Designed a binary and multi-class stress detection system for Zistel pulse oximeters. Implemented peak/valley detection and XGBoost for signal quality assessment before classification.

• **Heart Rate & SpO2 Detection**: Created a lightweight, adaptive , 4-step peak/valley detection algorithm for clinical pulse oximeter.

Autonomous Driving:

• **Autonomous Driving – Vehicle & Human Detection**: Utilized YOLOv8s for live vehicle and human detection with preprocessing and augmentation, achieving mAP50 of 90% and mAP50-95 of 68%.

• **License Plate Recognition**: Designed a 6-step educational project for a computer vision course as a TA, focusing on deep learning fundamentals for students.

NOTE: I Strongly Encourage You to Explore my Webpage for Further Technical Details of Above Projects. Information such as Client, Date, and Technical Backbone are Available on My Webpage.

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)*

• **Chessboard Piece Detection**: Developed a 4-step method using CNN and YOLOv5 to map chessboard arrangements to digital images. *(May 2023 – Fundamentals of Computer Vision)*

• **Four-State Counter Design**: Designed a Gray and Excess-3 code-based counter with 7-segment display for multiple configurations. *(Dec 2022 – Digital Systems 1)*

• **Car Interior Light Controller**: Programmed an Atmega64 microcontroller for multi-scenario control, simulated in Proteus. *(May 2023 – Digital Systems 2)*

Technical & Research SKILLS

Programming skills	Artificial Intelligence	Embedded systems	Research Skills
• Python, C, C++, Matlab	• ML, DL, Computer Vision	• STM32, nRF, AVR	Literature Review
• NumPy, Pandas, SQL	• Grid Search, Optimization	• Digital Signal Processing	Documentation
• QT, Cube MX, Code Vision	• PyTorch, TensorFlow, Hugging Face	• Algorithm Development	Writing (LaTeX)

TEACHING EXPERIENCE

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

VOLUNTARY WORK

Manager of Education Section in IEEE KNTU Student Branch

I undertook a variety of tasks as the manager of this section. Due to my impressive performance and prolific record through my one-year duty, I received a certification of appreciation from the counselor of the IEEE student branch (Dr. Nosrat Granpayeh) and the chairman of the IEEE KNTU student branch. As a leader, I created a dedicated and precise team. We conducted multiple workshops, online courses, webinars, and seminars. We were concerned about selling courses which were necessary and useful. I'm proud to say that our efforts not only enhanced the skills and knowledge of many students but also created about 10 part-time job opportunities for graduate students as instructors in various courses. In addition to technical courses, multiple webinars and seminars were conducted by experts to spread awareness about soft skills among undergraduate students.