Mohammad Javad Ranjbar — CV

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Research Interests

- Machine Learning
- Deep Learning
- Computer Vision
- Speech Synthesis
- Natural Language Processing
- Speech Recognition

Education

- **Master of Science in Computer Software Engineering — University of Tehran** Tehran-Iran
  - Overall GPA: : **4/4 (19.07/20)** 2022 – Present
  - **Research Title**: Investigating Text-to-Speech(TTS) models and their applications in audio generation, focusing on Zero-Shot TTS.
    Supervisors: Dr. Heshaam Faili and Dr. Azadeh Shakery
- **Bachelor of Science in Electrical Engineering— Amirkabir University of Technology** Tehran-Iran
  - Last 2 years GPA: : **3.64/4 (17.1)** via 67 passed credits 2016 – 2021
  - **Thesis Title: Facial Expression Recognition**
    Fine-tuned the ResNet model for facial emotion recognition. Implemented the FER model on a robot that responds to the owner's emotions with appropriate gestures and plays music based on the owner's expressions using speech commands.
    Supervisors: Dr. Mohammad Bagher Menhaj and Dr. Hassan Taheri

Work Experience

- **Teaching Assistant — Neuromatch Summer School**
  - Mentored students through daily sessions in Deep Learning with a focus on Natural Language Processing, guiding them through course material, exercises, and projects. Jun 2024 – Jul 2024
- **Co-founder — Sofia**
  - Sofia is an omnipresent RAG-based chatbot available on Telegram, WhatsApp, and the website, designed for answering customer service inquiries. Aug 2023 – Present
- **Teaching Assistant & Research Assistant — University of Tehran**
  - Machine Learning Methods in Natural Language Processing Teaching Assistant: Sep 2024 – Present
    - Developed comprehensive homework assignments,
    - Organized and held weekly discussion sessions to reinforce key concepts and address student queries.
    - Assisted in updating the course material by suggesting supplementary content.
  - Machine Learning Teaching Assistant: Designed the final project and HW assignments. Jan 2023 – Jan 2024
  - Statistical Inference Teaching Assistant: Designed hands-on and HW assignments. Jan 2023 – Jan 2024
  - Deep Learning Teaching Assistant: Contributed to the design of the final project. Jan 2024 – May 2024
  - Research assistant at NLP lab and Intelligent Information System Lab Jan 2023 – Present
- **Teaching Assistant & Research Assistant — Amirkabir University of Technology**
  - Teaching assistant for Introduction to Computational course Intelligence Oct 2021 – Jan 2022
  - Research assistant at Computer Intelligence and Large Scale System Research Lab 2020 – 2022
- **Teaching Assistant — Sharif University of Technology**
  - Machine Learning Teaching assistant: Contributed to the design of the final project. Feb 2024 – May 2024
- **Instructor and Robotics Developer — Amirkabir Robotics and Programming School (FIRA Academy)**
  - Instructor of image processing course: Developed and delivered an engaging course on introduction to machine learning and computer vision, focusing on image processing concepts. 2020 – 2021
  - Member of the production team of SWIMBot (Designed for Diginext): Contributed to the production of SWIMBot, a platform for applications like image processing, mapping, and obstacle avoidance. March 2021
- **Volunteer works**
  - Innovation Center of Amirkabir University of Technology: Member of Executive Committee. 2019 – 2020
  - International Conference on Robotics and Mechatronics (ICRoM): Member of Student Committee. 2019 , 2021

- **Intern — Canavat Electric Iranian Arvand**
  - Implemented a low-cost IR remote dimmer using an Arduino Nano. Summer 2019

Publications

- **MJ. Ranjbar**, MB. Menhaj, H. Taheri. "Social Robots: An Open-Source Framework for Personal Assistant Robots." Published in *Proceedings of the 10th RSI International Conference on Robotics and Mechatronics (ICRoM 2022)*.

Selected Courses

- Machine Learning (Grad) 4/4 (20/20)
- Statistical Inference (Grad) 4/4 (19.2/20)
- Digital Speech Processing (Grad) 4/4 (20/20)
- Natural Language Processing (Grad) 4/4 (18.2/20)
- Trust Worthy AI (Grad) 4/4 (17.4/20)
- Software Testing (Grad) 4/4 (19/20)
- Deep Learning (Grad) 4/4 (18.75/20)
- Advanced Algorithm Design (Grad) 4/4 (19.4/20)

Online Courses

- Machine Learning [Certificated]
- Algorithms Specialization (D & C) [Certificated]
- Natural Language Processing [C1 C2, C3, C4]
- Generative AI with LLMs [Certificated]

Technical & Personal Skills

- **Programming/Scripting:** Python *(Pytorch, Tensorflow, Keras, NLTK, OpenCV, SciPy, Scikit-learn, Pandas, Matplotlib, Numpy, Pygame, Pyaudio, Threading, PyQt, Xlsxwriter, transformers)*, R, C/C++, C#, Matlab, VHDL, Assembly, HTML, MySQL, LaTeX
- **Simulation Tools and hardware:** ARM(STM32), Arduino, Raspberry Pi, NodeMCU, Simulink, Proteus, H SPICE, Advanced Design System.
- **IDEs/Tools:** Jupyter Notebook, Google Colab, Visual Studio, Keil5, STM32 Cube MX, Microsoft Office, Adobe Photoshop, Adobe Premiere, Unity, Git, Docker
- **Language:** Persian (Native), English (Fluent), Toefl Score: 107 (R: 29, L: 30, S: 24, W: 24)

Selected Projects

- **Persian Text-to-Speech (TTS)** Deep Learning [2023]
  - Fine-tuned the SpeechT5 model on the Mozilla Common Voice dataset for the Persian language.
- **Speech emotion recognition** Deep Learning [2023]
  - Fine-tuned the Hubert model on SheMO: Persian Speech Emotion Detection Database.
- **Fine-tuning Segment Anything Model (SAM) with Meta-Learning** Deep Learning [2023]
  - Fine-tuned SAM on a custom dataset for detecting bodies of water.
- **Summarization with FLAN-T5** Generative AI with Large Language Models [2023]
  - Fine-tuned the FLAN-T5 model using traditional fine-tuning techniques and PEFT methods like LoRA to enhance its summarization capabilities. Additionally, applied reinforcement learning to improve the model's hate language issues.
- **FAQ chatbot** Natural language processing [2023]
  - Developed FAQ chatbot specialized in selling airplane tickets, capable of detecting intents, classifying domains, and extracting slot values (e.g., destination city, date, etc.)
  - Developed FAQ chatbot responding to users seeking information on weight loss strategies, nutrition, fitness, and general healthcare inquiries.
- **Faster R-CNN from scratch** Deep Learning [2023]
  - Developed a custom Faster R-CNN implementation for wildfire smoke detection.
- **Training robust model** Trustworthy AI [2023]
  - Trained a robust model with diverse data augmentation techniques and the Angular loss function. It was tested for resistance to fast gradient methods and performance with noisy data.a.
- **Persian music dastgah detection** Machine Learning [2022]
  - This project involves preprocessing an audio dataset, training various models—including neural networks and support vector machines—for Dastgath detection, and applying multiple clustering methods. Results were analyzed and compared based on different preprocessing techniques, feature extraction methods, for each model.

- **Correction of skewed text** DML lab [2021]
  - Created a dataset for page rotation and trained a CNN on it for predicting page rotation.
- **Snake game with Voice Control and Motion Detection** Advanced Programming [2020]
  - Developed the Snake game featuring voice control with four wake words and motion control through color detection.
- **2x2 Rubik's Cube Solver** Advanced Programming [2020]
  - Developed a console-based program for playing a 2x2 Rubik's cube, incorporating a depth-limited search algorithm for automatic solving.
- **Face Recognition System** Advanced Programming [2020]
  - Developed a face recognition system using the Eigenfaces method.
- **Irrigation System using STM32** Microprocessor Systems & Interfaces [2020]
  - Implemented an irrigation system using STM32, LCD, keypad, and YL-69. The LCD displays the menu for setting irrigation duration, and the YL-69 monitors soil conditions.
- **Smart Temperature Control System using STM32** Microprocessor Systems & Interfaces [2020]
  - Developed a smart temperature control system with STM32, LM35, and a stepper motor, and integrated remote setpoint adjustment via Arduino Due.
- **Handwriting Digit Recognition** Introduction to Machine Learning [2019]
  - Various convolutional neural network architectures with different hyperparameters were trained on the MNIST dataset, and the results and effects of each hyperparameter were analyzed.
- **MUSIC algorithm** Linear Algebra [2019]
  - Implemented the MUSIC algorithm to estimate the Direction of Arrival (DOA) of sound sources.

Honors

- Ranked within the top 0.5% (76th) among approximately 13000 participants in the computer engineering national master entrance exam for Iranian universities. 2022
- Ranked within the top 1% (35th) among approximately 2000 participants in the computer science national master entrance exam for Iranian universities. 2022
- Ranked within the top 0.6% (27th) among approximately 4000 participants in the information technology engineering national master entrance exam for Iranian universities. 2021
- Ranked within the top 0.25% in the nationwide entrance exam for B.Sc. degree among 163000 participants. 2016
- Accepted to participate in "Iranian Physics Olympiad stage 2 " from the top 5%
- Accepted three times to participate in the "Iranian Olympiad in Astronomy and Astrophysics - Stage 2" as one of the top 5% of participants. 2013–2015

References

- **Dr. A Shakery** — Associate Professor, Electrical and Computer Engineering Department, University of Tehran
  - Email: Shakery@ut.ac.ir
- **Dr. H Faili** — Professor, Electrical and Computer Engineering Department, University of Tehran
  - Email: hfaili@ut.ac.ir
- **Dr. MB Menhaj** — Professor, Electrical Engineering Department, Amirkabir University of Technology
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Further information, and Proofs are available upon Request