Mohammad Javad Ranjbar — CV

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Research Interests

- Conversational AI
- Human-Computer Interaction
- Large Language Models
- Speech Synthesis
- Generative Models
- 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**: Zero-Shot Text-to-Speech for Persian Language
    Supervisors: Dr. Azadeh Shakery and Dr. Heshaam Faili
- **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

Publications

- **MJ. Ranjbar**, AH. Sheikh, S. Karimi, A. Shakery, H. Faili. "MedQA-FA: A Clinical Question and Answer Dataset for the Persian Language." Under preparation.
- **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, NLTK, OpenCV, SciPy, Scikit-learn, Pandas, Matplotlib, Numpy, Pygame, Pyaudio, Threading, PyQt, Transformers, Selenium)*, 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: 103 (R: 29, L: 29, S: 24, W: 23)

Work Experience

- **Teaching Assistant & Research Assistant — University of Tehran**
  - Research Assistant at NLP Lab and Intelligent Information System Lab. Jan 2023 – Present
  - Teaching Assistant Roles:
    - Digital Speech Processing Jan 2025 – Present
    - Data Science Jan 2025 – Present
    - Advanced Algorithm Design Jan 2025 – Present
      - Designed homework assignments.
    - Machine Learning Methods in NLP (Chief TA) Sep 2024 – Present
      - Developed comprehensive homework assignments.
      - Organized weekly discussion sessions.
      - Assisted in updating course material.
    - Machine Learning Jan 2023 – Jan 2024
      - Designed final project, homework assignments and hands-on.
    - Statistical Inference Jan 2023 – Jan 2024
      - Designed hands-on and homework assignments.
    - Deep Learning Jan 2024 – May 2024
      - Designed final project.
- **Teaching Assistant — Sharif University of Technology**
  - Machine Learning Teaching Assistant:
    - Contributed to the design of the final project. Feb 2024 – Aug 2024
    - Organized a machine learning contest on Quera across three domains: NLP, computer vision, and general machine learning; developed and curated both questions and solutions. Oct 2024 - Feb 2025
- **Teaching Assistant — Neuromatch Summer School** Jun 2024 – Jul 2024
  - Mentored students through daily sessions in Deep Learning with a focus on Natural Language Processing, guiding them through course material, exercises, and projects.
- **Co-founder & NLP Engineer — Sofia** Aug 2023 – Present
  - Sofia is an omnipresent RAG-based chatbot available on Telegram, WhatsApp, and your website, designed for answering customer service inquiries. Achieved over 20,000 users on the University of Tehran's website,
- **Teaching Assistant & Research Assistant — Amirkabir University of Technology**
  - Teaching Assistant for Introduction to Computational Intelligence. Oct 2021 – Jan 2022
  - Research Assistant at Computer Intelligence and Large Scale System Research Lab. 2020 – 2022
- **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 Work**
  - 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

Selected Projects

- **Persian Text-to-Speech (TTS) & Speech-to-Text** Thesis project [ongoing]
  - I have collected a dataset for Persian speech and implemented systems for Voice Activity Detection (VAD) and source separation (Demucs) to clean the data. Additionally, I developed a system to align audio files, utilizing available transcriptions for further refinement. This project is still ongoing. Furthermore, I fine-tuned a baseline model (SpeechT5) on the Mozilla Common Voice dataset for Persian. While it works, the output is still somewhat noisy. Fine-tuned Whisper model for the Persian language.
- **Multimodal Question-Answering** Machine Learning [2025]
  - I designed this task for the Sharif ML course contest myself. I collected a dataset of five different Iranian animal species using the Google Search API, as these animals did not have well-established datasets. I then applied

the Segment Anything Model (SAM2) to remove backgrounds, isolating the animals. After that, I generated a synthetic dataset containing images with varying numbers of animals. Finally, I fine-tuned multiple Visual Question Answering (VQA) models, including PaliGemma.

- **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 such as LoRA to enhance its summarization capabilities. Additionally, applied reinforcement learning to decrease the model's use of toxic language.
- **FAQ chatbot** Natural language processing [2023]
  - Developed an FAQ chatbot using the RASA framework, specialized in selling airplane tickets. The chatbot is capable of detecting intents, classifying domains, and extracting slot values (e.g., destination city, date, etc.).
- **Correction of Angles in an Image** Machine Learning [2025]
  - I designed this task for the Sharif ML course contest. First, I generated a synthetic dataset, then trained a CNN model to predict the necessary rotation angle to align two given objects (e.g., an animal or a person) within an image correctly.
- **Training Robust and Interpretable Models** 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.
  - Various interpretability methods were explored, including SHAP, knowledge distillation, and D-rise to generate saliency maps. Additionally, LIME was used to interpret the decision-making process of MobileNet.
- **Dastgah detection for Persian music** 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.
- **Simple Fine-Tuning and Model Training** Digital Speech Processing, Deep Learning, NLP [2023, 2024]
  - Fine-tuned the HuBERT model on SheMO: Persian Speech Emotion Detection Database.
  - Fine-tuned SAM on a custom dataset for detecting bodies of water.
  - Developed a custom Faster R-CNN implementation for wildfire smoke detection.
  - Utilized LaBSE and ParsBERT for various NLP tasks, including sentiment analysis.
  - I have fine-tuned different CNN models, such as ResNet and VGG, for various tasks, including emotion recognition.

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

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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