

# Ehsan Rahnama

Machine Learning Engineer

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## RESEARCH INTEREST

My research interests are in machine learning, Bayesian learning, and geometric deep learning. My goal is to build AI systems that are easy to understand and based on solid mathematical ideas. I believe using geometric information and other math-based tools can make these systems more accurate and efficient. I also find Bayesian methods helpful for dealing with uncertainty and making better decisions. I'm especially excited about using these techniques to solve real problems in areas like healthcare and engineering. In the long run, I want to bring together theory and real-world needs to create AI solutions that are both intelligent and understandable.

## EDUCATION

*Master of Science (M.Sc.) in Mechanical Engineering of Biosystems*

(Sep. 2015- Jun. 2018)

University of Tehran, Iran

**Thesis Topic:** Exergetic, Economic, and Environmental Maps for Photovoltaic Systems **Thesis Details:** My master's dissertation analyzed solar energy potential across Iran by data-mining weather inputs, simulating a 100 kW PV system in all 31 provinces, and applying exergy-based methods to map efficiency, cost, and environmental impact.

**Supervisor:** [Prof. Mortaza Aghbashlo](#)

**GPA:** 17.30 out of 20 (3.81 out of 4)

**Outcome:** 2 ISI papers (Publishing a highly cited ISI papers, Q1 journal papers with IF= 9.9)

*Bachelor of Science (B.Sc.) in Agriculture Machinery Mechanics*

(Sep. 2010- Sep. 2014)

Shahid Chamran University of Ahvaz

**Project Topic:** Design and Manufacture of Laboratory Thresher **Project Details:** designed and built a laboratory thresher using SolidWorks and our department's workshop. This thresher is used to test agricultural products like wheat by adjusting the gap between the crusher and the concave mesh. This allows us to check whether the grains are crushed or their husks are properly removed during threshing.

**Supervisor:** [Prof. Mohammad Javad Sheikhdavoodi](#)

**GPA:** 16.61 out of 20 (3.56 out of 4)

## **PROFESSIONAL EXPERIENCE**

### ***LLM Developer Faraadid (a subgroup of Son Group)***

(2023- 2024)

- Leveraged AWS services (EC2, S3, Lambda) and Mongo Atlas to design, implement, and optimize scalable cloud infrastructure and NoSQL databases for an HSE assistance application
- Implemented RAG techniques to represent textual data semantically, enabling efficient similarity search and information retrieval.
- Experienced with various large language models (LLMs) and embedding models, including Mistral, Llama, and GPT-3.5.

### ***MLOps Faraadid (a subgroup of Son Group)***

(2022- 2025)

- Deployed MLflow for end-to-end AI workflow management and model registry, and developed a Flask-based API to streamline model registration and production deployment.
- Designed and implemented a testing platform that allows for the evaluation of AI models on diverse datasets.
- Deployed and managed software containers using Docker, including Elastic, Logstash, Kibana (ELK), MLflow, and Label Studio.

### ***ML Engineer Faraadid (a subgroup of Son Group)***

(2019- 2024)

- Applied dimensionality reduction techniques (UMAP, t-SNE) to interpret AI model behavior, visualizing classification of human postures (lying vs. standing) in industrial settings and analyzing UNET's feature space for decision-making insights.
- Trained object detection models that can handle the fluctuating conditions in surveillance cameras.
- Converted and optimized AI models to TensorRT, a high-performance inference engine, to improve accuracy and reduce latency.

## **RESEARCH PUBLICATION**

### ***Journal Papers:***

1. A New Systematic Decision Support Framework based on Solar Extended Energy Accounting Performance to Prioritize Photovoltaic Sites. Aghbashlo, M., Tabatabaei, M., **Rahnama, E.**, Rosen, M. A. (2020)., Journal of Cleaner Production, 256, 120356. DOI: <https://doi.org/10.1016/j.jclepro.2020.120356> (27 Cited)
2. Spatio-temporal Solar Exergoeconomic and Exergoenvironmental Maps for Photovoltaic Systems. **Rahnama, E.**, Aghbashlo, M., Tabatabaei, M., Khanali, M., Rosen, M. A. (2019)., Energy Conversion and Management, 195, 701-711. DOI: <https://doi.org/10.1016/j.enconman.2019.05.051> (42 Cited)

### ***ArXiv Papers:***

1. Industrial Scene Change Detection Using Deep Convolutional Neural Networks. Atghaei, A., **Rahnama, E.**, Azimi, K., Shahbazi, H. (2022)., arXiv preprint arXiv:2212.14278. DOI: <https://doi.org/10.48550/arXiv.2212.14278>

## **INDUSTRIAL/ACADEMIC PROJECTS**

1. Developed an HSE Assistance ChatBot using RAG architecture with LangChain, MongoDB Atlas, AWS Lambda, and SageMaker, enhancing domain-specific accuracy, and implemented semantic search with RAG for efficient retrieval using LLMs (Mistral, Llama, GPT-3.5) and embedding models. Faraadid, **E.Rahnama**, 2023-2024.

2. Designed and implemented an AI model testing platform featuring dynamic precision-recall analysis on diverse datasets, Docker containerization, a custom database for datasets/results, and Redash-powered visualizations for comprehensive performance evaluation. Faraadid, **E.Rahnama** and M.Khoshbin, 2023.
3. Explored Graph Neural Networks (GNNs) in non-Euclidean spaces for ergonomic posture. Faraadid, A.Atghaei, H.Ghavitan, A.Mirrashid, **E.Rahnama**, 2023.
4. Developed a UNET-based model to localize conceptual differences between scenes for housekeeping applications, Faraadid, A. Atghaei, **E.Rahnama** and K. Azimi, 2022.
5. Optimized object detection models for edge deployment by employing quantization-aware training. Faraadid, **E.Rahnama** and A. Mirrashid, 2022.
6. Applied advanced deep learning algorithms such as CNNs and Vision Transformers (ViTs) for diverse computer vision tasks. Faraadid, A. Mirrashid and **E.Rahnama**, 2021-2022.
7. Developed and trained several object detection models (Personal Protective Equipment detection) on custom datasets to address industrial challenges, including robust performance under fluctuating surveillance camera conditions, Faraadid, **E.Rahnama**, A. Mirrashid and M.Papen, 2019-2021.
8. Developed a high-precision supervised machine learning model for automated pistachio nut sorting. Graduate Class -Artificial Intelligence, **E.Rahnama**, 2016.
9. Developed a robust regression model to accurately predict soil cation exchange capacity. Graduate Class-Artificial Intelligence, **E.Rahnama**, 2016.
10. Employed PCA to reduce the dimensionality of high-dimensional custom tabular data. Graduate Class-Artificial Intelligence, **E.Rahnama**, 2016.
11. Implemented Ant Colony Optimization in MATLAB, Undergraduate Class-Engineering Design Methods, **E.Rahnama** and M. Hashemi, 2014.

## **HONORS AND AWARDS**

- **Ranked as the Top 10 % of Class of 2015**, Mechanical Engineering of Biosystems Department, University of Tehran
- **Ranked 4<sup>th</sup> Bachelor Degree**, Department of Biosystem Engineering, Shahid Chamran University of Ahvaz
- **Waived Tuition** (B.Sc.)

## **REFERENCES**

1. Prof. Mortaza Aghbashlo email: maghbashlo@ut.ac.ir Cell: +989143916702  
*Associate Professor, Mechanical Engineering of Biosystems Department, University of Tehran*
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*Senior AI expert, Ai-Bridge GmbH*