

Armin Toroghi

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Research Interests

- Large Language Models
- Natural Language Processing
- Knowledge Graphs
- Information Retrieval
- Recommender Systems
- Neurosymbolic Reasoning

Education

Ph.D. Candidate, University of Toronto

2021-2025

Information Engineering

GPA - 4/4

Thesis: Complex Multi-step inference over Knowledge Graphs Leveraging LLMs, Probabilistic, and Logical Reasoning

Supervisor: Prof. Scott Sanner

M.Sc., University of Tehran

2017-2020

Mechanical Engineering

GPA - 17.35/20 (3.88/4)

Research: Development and Application of Deep Neural Networks for Fault Detection of Air Compressors and Centrifugal Pumps

Supervisor: Prof. Ali Sadighi

B.Sc., University of Tehran

2013-2017

Mechanical Engineering (Magna Cum Laude)

GPA - 17.89/20 (3.84/4)

Research: Designing and Manufacturing a Smart Device for Measurement of Cervical Range of Motion

Supervisor: Prof. Mohammad Mahjoob

Research Experience

Borealis AI

Jan 2025-Apr 2025

Machine Learning Research Intern

Topics: Memory-Efficient Retrieval Augmented Generation and Multi-Step Reasoning Frameworks for Large Language Models

Vector Institute of Artificial Intelligence

May 2025-Aug 2025

Applied Machine Learning Intern

Topics: Commonsense Reasoning with LLMs, Interpretability and Explainability in NLP

Data-Driven Decision Making Lab (D3M), University of Toronto

Sep 2021-Present

Researcher

Topics: LLMs, Knowledge Graphs, Information Retrieval, Conversational Recommender Systems

Smart Electromechanical Energy Conversion Systems Lab, University of Tehran

Sep 2017-Sep 2020

Researcher

Topic: Machine Learning-based Condition Monitoring and Fault Detection of Turbo Machines

Publications

- **A.Toroghi**, A. Pesaranhader, T. Sadhu, and S. Sanner, "LLM-based Typed Hyperresolution for Commonsense Reasoning with Knowledge Bases", the Thirteenth International Conference on Learning Representations (ICLR-25)
- **A.Toroghi**, W. Guo, and S. Sanner, "CoLoTa: A Dataset for Entity-based Commonsense Reasoning over Long-Tail Knowledge", the 48th International ACM SIGIR Conference on Research and Development in Information Retrieval. (SIGIR-25)
- **A.Toroghi**, W. Guo, A. Pesaranhader, and S. Sanner, "Verifiable, Debuggable, and Repairable Commonsense Logical Reasoning via LLM-based Theory Resolution", the 2024 Conference on Empirical Methods in Natural Language Processing. (EMNLP-24 Main Track (Oral))
- **A.Toroghi**, W. Guo, M. Pour, and S. Sanner, "Right for Right Reasons: Large Language Models for Verifiable Commonsense Knowledge Graph Question Answering", the 2024 Conference on Empirical Methods in Natural Language Processing. (EMNLP-24 Main Track)
- **A.Toroghi**, and S. Sanner, "Bayesian Inference with Complex Knowledge Graph Evidence", the AAAI Conference on Artificial Intelligence. (AAAI-24)
- **A.Toroghi***, W. Guo*, and S. Sanner, "CR-LT-KGQA: A Knowledge Graph Question Answering Dataset Requiring Commonsense Reasoning and Long-Tail Knowledge", 2024

- David Eric Austin*, Anton Korikov*, **A. Toroghi**, and S. Sanner, "Bayesian Optimization with LLM-Based Acquisition Functions for Natural Language Preference Elicitation", the 18th ACM Conference on Recommender Systems. (RecSys-24)
- Shaina Raza, Mizanur Rahman, Safiullah Kamawal, **Armin Toroghi**, Ananya Raval, Farshad Navah, Amirmohammad Kazemeini, "A Comprehensive Review of Recommender Systems: Transitioning from Theory to Practice", Computer Science Review, Vol. 59, 2026
- **A. Toroghi**, G. Floto, Z. Tang, and S. Sanner, "Bayesian Knowledge-driven Critiquing with Indirect Evidence", the 46th International ACM SIGIR Conference on Research and Development in Information Retrieval. (SIGIR-23)
- Z. Tang, G. Floto, **A. Toroghi**, and S. Sanner, "LogicRec: Recommendation with Users' Logical Requirements", the 46th International ACM SIGIR Conference on Research and Development in Information Retrieval. (SIGIR-23)
- P. Farinneya, M. Abdollahpour, **A. Toroghi**, Z. Tang, and S. Sanner, "Self-Supervised Contrastive BERT Fine-tuning for Late Fusion in Neural Preference Matching", European Conference on Information Retrieval. (ECIR-23)
- **A. Toroghi** and A. Sadighi, "Fault Detection of Reciprocating Air Compressors Based on Electrical Signature Analysis Using Long Short-Term Memory Networks", ICSPIS-20 (outstanding paper award)
- **A. Toroghi** and A. Sadighi, "Smart Fault Detection of Reciprocating Air Compressors Based on Electrical Signature Analysis", ICROM-20 (Oral)
- Z. Araste, M. J. Moghaddam, **A. Toroghi**, and A. Sadighi, "Study of Electromechanical Coupling in a Motor-Driven Centrifugal Pump for Fault Detection and Diagnosis", ICROM-19

Honors and Awards

Department of Mechanical and Industrial Engineering Fellowship <i>University of Toronto</i>	2021
Outstanding Paper Award <i>8th Iranian Conference on Signal Processing and Intelligent Systems (ICSPIS)</i>	2020
Ranked 10th among 132 students and awarded exemption from the national M.Sc. entrance exam for exceptional academic performance <i>University of Tehran</i>	2017
Mechanical Engineering School Dean's List Scholar <i>University of Tehran</i> A list of students receiving special recognition from the school dean because of superior scholarship (5 consecutive semesters)	2013-2017
Ranked 430th among more than 300,000 participants (i.e., top 0.14%) <i>Iranian Nationwide University Entrance Exam</i>	2013

Teaching Experience

University of Toronto <i>Course Instructor:</i> Introduction to Artificial Intelligence (MIE369)	<i>Jan 2023-Apr 2023</i>
<i>Teaching Assistant:</i> Decision Support Systems (MIE451 & MIE1513), Introduction to Artificial Intelligence (MIE369), Applied Deep Learning (ECE1508)	<i>Jan 2022-Present</i>
Vector Institute of AI <i>Course Instructor and Mentor:</i> Applied AI Projects on Recommender Systems: <i>A series of projects held for industry partners of Vector Institute to help them design and implement recommender systems for their particular use cases.</i>	<i>Aug 2022-Sep 2023</i>
University of Tehran <i>Teaching Assistant:</i> System Identification and Estimation, Advanced Mechatronics, Mechatronics, Applied Finite Element Method, Modal Analysis, Automatic Control, Fluid MechanicsII, Heat Transfer	<i>Sep 2016- Sep 2020</i>
Maktabkhooneh.org <i>Instructor and Mentor:</i> A Best-selling Solidworks training course	<i>March 2018- Present</i>

Skills

Programming Python (PyTorch, Tensorflow, NumPy, SciPy, Scikit-Learn, etc.), Matlab, Java, C++

Engineering Software Solidworks, Abaqus CAE, AutoCAD, COMSOL Multiphysics, Ansys Maxwell, NU Hertz Filter Design, HSpice, PSpice, NI LabView, Automation Studio, SIMATIC Control, EES, SAM

Language Persian: Native, English: Fluent

Conference and Journal Reviewing

- ACM Transactions on Recommender Systems (TORS)
- International Conference on Machine Learning (ICML)
- International Joint Conference on Artificial Intelligence (IJCAI)
- Empirical Methods in Natural Language Processing (EMNLP)
- Association for Computational Linguistics (ACL)
- ACM International World Wide Web Conference (WWW)
- ACM SIGIR Conference on Research and Development in Information Retrieval