# Ahmad Ghasemi

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## SUMMARY

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| · **Research Interests:** | AI/ML Application in Physical Layer, Signal Processing, Drones, Efficient Deep Learning |
| · **Track Record:** | **7** Peer-reviewed Journal Articles, **14** Conference Papers, **2** books, **1** under review Paper |
| · **Awards:** | **1.** WOCC Best Paper Award, **2.** WPI Travel Award |
| · **Teaching Experience:** | **1.** Signal Processing, **2.** ML for Engineers, **3.** Math for Data Science & ML |
| · **Mentorship & Leadership:** | Mentored **2** PhD, **3** MSc, and **11** Undergraduate Students; Led **2** Projects |
| · **Presentations:** | Delivered **2** Talks: TinyML Symposium , NEWSDR 2023 |
| · **Grant Proposals:** | Submitted **3** Proposals (NSF) |
| · **Selected Projects:** | Efficient Graph Neural Networks for Radio Resource Management, Generative AI for UAV Trajectory Design |
| · **Key Skills:** | Signal Processing, Multi-Antenna Systems, Efficient & Scalable Deep Learning, Machine Learning, Python, PyTorch, TensorFlow, MATLAB, PySpark |

## PROFESSIONAL EXPERIENCE

**Research Fellow & Lecturer**, University of Massachusetts Amherst, Amherst, MA ⟶ **09/2023 - Present**
- Designing and implementing efficient deep learning and tiny GNN models for UAVs, focusing on model optimization and resource efficiency.
- Developing and optimizing end-to-end machine learning pipelines for large-scale, multi-modal data, improving computational efficiency and model performance.
- Collaborate with cross-functional teams to deliver AI-driven solutions tailored to specific business requirements, ensuring successful implementation and adoption.

**Graduate AI Researcher**, Worcester Polytechnic Institute, Worcester, MA ⟶ **01/2019 - 08/2023**
- Led a research project on low-cost, efficient deep learning algorithms for radio resource management, enhancing network capacity and computational efficiency.
- Developed and implemented efficient machine learning algorithms to optimize resource management, resulting in a **40%** increase in network capacity with linear complexity.

**Summer Graduate Research Internship (Funded by Ford Co.)**, Wireless Positioning Lab., Michigan Tech., MI ⟶ **06/2019 - 08/2019**
- Developed an efficient computer vision algorithm for autonomous vehicles, reducing latency by **15%**.
- Implemented the system on a Raspberry Pi, demonstrating practical, low-cost deployment.

**Data Scientist**, Hormozgan Electricity Distribution Co., Bandar Abbas, Iran ⟶ **06/2015 - 01/2019**
- Led development of advanced models, enhancing predictive accuracy by **30%** using ensemble methods and deep learning.
- Integrated machine learning technologies across departments, increasing project efficiency by **20%**.

## SELECTED PROJECTS

**1. Scalable Graph Neural Networks for Radio Resource Management**, UMass Amherst, Amherst, MA ⟶ **10/2023 - 03/2024**
- Innovated a Low Rank Message Passing Graph Neural Network (LR-MPGNN).
- This innovative design significantly reduced the model size by **60X**, with only a **2%** performance reduction in the sum rate.

**2. Tiny Graph Classification Expressiveness**, UMass Amherst, Amherst, MA ⟶ **09/2023 - 10/2023**
- Applied pruning, quantization-aware training, and post-training quantization techniques to optimize models.
- Reduced GCN and GIN model sizes by **93X** and **78X** respectively while maintaining performance.

**3. Adversarial Attacks against Graph Neural Networks based Wireless Communications**, WPI, Worcester, MA ⟶ **01/2022 - 02/2023**
- Introduced four novel adversarial attacks targeting GNN-based resource management, attained a **95%** success rate.
- Proposed a novel anomaly detection method based on eigen-value distribution, achieved a **100%** accuracy.

**4. Low-Cost Beamforming Algorithms**, WPI, Worcester, MA ⟶ **09/2020 - 04/2021**
- Implemented dimension reduction methods for user classification and clustering, resulted in a **10%** increase in accuracy.
- Proposed two efficient ML algorithms for resource management with linear complexity, reduced processing time by **60%**.

**5. Real-Time object tracking**, Wireless Positioning Lab., Michigan Tech., Houghton, MI ⟶ **06/2019 - 09/2019**
- Implemented efficient region-based CNN (R-CNN) and fast R-CNN on Raspberry Pi to track object in the real time.
- Achieved **15%** less latency.

## SKILLS

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| · **Radio Physical Layer:** | Signal processing, Modulation, Multiple-Access Techniques, Multi-Antenna Systems, Radio Resource Management |
| · **Machine Learning & Deep Learning:** | Efficient & Scalable Deep Learning, Generative AI, Large Language Models (LLMs) |
| · **Deep Learning frameworks:** | PyTorch, TensorFlow, Keras, TensorFlow Lite, TensorFlow Lite Micro |
| · **Cloud Computing:** | AWS, PySpark |
| · **Programming:** | Python, OpenCV, MATLAB, Julia |
| · **Distributed Computing:** | PySpark |
| · **Version Control:** | Git, GitHub |

## EDUCATION

**Ph.D. Data Science**, GPA: 3.94/4.0,
      - Worcester Polytechnic Institute (WPI), Worcester, MA, USA      **2019 − 2023**
      - Michigan Technological University (MTU), Houghton, MI, USA      **2018 − 2019**
**M.Sc. Electrical and Computer Engineering**, GPA: 17.27/20.0, Shiraz University, Shiraz, Iran      **2009 − 2012**

## HONORS AND AWARDS

**Travel Award**, School of Arts & Sciences, WPI, Worcester, MA, USA      **2022**
**TA of the Year Award (Finalist)**, WPI, Worcester, MA, USA      **2022**
**Charles Kao Best Paper Award**, the 29th Wireless and Optical Communications Conference, NJ, USA      **2020**