Mohammad Taha **Askari**

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Summary

I am a PhD student at the University of British Columbia specializing in digital signal processing for communication systems. My research journey began with an M.A.Sc., where I pioneered a lowpass filter model to understand the interaction between probabilistic shaping and fiber nonlinearity. This model led to the development of a novel sequence selection scheme, enhancing nonlinearity tolerance. During my PhD studies, I concentrated on devising a phase recovery algorithm tailored for probabilistic shaping in low-SNR scenarios. I am currently exploring the application of neural networks and sequence models in optical communication systems as part of my ongoing doctoral research.

Research Experience

M.A.Sc. & PhD Thesis at Data Communications Group

ECE Department, UBC

Research Assistant (Supervisor: Prof. Lutz Lampe)

Sep. 2020 - Sep. 2026

- Studied probabilistic signal shaping methods, with a focus on probabilistic amplitude shaping for optical fiber communications.
- Introduced a low pass filter model to explain the interplay between probabilistic shaping and fiber nonlinearity.
- Suggested a new sequence selection scheme to improve nonlinearity tolerance in probabilistic amplitude shaping for optical fiber communications.
- Designed Bayesian phase search algorithm for carrier phase recovery in the low-SNR regime.
- Studied end-to-end sequence-based auto encoder approach for probabilistic shaping.

Research Internship at Roche Canada

Greater Toronto Area, Canada

Algorithm R&D Software Engineering Intern

Jun. 2024 - Oct. 2024

- Designed and implemented pipelines for feature extraction, dataset generation, and neural network training, enabling efficient anomaly detection in sequencing data.
- Developed and optimized weakly supervised neural network models, including a novel multi-label architecture for multi-class anomaly segmentation.
- Integrated interpretability and complexity analysis into the training workflow, delivering detailed reports and insights for model evaluation and enhancement.

Publications and Posters

- M.T. Askari and L. Lampe, "Probabilistic Shaping for Nonlinearity Tolerance," Journal of Lightwave Technology. [Online Access]
- M.T. Askari and L. Lampe, "Perturbation-based Sequence Selection for Probabilistic Amplitude Shaping," 2024 European Conference on Optical Communication (ECOC). [Online Access]
- M.T. Askari and L. Lampe, "Bayesian Phase Search for Probabilistic Amplitude Shaping," 2023 European Conference on Optical Communication (ECOC). [Online Access]
- M.T. Askari, "Interplay between Fiber Nonlinearity and Probabilistic Amplitude Shaping," Master's Thesis, UBC [Online Access]
- M.T. Askari, L. Lampe, and J. Mitra, "Probabilistic Amplitude Shaping and Nonlinearity Tolerance: Analysis and Sequence Selection Method," Journal of Lightwave Technology. [Online Access]
- M.T. Askari, L. Lampe, and J. Mitra, "Nonlinearity Tolerant Shaping with Sequence Selection," 2022 European Conference on Optical Communication (ECOC) [Online Accrss]
- M.T. Askari, "Nonlinearity Tolerant Sequence Selection," Poster at 17th Canadian Workshop on Information Theory (CWIT)

Research Interests

Machine Learning in Communications
Applications of Sequence Models in Communication Systems
Information & Coding Theory

Education

PhD in Electrical & Computer Engineering

Vancouver, Canada

Electrical and Computer Engineering Department, The University of British Columbia (UBC) *Sep. 2022 - Present*

- Advisor: Prof. Lutz Lampe

M.A.Sc. in Electrical & Computer Engineering

Vancouver, Canada

Electrical and Computer Engineering Department, The University of British Columbia (UBC) *Sep. 2020 - Aug. 2022*

- Cumulative GPA: 93.7 out of 100 (4.0/4.0) via 18 credits
- Advisor: Prof. Lutz Lampe

B.Sc. in Electrical Engineering

Tehran, Iran

Department of Electical Enginerring, Sharif University of Technology (SUT) *Sep. 2015 - Jul. 2020*

- Cumulative GPA: 18.42 out of 20 (4.0/4.0) via 146 credits
- Advisor: Prof. Hamid Behroozi

Software Proficiency

Programming Python, Matlab, R, Git version control, SQL, Julia, C/C++.

Relevant Courses

CPSC 436N-Natural Language Processing	*95.0 out of 100*	**Dr. Shwartz**	*UBC*	*Winter1 2023*
EECE 571D-Detection, Estimation, and Learning	*98.0 out of 100*	**Dr. Lampe**	*UBC*	*Winter2 2021*
EECE 562-Statistical Signal Processing	*90.0 out of 100*	**Dr. Wang**	*UBC*	*Winter1 2021*
CPSC 540-Advanced Machine Learning	*96.0 out of 100*	**Dr. Schmidt**	*UBC*	*Winter2 2020*
CPSC 340-Machine Learning & Data Mining	*100 out of 100*	**Dr. Wood**	*UBC*	*Winter1 2020*
EECE 565-Communication Networks	*95.0 out of 100*	**Dr. Wong**	*UBC*	*Winter1 2020*
Introduction to Machine Learning	*18.0 out of 20*	**Dr. Mohammadzade**	*SUT*	*Spring 2019*
Information & Coding Theory	*18.7 out of 20*	**Dr. Mirmohseni**	*SUT*	*Fall 2018*

Selected Course Projects

COVID-19 Detection: A Combination of Transformer Models with Image Augmentation Methods

Winter 2020

COURSE: Advanced Machine Learning *UBC*

- Studied methods for generating synthetic X-ray images to improve the accuracy of COVID-19 detection models and implemented GAN and VAE to augment data.
- Applied transformer models to COVID-19 classification based on chest X-ray images.
- Supervisor: Dr. Schmidt

Trajectory Prediction

Winter 2020

COURSE: Machine Learning & Data Mining *UBC*

- Studied methods for autonomous driving trajectory prediction and implemented a chained neural network model.
- Supervisor: Dr. Wood

COVID-19 Deaths Prediction

Winter 2020

COURSE: Machine Learning & Data Mining *UBC*

- Studied algorithms for time-series regression and implemented linear auto-regressive model.
- Supervisor: Dr. Wood

Honors & Awards

Nominated for UBC Four Year Doctoral Fellowship with an amount of $18,200 per year. *2023*

Awarded UBC 2021 M.A.Sc. Graduate Student Initiative (GSI) with an amount of $5,000. *2021*

Member of the National Elites Foundation by being in the best ranks of the University entrance exam. *2015-Present*