

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 Access]
- 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

ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT, THE UNIVERSITY OF BRITISH COLUMBIA (UBC)

- Advisor: Prof. Lutz Lampe

Vancouver, Canada

Sep. 2022 - Present

M.A.Sc. in Electrical & Computer Engineering

ELECTRICAL AND COMPUTER ENGINEERING DEPARTMENT, THE UNIVERSITY OF BRITISH COLUMBIA (UBC)

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

Vancouver, Canada

Sep. 2020 - Aug. 2022

B.Sc. in Electrical Engineering

DEPARTMENT OF ELECTRICAL ENGINEERING, SHARIF UNIVERSITY OF TECHNOLOGY (SUT)

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

Tehran, Iran

Sep. 2015 - Jul. 2020

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. Schwartz	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