Nam Nguyen

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EDUCATION

Oregon State University — Corvallis, OR, US
Ph.D. in Electrical and Computer Engineering — Dec. 2026 (Expected)
Minor in Artificial Intelligence
Focus area: Information Theory, Machine Learning, Neural Data Compression

Oregon State University — Corvallis, OR, US
M.S. in Electrical and Computer Engineering — Dec. 2024
Thesis: *On Minimizing Symbol Error Probability using Beamforming in MIMO Gaussian Wiretap Channels*

RESEARCH INTERESTS

Intersection of information theory and machine learning: Rate-distortion-perception representation for lossy compression, neural data compression, representation learning.

Wireless communications and networks: Signal processing, optimization, and machine learning for advanced MIMO communication systems, physical layer security for MIMO, beamforming techniques, wireless networking and technology for 5G/6G.

Free-space quantum key distribution networks: Design, analysis, and optimization of link-layer retransmissions and relaying techniques.

RESEARCH EXPERIENCE

Research Assistant, Communications and Signal Processing Group — Dec. 2022 - Present
Oregon State University — Corvallis, OR, US
Advisor: Prof. Thinh Nguyen and Prof. Bella Bose
Topics: Representation learning, neural data compression, statistical signal processing and Bayesian inference, non-convex optimization, wireless communications, physical layer security.
Project: *Universal rate-distortion-classification representations for lossy compression*

- Develop a universal representation framework in lossy compression to handle multiple distortion-classification tradeoffs with a single encoder.
- Prove the approximate achievability of the universal rate-distortion-classification function using theoretical information-theoretic methods.
- Implement and evaluate novel deep learning algorithms for classification-enhanced neural image compression models (using Autoencoder + GAN + CNN Classifier) on MNIST/ SVHN datasets with PyTorch, showcasing minimal performance loss compared to designing separate encoders for each objective.
- **Outputs:** 1 accepted conference paper & 1 journal paper manuscript [1], [2].

Project: *Design and Security Analysis of Symbol Error Probability-based Beamforming in MIMO Gaussian Wiretap Channels*

- Formulated a mathematical model and PHY signal design (binary antipodal signals and M-ary detection schemes) and proposed a novel low-complexity algorithm utilizing KKT conditions, generalized eigen-decomposition, and projected gradient descent.
- Conducted numerical experiments in MATLAB to evaluate the proposed beamforming scheme, analyzed results, and authored the paper.
- **Outputs:** 1 published conference paper & 1 journal paper submission [3], [4].

Machine Learning Research Intern, Applied Artificial Intelligence Initiative — Jul. 2025
Deakin University — Burwood, Australia
Mentor: Prof. Mohamed Abdelrazek
Project: *AI Agentic Negotiation*

- Conduct research on AI agentic negotiation, focusing on how large language models (LLMs) perform in multi-agent bargaining and argumentation scenarios under uncertainty.
- Identify and analyze key negotiation strategies from existing literature, and evaluate the capabilities of various LLMs in executing these strategies.
- Design experimental setups to simulate negotiation dialogues, incorporating belief updates, offer-counteroffer dynamics, and strategic reasoning.

Research Assistant, Optical Communications Research Group   Mar. 2019 - Mar. 2023
Posts and Telecommunications Institute of Technology   Hanoi, Vietnam
Advisor: Prof. Vuong Mai and Prof. Ngoc Dang
Topics: Free-space quantum key distribution network, optical communication systems.
Project: *Design and Security Analysis of Satellite-based Free-Space Quantum Key Distribution Systems for Wireless and Vehicular Networks*
Sponsor: National Foundation for Science and Technology Development (NAFOSTED, Vietnam), Grant No. 102.02-2019.08

- Innovated project ideas by expanding terrestrial binary phase shift keying (BPSK) modulation/direct-detection/QKD systems to satellite-based quadrature phase shift keying (QPSK) modulation/QKD systems.
- Designed and analyzed satellite-based QKD systems, including link-layer retransmissions, relaying techniques, and performance evaluations under atmospheric turbulence-induced phase fluctuations.
- Executed numerical experiments in MATLAB to assess system performance, analyzed results, and authored research papers.
- **Outputs:** 2 published conference papers & 2 published journal papers [5], [6], [7], [8].

PUBLICATIONS
Google Scholar

[1] **Nam Nguyen**, Thuan Nguyen, Thinh Nguyen, and Bella Bose, "A Theory of Universal Rate-Distortion-Classification Representations for Lossy Compression," *will submit to IEEE Transactions on Signal Processing*, 2025. [PDF]

[2] **Nam Nguyen**, Thuan Nguyen, Thinh Nguyen, and Bella Bose, "Universal Rate-Distortion-Classification Representations for Lossy Compression," *IEEE Information Theory Workshop*, 2025 (Accepted). [PDF]

[3] **Nam Nguyen**, An Vuong, Thuan Nguyen, and Thinh Nguyen, "On Symbol Error Probability-based Beamforming in MIMO Gaussian Wiretap Channels," *submitted to IEEE Transactions on Vehicular Technology*, 2024. [PDF]

[4] **Nam Nguyen**, An Vuong, Thuan Nguyen, and Thinh Nguyen, "On Minimizing Symbol Error Probability for Antipodal Beamforming in Gaussian MIMO Wiretap Channels," *2024 IEEE Vehicular Technology Conference*, Washington, DC, USA, 2024, pp. 1-5. [PDF]

[5] **Nam Nguyen**, Thang V. Nguyen, Ngoc T. Dang, and Vuong Mai, "Performance of Satellite Quantum Key Distribution under Atmospheric Turbulence-Induced Phase Fluctuations," *International Communications Satellite Systems Conference*, Bradford, UK, Oct. 2023. [PDF]

[6] **Nam D. Nguyen**, Hang T. T. Phan, Hien T. T. Pham, Vuong V. Mai, and Ngoc T. Dang, "Reliability Improvement of Satellite-based Quantum Key Distribution Systems using Retransmission Scheme," *Photonic Network Communications*, 42, 27–39, 2021. [PDF]

[7] **Nam D. Nguyen**, Hien T. T. Pham, Vuong V. Mai, and Ngoc T. Dang, "Comprehensive Performance Analysis of Satellite-to-Ground FSO/QKD Systems using Key Retransmission," *Optical Engineering*, Vol. 59, No. 12, pp. 126102-1-25, Dec. 2020. [PDF]

[8] **Nam D. Nguyen**, Hien T. T. Pham, Vuong V. Mai, and Ngoc T. Dang, "Performance Enhancement of Satellite FSO/QKD Systems using HAP-based Relaying and ARQ," *2020 International Conference on Advanced Technologies for Communications*, Nha Trang, Vietnam, pp. 12-17, 2020. [PDF]

INDUSTRY
EXPERIENCE

Mobifone Telecommunications Corporation   Sept. 2020 - Dec. 2020
Networking and Communication Engineer Intern   Hanoi, Vietnam

- Conducted an in-depth study of technical documents to gain expertise in the 4G/LTE protocol and its applications in the telecommunications industry.
- Investigated and analyzed system and network operations, gaining valuable insights into network management and monitoring systems.

Viettel High Technology Industries Corporation   Jun. 2019 - Sept. 2019
Research and Development Intern   Hanoi, Vietnam

- Completed a competitive summer course on 4G/LTE Protocol Development, awarded a certificate for the top-performing project.
- Developed a multi-client TCP user client-server system to handle login, score retrieval, and logout requests over multi-threaded processes:
  - Designed a TCP server to authenticate clients and respond with scores, using unique threads for each client to handle simultaneous requests [Github Link].
  - Tools/Technologies: C, TCP/UDP Library, Linux, Functional Programming.

TEACHING EXPERIENCE

Teaching Assistant, Electrical Engineering and Computer Science   Mar. 2022 - Present
Oregon State University   Corvallis, OR, US

- **Courses:** ECE 353 - Introduction To Probability and Random Signals (3 terms), ECE 351 - Signals and Systems I (2 terms), ECE 352 - Signals and Systems II (3 terms), CS 372 - Introduction to Computer Networks (1 term), ENGR 201 - Electrical Fundamentals I (4 terms), ECE 271 - Digital Logic Design (1 term), ENGR 202 - Electrical Fundamentals II (2 terms).
- **Responsibilities:** Grading assignments and exams, holding office hours and review sessions, and improving course materials.

TECHNICAL SKILLS

Quantitative Research: Mathematical Modeling, Optimization, Statistics and Probability Theory.
Programming Skills: Python, MATLAB, C/C++, LaTeX.
Software Tools: Pytorch, Tensorflow, MATLAB Toolboxes, CVX.

TRAINING COURSES

AI 539 - Introduction to Online Learning, AI 534 - Machine Learning, AI 535 - Deep Learning, AI 539 - Information Theory, AI 586 - Applied Matrix Analysis, AI 539 - Convex Optimization, ECE 565 - Estimation, Filtering, and Detection, CS 527 - Error-Correcting Codes, ECE 563 - Wireless Communications Networks, ECE 669 - Communications System Design, ECE 564 - Digital Signal Processing, ECE 560 - Stochastic Signals and Systems, ECE 550 - Linear Systems.

AWARDS & HONORS

Participant, North American School of Information Theory – University of Minnesota	2025
NSF Student Travel Grant, AERPAW Spring Workshop – North Carolina State University	2025
Graduate School's Scholarly Presentation Award – Oregon State University	2024
SVTECH Scholarship – SV Technologies JSC	2021

Awarded to 5 outstanding students at the Posts and Telecommunications Institute of Technology

Participation Scholarship, 8th Vietnam School of Science – International Centre for Interdisciplinary Science and Education   2020

Second Prize, National Scientific Research Contest – Vietnam Ministry of Education and Training 2020

First Prize, Scientific Research Contest – Posts and Telecommunications Institute of Technology 2019

Second Prize in Physics – Provincial Excellent Student Competition, Vietnam   2012

First Prize in Physics – School-Level Excellent Student Competition, Vietnam   2011, 2012, 2013

REVIEWER SERVICE

2025 IEEE Wireless Communications Magazine (1 paper), 2025 IEEE International Symposium on Information Theory (4 papers), 2024 IEEE Access (1 paper), 2024 IEEE Wireless Communications Magazine (1 paper), 2023 IEEE International Conference on Communications Workshops (1 paper).

REFERENCES

Prof. Thinh Nguyen
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Prof. Bella Bose
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Prof. Vuong Mai
Professor of Engineering and Digital Technologies, University of Bradford, United Kingdom
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