

# Nam Nguyen

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## EDUCATION

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### Oregon State University

Mar 2022 - Mar 2027 (Expected)

Ph.D. in Electrical & Computer Engineering/Artificial Intelligence

Corvallis, OR, US

Focus area: Information Theory, Machine Learning, Neural Data Compression

### Oregon State University

Corvallis, OR, US

M.S. in Electrical & Computer Engineering

Dec. 2024

Thesis: *On Minimizing Symbol Error Probability using Beamforming in MIMO Gaussian Wiretap Channels*

## TECHNICAL SKILLS

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- **ML/AI:** Image/Video Compression, Computer Vision, Generative Models, Large Language Models (LLMs), Multi-Agent AI
- **Programming:** Python, MATLAB, C/C++,  $\text{\LaTeX}$
- **Frameworks/Tools:** PyTorch, TensorFlow, CompressAI, CVX, GitHub
- **Research:** Communication, Problem-Solving, Presenting Findings, Academic Writing

## WORK EXPERIENCE

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### Research Assistant | Oregon State University

Mar 2022 - Present

*Universal Rate-Distortion-Classification (RDC) Representations for Lossy Compression*

- Designed a trainable RDC objective that couples bit-rate, distortion, and task accuracy to learn semantic representations useful for compression and downstream inference.
- Built PyTorch training compression models (VAE, W-GAN, CNN) with differentiable quantization and entropy-constrained losses; produced RDC curves.
- Demonstrated that the learned latent acts as a compact feature codec supporting classification with minimal loss versus specialized encoders.

*Cross-Domain Lossy Compression via Rate and Classification-constrained Optimal Transport (OT)*

- Formulated distribution-shifted compression as an OT-regularized objective that preserves task-relevant semantics across domains under rate constraints.
- Implemented image compression models; evaluated cross-domain RD and task accuracy, showing robustness of semantic latents to moderate cross-domain.

*Perception-enhanced Zero-Shot Denoising via Neural Compression*

- Developed a patch-based, data-free denoiser in PyTorch that optimizes a compression-style objective on a single noisy image, balancing rate, distortion, and perceptual quality.
- Incorporated perception terms and an adversarial critic (W-GAN on clean patches) to trace rate-distortion-perception curves on natural images with Gaussian/Poisson noise.

*Design and security analysis of SEP-based beamforming in Gaussian MIMO wiretap*

- Formulated a mathematical model and signal design, 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 and analyzed results.

### Machine Learning Research Intern | Deakin University

Jul 2025 - Sep 2025

*AI agentic negotiation*

- Extended a multi-agent negotiation evaluation framework; automated experiments, logging, and reproducibility across local models (e.g., LLaMA/Qwen families).
- Implemented belief updates and offer-counteroffer dynamics; designed metrics and dashboards for comparative analysis.

**Research Assistant** | Posts and Telecommunications Institute of Technology      Mar 2019 - Mar 2023  
*Design and Security Analysis of Satellite-based Free-Space Quantum Key Distribution (QKD) Systems for Wireless and Vehicular Networks*

- Designed and evaluated satellite-based QKD architectures, incorporating link-layer retransmissions, relaying schemes, and security performance metrics.
- Conducted MATLAB-based simulations to quantify performance and validate analytical results.

## SELECTED PUBLICATIONS ([GOOGLE SCHOLAR](#))

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- [1] **[Preprint, 2025]** Nam Nguyen, Thuan Nguyen, Thinh Nguyen, and Bella Bose. *A Theory of Universal Rate-Distortion-Classification Representations for Lossy Compression*. [\[PDF\]](#)
- [2] **[IEEE ITW, 2025]** Nam Nguyen, Thuan Nguyen, Thinh Nguyen, and Bella Bose. *Universal Rate-Distortion-Classification Representations for Lossy Compression*. [\[PDF\]](#)
- [3] **[IEEE VTC, 2024]** Nam Nguyen, An Vuong, Thuan Nguyen, and Thinh Nguyen. *On Minimizing Symbol Error Probability for Antipodal Beamforming in Gaussian MIMO Wiretap Channels*. [\[PDF\]](#)
- [4] **[IEEE ICSSC, 2023]** Nam Nguyen, Thang V. Nguyen, Ngoc T. Dang, and Vuong Mai. *Performance of Satellite Quantum Key Distribution under Atmospheric Turbulence-Induced Phase Fluctuations*. [\[PDF\]](#)

## PRESENTATIONS

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- North American School of Information Theory (NASIT), *Universal Rate-Distortion Classification Representations for Lossy Compression*, Minneapolis, USA, 2024.
- Vehicular Technology Conference (VTC), *On Minimizing Symbol Error Probability for Antipodal Beamforming in Gaussian MIMO Wiretap Channels*, Washington, DC, USA, 2024.
- International Communications Satellite Systems Conference (ICSSC), *Performance of Satellite Quantum Key Distribution under Atmospheric Turbulence-Induced Phase Fluctuations*, UK, 2023.
- International Conference on Advanced Technologies for Communications (ATC), *Performance Enhancement of Satellite FSO/QKD Systems using HAP-based Relaying and ARQ*, Nha Trang, Vietnam, 2020.

## AWARDS & HONORS

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- NSF Student Travel Grant, AERPAW Spring Workshop – North Carolina State University      2025
- Graduate School's Scholarly Presentation Award – Oregon State University      2024, 2025
- Second Prize, National Scientific Research Contest      2020

## REVIEWER SERVICE

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2025 IEEE Wireless Communications Magazine (1 paper), NeurIPS 2025 (5 papers), 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).