

# Hai Duong's

## Curriculum Vitae

Fairfax, VA | hduong22@gmu.edu | (+1) 571-340-5970 | Google Scholar | Personal Website

### 1 Education

- **PhD**, Computer Science, George Mason University, Fairfax, VA 2022–present  
Advisor: ThanhVu Nguyen
- **MS**, Electrical Engineering, Hanoi University of Science and Technology, Hanoi, VN 2019–2021  
Advisor: Quoc-Cuong Nguyen
- **BS**, Electrical Engineering, Hanoi University of Science and Technology, Hanoi, VN 2014–2019

### 2 Experience

- **Applied Scientist Intern**, Amazon Web Services, Amazon 2026
- **Research Assistant**, ROARS Lab, George Mason University 2022–present  
Developed a verification tool, NeuralSAT P5, ranked 4<sup>th</sup> in VNN-COMP'23, 2<sup>nd</sup> in '24 and '25.  
Developed optimization techniques for DNN verification, e.g., stabilization P6, composition P3, unsat proof P4, structural perturbations P2, training for verification P7, etc.
- **Research Assistant**, BachLe's Lab, University of Melbourne 2021–2022  
Worked on a graph-based source code modeling and explanation technique P8.
- **Research Assistant**, Sensor Lab, Hanoi University of Science and Technology 2019–2021  
Developed a speech enhancement system using graph-based neural beamforming P10.  
Developed a small-footprint keyword spotting system using deformable convolution P9.

### 3 Awards and Honors

- Silver Reviewer Award, ICML 2026
- Outstanding PhD Student Award, GMU 2026
- Highlight Paper Award [P1], CVPR 2026
- Broadening Participation Scholarship Award, CVPR 2026
- Spotlight Paper Award [P3], NeurIPS 2025
- Scholar Award, NeurIPS 2025
- Graduate Travel Award, GMU 2025
- NeuralSAT ranked 2<sup>nd</sup>, VNN-COMP 2024–2025
- NeuralSAT ranked 4<sup>th</sup>, VNN-COMP 2023

- New Participant Award, VNN-COMP 2023
- Graduate Scholarship Award, HUST 2019–2021
- Outstanding Undergraduate Award, HUST 2015–2018

## 4 Publications

### 4.1 Refereed Conference/Journal Papers (Full Papers)

- P1 Hai Duong, Lam Nguyen, Thanh Le, and ThanhVu Nguyen. “Verifying Neural Network Robustness with Dual Perturbations”. In: *Computer Vision and Pattern Recognition (CVPR)*. 2026, to appear

#### Highlight Paper

- P2 Hai Duong, Thanh Le, Lam Nguyen, and ThanhVu Nguyen. “Verifying Structural Robustness of Deep Neural Network”. In: *Proceedings of the ACM on Software Engineering* 3. Foundations of Software Engineering (FSE) (2026), to appear

- P3 Hai Duong, David Shriver, ThanhVu Nguyen, and Matthew Dwyer. “Compositional Neural Network Verification via Assume-Guarantee Reasoning”. In: *Advances in Neural Information Processing Systems (NeurIPS)*. 2025, to appear

#### Spotlight Paper

- P4 Hai Duong, ThanhVu Nguyen, and Matthew Dwyer. “Generating and Checking DNN Verification Proofs”. In: *Advances in Neural Information Processing Systems (NeurIPS)*. 2025, to appear

- P5 Hai Duong, ThanhVu Nguyen, and Matthew Dwyer. “NeuralSAT: A High-Performance Verification Tool for Deep Neural Networks”. In: *Computer Aided Verification (CAV)*. 2025, pages 409–423

- P6 Hai Duong, Dong Xu, ThanhVu Nguyen, and Matthew Dwyer. “Harnessing Neuron Stability to Improve DNN Verification”. In: *Proceedings of the ACM on Software Engineering* 1. Foundations of Software Engineering (FSE) (2024), pages 859–881

- P7 Dong Xu, Nusrat Jahan Mozumder, Hai Duong, and Matthew B Dwyer. “Training for Verification: Increasing Neuron Stability to Scale DNN Verification”. In: *International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*. Springer. 2024, pages 24–44

- P8 Thanh-Dat Nguyen, Thanh Le-Cong, Duc-Minh Luong, Hai Duong, Xuan-Bach D Le, David Lo, and Quyet-Thang Huynh. “Ffl: Fine-grained fault localization for student programs via syntactic and semantic reasoning”. In: *2022 IEEE International Conference on Software Maintenance and Evolution (ICSME)*. IEEE. 2022, pages 151–162

- P9 Huu Binh Nguyen, Hai Duong, Anh Xuan Tran Thi, and Quoc Cuong Nguyen. “Efficient keyword spotting system using deformable convolutional network”. In: *IETE Journal of Research* 69.7 (2023), pages 4196–4204

- P10 Huu Binh Nguyen, Hai Duong, Tien Dat Bui, Hoang Ngoc Chau, and Quoc Cuong Nguyen. “Multi-channel speech enhancement using a minimum variance distortionless response beamformer based on graph convolutional network”. In: *International Journal of Advanced Computer Science and Applications* 13.10 (2022)

## 4.2 Refereed Conference/Workshop Papers (Short Papers)

- S1 Hai Duong and ThanhVu Nguyen. “NeuralSAT: Scaling Constraint Solving for DNN Verification (Competition Contribution)”. In: *International Symposium on AI Verification (SAIV)*. Springer. 2025, pages 253–259
- S2 ThanhVu Nguyen, KimHao Nguyen, and Hai Duong. “SymInfer: Inferring Numerical Invariants using Symbolic States”. In: *International Conference on Software Engineering (ICSE)*. IEEE, 2022, pages 197–201

## 4.3 Unpublished

- U1 Hai Duong, Thanh Le, and ThanhVu Nguyen. “DRL-Guided Smart Branching for Neural Network Verification”. In: *Submitted*. 2026
- U2 Thanh Le, Hai Duong, ThanhVu Nguyen, and Takeshi Matsumura. “Verca: Verifying Robustness of Constrained-Latent Autoencoders”. In: *Submitted*. 2026
- U3 Junyu Yin, Lingda Li, Hai Duong, Adolffy Hoisie, and Keren Zhou. “Trace-Driven DL-based Framework for GPU Performance Modeling”. In: *Submitted*. 2026
- U4 Thanh Le, Hai Duong, ThanhVu Nguyen, and Takeshi Matsumura. “Formal Verification of DNN-based Semantic Communication to Adversarial Noise”. In: *Submitted*. 2026
- U5 Thanh Le, Hai Duong, Yusheng Ji, ThanhVu Nguyen, and John C.S. Lui. “FGGM: Formal Grey-box Gradient Method for Attacking DRL-based MU-MIMO Scheduler”. In: *arXiv*. 2025
- U6 Hai Duong, ThanhVu Nguyen, and Matthew Dwyer. “A DPLL(T) Framework for Verifying Deep Neural Networks”. In: *arXiv*. 2024

## 5 Miscellaneous

- Contribute to proposals:
  - Amazon Research Award (Build on Trainium: Responsible AI): Leveraging AWS Trainium for Verifiable AI and ML-Assisted Mathematical Reasoning (2026). \$250,000 Training Credits. Amazon.
  - NVIDIA Academic Grant Program: Trustworthy AI: Bringing Scalability and Assurance to DNN Verification (2025). DGX Spark System. NVIDIA.
  - Amazon Research Award (Automated Reasoning): Scalable and Precise DNN Constraint Solving with Abstraction and Conflict Clause Learning (2023). \$50,000 unrestricted gift. Amazon.
  - NSF CAREER: NeuralSAT: A Constraint-Solving Framework for Verifying Deep Neural Networks (2023). NSF 2238133. 8/1/2023–7/31/2028, \$510,509. NSF.
- Help review conference papers:
  - ISSTA’23
  - PLDI’24, OOPSLA’24
  - ICLR’25
  - CVPR’26, ICML’26, ECCV’26, NeurIPS’26