Van Tien Nguyen

Doctoral Candidate in Electrical Engineering

Machine Learning Optimization and Systems (MILOS) Laboratory

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Research Profile

I develop methods for resource-efficient quantum and hybrid quantum–classical learning, drawing on variational quantum algorithms, tensor decompositions, and low-rank models. My research examines how architecture, input encoding, and measurement readouts affect predictive performance and resource requirements. I evaluate methods through mathematical analysis, classical baselines, reproducible simulation, finite-shot studies, and experiments on IBM Quantum processors.

Research Interests

Quantum algorithms for learning and optimization; measurement-aware quantum learning; structured and low-rank neural networks; tensor decomposition; noise-aware evaluation; and resource and outcome modeling for hybrid computation.

Education

The University of Texas at San Antonio *Aug. 2023–Present*

Ph.D., Electrical Engineering; doctoral candidate San Antonio, TX

- Expected graduation: Summer/Fall 2027; GPA: 3.95/4.00.
- Advisor: Prof. Panagiotis P. Markopoulos.
- Dissertation: *Structure-Aware and Resource-Efficient Quantum–Classical Learning.*

VNUHCMC–University of Information Technology *Aug. 2018–Jan. 2022*

B.S. (Honors), Computer Science Ho Chi Minh City, Vietnam

- Graduated with Excellence; ranked 1st of 26 students; final grade: 9.05/10.
- Thesis: *Evaluating Deep Learning Methods for Vietnamese Infographic Visual Question Answering.*
- Advisors: Tien Do Van, M.Sc., and Thanh Duc Ngo, Ph.D.

Doctoral Research Experience

Doctoral Researcher, MILOS Laboratory *Aug. 2023–Present*

The University of Texas at San Antonio San Antonio, TX

Lead algorithm design, mathematical analysis, implementation, experiments, and technical writing for quantum and hybrid learning projects; co-develop classical tensor-based models.

- **VQBR: measurement-based Bayesian regression.** Developed a variational method that analytically eliminates coefficient scale and recovers the maximum a posteriori direction from quantum measurements without explicit Gram-matrix construction. Evaluated simulations, finite-shot performance, and IBM hardware experiments with zero-noise extrapolation.
- **ML-QRC: structured quantum-feature readouts.** Developed a Tucker-factored classical readout with approximately 12.1× fewer trainable parameters than the compared multilayer perceptron. Evaluated Mackey–Glass and transverse-field Ising model benchmarks in a quantum extreme-learning setting; ongoing work extends the study to recurrent reservoirs.
- **QTCL: hybrid tensor-contraction layers.** Integrated trainable quantum circuits into compressed CNN bottlenecks and compared against classical counterparts, identifying architecture-dependent benefits.
- **MTL / LR-MTL: compact classical networks.** Co-developed depth- and rank-selective multilinear layers and adaptive low-rank extensions; studied parameter and predictive-performance tradeoffs in classification and object detection.
- **QALR-CPD: quantum tensor optimization.** Formulated adaptive CP-rank selection as an interaction-aware quadratic unconstrained binary optimization problem and applied QAOA to the resulting subproblems.

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Publications and Manuscripts

Accepted Papers

[1] **V. T. Nguyen** and P. P. Markopoulos, "VQBR: Variational quantum Bayesian regression via measurement-based MAP direction recovery," in *Proc. IEEE Int. Conf. Quantum Comput. Eng. (QCE)*, Toronto, ON, Canada, Sep. 2026. *Accepted and presented.* Accepted paper | Code and slides.

[2] **V. T. Nguyen** and P. P. Markopoulos, "Parameter-efficient multilinear readout for quantum reservoir computing," presented at the *Workshop Quantum Mach. Learn. (QML@QCE)*, IEEE Quantum Week, Toronto, ON, Canada, Sep. 2026. *Accepted paper; lightning talk and poster presented.* Accepted paper | Code.

[3] **V. T. Nguyen**, M. Dhanaraj, and P. P. Markopoulos, "Depth- and rank-selective multilinear transformation layers for compact CNNs," in *Proc. 60th Asilomar Conf. Signals, Syst., Comput.*, Pacific Grove, CA, USA, Oct. 2026. *Accepted; conference upcoming.* Accepted paper | Code.

Published Papers

[4] **V. T. Nguyen** and P. P. Markopoulos, "Quantum-based tensor contraction layers," in *Proc. SPIE, Mach. Learn. Challenging Data*, vol. 14030, 2026, Art. no. 140300I, doi: 10.1117/12.3098024. Code.

[5] M. Tran, T. Pham, **V. T. Nguyen**, T. Do, and T. N. Duc, "A robust framework for mathematical formula detection," in *Proc. Int. Conf. Multimedia Anal. Pattern Recognit. (MAPR)*, 2021, pp. 1–6, doi: 10.1109/MAPR53640.2021.9585197.

Submitted / Under Review

[6] **V. T. Nguyen** and P. P. Markopoulos, "Quantum computing for tensor decomposition: A review of foundations, algorithms, challenges, and future directions," manuscript submitted for publication, Aug. 2026. *Submitted to ACM Trans. Quantum Comput.* Preprint.

[7] **V. T. Nguyen** and P. P. Markopoulos, "Quantum optimization for adaptive low-rank CP decomposition," manuscript submitted for publication, Sep. 2026. *Submitted to Quantum Mach. Intell.* Preprint.

Manuscripts in Revision

[8] M. Dhanaraj*, **V. T. Nguyen***, and P. P. Markopoulos, "Adaptive low-rank multilinear transformations for compact convolutional neural networks," unpublished manuscript, 2026. *In revision; venue TBD. *Equal contribution.* Preprint.

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Selected Presentations and Invited Talks

- **Invited speaker**, Qiskit Fall Fest, University of California, Irvine, virtual, Oct. 19, 2026. *Upcoming.*
- **Technical-paper presenter**, VQBR, IEEE QCE, Toronto, Canada, Sept. 18, 2026.
- **Lightning-talk and poster presenter**, ML-QRC, QML@QCE Workshop, Toronto, Canada, Sept. 13, 2026.
- **Presenter**, QTCL, SPIE Machine Learning from Challenging Data, National Harbor, MD, Apr. 2026.
- **Lightning-talk and poster presenter**, Quantum Student Success Summit (QS3), Rice University, Mar. 2026.

Additional Research and Industry Experience

Research Engineer *Mar. 2022–Mar. 2023*
Viettel High Technology Industries Corporation Vietnam

- Developed NLP systems for named-entity recognition, entity linking, summarization, and timeline generation using news and social-media datasets.
- Packaged models as containerized microservices and integrated them into production workflows with version control, CI/CD, and reproducible model serving.

Research Assistant, AI Club *2020–2022*
VNUHCMC–University of Information Technology Ho Chi Minh City, Vietnam

- Conducted computer-vision and NLP research, including infographic visual question answering, instance retrieval, mathematical-formula detection, and reinforcement-learning game agents.
- Contributed to dataset construction, model training, evaluation, technical writing, and research presentations.

Teaching Experience

Graduate Teaching Assistant *Aug. 2026–Present*
The University of Texas at San Antonio San Antonio, TX

- Support EE 3233: System Programming for Engineers through two recitation sections, laboratory instruction, worked examples, grading, and student support.
- Prepare instructional materials and programming exercises; help students develop, test, and debug Python assignments.

Teaching Assistant *Sept. 2021–Jan. 2022*
VNUHCMC–University of Information Technology Ho Chi Minh City, Vietnam

- Supported tutorials, grading, office hours, and exercises for introductory programming in C++ and Python.

Honors and Awards

- **Graduate School Academic Travel Fund**, UT San Antonio, $750 for IEEE Quantum Week, Toronto, Canada, Sept. 2026.
- **NSF Student Travel Grant**, IEEE Quantum Week 2026; up to $1,250 in reimbursable travel support, awarded July 2026.
- **Phase III selection**, qBraid–MITRE–JonesTrading Global Industry Challenge, June 2026.
- **Institutional nominee, Google PhD Fellowship in Quantum Computing**, one of four UT San Antonio nominees, Apr. 2026.
- **Quantum Rising Star Award**, inaugural Quantum Student Success Summit (QS3), Rice University, Mar. 2026.
- **Graduate School Academic Travel Fund**, UT San Antonio, $750 for SPIE Machine Learning from Challenging Data, Spring 2026.
- **Student of 5 Merits**, University of Information Technology, 2019–2021 (three consecutive years).
- **Consolation Prize**, AI Camera Inspection Challenge, 2020.
- **Consolation Prize**, National Mathematical Olympiad Competition, 2019.

Professional Service and Research Support

- **Research proposal development**, MILOS Laboratory: contribute literature synthesis, problem formulation, project planning, technical writing, and supporting preliminary evidence with the faculty advisor.
- **Research infrastructure**, MILOS Laboratory: maintain shared GPU/CPU environments and support reproducible experiments and remote laboratory workflows.
- **Scribe**, EXAIL Workshop, Pittsburgh, PA, Oct. 2024.
- **Participant**, NSF Spring AI School, San Antonio, TX, 2024–2026.

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Quantum Community Leadership and Certification

- **Lead organizer, Qiskit Fall Fest at UT San Antonio**, 2026. Selected for IBM Quantum's Partner Plus program; organizing a virtual workshop on Nov. 19–20, 2026. *Upcoming.* Event website.
- **Qiskit Advocate**, Aug. 2025–Present; Tier 1 since July 2026. Confirmation.
- **IBM Certified Quantum Computation using Qiskit v2.X Developer–Associate**, June 2026. Credential.
- **Mentor, Qiskit Global Summer School**, IBM Quantum, 2026. Credential.
- **Quantum Excellence completion badges**, Qiskit Global Summer School, 2024 and 2025.

Selected Quantum Learning Credentials

- Quantum Diagonalization Algorithms, IBM Quantum.
- Quantum Machine Learning, IBM Quantum.
- Variational Algorithm Design, IBM Quantum.
- Integrating Quantum and High-Performance Computing, IBM Quantum.

Selected Additional Technical Projects

- **Transformer-Based Quantum Error Mitigation.** Compared unmitigated estimation, zero-noise extrapolation, a histogram MLP, and a Transformer on measurement shot sequences; examined permutation sensitivity through a shuffle ablation. Code and report.
- **HHL for Linear Regression.** Implemented simulator experiments and analyzed conditioning, numerical stability, data-loading assumptions, and resource requirements. Code and report.
- **Quantum Neural Network Benchmarks.** Implemented variational classifiers and compared them with classical baselines across benchmark datasets. Code and report.
- **NV-Center Quantum Sensing.** Simulated nanodiamond T_1 relaxometry with amplitude damping, inversion recovery, relaxation-time fitting, and ensemble scaling. Code and report.

Technical Skills

Programming and ML	Python, C/C++, PyTorch, TensorFlow, scikit-learn, NumPy, SciPy, snnTorch.
Quantum Computing	Qiskit, IBM Quantum Runtime, PennyLane, Cirq, CUDA-Q; variational algorithms, QAOA, quantum measurements, finite-shot analysis, zero-noise extrapolation.
Mathematics	Linear and multilinear algebra, tensor decomposition, low-rank modeling, optimization.
Research Computing	Linux, Git/GitHub, Docker, CUDA/GPU workflows, Jupyter, LaTeX, CI/CD.

Patents and Invention Disclosures

- **Quantum-computing invention disclosure**, UT San Antonio, 2026; confidential, under institutional review.
- **Detecting Ships in Distress Based on Optical Satellite Images and Automatic Identification System Signals**, Vietnamese patent filing, Jan. 2023.

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