KHANH DUY TRAN

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Google Scholar | ORCID | Portfolio

Research Interests

My research focuses on the technical feasibility of edge-enabled AI for wearable biomedical systems that support cardiovascular monitoring outside clinical settings. I specifically work on **(1) wearable biomedical systems engineering**, spanning hardware design, physiological signal processing, embedded AI deployment, and cloud/system integration; and **(2) reliability-aware clinical AI**, including predictive uncertainty, selective prediction, risk–coverage analysis, and identification of low-confidence diagnostic outputs.

Education

M.Eng. in Electrical Engineering, International University – Vietnam National University, HCMC *2024–Present*
Expected degree completion: November 2026–March 2027 | *English-medium instruction*
Master's Thesis: *Edge AI-Enabled Smart Healthcare Framework for Real-Time Cardiovascular Disease Detection*

B.Eng. in Electrical Engineering, International University – Vietnam National University, HCMC *2020–2024*
GPA: 3.75/4.0 — (ranked 1st in class K20) | *English-medium instruction* | *ABET-accredited*
Undergraduate Thesis: *Development of a Real-Time Automatic Cardiovascular Disease Detection Edge Computing System*

Research Experience

Research Assistant, School of Electrical Engineering, International University – VNUHCM *2022–Present*
Advisor: Dr. Quoc T. Huynh

- Conducted research on wearable biomedical systems, spanning hardware development, physiological signal processing, and embedded AI, with applications in ECG, EEG, SCG, and PCG.
- Developed end-to-end wearable monitoring systems integrating multi-lead ECG acquisition, real-time processing, on-device AI inference, wireless communication, and cloud-based monitoring.
- Developed and evaluated signal-processing and machine-learning methods for arrhythmia classification, neurological abnormality detection, heart-sound analysis, and SCG fiducial-point identification, while contributing to experimental design, research mentoring, and publications.

Independent Research – Physiological Signal Reliability in Real-World Monitoring *2026–Present*

- Investigated Bayesian formulations of aleatoric and epistemic uncertainty for wearable ECG signal-quality assessment under free-living conditions.
- Investigating the integration of signal-quality assessment and recursive Kalman filtering to improve the reliability of continuous physiological monitoring while preserving diagnostic ECG morphology.

Publications

Journal Articles (Under Review)

[1] **Tran, K.D.**, Tong, H.D., Doan, M.N., Vu, L.T.K., Nguyen, U.D., and Huynh, Q.T. "An AGENet-Based Cloud-Enabled Wearable Telemedicine System for AI-Assisted ECG Monitoring and Arrhythmia Classification." *Physiological Measurement*, submitted August 2026; under review.

[2] **Tran, K.D.** "Reliability of Predictive Uncertainty in Free-Living Wearable ECG Signal-Quality Assessment under Noise and Distribution Shift." *Medical Engineering & Physics*, submitted Aug. 2026; under review.
Preprint: *medRxiv*, doi:10.64898/2026.08.25.26361304.

[3] **Tran, K.D.** "BLiSS: A Beat-Local, Signal-Quality-Informed Kalman Smoother for ECG Denoising under Non-Stationary Muscle Artifact, with Ectopic-Beat Reconstruction Assessment." *Biomedical Engineering Letters*, submitted November 2026; under review.
Preprint: *Research Square*, doi:10.21203/rs.3.rs-11595235/v1.

Conference Papers

[1] **Tran, K.D.**, Tang, L.H., Nguyen, U.D., and Huynh, Q.T. "Developing a Deep Learning Model Using a Combination of CNN and RCNN for Cardiovascular Disease Classification." *ATC 2024*, Ho Chi Minh City, Vietnam, Oct. 2024. doi:10.1109/ATC63255.2024.10908251.

[2] **Tran, K.D.**, Tang, L.H., Nguyen, U.D., and Huynh, Q.T. "Developing a Mixed Deep Learning Model Approach for Arrhythmia Classification Based on ECG Signal." *RIVF 2024*, Da Nang, Vietnam, Oct. 2024. doi:10.1109/RIVF64335.2024.11009042.

[3] Phan, T.L.N., **Tran, K.D.**, Doan, M.N., Nguyen, U.D., Vu, L.T.K., and Huynh, Q.T. "Robust Abnormal Heart Sound Detection via Soft Voting Ensemble on Augmented MFCC Representations." *RIVF 2025*, Ho Chi Minh City, Vietnam, Nov. 2025. doi:10.1109/RIVF68649.2025.11365204.

[4] Doan, M.N., **Tran, K.D.**, Phan, T.L.N., Son, H.D., Nguyen, U.D., Vu, L.T.K., and Huynh, Q.T. "EEG-Based Brain–Computer Interface for Directional Control Using Machine Learning on Overt Spatial Attention." *RIVF 2025*, Ho Chi Minh City, Vietnam, Nov. 2025. doi:10.1109/RIVF68649.2025.11365260.

[5] Huynh, T.N.T., **Tran, K.D.**, Phan, C.T., Doan, M.N., Vu, L.T.K., Nguyen, U.D., and Huynh, Q.T. "BEAT-AO: An Unsupervised Bayesian Systolic-Envelope Framework for Aortic Valve Opening Detection from Seismocardiography." *RIVF 2026*, accepted for publication.

[6] Doan, M.N., **Tran, K.D.**, Phan, T.L.N., Phan, C.T., Nguyen, U.D., Vu, L.T.K., and Huynh, Q.T. "Hierarchical Patient-Level Stacking for EEG-Based Stroke Detection and Classification." *RIVF 2026*, accepted for publication.

Grants and Funding

- **Researcher**, "Cloud-Enabled Autonomous Telemedicine Platform for Continuous ECG Monitoring and Arrhythmia Screening," faculty research grant, School of Electrical Engineering, Vietnam National University, Ho Chi Minh City (VNU-HCM). Grant No. T2026-01-EE, 2026. (PI: Dr. Quoc T. Huynh)
- **Researcher**, "Developing Deep Learning Models for Arrhythmia Classification," faculty research grant, School of Electrical Engineering, Vietnam National University, Ho Chi Minh City (VNU-HCM). Grant No. T2023-03-EE, 2024. (PI: Dr. Quoc T. Huynh)
- **Student Principal Investigator**, "Developing a Cardiovascular Diseases Monitoring System," student research grant, International University – VNUHCM, 2024.

Honors and Awards

- Class of K20 Valedictorian, School of Electrical Engineering, International University (2024).
- Second Prize, Fifth Scientific Conference for Students, International University – VNUHCM (2024).
- Euréka Research Awards (2023, 2025); Bosch Talented Scholarship Award (2023); Viet Nam Electricity Scholarship Award (2024).
- Undergraduate University Scholarship (2020–2024).
- Graduate University Scholarship (2024–2026).

Teaching & Industry Experience

Teaching Assistant, International University – VNUHCM *2023–2024*

- Supported C/C++ Programming, Object-Oriented Programming, and Introduction to Computing.

Associate Software Engineer, OPSWAT *2024–2025*

- Developed C++/Linux applications for malware detection and system scanning using multithreading, multi-process execution, process isolation, logging, and network analysis.

Software Engineer Intern, DEK Technologies *2023*

- Developed microservice-based messaging features using WebSockets, Linux IPC/APIs, and Docker.

Academic Service

Peer Reviewer (2026): *Biomedical Physics & Engineering Express* (IOP Publishing), *IEEE Sensors Letters* (IEEE), and *Physiological Measurement* (IOP Publishing).

Technical Skills

Programming	C/C++, Python, MATLAB, Bash
ML/DL	PyTorch, TensorFlow, Keras
Embedded & Hardware	STM32, ESP32, Raspberry Pi
Tools & Systems	Git, Docker, Altium, LaTeX
Languages	English, Vietnamese