Quy Phuong Le

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🎓 Google Scholar | 🌐 Personal Website | 📄 Portfolio | ⓞ Github | in LinkedIn

Education

Pukyong National University *Mar 2024 – Feb 2026*
MS Degree in Industry 4.0 Convergence Bionics Engineering *(Full time)* Busan, Republic of Korea
- **GPA**: 4.17/4.5
- **Thesis Topic**: Edge Computing Approach for Golf Club Path Recognition using Self-Supervised Learning

Ho Chi Minh City University of Technology *Aug 2019 – Nov 2023*
BS Degree in Mechatronic Engineering *(Full time)* Ho Chi Minh, Vietnam
- **GPA**: 8.22/10 (*Honors Program*)
- **Thesis topic**: Damage detection of steel beam using CycleGAN

Research Experience & Projects 📁

NanoBioMechanics Laboratory (NBMLab) ⊕ *Mar 2024 – Present*
Research Assistant, Dept. of Industry 4.0 Convergence Bionics Engineering Busan, Republic of Korea

During my time at NBM Lab, I developed intelligent systems integrated with AI for smart devices to support senior healthcare applications and sports analytics. I designed and implemented real-time data acquisition pipelines for motion analysis. My research focuses on signal processing, machine learning for biomedical applications collected from smart devices.

1. Smart Wearable Devices for Golf Swing Analyzer System (▶ Video, ⓞ Code)
- Investigate sensor-based biomechanical modeling for golf swing analysis using wearable inertial and pressure sensors (smart gloves, smart belts, smart insoles).
- Develop algorithms for preprocessing, denoising, feature extraction, and reconstruction of swing motion using an unsupervised latent-space model.
- Propose a similarity scoring metric to compare user motion against expert trajectories quantitatively.
- Conduct experimental evaluation on real swing data; achieve 92% improvement in estimation over baseline methods.
- Built a visualization interface to support human–computer interaction experiments.

2. Non-contact Sensor Vital Signs Monitoring System in Acupuncture (▶ Video, ⓞ Code)
- Design a non-contact physiological monitoring system capturing BCG signals via a PVDF sensor.
- Develop a hybrid deep-learning architecture integrating GRU and multi-head attention for temporal physiological signal modeling.
- Achieve an MAE of 1.43 bpm for heart rate, respiration rate estimation on the collected dataset.
- Build a cloud-based pipeline and real-time visualization; the system was evaluated on patients in acupuncture.

3. Smart Device with Sensors Fusion for Vital Signs Monitoring (▶ Video, ⓞ Code)
- Develop a smart chair integrating multiple sensors (BCG, PPG, ECG) to monitor physiological signals continuously.
- Implement sensor fusion algorithms to enhance accuracy in heart rate and respiration measurement.
- Design an AI-assisted system for health status detection and anomaly identification in real time.

4. Wireless body sensor network for motion capture (▶ Video, ⓞ Code)
- Develop a wireless sensor network to collect and process data from multiple sensor nodes.
- Design a system to reconstruct body movements based on real-time sensor data.
- Implement data synchronization and optimized communication protocols for accurate motion analysis.

UID Laboratory ⊕ *Oct 2021 – Jan 2024*
Research Assistant, Dept. of Mechanical Engineering Ho Chi Minh, Vietnam

At UID Lab, I worked on hands-on projects in Machine Learning and Artificial Intelligence. I explored embedded systems and robotics to integrate software and hardware for signals. In addition, I conducted research in signal processing, machine learning algorithms, and deep learning architectures to design and implement neural network modules.

1. PPG Signal and Application in the Medical (ⓞ Code)
- Research and design embedded systems and PCB for PPG signal measurement using the heart rate
- Develop MCU with RTOS and BLE capabilities for signal acquisition and transmission.

2. Study on Damage Detection of Steel Beam Using AI
- Utilizing vibration data through signal processing, for anomaly detection in steel beams.
- Develop and deploy using the CycleGAN architecture. Vibration data is encoded to lower dimension and three-sigma rule to detect and visualize damage.

Technical Skills

Programming: C/C++, C#, Python, Matlab

Machine Learning & Edge AI: PyTorch, TensorFlow, Quantization, Pruning, ONNX, TFLite

Embedded Systems: MCU, PCB Design, Sensors and Actuators, Analog Front End, RTOS

IoT & Cloud Integration: Firebase, Azure, MQTT, TCP/IP, UDP

Tools: Bash, Docker, Git, CUDA, TensorBoard

Publications

[J.1] Truong Tien Vo*, **Quy Phuong Le***, Huynwoo Jung*, et al. (2025). **Multi-Sensor Smart Glove With Unsupervised Learning Model for Real-Time Wrist Motion Analysis in Golf Swing Biomechanics**. *IEEE Internet of Things Journal*, 12(11), pp. 16574–16586. (*Co-First*) (**Q1**, IF **8.9**, Top **4.1%**)

[J.2] Thanh Tung Luu, Duc Thien An Nguyen, **Quy Phuong Le**, et al. (2024). **Fatigue Damage Quantification for Structural Health Monitoring of Steel Beam Using CycleGAN**. *Journal of Engineering Science and Technology*, 19(2), pp. 705–724. (Q3, IF 0.5, Indexed by Scopus)

[J.3] **Quy Phuong Le**, Truong Tien Vo, Dogeon Ha, et al. (2025). **On-Chip Machine Learning For In-home Patient Monitoring Using Non-Contact Ballistocardiogram-Based Bed Sensor**. Manuscript is in revision for publication in *IEEE Internet of Things Journal*. (**Q1**, IF **8.9**, Top **4.1%**)

[J.4] Truong Tien Vo*, **Quy Phuong Le***, Trong Nhan Nguyen, et al. (2025). **Multi-Task Non-Contact Ballistocardiogram Based Vital Signs Monitoring in Acupuncture**. Manuscript is in revision for publication in *Computers in Biology and Medicine*. (*Co-First*) (**Q1**, IF **6.3**, Top **5.2%**)

[J.5] **Quy Phuong Le**, Dogeon Ha, Huynwoo Jung, et al. (2025). **On-Device Club Path Recognition with Self-Supervised Learning for Golf Analysis**. Manuscript submitted to *IEEE Sensors Journal*. (**Q1**, IF **4.5**, Top **19.6%**)

[J.6] Dogeon Ha, **Quy Phuong Le**, Truong Tien Vo, et al. (2025). **Golf Swing Measurement with Real-Time Sweet Spot Detection using High-Speed Vision and Deep Neural Network**. Manuscript is in revision for publication in *Measurement Science and Technology*. (**Q1**, IF **3.4**, Top **20.4%**)

[J.7] Truong Tien Vo, Huu Sang Nguyen, Le Hai Tran, **Quy Phuong Le**, et al. (2025). **Multimodal Smart Clothing with Haptic Feedback for Real-Time Muscle Activation Assessment in Self-Coaching Fitness**. Manuscript submitted to *IEEE Internet of Things Journal*. (**Q1**, IF **8.9**, Top **4.1%**)

Awards

2025 PKNU Fire Grant

2025 Brain Korea BLUE Scholarship Award

References

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