Cuong Pham

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PROFESSIONAL INTERESTS

I have a strong interest in data-driven techniques incorporating signal processing and machine learning methods for healthcare research with the goal of enhancing the digitalization of the computer-aid medical system. I conduct human-based biosignal experiments and analyze multi-modal biomedical datasets associated to different sub-domain studies in neurology, cardiology, and digital remote monitoring.

EDUCATION

Ritsumeikan University   Shiga, Japan
M.Eng. in Advanced Information Science and Engineering   *2021 – 2023*

- Committee: Dr. Ruck Thawonmas (Chair) | Dr. Koji Kashihara (Advisor)
- Relevant Courses: Adv. Topics in Global Software Engineering, Adv. Topics in Communication Science, Adv. Topics in Human Factors for System Engineering, Adv. Topics for Knowledge-based System.

VNU-HCM University of Technology   HCMC, Vietnam
B.Eng. in Physics Engineering   *2015 – 2020*

- Biomedical Engineering Specialization
- Relevant Courses: Numerical Methods, Electrical and Electronics Engineering, Digital Signal Processing, Medical Instrumentation and Labs, Sensors and Measurement Techniques
- Remarks: 1st-rank faculty Honors (2016) | CGPA: 8.13/10

WORK EXPERIENCE

VinUni-Illinois Smart Health Center, VinUniversity   Hanoi, Vietnam
PhD Candidate   *Aug 2024 – now*

- My current study focus on developing **efficient multimodal AI framework** for digital phenotype monitoring and assessment of some common **neurological diseases and mental health illness**, with a target on low-resource deployment setting, e.g., low and middle-income countries. Advisor: Dr. Hieu Pham, Dr. Huong Ha.

School of Biomedical Engineering, VNU-HCM International University   HCMC, Vietnam
Research Assistant   *Nov 2023 – Jul 2024*

- Research: implemented pipeline for Brain Computer Interface collaborative project by KC4.0-MOST. Involved in experimental protocol design and calibration with PsychoPy x EEG data acquisition & management tasks; write technical documentation; conducted tutorial seminars of EEG signal processing to students.
- Signal Processing: serialized the collected in-house EEG datasets; developed pipeline for predictive modelling; conducted performance benchmarking with other data sources; deployed and maintained web apps for Cloud storage, user interaction, signal analysis and visualization.
- Online-BCI: collaborated with the IT team to build a customized platform incorporating user configuration, and UI controller; deployed and evaluated user-specific ML models with calibration for for real-time mouse control system.

HATO Medical Technologies ApS   Odense, Denmark
Machine Learning Engineer   *Jun 2022 – Nov 2023*

- Cardiology Research: worked with cardiologists and health-tech startup stakeholders to standardize clinical labelling diagnosis for customized usage cases at a local Danish emergency department. Conducted literature reviews, write technical documentation, prepare materials for research grants.
- Data Solution: collected and handled data from public and clinical sources. Designed pipeline for large-scaled data processing, data cleaning and cross-source alignment. Collaborated with software developers to integrate data serialization pipeline into in-house product's back-end.
- ML/AI Development: built Cloud-based internal data management with interactive web app. Monitored and evaluated time-series modelling; deployed models for real-time abnormalities classification and interpretation, adapted to technical requirements.

GSISE, Ritsumeikan University — Shiga, Japan
M.Eng Research Assitant — *Apr 2022 – Jul 2023*

- Signal Quality Enhancement: designed pipeline to track landmarks on customized forehead region-of-interest, using combination of unsupervised optical models and deep auto-encoder network to improve signal-to-noise ratio; evaluated on public remote photoplethysmograph (rPPG) dataset.
- Experimental Analysis: collected data (healthy subject) with multiple camera settings & posture constraints; synchronized facial video and blood volume pulse signal; evaluated heart rate benchmarks among different configurations with conventional methods and statistical analysis.
- Feature Assessment: investigated the feasibility of remote stiffness assessment via camera using real-time Face-Mesh tracking, a deep 3D-CNN model, and customized morphology feature technique; evaluated on a public rPPG dataset.

GTOPIA Vietnam. Ltd — HCMC, Vietnam
Signal Processing Engineer — *Jan – Jun 2020*

- Wearable Research: designed pipeline with API for raw data aggregation from in-house wearable product; signal processing designed pipeline for data interpretation; conducted experiments on commercial wristbands's performance under different usage scenarios. Research on hemodynamic (e.g., pulse wave velocity) on in-house vital signs dataset.
- Data Collection: collaborated with Ho Chi Minh Heart Institute for large-scale clinical data acquisition. Processed, categorized, and digitalized health records of administered patients with cardiovascular diseases.

Biomedical Electronics Laboratory, Shibaura Institute of Technology — Tokyo, Japan
Research Intern — *Sep – Nov 2019*

- EEG Experiment: involved in data collection activities within the Brain Computer Interface team of Auditory and Motor Imagery studies. Conducted research on EEG visualization for motor cortex response and how to conduct neuro-feedback. Revised experiment procedure for bachelor thesis. Advisor: Dr. Shinichiro Kanoh.

PUBLICATION

Peer-reviewed Conference Paper

- **C. Pham** and K. Kashihara (2022, March), A Hybrid Controller for Multiple Drug Infusion in Heart Failure using Convolutional Neural Network. *In 2022 IEEE 4th Global Conference on Life Sciences and Technologies (LifeTech) (pp. 340-344).* (Link)

- Nguyen, M. T. D., **Pham, C. Q.**, Nguyen, H. N., Le, K. Q., & Huynh, L. Q. (2022), A Statistical Approach to Evaluate Beta Response in Motor Imagery-Based Brain-Computer Interface. *In 8th International Conference on the Development of Biomedical Engineering in Vietnam (pp. 203-217).* (Link)

Thesis

- **Cuong Pham**, Remote Photoplethysmography Assessment Using Deep Learning (2023, Aug), *Master Thesis @ Graduate School of Information Science and Engineering, Ritsumeikan University.*

ACADEMIC ACTIVITIES

Teaching Assistant

- [**Fall 2024**] Computer Vision @ CECS, VinUniversity. *Prepared materials, instructed and evaluated student programming practice lab sessions on computer vision topics.*

- [**Fall 2022**] Experiments in Artificial and Natural Intelligence @ CISE, Ritsumeikan University. *Instructed students to conduct biosensors experiments, calibrated and maintained lab's equipments/softwares.*

School Projects

- [**Sep 2022 – Jan 2023**] WasteWise @ GSISE, Ritsumeikan University: *Team of 7 collaborate with TH Nürnberg (Germany) on a ML-based mobile solution for trash bins time collection recommendation in public spaces using crowdsourcing data. Designed ML model to integrate into Android app features; evaluated on a pilot self-collected data in Shiga, Japan.*

- [**Sep 2018 – Mar 2019**] Stationary Bike @ VNU-HCM University of Technology. *Designed circuits for automated workload adjustment adapting to the biker's heart rate. Collaborated with HCMC Institute of Biomedical Physic; conducted experiment on university students to evaluate VO2max improvement over the endurance training course.*
- [**Mar – Jul 2017**] Pet Feeder @ VNU-HCM University of Technology. *Tech-lead freelance team of 6 to design the proof-of-concept low-cost automated pet-feeding system. Conducted mechanical design and material 3D-printing, developed electrical circuits and platform for IoT user control.*

Talks

- [**Jun 2024**] Poster Presentation @ <u>NeuroCoB-BrainConnects 2024</u> (Putrajaya, Malaysia). *Evaluation of Cue-based Protocol Implementations in Motor Imagery - based Brain-Computer Interface Experiments.*
- [**Oct 2019**] Poster Presentation @ <u>ISAS 2019</u> (HCMC, Vietnam). *Exercise Physiology: Improving Stationary Bike Training Performance Using Heart Rate Variability.*
- [**Oct 2019**] Project Presentation @ <u>iCAEP 6</u> (Thai Nguyen, Vietnam). *Research into the relationship between cardiac responses and neural activity to improve classification of EEG-based imaginary action.*
- [**Mar 2019**] Poster Presentation @ <u>SEATUC 2019</u> (Hanoi, Vietnam). *Exercise Physiology: Cardiac Endurance Training for Students by Stationary Bike.*

Communitiy Involvement

- [**Jan 2023**] Teaching Assistant @ Ritsumeikan Junior High. *I organized activities and trained language skills for Japanese junior students to join on-stage competition.*
- [**Oct 2022**] Technical Staff @ IEEE/RSJ IROS 2022. *I managed attendees logistics; information desk; set up PC at venue; in charge of Webinar operations and supported technical issues.*
- [**Sep 2020 – Apr 2021**] EEG Study Group Founder @ VNU-HCM University of Technology. *I host a weekly knowledge sharing session among lab members concerning technical issues and practical tips in Polysomnography sleep studies. Conducted tutorials on EEG analysis with MATLAB for students.*

Mentoring Students

- **Tuong Nguyen H.**, now Research Staff @ VNU-HCM International University.
- **Ha Nguyen L. N.**, now Biomedical Engineer @ Cho Ray Hospital.

AWARDS

- [**Aug 2022**] 2nd prize in Kyoto Startup Weekend Competition; by Techstars x KYOTO Design Lab.
- [**Feb 2022**] GAKKAI Scholarship; by Ritsumeikan University.
- [**Sep 2021**] Fully-funded Monbukagakusho Scholarship; by Japanese Gonvernment (MEXT).

SELECTED SKILLS

- **Programming**: Python, Matlab, Linux, R, SQL
- **ML/AI**: OpenCV, Scikit-learn, LightGBM, XGBoost, Keras, Pytorch
- **Tech Stacks**: Database (MySQL, MongoDB, Firebase), Webapp (Streamlit, Flask, React Native), Cloud AWS (S3, EC2, Lambda), Tools (Git, Docker, Jira)
- **Miscellaneous**: Data Analysis (ggplot2, dplyr, numpy, scipy, pandas, matplotlib), Bio-Signal Experiment (ECG, EEG, PPG, wearable), Signal Processing (spectral analysis, transformation - SVD, PCA, ICA, IIR/FIR filtering), Circuits (Arduino, Raspberry Pi)
- **Language**: Vietnamese (native), English (fluent)

REFERENCE

Hieu Pham, Ph.D.
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Scientific Director, Entrepreneurship Lab (E-lab) at VinUniversity.
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