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*

- Fully-funded MEXT Scholar
- 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.
- Remarks: GAKKAI Scholarship | GPA: 3.6/5.0

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) | major-GPA: 8.13/10

WORK EXPERIENCE

VinUni-Illinois Smart Health Center, VinUniversity — Hanoi, Vietnam
CS PhD Candidate (Advisor: Dr. Hieu Pham, Dr. Huong Ha) — *Aug 2024 – now*

- Mental Health Research
  - *Research Coordinator*: project management for a team of 10 multidisciplinary experts and students; working with hospitals/clinics for a large-scale digital-phenotying Vietnamese cohorts.
  - *Software Development*: building and maintaining project website for streamlined content; designing and developing a full-stack Android/IOS mobile app for user configuration;
  - *Data Collection System*: developing admin dashboard allowing the integration of wearable devices and smartphones for seamless multimodal data acquisition; setup Cloud-based secured storage and synchronization.
- Multimodal AI Research
  - Conducted literature review on (1) mental health and neurological diseases; (2) benchmark multimodal frameworks.
  - Testing new modeling frameworks on digital phenotyping studies and comparing to its replicated baseline.

School of Biomedical Engineering, VNU-HCM International University — HCMC, Vietnam
Research Assistant (Advisor: Dr. Huong Ha) — *Nov 2023 – Jul 2024*

- *Brain Computer Interface (BCI) Research*: involved in experimental protocol design and calibration with PsychoPy x EEG data acquisition & management tasks; conducted literature review and wrote technical documentation; conducted tutorial seminars of signal processing to students.
- *Tech-lead BCI Modeling*: serialized and processed the collected in-house datasets; developed ML pipeline for predictive modeling tasks; conducted performance benchmarking with other data sources; deployed and maintained web apps for Cloud storage, performance response analysis and data visualization.
- *Online-BCI*: collaborated with the software developers to build a customized desktop app for BCI data acquisition and response controller; deployed and evaluated user-specific calibrated modeling for real-time mouse control system; conducted inspection process to integrate the platform into a project by KC4.0-MOST.

HATO Medical Technologies ApS Odense, Denmark

Machine Learning Engineer *Jun 2022 – Nov 2023*

- *Cardiology Research*: worked closely with cardiologists and health-tech startup stakeholders to establish standardized clinical labeling protocols tailored to specific use cases at a local Danish emergency department focusing on final outcomes for cardiovascular diseases ; conducted literature reviews for evidence-based decision making, wrote technical documentation, prepared research materials and wrote grant proposals/fundings.
- *Data Pipeline*: collected and handled data from public repositories and clinical sources. Implemented a scalable data processing pipeline, including data cleaning, and alignment across sources. Collaborated with software developers to integrate a data serialization pipeline into the backend architecture of the in-house product.
- *AI/ML Development*: implemented a cloud-based internal data management system with interactive web app and tested its streamline workflow. Monitored and evaluated time-series predictive modeling; deployed models for real-time abnormalities detection and interpretation; inspected and ensured the solution meet technical requirements.

GSISE, Ritsumeikan University Shiga, Japan

M.Eng Research Assitant (Advisor: Dr. Koji Kashihara) *Oct 2021 – Aug 2023*

- *Drug Infusion Research*: developed a hybrid controller to regulate cardiac output and mean arterial pressure within during drug infusion using ML model with short-time previous drug inputs; evaluated on a mathematical modeling responses of dogs with heart-failure dataset.
- *RPPG 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 datasets.
- *RPPG Constrainst-based Experiments*: collected data (5 healthy subjects with different camera settings & postures); designed platform to synchronize facial video and blood volume pulse signal; evaluated heart rate benchmarks among different configurations with unsupervised methods and statistical analysis.
- *RPPG Feature Waveform Assessment*: investigated the reliability of waveform feature related to cardiac aging/stiffness by using a real-time Face-Mesh tracking with deep learning model and a customized morphology extraction; evaluated on a public well controlled rPPG dataset.

GTOPIA Vietnam. Ltd HCMC, Vietnam

Signal Processing Intern (Advisor: Dr. Liem Huynh) *Jan – Jun 2020*

- *Wearable Research*: designed pipeline with API for raw data aggregation from in-house wearable product; designed signal processing pipeline for vital-sign hemodynamic monitoring; conducted experiments on commercial wristbands's performance under different usage scenarios.
- *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 (Advisor: Dr. Shinichiro Kanoh) *Sep – Nov 2019*

- *EEG Experimental Research*: involved in data collection activities for Auditory and Motor Imagery studies; conducted experimental analysis on EEG visualization for motor cortex response and how to conduct neuro-feedback. Revised experiment procedure for the Bachelor Thesis.

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).* [paper] [github]
- 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).* [paper] [github]

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.*

University Projects

- **[Sep 2022 – Jan 2023]** WasteWise @ GSISE, Ritsumeikan University (Japan). *Team of 6 collaborate with TH Nürnberg (Germany) on a ML-based mobile app for trash bins time collection recommendation in public spaces using crowdsourcing data; evaluated on a pilot self-collected data in Shiga, Japan.* [notes]
- **[Sep 2018 – Mar 2019]** Stationary Bike @ VNU-HCM University of Technology (Vietnam). *Designed circuits for workload adjustment adapting to the biker's heart rate. Collaborated with HCMC Institute of Biomedical Physics for endurance course design; evaluated VO2max improvement on students.* [notes]
- **[Mar – Jul 2017]** Pet Feeder @ VNU-HCM University of Technology (Vietnam). *Tech-lead freelance team to design the low-cost automated pet-feeding system; conducted mechanical design and material 3D-printing, developed electrical circuits and platform for IoT user control; delivered to reserved clients.* [notes]

Talks

- **[Jun 2024]** Poster Presentation @ NeuroCoB 2024 (Putrajaya, Malaysia). *Evaluation of Cue-based Protocol Implementations in Motor Imagery - based Brain-Computer Interface Experiments.* [github]
- **[Oct 2019]** Poster Presentation @ ISAS 2019 (HCMC, Vietnam). *Exercise Physiology: Improving Stationary Bike Training Performance Using Heart Rate Variability.*
- **[Oct 2019]** Project Presentation @ iCAEP 6 (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 @ SEATUC 2019 (Hanoi, Vietnam). *Exercise Physiology: Cardiac Endurance Training for Students by Stationary Bike.*

Communitiy Involvement

- **[Jan 2023]** Teaching Assistant @ Ritsumeikan Junior High (Japan). *Organized activities and trained language skills for Japanese junior students to join on-stage competition.*
- **[Oct 2022]** Technical Staff @ IEEE/RSJ IROS 2022 (Japan). *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 @ VNU-HCM University of Technology (Vietnam). *Hosted 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 (Vietnam).
- **Hidetake Kondo**, now Software Developer @ e-Jan Networks Co. (Japan).
- **Ha Nguyen L. N.**, now Biomedical Engineer @ Cho Ray Hospital (Vietnam).

AWARDS

- **[Aug 2022]** 2nd prize in Kyoto Startup Weekend Competition; by Techstars x KYOTO Design Lab.
- **[Sep 2021]** Monbukagakusho Scholarship; by Japanese Government.

SELECTED SKILLS

- **Programming**: Python, MATLAB, Linux, R, SQL, Javascript, C#
- **Machine Learning**: OpenCV, Scikit-learn, LightGBM, XGBoost, Keras, Pytorch, Lightning
- **Tech Stacks**: Database (MySQL, MongoDB, Firebase), Webapp (Streamlit, Flask), Mobile (React Native), Cloud AWS (S3, EC2, Lambda), Tools (Git, Docker, Jira)
- **Miscellaneous**: Data Analysis (scipy, pandas, ggplot2, dplyr), Bio-Signal Experimentation (ECG, EEG, PPG, wearable/bio-sensors), Signal Processing (spectral & time-frequency analysis, transformation [SVD, PCA, ICA], filtering IIR/FIR), Circuit (ESP32, Arduino, Raspberry Pi, IoT sensors)
- **Language**: Vietnamese (native), English (fluent)

REFERENCE

Hieu Pham, Ph.D.
Assistant Professor, College of Engineering & Computer Science (CECS) &
Scientific Director, Entrepreneurship Lab (E-lab),
PI at VinUni-Illinois Smart Health Center, VinUniversity.
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