Cuong Pham

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PROFESSIONAL INTERESTS

I have a strong interest in data-driven techniques and 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 multimodal 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 Systems

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

WORK EXPERIENCE

VinUni-Illinois Smart Health Center, VinUniversity — Hanoi, Vietnam
Graduate Research Assistant (PhD student) — *Aug 2024 – now*

- My 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. Advised by Dr. Hieu Pham and Dr. Huong Ha, currently we are in clinical collaboration to build Vietnamese Mental Health Database cohort.

Brain Health Lab, VNU-HCM International University — HCMC, Vietnam
Research Assistant — *Nov 2023 – Jul 2024*

- Technical-led Brain Computer Interface (BCI) team in collaborative project (KC 4.0 funded by MOST). Involved in experimental protocol design and calibration with PsychoPy x EEG data acquisition & management tasks. Conducted tutorial seminars of EEG signal processing to undergraduate students.
- Analyzed the collected data: processed and serialized EEG datasets; developed pipeline for multi-task classification modelling; conducted performance benchmarking documentation with other data sources; deployed and maintained web apps for data storage, signal analysis and visualization.
- Developed online-BCI modelling for mouse control system. Proposed the paradigm for offline/online evaluation with real users. Collaborated with the software developer team to build a customized platform incorporating user configuration, and user interface controller.

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

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

GSISE, Ritsumeikan University Shiga, Japan

Graduate Research Assistant (M.Eng student) *Sep 2021 – Jul 2023*

- Designed pipeline with the remote photoplethysmography (RPPG) dataset to with customized facial ROI tracking, using unsupervised optical models, and a deep autoencoder network to enhance the signal's quality.
- Conducted experiments with healthy subjects: synchronized facial video and blood volume pulse signal; collected data with multiple camera settings & subject constraints. Evaluated heart rate benchmarks among different configurations with conventional methods and statistical analysis.
- Investigated the feasibility of stiffness feature assessment via camera on a public RPPG dataset, by using real-time Face-Mesh tracking, a deep 3D-CNN model, and morphology feature extraction technique.

GTOPIA Vietnam. Ltd HCMC, Vietnam

Signal Processing Engineer *Jan – Jun 2020*

- Designed pipeline for commercial biosensor-based wristbands for data interpretation, including setup API for raw data extraction and serialization. Conducted research on signal processing and hemodynamic modeling on vital signs data. Analyzed wearable device's technical performance under different usage scenarios.
- Collaborated with Ho-Chi-Minh-Heart-Institute for large-scale clinical data collection. Processed, categorized, and digitalized health records of administered patients.

Biomedical Electronics Laboratory, Shibaura Institute of Technology Tokyo, Japan

Research Intern *Sep – Nov 2019*

- Involved in data collection activities within the Brain Computer Interface experimental 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. Advised by 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.*

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**] Monbukagakusho (MEXT) Scholarship; by Japanese Gonvernment.
- [**Sep 2016**] 1st-rank Faculty Honors and University Scholarships; by VNU-HCM University of Technology.

ACADMIC ACTIVITIES

Teaching

- [**Fall 2024**] **Teaching Assistant @ CECS, VinUniversity**. *Course: Computer Vision.* I instructed and evaluated hands-on practice lab sessions on image processing topic.
- [**Fall 2022**] **Teaching Assistant @ CISE, Ritsumeikan University**. *Course: Experiments in Artificial and Natural Intelligence.* I instructed students to conduct various experiments with ECG, EMG sensors and to analyze data, using designated equipment/software in the laboratory.

Talks

- **[Jun 2024]** Evaluation of Cue-based Protocol Implementations in Motor Imagery - based Brain-Computer Interface Experiments. *In the NeuroCoB Society's Brainconnects Hybrid Joint International Neuroimaging Conference & fMRI/PET-CT Workshop (NSNC2024) – Putrajaya, Malaysia.*
- **[Oct 2019]** Exercise Physiology: Improving Stationary Bike Training Performance Using Heart Rate Variability. *In the International Symposium on Applied Science 2019 (ISAS 2019) – HCMC, Vietnam.*
- **[Oct 2019]** Research into the relationship between cardiac responses and neural activity to improve classification of EEG-based imaginary action. *In the 6th International Conference on Applied and Engineering Physics (iCAEP 2019) – Thai Nguyen, Vietnam.*
- **[Mar 2019]** Cardiac endurance training for students by stationary bike. *In the 13th Southeast Asian Technical University Consortium Symposium (SEATUC 2019) – Hanoi, Vietnam.*

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. Conducted experiment on university students (with consultations from HCMC Institute of Biomedical Physics), to evaluate VO2max improvement over the endurance training course.(photo)
- **[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.(photo)

Communitiy Involvement

- **[Jan 2023] Teaching Assistant @ Ritsumeikan Junior High**. I organized activities and trained language skills for Japanese junior students for on-stage competition.
- **[Oct 2022] Technical Staff @ IEEE/RSJ IROS 2022 conference**. I managed attendees' invitations, materials; handled information desk; set up PC at the venue site; in charge of Webinar operations and supported the Chair with technical issues.
- **[Sep 2020 – Apr 2021] EEG Group @ 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

- **[2024]** Tuong Nguyen H. | Topic: *Motor Imagery EEG Analysis* @ VNU-HCM International University.
- **[2021]** Ha Nguyen L. N. | Topic: *Raid-Eye-Movement Detection* @ VNU-HCM University of Technology.
- **[2021]** Duyen Pham M., | Topic: *Sleep Spindle Analysis* @ VNU-HCM University of Technology.

SELECTED SKILLS

- **Programming**: Python, Jupyter/Colab, Matlab, R, Linux
- **Data Analysis**: MySQL, Pandas, Numpy, Scipy, ANOVA
- **Machine Learning**: Scikit-learn, Keras, PyTorch, Boosting models
- **Computer Vision**: OpenCV, Scikit-image, DeepStream
- **Miscellaneous Tools**: Git, Scrum (Jira), Cloud (AWS), Webapp (Streamlit, Flask)
- **Circuits/Hardware**: Arduino, ESP8266, Raspberry Pi
- **Signal Processing**: spectral analysis, signal transformation, signal filtering, time-frequency analysis
- **Language**: Vietnamese (native), English (fluent)

REFERENCE

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