RATTANAPHON CHAISAEN

Ph.D. student at School of Information Science and Technology (IST),
Vidyasirimedhi Institute of Science and Technology (VISTEC), Thailand
github.com/xydxdy

I am experienced in EEG/EMG signal processing, brain-computer interfaces (BCIs), and AI in healthcare. I specialize in end-to-end EEG pipelines—from data acquisition and preprocessing to analyzing large-scale polysomnography (PSG) for movement-related brain patterns—with a strong emphasis on deep learning model reliability. Additionally, I am skilled in developing web applications and RESTful APIs, as well as managing medical data securely through hands-on practice with IRB-compliant protocols and privacy-preserving data handling.

EDUCATION

Vidyasirimedhi Institute of Science and Technology — *Aug 2018 – Present*
Doctor of Philosophy in Information Science and Technology — *Rayong, Thailand*

Khon Kaen University — *Aug 2014 – Jul 2018*
Bachelor of Science in Computer Science (First Class Honors) — *Khon Kaen, Thailand*

RESEARCH INTERESTS

- **Neural Engineering:** Brain-Computer Interfaces (BCIs), Motor Imagery (MI), Sleep EEG, Seizure EEG, and Assistive Technology.
- **Signal Processing:** Machine Learning, Deep Learning, EEG/EMG Analysis of Sleep-Related Movement, and Bio-signal Processing.
- **Applications:** Interdisciplinary Applied Research, Clinical Assistive Tech and AI in healthcare applications.

SUMMARY OF SKILLS

- **BCI & EEG:** Motor imagery BCI system design, asynchronous EEG classification, multi-biosignal (EEG/EMG) recording and analysis, EEG preprocessing (filtering, artifact removal, segmentation), and understanding of normal and abnormal EEG patterns including seizure EEG.
- **Deep Learning & Signal Processing:** Development of time-series deep learning pipelines for EEG/EMG (e.g., CNN-based and hybrid architectures) including preprocessing, feature extraction, and classification (including EEG seizure detection) using TensorFlow, PyTorch, Scikit-learn, MNE, and EEGLAB for bio-signal analysis and AI in healthcare applications.
- **Model Evaluation & Testing:** Model validation and benchmarking using cross-validation, ablation studies, and metrics such as accuracy, F1-score, ROC-AUC, and confusion matrices for EEG/EMG and healthcare-related models.
- **BCI Hardware & Tooling:** g.HIAMP, g.USBAMP, OpenBCI, MUSE EEG, Delsys Trigno Wireless EMG, and real-time data acquisition configuration.
- **Research & Data:** Experimental setup for bio-signals, IRB proposal writing, working with EEG public and clinical datasets including seizure EEG, and implementing state-of-the-art classification models.
- **Medical Data Management & Security:** Understanding of privacy and security for medical and EEG data (e.g., de-identification, access control), and experience designing secure storage and transfer workflows for bio-signal datasets in line with IRB and data protection requirements.
- **Software Engineering & Product Workflow:** Python (expert), MATLAB, C, C++, SQL; RESTful back-end APIs with Flask & Node.js; front-end development with HTML5/CSS3 and JavaScript (React); end-to-end workflow covering requirement analysis and system audit, UX/UI wireframe design, backend workflow, database schema design, QA (integration, functional, user acceptance testing), and deployment of web services.
- **Developer Tools & Practices:** Docker, Git/GitHub and other version control software, Conda, Linux/Bash, reproducible research workflows, and collaborative software development.
- **Leadership:** Advising high school, undergraduate, and doctoral students in research methodology.

RESEARCH EXPERIENCE

Ph.D. Researcher (August 2018 – Present) INTERFACEs LAB, VISTEC, THAILAND.
Supervised by Assoc. Prof. Theerawit Wilaiprasitporn.

- Conducted research in machine learning, deep learning, and signal processing, with a focus on brain-computer interfaces (BCIs), EEG-based monitoring, and assistive technologies.
- Designed experimental protocols and conducted multi-biosignal studies using EEG and EMG data for sit-to-stand and stand-to-sit transitions, including EEG preprocessing (filtering, artifact removal, epoching) and analysis of normal and abnormal brain activity.
- Developed and evaluated deep learning pipelines for EEG time-series, including models for EEG-related analysis and abnormal event detection, with rigorous model validation.

- Managed EEG and clinical datasets under IRB-approved protocols, in accordance with the Declaration of Helsinki 1975, ensuring secure storage, controlled access, and privacy-preserving data handling for medical research.
- Expanded research into related areas, including the evaluation of antidepressant effects in mice after administering Kratom leaf extracts, the analysis of EEG patterns in individuals with long-term Kratom consumption, and the development of a classification model for PD-L1 expression in lung cancer.
- Analyzed large-scale polysomnography (PSG) datasets for processing and identifying movement-related brain patterns during sleep.

WORK EXPERIENCE

Full Stack Developer (Part-Time) (September 2025 – December 2025) FITSLOTH CO., LTD., THAILAND
- Performed requirement analysis and system audit with stakeholders to define features for a micronutrient calculation web application.
- Designed UX/UI wireframes and front-end components using React and HTML5/CSS3.
- Implemented backend workflows and RESTful APIs with Node.js, and collaborated on database schema design.
- Conducted end-to-end QA including functional testing and user acceptance testing (UAT) for the full workflow.

Backend Developer (Part-Time) (May 2024 – December 2024) TRANSPORTATION INSTITUTE CHULALONGKORN UNIVERSITY, THAILAND
- Built a Steel Supply Chain Management System.
- Designed backend workflows, database schemas, and APIs using the Flask framework (Python).
- Implemented and tested integration points across modules, performing functional and integration testing.

Project Researcher (February 2021 – December 2021) PTTEP INTERNATIONAL LIMITED (YANGON BRANCH), MYANMAR.
- Developed PIG signaller detection using deep learning approaches.

Project Researcher (October 2018 – December 2019) VISTEC-PTT ROBOTICS AI AND INTELLIGENT SOLUTION, THAILAND
- Developed a motor imagery-based BCI system for controlling a lower-limb exoskeleton.

JOURNALS

- **R. Chaisaen***, P. Autthasan*, A. Ditthapron and T. Wilaiprasitporn, "AlphaGrad: Normalized Gradient Descent for Adaptive Multi-loss Functions in EEG-based Motor Imagery Classification" in *IEEE Journal of Biomedical and Health*, 2025.
- P. Autthasan*, **R. Chaisaen***, P. Autthasan, H. Phan, M. D. Vos and T. Wilaiprasitporn, "MixNet: Joining Force of Classical and Modern Approaches toward The Comprehensive Pipeline in Motor Imagery EEG Classification," in *IEEE Internet of Things Journal*, 2024.
- J. Nukitram, W. Saengmolee, **R. Chaisaen**, P. Autthasan, N. Sengnon, J. Wungsintaweekul, D. Cheaha, E. Kumarnsit, T. Sudhawiyangkul and T. Wilaiprasitporn, "ANet: Autoencoder-Based Local Field Potential Feature Extractor for Evaluating an Antidepressant Effect in Mice After Administering Kratom Leaf Extracts," in *IEEE Transactions on Biomedical Circuits and Systems*, 2023.
- S. Kiatthaveephong, S. Santiwongkarn, **R. Chaisaen**, C. Rungsilp, T. Yagi and T. Wilaiprasitporn, "An Effect of Limb Position in Motor Imagery Training Paradigm in Immersive Virtual Environment," in *2022 IEEE Sensors*, 2022.
- W. Saengmolee, **R. Chaisaen**, P. Autthasan, C. Rungsilp, N. Sa-ih, D. Cheaha, E. Kumarnsit and T. Wilaiprasitporn, "Consumer-Grade Brain Measuring Sensor in People with Long-Term Kratom Consumption," in *IEEE Sensors Journal*, 2022.
- P. Autthasan*, **R. Chaisaen***, T. Sudhawiyangkul, S. Kiatthaveephong, P. Rangpong, N. Dilokthanakul, G. Bhakdisongkhram, H. Phan, C. Guan, and T. Wilaiprasitporn, "MIN2Net: End-to-End Multi-Task Learning for Subject-Independent Motor Imagery EEG Classification," in *IEEE Transactions on Biomedical Engineering*, 2021.
- P. Thuwajit, P. Rangpong, P. Sawangjai, P. Autthasan, **R. Chaisaen**, N. Banluesombatkul, P. Boonchit, N. Tatsaringkansakul, T. Sudhawiyangkul, and T. Wilaiprasitporn, "EEGWaveNet: Multi-Scale CNN-Based Spatiotemporal Feature Extraction for EEG Seizure Detection," in *IEEE Transactions on Industrial Informatics*, 2021.
- S. Kongwudhikunakorn, S. Kiatthaveephong, K. Thanontip, P. Leelaarporn, M. Piriyajitakonkij, T. Charoenpattarawut, P. Autthasan, **R. Chaisaen**, P. Dujada, T. Sudhawiyangkul, V. Senanarong, and T. Wilaiprasitporn, "A Pilot Study on Visually Stimulated Cognitive Tasks for EEG-Based Dementia Recognition," in *IEEE Transactions on Instrumentation and Measurement*, vol. 70, pp. 1-10, 2021.
- P. Leelaarporn, P. Wachiraphan, T. Kaewlee, T. Udsa, **R. Chaisaen**, T. Choksatchawathi, R. Laosirirat, P. Lakhan, P. Natnithikarat, K. Thanontip, W. Chen, S. C. Mukhopadhyay, and T. Wilaiprasitporn, "Sensor-Driven Achieving of Smart Living: A Review," in *IEEE Sensors Journal*, vol. 21, no. 9, pp. 10369-10391, 2021.
- **R. Chaisaen***, P. Autthasan*, N. Mingchinda, P. Leelaarporn, N. Kunaseth, S. Tammajarung, P. Manoonpong, S. C. Mukhopadhyay, and T. Wilaiprasitporn, "Decoding EEG Rhythms During Action Observation, Motor Imagery, and Execution for Standing and Sitting," in *IEEE Sensors Journal*, vol. 20, no. 22, pp. 13776-13786, 2020.

* equal contribution

ACTIVITIES

Poster Presentation (July 2022) EMBC 2022, GLASGOW, SCOTLAND, UK
- Presented the poster titled "Towards Asynchronous Motor Imagery EEG Classification".
- Volunteered as a student volunteer at the conference.

Mentor (April 2022 – July 2022) AI BUILDERS, VISTEC, AIRESEARCH, AND CENTRAL DIGITAL, THAILAND
- Advised high school students on completing their AI project.

Mentor (October 2020) SCB CHALLENGE '15, THE SIAM COMMERCIAL BANK, THAILAND
- Designed lesson plans and activities for a high school workshop.
- Taught basic Python, wearable devices, and machine learning concepts.
- Provided guidance and follow-ups to ensure students successfully completed their projects.

Mentor (November 2019) SCB CHALLENGE '14, THE SIAM COMMERCIAL BANK, THAILAND
- Taught basic Python, brain-computer interfaces (BCIs), and UX/UI design to high school students.

Oral Presentation (August 2019) SICE LIFE ENGINERRING SYMPOSIUM AND ECTI BIOMEDICAL ENGINEERING, BANGKOK, THAILAND
- Topic "EEG Time-Frequency Comparison of Standing and Sitting Motor Imagery".
- Topic "EMG Time-Frequency Comparison of Standing and Attempting to stand tasks".

Oral Presentation (November 2018) WORKSHOP IN ADVANCED HUMAN-MACHINE INTERACTION FOR IMPROVING QUALITY OF LIFE AND HEALTH, ICSEC 2018, BMEICON 2018, CHIANG MAI, THAILAND
- Topic "Joint Data Training for Motor Imagery-EEG Classification".

Exchange Student Program (November 2017) YAMAGUCHI UNIVERSITY, JAPAN
- Participated in the Japan-Asia Youth Exchange Program in Science (SAKURA Exchange Program in Science), organized by the Japan Science and Technology Agency (JST).

Intern (June 2017 – July 2017) TRUE CORPORATION PUBLIC COMPANY LIMITED, THAILAND (True Academy Project)
- Contributed to a server monitoring project at the Service Command Center.

Intern (August 2016 – January 2017) THAI BEVERAGE LOGISTICS COMPANY LIMITED, THAILAND
- Developed a mobile application to streamline logistic operations for truck drivers.

SCHOLARSHIPS

- **Graduate Study:** Received a fully-funded scholarship from PTT Public Company Limited and The Siam Commercial Bank.
- **Undergraduate Study:** Received a fully-funded scholarship from the Department of Computer Science, Khon Kaen University.
- **High School Study:** Received a fully-funded scholarship from Princess Chulabhorn's Science High School Loei.