PIERRE LE FLOCH

PhD Researcher · Machine Learning for Healthcare · Imperial College London

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RESEARCH PROFILE

Second-year PhD researcher in the department of computer science at Imperial College London (UKRI AI4Health CDT). I develop multimodal machine learning systems for healthcare, with a focus on computer vision, probabilistic time-series forecasting, and personalised clinical decision support in chronic skin disease. Experienced in PyTorch, Bayesian modelling, medical image analysis, and real-world clinical datasets.

EDUCATION

Imperial College London - PhD in Artificial Intelligence for Healthcare *Oct 2024 - Jun 2028*

UKRI AI4Health Centre for Doctoral Training (CDT) · Supervisors: Prof. Reiko Tanaka & Prof. Adnan Custovic

- Developing a multimodal AI framework for diagnosis, monitoring and treatment support in chronic skin disease, integrating clinical images, longitudinal symptom scores, treatment records and environmental data.
- Building deep learning models for image-based lesion segmentation, infection detection and severity assessment, alongside Bayesian state-space models for real-time symptom trajectory forecasting.
- Investigating causal modelling to estimate patient-specific treatment and environmental trigger effects and tune LLMs to extract structured clinical information from free-text for explainable clinical decision support.

Imperial College London - MEng Molecular Bioengineering (First Class Honours) *Oct 2020 - Jun 2024*

Prizes: Best Second Year Group Project · Thesis: 78%

- Developed and benchmarked deep learning segmentation and classification models for automated clinical severity scoring, contributing to the EczemaNet research programme at Imperial.

Lycée Français Charles De Gaulle, London — Scientific Baccalaureate *Jun 2020*

Mathematics 19/20 · Physics 19/20 · Chemistry 18/20

RELEVANT PUBLICATIONS

[1] **Le Floch, P.,** Duverdier, A., Oliveira, S., Moss, R., Hurault, G., Stalder, J.F., Saint Aroman, M., Custovic, A. & Tanaka, R.J. "XemaPred: A Fast and Scalable Computational Framework for Real-Time Forecasting of Eczema Severity." *In preparation, 2026.*

[2] Tang, W.H., **Le Floch, P**., Huang, L., Deliot, S. & Tanaka, R.J. "EczemaNet III." *In preparation, 2026*

[3] Wu, H.L.A., **Le Floch, P.**, Duverdier, A., Irvine, A., Dubrac, S. & Tanaka, R.J. "Current research landscape and future prospects of in silico modelling approaches for atopic dermatitis." *JID Innovations. Under consideration, 2026.*

AWARDS & SCHOLARSHIPS

- **AI4Health UKRI CDT Studentship** - Imperial College London, 2024–2028 Full tuition fees and annual stipend funded by UK Research and Innovation (UKRI). One of 19 places awarded nationally across a highly competitive selection process.
- **Best Second Year Group Project** - Department of Bioengineering, Imperial College London, 2022
- **UROP Funding** - Department of Bioengineering, Imperial College London, 2023 Competitively selected for an Undergraduate Research Opportunities Programme placement in Prof. Reiko Tanaka's group.

CONFERENCES & PUBLIC ENGAGEMENT

Machine Intelligence for Health Conference (MI4H) *May 2026*

Accepted for Poster Presentation · The Slate, Warwick Conferences, Coventry

- Presented “XemaPred: A Fast and Scalable Computational Framework for Real-Time Forecasting of Eczema Severity” to an audience of ML researchers, clinicians and industry partners from Imperial, UCL, Leeds and Edinburgh.

ICSM Immunology Conference 2026 - Imperial College London *March 2026*

Workshop Lead · Computational Immunology: Models, Data & Medicine · accessible here

- Led a hands-on workshop introducing computational approaches in immunology, with a focus on AI/ML for personalised prediction, disease modelling, and treatment strategy development.

Great Exhibition Festival *June 2025 & 2026*

- Competitively selected for two consecutive years to exhibit my research at one of the UK's largest public science festivals, engaging 50,000+ visitors with AI-driven tools for personalised healthcare.

RESEARCH & INDUSTRY EXPERIENCE

Machine Learning Engineer / Research Assistant - Tanaka Group, Imperial *Jun - Sept 2023*

- Extended the EczemaNet prediction pipeline with improved data augmentation and architecture refinements, enhancing generalisation and prediction performance over the prior published baseline.
- Architected a modular PyTorch training framework integrating Hydra and PyTorch Lightning for scalable, reproducible experimentation.

Bioinformatics Intern - Illumina, Cambridge *Jun - Sept 2022*

- Contributed to the development of Virtual Long Read Detection (VLRD) on the DRAGEN Bio-IT Platform, improving variant calling accuracy in homologous genome regions where short-read approaches fail.
- Implemented a statistical model for somatic cancer mutation detection in homologous genome regions, reaching 90% precision on benchmarked variant calling tasks.

TEACHING & SUPERVISION

Graduate Teaching Assistant & master's student Supervision - Imperial College *Oct 2024 – Present*

- Delivered tutorials for Computer vision, deep learning, Mathematics and Control Engineering for 2 years.
- Co-supervised 3 MEng students in Computer Science at Imperial on projects in time-series generation and image-based infection detection, all passed with highest honor.

Maths Circle Mentor - Axiom Maths *(nationally funded UK charity)* *2025 – Present*

- Delivered weekly 2-hour Maths Circle sessions to a group of 7 high-attaining secondary school pupils (top 5% nationally), using collaborative problem-solving to deepen mathematical thinking beyond the national curriculum.

Private Tutor - Mathematics, Physics, Chemistry & Computer Science Circle Mentor *2020 – 2025*

- Tutored 20+ students at secondary and A-level across maths, physics, chemistry and computer science, 4–10 hours per week; also worked with Cours Thelema (2022) delivering structured lessons.

SELECTED PROJECTS · Full portfolio: *github.com/LeFlochPierre* · *leflochpierre.github.io*

Personal LLM Fine-Tuning Framework · ***Python, PyTorch, Llama 3, QLoRA***

- Fine-tuned open-source LLMs using QLoRA adapters on a private conversational dataset to explore efficient personalisation, domain adaptation and conversational style modelling.

Machine Learning Research projects · ***Python, PyTorch, TensorFlow, Optuna, OpenAI Gym***

- Computer vision: semantic segmentation via U-Net and image classification via Deep CNN with transfer learning, benchmarked across multiple architectures.
- Reinforcement learning: maze navigation agent using Dynamic Programming, Monte Carlo and Temporal Difference methods; cart-pole optimisation with Optuna hyperparameter tuning.

TECHNICAL SKILLS

ML / DL	PyTorch, TensorFlow, JAX, PyTorch Lightning, Hydra, Optuna, Hugging Face, WandB
Languages	Python (expert), R, Stan, PyMC, MATLAB, C/C++, Java, Arduino, Bash, SQL.
DevOps / Infra	Docker, HTML/CSS, Linux, Git, JavaScript, Firebase, LaTeX, Cuda, HPC, multi-GPU workstation management.

LANGUAGES

French (native) · **English** (native) · **Italian** (B2) · **Spanish** (B1)

REFERENCES

Prof. Reiko Tanaka — Imperial College London — r.tanaka@imperial.ac.uk
Prof. Adnan Custovic — Imperial College London — a.custovic@imperial.ac.uk