Jesse Wood

Postdoctoral Research Fellow, Artificial Intelligence for Analytical Chemistry

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SUMMARY

Postdoctoral researcher applying deep learning to mass spectrometry and chromatography so that seafood can be authenticated and traced by its chemistry. PhD in Artificial Intelligence, software engineering background from NIWA, and a habit of shipping research code with tests and CI that colleagues use every day.

EXPERIENCE

Postdoctoral Research Fellow, Victoria University of Wellington 2026 – present

- Researcher in Hiringa te Mahara, the Aotearoa New Zealand pod of Abundant Intelligences, an Indigenous-led programme reimagining AI from Indigenous knowledge systems. Supervised by Dr Kevin Shedlock, School of Engineering and Computer Science.
- Deep learning on GC-MS chromatograms to authenticate fish species and counter illegal, unreported and unregulated fishing, with the Bioeconomy Science Institute (formerly Plant and Food Research).
- Built the group's research software: multi-batch retention-time alignment (joint-align) and self-supervised pretraining on reference spectra (chroma-dcnn).
- Lecture undergraduate Python and AI/ML. Elected postdoctoral representative on the board of the AI Research Association of Aotearoa New Zealand.

Research Assistant, Victoria University of Wellington 2025 – 2026

- Continued the doctoral research on AI for marine biomass analysis with the VUW machine learning groups and industry partners.

Software Developer Intern, then Contract Software Engineer, NIWA 2020 – 2024

- Built and deployed web services (Linux, PostgreSQL, GeoServer) serving national ocean data through OGC-compliant APIs for the New Zealand Ocean Data Network portal, in an Agile team.

EDUCATION

Doctor of Philosophy, Artificial Intelligence, Victoria University of Wellington 2022 – 2026

- Thesis: Machine Learning for Rapid Evaporative Ionization Mass Spectrometry for Marine Biomass Analysis. Wellington Doctoral Scholarship and MBIE Doctoral Grant.
- Transformers at 100% accuracy on species identification and 74% on body parts against a 51% chemometric baseline; SpectroSim, a self-supervised method tracing samples to their batch at 71% without labels; explanations with LIME, SHAP and Grad-CAM.

Bachelor of Engineering with Honours, Software Engineering, Victoria University of Wellington 2016 – 2022

PUBLICATIONS

- Wood J (2026). Machine Learning for Rapid Evaporative Ionization Mass Spectrometry for Marine Biomass Analysis. PhD thesis, Victoria University of Wellington. doi:10.26686/mef0-mr46
- Wood J, Nguyen B, Xue B, Zhang M, Killeen D (2025). Hook, line, and spectra: machine learning for fish species identification and body part classification using rapid evaporative ionization mass spectrometry. Intelligent Marine Technology and Systems 3(1):16. doi:10.1007/s44295-025-00066-3
- Wood J, Nguyen BH, Xue B, Zhang M, Killeen D (2022). Automated fish classification using unprocessed fatty acid chromatographic data: a machine learning approach. Australasian Joint Conference on Artificial Intelligence, 516–529. doi:10.1007/978-3-031-22695-3_36

OPEN SOURCE

ruru, a plain-text literature library with a terminal UI and an agent-friendly CLI; taura, a provenance ledger linking every number in a paper to its run and commit; joint-align and chroma-dcnn, GC-MS research code built on both, with every result traced by taura and every citation checked by ruru; gpu-spooler, a job queue for SSH-reachable GPU servers; kete, a local-first personal finance CLI and TUI; qsh, a local vision-language model for the Unix pipe in Rust and Python; ZeroSlop, a Chrome extension that flags AI-generated posts.

SKILLS

Machine learning: PyTorch, Transformers, Hugging Face, scikit-learn, NumPy, pandas, Optuna, DEAP, Weights & Biases, LIME, SHAP, Grad-CAM, conformal prediction
Analytical data: REIMS and GC-MS mass spectrometry, chromatogram alignment, high-dimensional low-sample-size learning
Languages and systems: Python, Rust, C++, Haskell, TypeScript, SQL, Docker, Linux, Git, PostgreSQL, GeoServer, Bun