

Zipeng Wu

Temporal Representation for Foundation / World Models | Time-Series ML | ICML 2026
First Author

Birmingham, UK | zxw365@student.bham.ac.uk | +44 7778 407427 | [LinkedIn](#) | [GitHub](#) | [Google Scholar](#) | [UoB profile](#)

Core profile. Time-series machine learning researcher in Applied Mathematics at the University of Birmingham. My research starts from temporal/time-series representation under non-stationarity, including decomposition as representation extraction, forecasting, retrieval/similarity search, symbolic regression, and sequence-level evaluation. My recent direction extends this traditional temporal-representation line toward foundation and world models, focusing on how action histories, temporal memory, VLA trajectories, computer-use sequences, and model rollouts preserve temporal structure, state/action alignment, and long-horizon consistency.

Targeted Fit: Temporal Representation for Foundation / World Models

Temporal representation	Time-series foundation models	World-model rollouts	VLA trajectories	Long-horizon evaluation
Research spine	Temporal/time-series representation is the central object. Decomposition, forecasting, classification, symbolic regression, similarity search, retrieval, and rollout diagnostics are downstream tests of whether useful temporal structure is preserved.			
Foundation direction	Current work extends traditional time-series representation toward foundation/world-model settings, with emphasis on temporal representation rather than generic world modelling.			
Representation targets	Action histories, temporal memory, VLA trajectories, computer-use sequences, state/action histories, and long-horizon model rollouts.			
Evaluation angle	Strongest fit where models must preserve temporal causality, state/action alignment, task progress, retrieval context, and rollout consistency beyond next-step prediction accuracy.			

Selected Grants, Scholarships and Compute Awards

UKRI/AIRR 2026	<i>Language-Action Time-Series Tokenization for Efficient VLA Policies</i> (AIRR-GW 0261-9925-2489-1), Jul 1–Sep 29 2026: 10,000 GPUHR compute allocation on Isambard-AI, with nominal compute-resource value £45,000; compute resources only, not direct cash funding.
UKRI/AIRR 2026	<i>Time Series Language and Foundation Model</i> (AIRR-GW 0261-5623-3483-1), Jun 11–Sep 9 2026: 10,000 GPUHR compute allocation on Isambard-AI, with nominal compute-resource value £45,000; compute resources only, not direct cash funding.
Terms	UKRI/AIRR compute awards total 20,000 GPUHR on Isambard-AI, with nominal compute-resource value £90,000. Award terms state compute resources only, not direct cash funding.
UoB PhD scholarship	University of Birmingham College PhD scholarship, Jan 2024–Jul 2027: full scholarship support for Applied Mathematics PhD study, covering tuition fees and stipend/living costs.

Selected Publications and Presentations

ICML 2026	Time-Series Decomposition as a Standalone Task: A Mechanism-Driven Diagnostic Benchmark. Zipeng Wu, Jiani Wei, Shiqiao Zhou, Jiajun Chen, Fabian Spill, and J. W. Andrews*. <i>Forty-third International Conference on Machine Learning (ICML 2026)</i> , CORE/ICORE A*, 2026. First author. Decomposition as temporal representation: extracting trend, oscillatory/periodic, residual, and mechanism-relevant structure for diagnostics and downstream learning.
KDD 2026	Stationarity-Aware Retrieval-Augmented Time Series Forecasting. Shiqiao Zhou, Holger Schöner, Zipeng Wu, Edouard Fouché, IAG Wilson, and Shuo Wang*. <i>32nd SIGKDD Conference on Knowledge Discovery and Data Mining (KDD 2026)</i> , CORE/ICORE A*, 2026. Co-author. Related co-authored work on retrieval-augmented forecasting under stationarity shifts.
BIBM 2024	iTARGET: Interpretable Tailored Age Regression for Grouped Epigenetic Traits. Zipeng Wu, Daniel Herring, Fabian Spill, James Andrews. <i>IEEE International Conference on Bioinformatics and Biomedicine (BIBM)</i> , CORE/ICORE B, pp. 647–652. First author. Interpretable regression framework for grouped epigenetic traits.
Heliyon 2023	A novel online multi-task learning for COVID-19 multi-output spatio-temporal prediction. Zipeng Wu, Chu Kiong Loo, Unaizah Obaidallah, Kitsuchart Pasupa. <i>Heliyon</i> , JCR Q1, 9(8), e18771, 2023. First author. Online multi-task learning under temporal autocorrelation, spatial dependency, and concept drift.
ICONIP 2023	Correlated Online k-Nearest Neighbors Regressor Chain for Online Multi-output Regression. Zipeng Wu, Chu Kiong Loo, Kitsuchart Pasupa. <i>ICONIP 2023</i> , CORE/ICORE B, LNCS 14449, pp. 28–39. First author; oral presentation. Online multi-output regression with chain structure for exploiting target correlations.
ICONIP 2022	An Interpretable Multi-target Regression Method for Hierarchical Load Forecasting. Zipeng Wu, Chu Kiong Loo, Kitsuchart Pasupa, Licheng Xu. <i>ICONIP 2022</i> , CORE/ICORE B, CCIS 1794, pp. 3–12. First author; oral presentation. Interpretable multi-target learning for energy/load time series.

Dynamic regressor-chain modelling for urban mobility time-series demand.

Education

2024–2027	PhD Researcher in Applied Mathematics Advisors: Prof. J. W. Andrews and Dr. Fabian Spill. Focus: temporal representation, decomposition as representation extraction, trend/periodic/residual structure, sequence diagnostics, symbolic regression, forecasting, classification, similarity search, and robust evaluation under non-stationarity.	University of Birmingham, UK
2020–2023	Master of Computer Science (Research) Research in online machine learning, multi-output regression, spatio-temporal prediction, and time-series forecasting.	Universiti Malaya, Malaysia
2015–2019	Bachelor of Engineering Information Technology; computing and engineering-oriented problem solving.	Guilin University of Electronic Technology, China

Selected Software

De-Time	De-Time: time-series decomposition as representation extraction. Python/CLI workflow for extracting trend, oscillatory/periodic structure, residuals, method-specific components, and metadata through a stable interface. [project]
EchoTime	EchoTime: explainable time-series similarity for humans and agents. Compares time series and datasets, explains structural matches/differences, and emits compact JSON plus shareable HTML reports. [project]

Quantitative Research Internships

Feb–Jul 2021	Quantitative Strategist Intern Developed digital-asset quantitative strategies, exchange-trading prototypes, and Python backtesting workflows for strategy evaluation.	Endemaj Token Fund, Kuala Lumpur
Jun–Sep 2018	Quantitative Strategist Intern Worked with cryptocurrency OHLCV/minute data; built backtests using Sharpe ratio, maximum drawdown, moving averages, RSI, and Bollinger-band-style signals.	Beijing Singularity Disintegration Co., Beijing

Technical Skills

Programming and research engineering: Python, PyTorch, scikit-learn, NumPy, SciPy, pandas, Git, Linux, reproducible ML pipelines, experiment tracking, benchmark design, JSON/Markdown reporting, and research-code packaging.

Temporal / time-series ML: temporal representation, time-series representation, decomposition as representation extraction, trend, periodic, and residual structure, forecasting, retrieval/similarity search, classification, online learning, multi-output regression, symbolic regression, and benchmarking under non-stationarity.

Foundation / world-model temporal representation: temporal representation for foundation/world models, time-series foundation models, action histories, action tokenization, temporal memory/retrieval, VLA trajectories, computer-use sequences, long-horizon consistency, and rollout diagnostics.

Availability: available for 6+ month research internships/placements where research-aligned; Student visa valid through May 2028; PhD scholarship runs Jan 2024–Jul 2027; supervisor supports PhD fieldwork/work-placement or external research placement, subject to University/Student visa documentation.