ROUSSEL DESMOND NZOYEM

Machine Learning researcher specialising in rapidly adaptable physics-informed and rule-based systems

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ABOUT ME

I design principled data-driven algorithms that leverage physical rules for world modelling, simulation and control. My commitment to solving pressing real-world challenges is reflected in my research, teaching, outreach, and my hobbies.

SKILLS

Neural ODEs | 3D Animation | Inverse problems | Diffusion/Flow matching | GNNs | Simulation | Transformers | Differentiable programming | Distributed Training | CI/CD | PDEs | Finite Elements/Volumes | OpenMP | MPI | UDEs | Foundation Models | Forecasting | Reduced-Order Modelling

Interpersonal: Teamwork, open-source collaboration, cross-cultural communication.

Work ethic: Rigour, adaptability, efficiency in dynamic and fast-paced environments.

TOOLS

C/C++ | CUDA | Python | Julia | JAX | Git | AWS | Linux | TensorFlow | PyTorch | Docker

RESEARCH INTERESTS

Model Adaptation
- Meta-learning, few-shot learning
- Out-of-distribution generalisation
- Test-time training, in-context learning

AI Fundamentals
- Sequence Modelling, NLP
- Computer Vision and World Models
- Foundation Models for Science

Scientific Machine Learning
- Physics-Informed AI for solving PDEs
- Spatial simulation of physical systems
- Differentiable programming at scale

LANGUAGES

English ●●●●●
French ●●●●●
Japanese ●●●○○
Spanish ●●○○○

RESEARCH & WORK EXPERIENCE

Visiting Researcher | **AMII, University of Alberta** | Edmonton, CA
November 2025 — January 2026
- Accelerating in-context learning for world models, with applications to digital twins and character animation
- Hosted by Dr Bahareh Tollooshams

Teaching Assistant | **University of Bristol** | Bristol, UK
January 2022 — September 2025
- Collaborated with faculty across multiple departments to support 200+ students in AI, HPC, Computer Architecture, and Cloud Computing courses
- Nominated for the Bristol Teaching Awards for excellent lecture quality and student impact

Data Science Internship | **SLB (Schlumberger)** | Oxford, UK
June 2024 — September 2024
- Scaled Graph Neural Network (GNN) 3D inputs by 10X, enabling production-scale modelling of large-scale PDE systems
- Implemented novel JAX GNN layers using Jraph, and achieved 2X speedup compared to PyTorch's PyG
- Achieved zero-shot super-resolution and transfer learning from small to large graphs for reservoir simulation

PhD Summer Projects | **HPC Research Group & Bristol Robotics Lab.** | Bristol, UK
May 2022 — August 2022
- Extensively explored path planning and stable grasping under disturbance within Mujoco
- Integrated differentiable physics simulators (MuJoCo MJX + NVIDIA WARP) for robotics and human body sims
- Accelerated algebraic multigrid solvers by using GNNs, benchmarking across DGL, PyG, and Jraph frameworks

MSc Internship | **Jacques-Louis Lions Laboratory (Sorbonne University)** | Paris, FR
February 2021 — July 2021
- Developed physics-based generative models for complex, non-linear dynamical systems, simulating ice floe fracture using mass-spring-damper (MSD) systems and the Francfort-Marigo model
- Developed an interactive software for MSD percussion and fracture simulation using Python's Flask
- Led to my MSc thesis "Fracturing of ice floes by impact in a granular mode", supervised by Prof Stéphane Labbé

MSc Internship | **Research Institute Mathématiques Avancées (IRMA)** | Strasbourg, FR
June 2020 — August 2020
- Addressed an inverse problem using a VNet architecture for the supervised reconstruction of a domain's density, with the radiative transfer equation (RTE) solved via a Finite Volume scheme to generate data.

EDUCATION

PhD in Machine Learning (Interactive AI) | **University of Bristol** | Bristol, UK
September 2021 — February 2026
- Thesis: "Learning to Learn Sequential Dynamics: Context-Aware Out-of-Distribution Adaptation for Time Series and Physical Systems", examined by Prof Nathan Kutz and Dr Gabriel Leivas Oliveira
- PhD supervised by Dr. Tom Deakin, Prof. David Barton, and Prof. Simon McIntosh-Smith
- Published 5+ first-author papers at top-tier venues (ICLR, CoLLAs, AAAI, SuperComputing)

MSc in Applied Mathematics (CSMI) | **University of Strasbourg** | Strasbourg, FR
September 2019 — September 2021
- Theoretical and practical analysis of partial differential equations, signal processing, and deep learning
- Thesis: "Ice floe fracture in a granular model", advised by Prof. Stéphane Labbé at Sorbonne's LJLL
- Completed the degree with exceptional distinction (FR: 18.1/20 — Excellent, UK: 1st, US: 4.0)

BSc in Mathematics | **Aix-Marseille University** | Marseille, FR
November 2017 — July 2019
- Strong accent on statistics, algebra, advanced calculus, and numerical analysis; achieved with 15.25/20

Associate degree in Mechatronics | **Oshima College of Technology** | Oshima, JP
April 2017 — June 2019
- Intensive training focusing on mechanical, electrical, and computer science engineering
- Assembly languages for the CASL and CASL II machines

Associate degree in Computer Science | **University of the People** | Pasadena, USA
January 2017 — April 2019
- Theoretical and applied computer science followed by web and software development projects
- Assembly language and low-level computer architecture

OUTREACH & VOLUNTEERING

Outreach Ambassador, Widening Participation Tutor
University of Bristol | Bristol, UK
September 2022 — Present
I lead the CodeMakers initiative to foster curiosity in young students with after-school programming activities. We also deliver STEM sessions to aspiring UoB students.

Volunteer Private Instructor
ExamStar | Bristol, UK
September 2022 — July 2024
Affordable mathematics lessons for primary and secondary school pupils via Zoom and MS Teams.

Volunteer Language Tutor
UoB Global Lounge | Bristol, UK
September 2022 — December 2022
Bi-weekly position as a French language tutor at the Global Lounge's Language Café.

Volunteer Staff
University of Bristol | Bristol, UK
September 2022
I worked aboard the SS Great Britain to set up and evaluate exhibitions for the FUTURES Festival of Discovery.

Private Instructor
Complétude | Strasbourg, FR
January 2020 — January 2021
Weekly monitoring of high school students in mathematics and computer science with group tutoring during holidays.

TRAINING & CERTIFICATES

AWS Machine Learning Foundations 2022
Udacity — October 2022

React Front to Back 2022
Packt — September 2022

Deploying a Model for Inference at Production Scale
NVIDIA — August 2022

Introduction to Higher Education (HE) Teaching
UoB — January 2022

Electrotechnique I
EPFL — December 2015

SERVICES

Reviewer for **ICLR**'25'26

Top Reviewer for **ICML**'25

Reviewer for **NeurIPS**'25

Reviewer for **TMLR**

Reviewer for **EuroPAR**'24

Associate degree in Maths. and Phys. Sci. | **Polytechnique (NASEY)** | Yaoundé, CMR
September 2014 — April 2017
- First two years (MSP) consisting of mathematics and physics common core subjects
- Ranked 6th out of more than 4,000 candidates in the national entrance exam

GCE A Levels | **Gov. Bilingual High School B'da** | Bamenda, CMR
September 2007 — July 2014
- Série C, with 15.65/20 (mention "Bien")

RECENT PROJECTS

MJ-Warp for Spatial Simulation (***January 2026***)
- Exploring automatic differentiation and gradient-free generalisation (in-simulation) with MuJoCo Warp
- Ongoing project (code available soon)

In-Context Learning of Time Series (***September 2025***)
- Developed a competitive entry for the Singular Stochastic PDE Learning Competition, achieving high-accuracy forecasts of system states under highly noisy conditions
- Engineered and untangled time-lagged time series to uncover predictive dependencies and empirically test the recently-developed WARP linear recurrent model

WARP for Weight-Space Learning (***June 2025***)
- Assembled a team of PhDs and postdocs from UK, France, and the USA to redefined test-time sequence modelling
- Led to the paper "Weight-Space Linear Recurrent Neural Networks" accepted at ICLR 2026
- Code: https://github.com/ddrous/warp

SELECTED PUBLICATIONS

Weight-Space Linear Recurrent Neural Networks
RD Nzoyem, N Keshtmand, EC Fernandez, I Tsayem, RS Rodriguez, DAW Barton, T Deakin
International Conference on Learning Representations (ICLR) 2026

Language Models Do Not Embed Numbers Continuously
A Davies, **RD Nzoyem**, N Ajmeri, T Silva Filho
AAAI Student Abstract & Poster Program 2026

Towards Foundational Models for Dynamical System Reconstruction: Hierarchical Meta-Learning via Mixture of Experts
RD Nzoyem, G Stevens, A Sahota, DAW Barton, T Deakin
SCOPE Workshop @ ICLR 2025

Neural Context Flows for Meta-Learning of Dynamical Systems
RD Nzoyem, DAW Barton, T Deakin
ICLR 2025

Reevaluating Meta-Learning Optimization Algorithms Through Contextual Self-Modulation
RD Nzoyem, DAW Barton, T Deakin
Conference on Lifelong Learning Agents (CoLLAs) 2025

A comparison of mesh-free differentiable programming and data-driven strategies for optimal control under PDE constraints
RD Nzoyem, DAW Barton, T Deakin
SuperComputing (SC) 2023 Workshop on AI4S

SELECTED PREPRINTS

Out-of-Support Generalisation via Weight Space Sequence Modelling
RD Nzoyem
arXiv Preprint 2026

FLEX: Feature Importance from Layered Counterfactual Explanations
N Keshtmand, **RD Nzoyem**, J Clark,
arXiv Preprint 2025

Learning to Learn Sequential Dynamics
RD Nzoyem
ResearchGate Preprint 2025

OTHER SERVICES & RESPONSABILITIES

- ***24-25th June 2025*** — I co-organised the Joint UKRI CDT Conference in Artificial Intelligence, Machine Learning & Advanced ComputingInteractive Artificial Intelligence / Practice-Oriented Artificial Intelligence
- ***26-27th March 2024*** — I co-organised The Interactive AI Spring Research Conference

TALKS

- (*10 June 2025, University of Bristol, Bristol, UK*) **Workshop on Scientific Machine Learning in the Faculty of Engineering** — "Weight-Space Linear Recurrent Neural Networks"
- (*13 Feb 2025, University of Bristol, Bristol, UK*) **EPS Seminar Series + Engineering Design Society** — "Neural Context Flows for Meta-Learning of Dynamical Systems"
- (*13 Nov 2024, Institute of Physics, London, UK*) **2nd workshop on Physics Enhancing Machine Learning in Applied Mechanics** — "Differentiable Programming for Mesh-Free Fluid Control"
- (*10 Mar 2023, CMU Africa, Kigali, Rwanda*) **Graduate Degree Student Seminar** — "Emerging Techniques and Applications of Graph Neural Networks"

AWARDS AND SCHOLARSHIPS

- **Financial Assistance** by **CRM** (*May 2025*) — Assistance for all expenses to attend the Mathematical Foundations of Data Science thematic programme at the CRM in Montréal.
- **Financial Assistance** by **ICLR** (*March 2025*) — Funding for registration, travel, and accommodation to present multiple research papers at ICLR'25 in Singapore.
- **CDT Studentship** by **UK Research and Innovation** (*June 2021*) — Fully-funded scholarship to pursue a PhD within the Interactive AI CDT at the University of Bristol.
- **MEXT (Monbukagakusho)** by **The Japanese Government** (*November 2016*) — For this prestigious international scholarship, I was the only one chosen amongst hundreds of candidates.
- **Fondation Hoffmann** by **University of the People** (*April 2017 & April 2018*) — Scholarship granted (and renewed) to fully support assessment fees.
- **Excellence Award** by **The President of the Republic of Cameroon** (*July 2015 & July 2016*) — Prize awarded for two consecutive years for my outstanding accomplishments at Polytechnique Yaoundé.
- **Excellence Award** by **PKFokam Institute of Technology** (*July 2014*) — For my fourth place at the PKFokam Excellence national mathematical olympiad.
- **Excellence Award** by **Les Brasseries du Cameroun** (*October 2014*) — Grant awarded to the best student at the GCE A-level in every region of Cameroon.

REFERENCES

Dr. Tom Deakin (HPC Research Group, University of Bristol)
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Pr. David Barton (University of Bristol)
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Pr. Christophe Prudh'homme (IRMA, Unistra)
prudhomm@math.unistra.fr — *+33 3 68 85 00 89*

HOBBIES & PERSONAL SKILLS

Video games and coding: Fan and designer;
Cinema and music: Composition, documentary movies;
Football: Regular practice at the amateur level;
Traveling: Loves visiting the farthest corners of Earth;
Languages: English & French (*native*), Japanese (*proficient*), Spanish (*basic*).