ROUSSEL DESMOND NZOYEM

PhD researcher specialising in model adaptation and deep sequence models.

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ABOUT ME

A creative problem-solver fascinated by the intersection of machine learning and scientific computing. I build the next wave of generative models and simulation technologies, leveraging my deep experience in meta-learning, differentiable programming, and HPC to create realistic and immersive virtual worlds.

SKILLS

Transformers | Linear RNNs | Physical AI | Diffusion/Flow matching | GNNs | Simulation | Optimisation | Differentiable programming | Optimal control | CFD | PDEs | Finite Elements/Volumes | OpenMP | MPI | OpenCL | Computer Vision | 3D Graphics | Cloud Computing

Interpersonal: Teamwork, cross-cultural communication (fluent in 4 languages).

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

Machine Learning
- Out-of-distribution generalisation
- Test-time training, in-context learning

Simulation
- AI for partial differential equations
- Computer graphics & photorealism

High-Performance Computing
- Parallelisation algorithms
- Efficient linear recurrence inference
- Hardware-aware distributed training

LANGUAGES

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

RESEARCH & WORK EXPERIENCE

Teaching Assistant | **University of Bristol** | Bristol, UK
January 2022 — Present
- Supported **MSc** units—Introduction to AI, High-Performance Computing, Computer Architecture, Cloud Computing—and **BSc** units—Scientific Computing, Engineering Mathematics (EMAT) 1&2
- Received one Bristol Teaching Awards nomination for preparing and delivering lectures for EMAT

Data Science Internship | **SLB (Schlumberger)** | Abingdon, UK
June 2024 — September 2024
- Scaled by 10X Graph Neural Networks (GNNs) inputs for proxy modelling of carbon capture and storage
- 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

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 NVIDIA's WARP and MuJoCo's MJX for robotic spatial simulation and control (follow-up work)
- Accelerated algebraic multigrid linear solvers with GNNs, benchmarking DGL, PyG, and Jraph

MSc Internship | **Jacques-Louis Lions Laboratory (Sorbonne University)** | Paris, FR
February 2021 — July 2021
- Theoretically studied the collapse of the Arctic ice cap via a percussive granular model. Ice floes were modelled with mass-spring-damper (MSD) systems, and fracture with 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
- Inverse problem using ML (VNet) for the supervised reconstruction of a domain's density, with the radiative transfer equation (RTE) solved via a Finite Volume splitting scheme to generate ground truth data

EDUCATION

PhD in Machine Learning (Interactive AI) | **University of Bristol** | Bristol, UK
September 2021 — (Anticipated February 2026)
- Meta-learning, test-time training, and parameter efficient fine-tuning for OoD generalisation
- Physics-informed neural networks and generative models for sequential data and spatial computing
- Supervised by Dr Tom Deakin, Pr David Barton, and Pr Simon McIntosh-Smith

MSc in Applied Mathematics (CSMI) | **University of Strasbourg** | Strasbourg, FR
September 2019 — September 2021
- Modelisation, simulation, and optimisation of physical systems on high-performance computing clusters
- Theoretical and practical analysis of partial differential equations, signal processing, and deep learning
- 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

RECENT PROJECTS

MJ-Warp (*September 2025*)
- Developed novel control algorithms for robotic manipulation in highly realistic physics simulations by integrating NVIDIA WARP with MuJoCo's MJX, directly aligning with research in AI for simulation and VR environments.

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

OTHER SERVICES

Reviewer for **ICLR**'25

Top Reviewer for **ICML**'25

Reviewer for **NeurIPS**'25

Reviewer for **TMLR**

Reviewer for **EuroPAR**'24

SELECTED PUBLICATIONS

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

Neural Context Flows for Meta-Learning of Dynamical Systems
RD Nzoyem, DAW Barton, T Deakin
International Conference on Learning Representations (ICLR) 2025

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

MixER: Better Mixture of Experts Routing for Hierarchical Meta-Learning
RD Nzoyem, G Stevens, A Sahota, DAW Barton, T Deakin
SCOPE Workshop @ ICLR 2025

SELECTED PREPRINTS

Weight-Space Linear Recurrent Neural Networks
RD Nzoyem, N Keshtmand, I Tsayem, DAW Barton, T Deakin
arXiv Preprint (2025)

Language Models Do Not Embed Numbers Continuously
A Davies, **RD Nzoyem**, N Ajmeri, T Silva Filho
arXiv Preprint (2025)

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

Learning to Learn Sequential Dynamics
RD Nzoyem
(2025)

SERVICES & RESPONSIBILITIES

- ***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*).