

Dayoon Jung

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Profile

MPhys Theoretical Physics graduate with experience in statistical deep learning, physics-informed neural networks and ML engineering for quantitative MRI. Skilled in Python/PyTorch, simulation-based validation and reproducible model evaluation.

Education

University of Edinburgh, MPhys Theoretical Physics (2:1 Honours) Sept 2022 – May 2026

- Direct Entry to 2nd year.
- Relevant modules: Machine Learning in Python, Medical Physics, Modelling & Visualisation, Fourier Analysis & Statistics, Computer Modelling.

MPhys Project "Simulation-Based Evaluation of Cerebrovascular Reactivity Mapping in BOLD MRI using Physics-Informed Neural Networks" (1st class) github.com/djdayz/MPhys-CVR-PINN

- Developed an end-to-end Python pipeline for analysing high-dimensional time-series data using statistical modelling, simulation and machine learning.
- Processed functional MRI, structural MRI and physiological gas-monitoring data in community standard (BIDS) format.
- Implemented image preprocessing using FSL and FastSurfer, including motion correction, registration, brain extraction and tissue segmentation.
- Implemented voxelwise statistical modelling to estimate vascular response magnitude and temporal delay maps.
- Designed simulation experiments to evaluate parameter recovery under controlled image-noise conditions.
- Compared conventional statistical modelling, supervised learning and a PyTorch physics-informed neural network.
- Evaluated model performance using Bland–Altman analysis, Pearson correlation, RMSE, MAE, SSIM and bias.
- Reduced low-signal-quality response-magnitude RMSE from 0.214 to 0.127 %BOLD/mmHg using the physics-informed neural network.

BVIS Hanoi (A-levels, 2022): Mathematics (A*), Chemistry (A*), Physics (A)

Projects

NeuroCVR-AI: Synthetic MRI Benchmarking and ML Engineering Platform github.com/djdayz/neurocvr-ai-platform

- Built an independent end-to-end ML/R&D platform for synthetic MRI response benchmarking.
- Simulated physiological stimulus-driven MRI time-series data for controlled model evaluation.
- Implemented voxelwise statistical estimation of response magnitude and timing maps.
- Generated NIfTI outputs, quantitative error metrics and reproducible benchmark reports.
- Engineered the workflow as a modular Python package with a src layout, CLI, YAML configuration and automated checks.
- Added Docker, Makefile commands and pytest/Ruff checks to support reproducible development.
- Served benchmark experiments through FastAPI endpoints for health checks, model evaluation and technical QC reporting.
- Deployed and tested the API on AWS EC2.
- Added MLflow experiment tracking for noise-level and random-seed benchmark sweeps.
- Created a research-only medical AI model card describing intended use, limitations and safety considerations.

ML Classification Pipeline: Childhood Depression Risk, UNICEF MICS Malawi

- Built a scikit-learn classification pipeline for 87-feature mixed-type survey data.
- Used preprocessing pipelines for imputation, encoding and feature scaling.
- Optimised a Random Forest classifier using RandomizedSearchCV.
- Interpreted model behaviour using feature importances and logistic regression coefficients.
- Analysed missingness patterns in relation to data quality and socioeconomic context.

Experience

First-Author Poster Presenter, SINAPSE ASM Edinburgh 2026 Jun 2026

Presented first-class MPhys thesis research on statistical modelling and physics-informed deep learning for quantitative MRI analysis to an interdisciplinary medical imaging audience.

Processing Lab Chemist, Engineering for Change, Edinburgh Oct 2023 – Apr 2024

Designed quantitative process monitoring for plastic recycling into 3D-print filament, applying statistical quality control, structured documentation and reproducible reporting.

Project Reporter, EconoVogue Societe, Remote Sept 2023 – May 2024

Produced analytical reports on macroeconomic trends for specialist and non-specialist audiences, strengthening technical writing, synthesis and communication.

Technical Skills

Machine Learning & Statistical Modelling: PyTorch, scikit-learn, physics-informed neural networks, SIREN networks, automatic differentiation, ODE modelling, simulation design, parameter recovery, hyperparameter search, model comparison

ML Engineering: Python, SQL, Git/GitHub, Linux, Docker, FastAPI, Typer, MLflow, AWS EC2, pytest, Ruff, Makefile, API testing

Scientific Computing & Validation: NumPy, SciPy, Pandas, Matplotlib, Bland–Altman analysis, Pearson correlation, RMSE, MAE, SSIM, bias analysis, Gaussian KDE

Medical Imaging: MRI time-series analysis, functional MRI, structural MRI, NIfTI/BIDS, FSL, FreeSurfer/FastSurfer, voxelwise modelling, image registration, tissue segmentation, anatomical masking

Languages: English fluent, Korean native