

# Cameron Shand

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## Education

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### University of Manchester

Manchester, UK

PHD COMPUTER SCIENCE (4-YEAR CDT; EPSRC-FUNDED)

Sept. 2015 – Apr. 2020

**Title** *Evolutionary algorithms in clustering: Challenging problem generation and search space adaptation*

**Topics** Clustering, evolutionary computation, multi-objective optimization, algorithm selection

**Highlighted Project** HAWKS (<https://hawks.readthedocs.io/>)

### UCL (University College London)

London, UK

FIRST CLASS (HONS) MEng BIOCHEMICAL ENGINEERING WITH BIOPROCESS MANAGEMENT

Sept. 2010 – July 2015

**Topics** Mathematical modelling, biochemistry, economic appraisal, plant design, project management

**Master's Project** *Challenges facing a stem cell therapy to restore cardiac function following an acute myocardial infarction*

## Professional Experience

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### Francis Crick Institute

London, UK

SENIOR ML ENGINEER

Sept. 2024 – Present

ML ENGINEER

May 2023 – Sept. 2024

- Delivered scalable, user-friendly platform (*AI OnDemand*) to allow scientists to run and finetune SOTA segmentation models on imaging data, supporting Crick research
- Managed *AI OnDemand* tasks, milestones, and contributors, coordinating with local HPC for rollout and gathering requirements and feedback from scientists
- Successfully led multiple projects for research labs from scoping to delivery, across various tasks and imaging modalities
- Established as a key figure for image analysis, pipelining, and a key part in institute-wide LLM application development
- Advised and supported on multiple projects across the team; assisting with methodology, implementation, scientific writing, UI design, and pipeline architecture, including a novel method for high-content screening analysis
- Created templates and documentation to establish best practices with key tools (e.g. Lightning), raising standards across the team and institute
- Regularly represent the team at internal and external conferences with talks/posters, and co-organiser of the Crick AI Club

### UCL (University College London)

London, UK

RESEARCH FELLOW IN DISEASE PROGRESSION MODELLING AND MACHINE LEARNING FOR CLINICAL TRIALS

Sept. 2020 – May 2023

- Analysed subgroup treatment effects in multiple Alzheimer's clinical trials using disease progression models (DPMs)
- Developed novel unsupervised methods for DPM with inherent uncertainty estimation and outlier detection
- Awarded ATI Postdoctoral Enrichment Award for multi-view clustering/VAEs for multiple neuroimaging modalities project
- Assumed maintenance and greatly optimized pySuStaIn, a widely-used model in industry and academia
- Developed internal containerised tooling for neuroimaging processing
- Won pitch at Race Against Dementia innovation accelerator, and came 2<sup>nd</sup> in NEUROHACK on dementia prediction problem

### IBM Research

Warrington, UK

RESEARCH INTERN

Feb. 2019 – May 2019

- Created explainable ML framework for analysing metagenomic data to predict disease status
- Incorporated numerous models to explore complexity vs. explainability, from random forests to XGBoost to neural networks
- Presented results to large pharma client, highlighting protective and causative bacterial species through explainable ML

### Roche

Basel, Switzerland

INTERN

Aug. 2013 – July 2014

- Designed new pilot-plant, liaising with engineering, project management, and legal departments to ascertain requirements
- Given a formal approval with a £5mil budget after 4 months, despite being given 12 months to complete the task

## Teaching/Supervisory Experience

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### UCL (University College London)

London, UK

SUPERVISOR/MENTOR

Oct. 2021 – Present

- Supervised undergraduate project on cross-cohort data-driven subtype reproducibility (awarded the Sidney Russ Prize)
- Regularly mentor and support PhD students in POND group, both technically and working with local HPC resources

### University of Manchester

Manchester, UK

GRADUATE TEACHING ASSISTANT (GTA)

Sept. 2016 – Apr 2020

- Demonstrated for: *Programming in Python for Business Analytics*, *Data Engineering*, *Foundations of Machine Learning*, and *Modelling and Visualization of High Dimensional Data* Master's modules; and, *Fundamentals of Data Analytics* and *Business Data Analytics* undergraduate modules
- Head GTA for *Data Engineering* — coordinated other GTAs, developed coursework, moderated marking, and delivered weekly 1-hour tutorials
- Nominated for teaching award by students for *Programming in Python* module

SUPERVISOR/MENTOR

Sept. 2017 – Present

- Supervised three MSc dissertations extending my work on search space adaptation and clustering with concept drift
- Supported and advised fellow PhD students as a PGR Mentor and CDT representative

## Skills

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**Programming** Python >>> Bash, Groovy, > R, Julia, L<sup>A</sup>T<sub>E</sub>X > MATLAB

**Concepts** Image analysis, segmentation, clustering, multi-objective optimization, CNNs, LLMs, contrastive learning, Bayesian modelling, evolutionary computation, dimensionality reduction, statistical testing, explainability/interpretability

**Software Engineering** OOP, unit testing, version control, conda/uv, Docker/Singularity, data structures, CUDA, agents, HPC, Cloud (AWS)

**Tools/Libraries** PyTorch, Lightning, Numpy/scipy/matplotlib/pandas/seaborn etc., Nextflow, Napari, Qt, CuPy, PyMC, OpenCV, Hydra, Pydantic, Langfuse, Qdrant, LlamaIndex, FastMCP

**Languages** English (native), German (CEF A2), Romanian (beginner)

## Selected Publications

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Please see [here](#) for a complete list.

### Asymmetric Contrastive Objectives for Efficient Phenotypic Screening

Luke Nightingale, Joseph Tuersley, Scott Warchal, Andrea Cairoli, Jacob Howes, **Cameron Shand**, Andrew J Powell, Darren V.S. Green, Amy Strange, Michael Howell

Accepted at ICML'26

### Heterogeneity in Preclinical Alzheimer's Disease Trial Cohort Identified by Image-based Data-Driven Disease Progression Modelling

**Cameron Shand**, Pawel J. Markiewicz, David M. Cash, Daniel C. Alexander, Michael C. Donohue, Frederik Barkhof, Neil P. Oxtoby, for the Alzheimer's Disease Neuroimaging Initiative

medRxiv (2023)

### HAWKS: Evolving Challenging Benchmark Sets for Cluster Analysis

**Cameron Shand**, Richard Allmendinger, Julia Handl, Andrew Webb, and John Keane

IEEE Transactions on Evolutionary Computation (2021)

### Explainable AI reveals changes in skin microbiome composition linked to phenotypic differences

Anna Paola Carrieri, Niina Haiminen, Sean Maudsley-Barton, Laura-Jayne Gardiner, Barry Murphy, Andrew Mayes, Sarah Paterson, Sally Grimshaw, Martyn Winn, **Cameron Shand**, Will Rowe, Stacy Hawkins, Ashley MacGuire-Flanagan, Jane Tazzioli, John Kenny, Laxmi Parida, Michael Hoptroff, Edward O. Pyzer-Knapp

Scientific reports 11.1 (2021): 1-18