

RIAD IBADULLA, PHD

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PROFILE

Applied deep learning and computer vision researcher and lecturer with a PhD in Computer Science and an MSc in Artificial Intelligence from the University of St Andrews, specialising in efficient deep learning and AI accelerators across both industry and academia. Experience spans deep learning engineering, research, and higher education teaching, including module leadership, supervision, and assessment design at postgraduate level.

EDUCATION

10/2020–12/2024	PhD Computer Science	City, University of London
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Thesis: High Resolution Capabilities of Free-space Optical Neural Networks (CNNs, Transformers, Computer Vision).

- Designed and developed novel deep learning architectures for free-space optical AI accelerators, covering CNNs, Vision Transformers, image classification, semantic segmentation, and medical image analysis.
- Developed the **FatNet** architecture transformation framework, enabling conventional neural networks to be adapted for optical hardware by trading channel depth for spatial resolution while preserving model capacity.
- Designed **Fat-U-Net** and convolution-based Vision Transformer architectures for efficient high-resolution inference under optical computing constraints, including methods for optical parallelisation.
- Built optical neural network simulators and conducted extensive experimental evaluation of ResNet, VGG, AlexNet, U-Net, and Transformer-based models on benchmark computer vision datasets.
- Published three first-author peer-reviewed papers, including a publication in **IEEE Transactions on Neural Networks and Learning Systems (TNNLS)**, demonstrating contributions to optical deep learning, computer vision, and AI accelerator research.

09/2018–08/2019	MSc Artificial Intelligence	University of St Andrews
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Thesis: Simplex Optimisation for Aerial Image Stitching (16.5/20)

- Replaced feature-based matching (SIFT) with a direct, pixel-based stitching method that preserves the original image data and avoids the loss introduced by blending, intended for aerial mapping and research use.
- Estimated the homography aligning two aerial images by minimising a pixel-difference objective function with the Nelder-Mead simplex optimiser, using regularisation to constrain the geometric transformations.

Overall Grade: 72% (Merit)

09/2015–09/2018	BEng Computer Systems Engineering	City, University of London
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Thesis: Estimating Hyperparameters of Long Short-Term Memory in Speech Recognition Systems (72.5)

Overall Grade: 74.14 (First Class)

WORK EXPERIENCE

01/2025–Present **Lecturer in Computer Science** **City, University of London**

Leading Python programming and MSc-level Deep Learning for Computer Vision modules. Supervising both MSc thesis projects and BSc final year dissertations. Designing the assessment, lecturing and assisting with labs for other ML and Software Engineering modules.

Research on medical imaging, segmentation and alignment of knees and locating the correct points for the prostatic patella.

11/2024–04/2025 **Post Doctoral Research (part-time)** **City, University of London**

Research on robust neural networks for intrusion detection, combining deep learning with formal methods (SMT). Developed and analysed recursive delegation techniques to improve robustness against adversarial attacks, with systematic experimentation and quantitative evaluation. Published one paper and preparing **two** more papers.

- Built evaluation tooling for controlled experiments, ablations, and robustness metrics under perturbations.
- Collaborated with academic stakeholders to translate research ideas into implementable prototype.

05/2021–12/2024 **Teaching Assistant** **City, University of London**

Assisted in undergraduate and postgraduate courses across Python, C++, Big Data (GCP/PySpark), and Computer Vision. Supported lab sessions and coursework development, including model training pipelines, evaluation, and reproducibility practices.

11/2019–08/2020 **Deep Learning Engineer** **Optalysys**

Optalysys develops optical co-processors for AI acceleration. Designed and evaluated deep learning models for high-throughput inference, focusing on architecture choices and performance trade-offs under strict compute, memory, and latency constraints.

- Delivered the prototypes and implementations to validate research hypotheses against GPU baselines, including quantitative benchmarking.
- Contributed to a demo project with the UK National Cyber Security Centre for video-based extremism detection, using accelerated preprocessing.
- Partnered with engineering stakeholders to assess integration considerations for optical inference (throughput, numerical stability, pipeline constraints).
- Collaborated on an internal initiative to prototype an AlphaZero-style optical AI model

01/2019–05/2019 **Python Developer (Internship)** **Formation MSK Ltd**

Worked on the “Envision-Engine” project — an analytical tool designed to process KPIs and recommend strategies for telecom retail clients (O2, Vodafone). Focused on data analysis, visualisation, and decision tree logic development.

TECHNICAL SKILLS

- Programming: Python (Advanced), Java (Advanced), Swift (Advanced; shipped an App Store application), JavaScript (Intermediate), C/C++ (Intermediate), C# (Intermediate)
- Deep Learning: PyTorch (Advanced), TensorFlow (Advanced), Keras (Advanced), scikit-learn, NumPy, Pandas, SciPy
- Computer Vision: CNNs, Vision Transformers, image segmentation, feature extraction; medical image segmentation (Swin-UNet, TransUNet); video-based detection

- LLMs & NLP: Hugging Face Transformers, retrieval-augmented generation (RAG), named-entity recognition, token classification (BERT/DistilBERT), local LLM inference (Ollama)
- MLOps & Tooling: Weights & Biases (sweeps, artifact logging), MLflow, DVC, Docker; experiment tracking and reproducible pipelines
- Experimentation & Evaluation: ablations, metrics design, robustness testing, quantitative analysis
- Data & Systems: SQL, Spark, GCP; data curation and processing pipelines for training and evaluation
- Engineering: Git, unit testing, CI/CD, system design, requirements engineering, agile workflow
- Visualisation: Matplotlib, Seaborn, Plotly; Streamlit for model-output visualisation and internal tooling
- Deployment: latency and memory constraints, throughput profiling, numerical stability; prototypes and reference implementations for research-to-production handoff

LANGUAGES

- English (fluent), Russian (native), Azerbaijani (native), Turkish (fluent)

ACHIEVEMENTS & AWARDS

First Place, Generative AI Hackathon hosted by the Data Science Team of 10 Downing Street (Evidence House) – July 2023

Built a genAI prototype to modernise ministerial red boxes, improving workflow efficiency through applied ML and NLP with user-centred design. Presented the winning solution to Minister Alex Burghart at 10 Downing Street.

City St George's news coverage

State Scholarship – “Education of Azerbaijani Youth Abroad” – June 2014

Awarded a fully funded government scholarship covering tuition, living costs, and visa expenses for international study, based on nationwide academic excellence.

PUBLICATIONS

- **R. Ibadulla**, T. M. Chen, C. C. Reyes-Aldasoro, “ConvShareViT: A Vision Transformer-Like Architecture for Free-Space Optical Accelerators” *IEEE Transactions on Neural Networks and Learning Systems*, 2026.
- D. Brito-Pacheco, **R. Ibadulla**, X. Fernández, P. Giannopoulos, C. C. Reyes-Aldasoro, “Persistent Homology and Gabor Features Reveal Inconsistencies Between Widely Used Colorectal Cancer Training and Testing Datasets,” *Medical Image Understanding and Analysis (MIUA)*, Springer, 2025.
- **R. Ibadulla**, H. Asad, “PROTECTION: Provably Robust Intrusion Detection System for IoT Through Recursive Delegation,” *SAFECOMP 2025*, Springer, 2025.
- **R. Ibadulla**, C. C. Reyes-Aldasoro, T. M. Chen, “Fat-U-Net: Non-Contracting U-Net for Free-Space Optical Neural Networks,” *Proc. SPIE 12903, AI and Optical Data Sciences V*, 2024.
- **R. Ibadulla**, T. M. Chen, C. C. Reyes-Aldasoro, “FatNet: High-Resolution Kernels for Classification Using Fully Convolutional Optical Neural Networks,” *MDPI: AI*, 2023.

Full list: Google Scholar