Abi Langbridge

PhD researcher at Imperial College London, co-supervised by IBM Research. Experienced in developing and applying novel machine learning and optimal transport methods across broad domains. Skilled in bridging academic research and industrial application through internships, international projects, and collaborations with cross-disciplinary teams.

EDUCATION

PhD Design Engineering, Imperial College London (2023 - Summer 2026)
"Discovery of explainable digital twins in adversarial environments"

- Co-funded and co-supervised by IBM Research
- Developed novel methods grounded in optimal transport theory, with applications to algorithmic fairness, anomaly detection, and ontology creation
- Contributed to two Horizon Europe international research projects, collaborating with teams across institutions and disciplines
- Disseminated findings through conference presentations and workshops

MEng Design Engineering, Imperial College London (2022)

- Graduated First Class, Head of School, and awarded Dean's List for academic excellence in all four years
- Received the department's DESIRE Award for AI and Data for thesis on the optimisation of urban cycle commutes using large-scale mobility datasets

INDUSTRY EXPERIENCE

Research Intern, IBM Research Dublin (Summers 2022 - 2025)

- Adapted and extended algorithms from my PhD research to address challenges in industrial datasets and align with the lab's strategic goals
- Collaborated with multidisciplinary research teams in Dublin and the USA

Freelance Data Scientist (2022 - 2024)

- Specialised in working with large-scale spatiotemporal data, developing scalable analytical methods for various startups
- Worked closely with clients to understand domain-specific challenges, communicating methods and results to non-technical stakeholders

SKILLS AND RESEARCH INTERESTS

Research Areas: Optimal Transport, Explainable AI, Algorithmic Fairness, Anomaly Detection, Semantic Matching, Agentic Systems

Technical Skills: Optimisation, Machine Learning, Statistical Modelling, Data Visualisation, Python (NumPy, PyTorch, JAX), MATLAB, Git

Publications: Six publications (three first author) since the beginning of my PhD at several top-tier computer science conferences

References available upon request.

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TEACHING EXPERIENCE

Dyson School of Design Engineering, Imperial College London (2023 -)

- Taught in-person and hybrid tutorials for “Machine Learning”, “Design Analytics for the Sharing Economy”, and “Data Science” modules
- Provided one-on-one and small group support for students

PUBLICATIONS

- Fabio Lorenzi, **Abigail Langbridge**, Fearghal O’Donncha, James T Rayfield, Bradley Eck & Sal Rosato “Industrial agents: Automatic deployment of heuristic rules for asset monitoring”. Under review at AAAI Conference on Artificial Intelligence (2026)
- **Abigail Langbridge**, Anthony Quinn & Robert Shorten “Overcoming representation bias in fairness-aware data repair using optimal transport”. *Commun. Optim. Theory 2025* (2025) 48, pp. 1-16.
- Alexander Timms, **Abigail Langbridge**, Antonis Antonopoulos, Antonis Mygiakis, Eleni Voulgari & Fearghal O’Donncha “Agentic AI for Digital Twin”. In *Proceedings of the AAAI Conference on Artificial Intelligence* (2025)
- **Abigail Langbridge**, Fearghal O’Donncha, James T Rayfield & Bradley Eck “Optimal transport for efficient, unsupervised anomaly detection on industrial data”. In *Proceedings of the IEEE International Conference on Big Data* (2024)
- Alexander Timms, **Abigail Langbridge** & Fearghal O’Donncha “Agentic anomaly detection for shipping”. In *Proceedings of the NeurIPS 2024 Workshop on Open-World Agents* (2024)
- **Abigail Langbridge**, Anthony Quinn & Robert Shorten “Optimal transport for fairness: archival data repair using small research data sets”. In *Proceedings of the IEEE 40th International Conference on Data Engineering Workshops* (2024)

EXTRA-CURRICULAR EXPERIENCE

Chairperson, Imperial SCUBA Diving Club (2023 - 2025)

- Managed committee of eight to ten students from across Imperial to deliver diver training to more than thirty trainees every year
- Led grant applications for more than £15k of SU funding each year