Dr Fayyaz Minhas

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Biography: *Dr Minhas is an Associate Professor of Computer Science at the University of Warwick, where he leads the Predictive Systems in Biomedicine (PRISM) lab. Trained in computer science and systems engineering, with a doctorate in AI for biomedicine under the Fulbright programme, he has over 14 years of experience spanning academic and industry-facing AI research. His work is driven by a deep fascination in how structure, dynamics, and interaction give rise to biological function and pathology, and in designing novel AI methods that make such patterns interpretable, robust, and translatable. He has led and contributed to large-scale programmes such as PathLAKE, delivering production-grade AI infrastructure for NHS computational pathology, and to industry-partnered projects designing multimodal AI for disease risk stratification, therapeutic response modelling, and biomolecular discovery. His research has resulted in patented technologies, significant competitive research funding, and over 100 high-impact publications across AI, biomedical imaging, and molecular science. Dr Minhas is an active academic leader and mentor, known for building interdisciplinary teams and training researchers at the interface of AI, clinical medicine, and biological science, particularly those motivated by asking why as much as how.*

Core Domains

- **Scientific and multimodal AI**, including foundation models
- **Graph learning and representation learning** for large-scale, weakly supervised data
- **Computer vision at scale** for cellular and tissue imaging
- **Translational AI** for biomedical and drug discovery, including biomarker and therapeutic response modelling

Leadership

- **Strategic AI leadership**, building and leading multidisciplinary teams across AI, engineering, biology, and clinical domains and delivering large-scale research programmes in imaging, omics, and biomolecular discovery.
- **AI capacity building and mentorship**, through formal teaching, doctoral supervision, programme leadership, and developing AI researchers and engineers and embedding sustainable cross-disciplinary practice.

Professional Experience:

University of Warwick, United Kingdom | Associate Professor (2022-Present) | Assistant Professor (2019-2022) | AI Research Lead (Scientific & Multimodal AI for Biomedicine)

- **Provide strategic leadership for artificial intelligence research programmes**, spanning scientific and multimodal AI, computer vision, and graph-based learning, with large-scale deployment across imaging, omics, and biomarker discovery. Played a leading role in delivering national computational pathology infrastructure through the Pathology Image Data Lake for Analytics and Learning (PathLAKE) programme.
- **Translate foundational AI research into real-world impact**, leading the development of patented technologies and industry-facing platforms through close collaboration with clinicians, wet-lab scientists, and computational biologists, and supporting deployment into clinical and translational pipelines.
- **Lead AI capacity building and training**, supervised 10+ PhD students and 30+ postgraduate researchers to completion, delivering advanced AI/ML teaching, and mentoring researchers and engineers across career stages, with a proven ability to communicate complex AI concepts across interdisciplinary academic and clinical teams.

Pakistan Institute of Engineering and Applied Sciences, Pakistan

Principal Scientist | Senior Scientist | 2009-2019

- Led applied machine learning in biomedical imaging and computational biology, delivering end to end systems and mentoring junior researchers.

Qualifications:

- Fellowship of the Higher Education Academy (**FHEA**), United Kingdom
- PhD **Computer Science**, Colorado State University, USA (**Fulbright Scholar**)
- MS **Systems Engineering**, Pakistan Inst. of Engineering & Applied Sciences (distinction)
- BS Computer Sciences, Pakistan Inst. of Engineering & Applied Sciences (distinction)

Academic Experience and Scholarship

- **Over 14 years of sustained academic research experience** in computer science and artificial intelligence, spanning early-career research through to academic leadership.
- **Clear academic progression and recognition**, including promotion from Assistant to Associate Professor at the University of Warwick, reflecting sustained excellence in research, leadership, and impact.
- I**nternationally recognised scholarly contribution** across artificial intelligence and scientific machine learning with senior and corresponding authorship in leading journals and conferences, **including high quality outputs suitable for REF submission**.
- **Academic leadership in education and research culture**, including design and periodic renewal of postgraduate AI and machine-learning modules, contribution to curriculum development, and membership of doctoral (PGR) and research strategy committees.
- **Research environment and academic citizenship**, including founding interdisciplinary research laboratories and contributing to centre-level academic strategy (**Deputy Director, Warwick Tissue Image Analytics Centre**) as well as conference organization

Programme Leadership and Funding

Secured approximately **£2.5M in competitive research funding** at the University of Warwick since 2019 **as principal investigator or major co-investigator**, including **nine funded awards in the past three years**. Provided **strategic leadership for large-scale AI programmes**, with responsibility for scientific direction, team leadership, and delivery across academia, healthcare, and industry.

- **Industry partnered AI for multimodal discovery and colorectal cancer**
  Principal investigator and AI lead on **SpyGlass ML Guided Discovery in Cross Modal Omics** and **Predictive Modelling in Colorectal Cancer**, GSK and GSK KU Leuven collaborations developing AI methods for multimodal discovery, risk stratification, and translational decision support.
- **National scale clinical AI validation and infrastructure**
  Active Co-I and ML leadership roles on **Pathology Image Data Lake for Analytics and Learning PathLAKE and PathLAKE Plus and COBIx Multi Site Validation of AI for Large Bowel Cancer Screening**, delivering deployable AI computational pathology solutions across NHS partners in collaboration with industrial partners.
- **AI for early cancer detection and personalised medicine**
  Principal investigator and AI lead on **Machine Learning for Early Detection of Mesothelioma Using Pleural Fluid Data**, **Identification of Pre-Neoplastic Signatures in Mesothelioma**, and **Causal Modelling with Graph Neural Networks for Personalised Medicine in Computational Pathology**, spanning Asthma and Lung UK, CRUK, and EPSRC funding.
- **Applied AI systems and disease trajectory modelling**
  Principal investigator on **FERRIQ AI Driven Mapping of Disease Trajectories in Genetic Iron Overload**, **Kikohozi Cough App (MRC, Co-I)**, and **Vibrational Spectroscopy Based Prediction of Spatial Analysis and Breast Cancer Receptor Status**, delivering AI driven clinical decision support and diagnostic systems across UK and global health settings.
- **Research environment and capability building**
  Founded and led three interdisciplinary laboratories and served as **Deputy Director of the Warwick Tissue Image Analytics Centre**, establishing sustainable AI environments, infrastructure, and translational pipelines spanning AI, clinical, and biological domains.

Patents: A portfolio of patents translating AI research into deployable technologies for clinical diagnostics, genomics, and molecular discovery.

- **Endometronome: AI platform for quantitative endometrial tissue analysis supporting reproductive health diagnostics and patient stratification |** UK Patent GB2416405.5, filed November 2024 | Co-inventor 35% Conception, supervision, and drafting.
- **IGUANA: Graph learning framework for scalable analysis of cellular architecture in histological images** underpinning industry facing computational pathology platforms | UK Patent GB2213199.9, filed September 2022 | Co-inventor 20%. Idea formulation, implementation supervision, and patent drafting.
- **Machine learning driven discovery of CRISPR Cas9 modulators for genome editing control and safety, in collaboration with the Doudna lab Nobel Prize in Chemistry 2020** | US Patent WO2021108442A2, issued June 2021 | Co-inventor 30%. Conception, machine learning supervision, and patent drafting.

Peer-reviewed Publications*

Published extensively in artificial intelligence, scientific machine learning, and multimodal modelling, with sustained impact across biomedical, clinical, and molecular discovery, with ***70+ Q1 journal publications, 50+ peer reviewed conference papers, 4,600+ citations (h index 37, i10 index 82)****. Publications include Nature Biomedical Engineering (IF 26.6), Gut (IF 26.2), The Lancet Digital Health (IF 24.1), ACM Computing Surveys (IF 28), Journal of Thoracic Oncology (IF 20.8), Nucleic Acids Research (IF 16), Medical Image Analysis (IF 11.8), Cell Reports Medicine (IF 10.6), npj Precision Oncology (IF 8), Analytical Chemistry (IF 6.7), Quantum (IF 6.8), Bioinformatics (IF 5.4), Modern Pathology (IF 5.5), and The Journal of Pathology (IF 5.2). Work presented at leading international conferences including CVPR, ICCV, MICCAI, ISBI, ECCB, ISMB, MIUA, and Learning on Graphs.*

Selected Publications ***Full List: https://scholar.google.com/citations?user=cQ6eO_kAAAAJ**

- ***Confounding Factors and Biases Abound When Predicting Omics Based Biomarkers from Histological Images, Nature Biomedical Engineering, 2025 (in-press)*** Defined a principled framework for identifying and mitigating confounding in histology to omics prediction with foundation models, shaping standards for trustworthy translational AI.
- ***Screening of Normal Endoscopic Large Bowel Biopsies with Interpretable Graph Learning, Gut, 2023*** Introduced interpretable graph learning for large-scale histology analysis, deployed in clinical and translational workflows through the Pathology Image Data Lake for Analytics and Learning PathLAKE.
- ***Cancer Drug Sensitivity Prediction from Routine Histology Images, npj Precision Oncology, 2024*** Demonstrated inference of drug sensitivity directly from tissue morphology, supporting phenotypic screening and therapeutic response stratification.
- ***Cross Linking Breast Tumor Transcriptomic States and Tissue Histology, Cell Reports Medicine, 2023*** Linked histological phenotype to transcriptomic programs using multimodal AI, enabling pathway level inference.
- ***SlideGraph+: Whole Slide Image Level Graphs to Predict HER2 Status in Breast Cancer, Medical Image Analysis, 2022*** Developed graph neural network models connecting tissue architecture to phenotype.
- ***TIAToolbox: An End-to-End Library for Advanced Tissue Image Analytics, Nature Communications Medicine, 2022*** Contributed to a widely adopted open-source platform enabling reproducible computational pathology across research and clinical pipelines.
- ***Insights into Performance Evaluation of Compound Protein Interaction Prediction Methods, Bioinformatics****, 2022* Established robust evaluation principles for compound protein interaction models used in virtual screening and target discovery.
- **Machine Learning Predicts New Anti-CRISPR Proteins, *Nucleic Acids Research****, 2020* Applied machine learning to discover novel anti CRISPR proteins with direct implications for genome editing control, in collaboration **with Jennifer Doudna, Nobel Prize in Chemistry 2020**.
- **RAMClust A Novel Feature Clustering Method for Metabolomics Annotation, *Analytical Chemistry*, 2014** Introduced a machine learning based clustering method that underpins the widely used RAMClustR software and remains foundational in metabolomics workflows.