

MAKANAKA MAZHEKE

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EDUCATION

UCL, London

MSci Medical Physics

2023 - 2027

First Class Average

Physics with a Medical Physics Specialisation

NANYANG TECHNOLOGICAL UNIVERSITY, Singapore

Summer Exchange Student

2026 - 2026

GPA : 4.0/5.0 (B+) in Additive Manufacturing and Bioprinting

KEY SKILLS

- **Magnetic Resonance Imaging:** Brain MRI reconstruction from k-space; Lung MRI respiratory motion data extraction
- **Image Processing:** Python (Scikit-Image), MATLAB (image reconstruction, segmentation, pipeline development)
- **Machine Learning:** Feature engineering; Dimensionality Reduction (t-SNE, PCA); Classical Models (MLP, SVM, Random Forest); Deep Learning (CNNs, TensorFlow/Keras, RNNs/LSTMs)

RESEARCH EXPERIENCE

INSTITUTE OF CANCER RESEARCH

London

Summer Research Scholar

August 2026 - Present

- Building a patient specific AI model to estimate 3D abdominal motion from 2D MRI for cancer radiotherapy under the Radiotherapy Physics Modelling team

ROSALIND FRANKLIN INSTITUTE

Oxford

Artificial Intelligence and Machine Learning Intern

June 2025 - August 2025

- Engineered 3 DNA features (k-mers, z-scores, Word2Vec) and applied 3 machine learning models : Support Vector Machine (SVM), Random Forest (RF), Multi-layer Perceptron(MLP) to predict cancer-linked DNA from 15 cancer types
- Achieved prediction accuracy up to 95%, specificity up to 97% and sensitivity up to 95%, surpassing an existing benchmark
- Visualised cancer-type clustering in DNA data using t-distributed stochastic neighbor embedding (t-SNE)

UCL MEDICAL PHYSICS & BIOMEDICAL ENGINEERING DEPARTMENT

London

Undergraduate Student Researcher

November 2024 - June 2025

- Investigated discrepancies in pathogenicity predictions for Fumarate Hydratase (FH) mutations by bench-marking mechanistic biophysical models against the statistical models (Revel)
- Performed correlation analysis between statistical model outputs (Revel) and structural biophysical features(hinge and binding site distance) to identify predictive patterns

ACADEMIC PROJECTS

UCL DEPARTMENT OF PHYSICS AND ASTRONOMY

London

Lung MRI

January 2026 - April 2026

- Developed a MATLAB pipeline to extract and compare respiratory wave-forms from dynamic lung MRI applying three methods: intensity-based manual and automated ROI tracking, and deformation-based analysis
- Quantified agreement between methods through correlation, phase analysis, lag, and respiratory rate; identified patient-dependent variability and an inverse correlation between Jacobian and intensity signals
- Designed an outlier detection method to assess how agreement degrades during irregular breathing for clinical robustness
Final Grade : 82%

Practical Machine Learning for Physicists

January 2026 - April 2026

- Built CNN architectures to infer cosmological parameters (Ω_m , σ_8) from 2D simulation images in the CAMELS Multi-Field Dataset, implementing macrostate-aware data splits to ensure generalisation to unseen parameter combinations
- Compared models across varying complexity through MSE, R^2 , and loss curves; identifying optimal complexity for limited data
Final Grade : 87%

UCL DEPARTMENT OF MEDICAL PHYSICS & BIOMEDICAL ENGINEERING

Brain MRI

September 2025 - January 2026

- Executed a MRI processing pipeline in MATLAB, reconstructing high-quality 2D/3D images from raw k-space data through Fourier transforms and applying spectral filtering
 - Applied 3D tumour segmentation through intensity thresholding and validated results against ground-truth data, calculating a Dice similarity coefficient of 0.98
 - Corrected 3D volumetric MRI data, and creating informative visualisations for anatomical analysis
- Final Grade : 94%

PUBLICATIONS AND PRESENTATIONS

- de Goes F R, **Mazheke M** , et al. "Exploring Feature Representations for Cancer-Associated sORF Prediction." Oral Talk. ISCB-UK 2026, Robinson College, University of Cambridge, UK. 21–22 April 2026
- **Mazheke, M.** "Machine Learning for Predicting Cancer-Associated Short DNA." Poster Presentation. HDRUK Black Interns Programme Closing Ceremony, The Wellcome Trust, London, United Kingdom. August 2025

AWARDS

- UCL Global Bursary (£800) to fund Nanyang Technological University, Singapore summer programme in Bioprinting and 3D Printing (2026)

VOLUNTEERING AND EXTRACURRICULAR ACTIVITIES

- Secured a £500 Sponsorship Deal with Panda Surgical as the Sponsorship Manager for UCL Medical Physics Society
- Led volunteering efforts to help the homeless in Central London as a Secretary for UCL Street Aid Society
- Student Glider Pilot at the Royal Air Force Chilterns Gliding Club (RAF Halton)