

ZAEEMA HASSAN

Genetics and Molecular Biology Graduate

Molecular Biology - Regenerative Medicine - Microbiology - Cancer Biology

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Research Focus

My research centres on building deep learning systems that turn satellite imagery into actionable geospatial understanding. I work across the full pipeline — from multi-sensor data preparation to model design, training and rigorous evaluation — with a particular emphasis on reproducibility and open science.

01

Deep learning for remote sensing image analysis

Convolutional and attention-based architectures (CNNs, U-Net, Vision Transformers) applied to optical and multi-spectral satellite imagery; transfer learning and domain adaptation across sensors and regions.

02

Land-cover classification & semantic segmentation

Pixel- and tile-level mapping of land cover from Sentinel-2 imagery; handling class imbalance, spatial autocorrelation and label noise at scale.

03

Change detection in multi-temporal imagery

Bi-temporal and time-series architectures for detecting and characterizing land-cover change; robustness to seasonal variation and atmospheric effects.

04

Crop-type mapping from satellite time series

Temporal deep models (1D-CNNs, temporal Transformers) for agricultural classification from dense NDVI/time-series stacks, validated in competitive settings.

Education

B.S. Genetics and Molecular Biology

University of Health Sciences, Lahore

Graduated · GPA 3.85 / 4.0 · Coursework: Molecular Biology, Human Genetics, Recombinant Biology, Microbiology, Cancer Biology, Genetic Engineering

Research Project

CNN-based land-cover classification from Sentinel-2 imagery

Final-year thesis · Jan – Jun 2026 · PyTorch

- End-to-end PyTorch pipeline classifying 6 land-cover classes on 10,000 labeled tiles — 91% test accuracy.
- Designed the full pipeline solo: preprocessing, augmentation, training, evaluation and error analysis.
- Code: github.com/hsajid/landcover

Reproducing attention U-Net for building-footprint segmentation

Independent research · Aug – Oct 2026 · WHU Building dataset

- Re-implemented attention U-Net (Oktay et al.) from scratch — 89.2% IoU vs. 91.1% reported.
- Isolated and documented every implementation difference in a 6-page report.
- Code & report: github.com/hsajid/attn-unet-whu

Kaggle: crop-type classification from satellite time series

Competition entry · Nov 2026 · 1D-CNN + feature engineering

- Ranked 128 / 2,400 with a 1D-CNN and handcrafted temporal-feature approach.
- Public notebook with full evaluation and ablations.

Research Trajectory

My near-term goal is to deepen expertise in foundation models and self-supervised learning for Earth observation — scaling vision architectures to petabyte-scale satellite archives with limited labels. Longer term, I aim to develop change-detection systems that operate reliably across sensors, continents and seasons, and to publish reproducible benchmarks that lower the barrier to entry for the EO research community.

Technical Skills

PROGRAMMING

Python · C++ · SQL

GEOSPATIAL TOOLING

QGIS · GDAL · Google Earth Engine

DATA & ANALYSIS

pandas · NumPy · experiment tracking · statistical evaluation

DEEP LEARNING

PyTorch · scikit-learn · OpenCV

ML TECHNIQUES

CNNs · U-Net · attention mechanisms · time-series models · data augmentation

WRITING & REPRODUCIBILITY

LaTeX · Markdown · versioned, documented code

Key Numbers

3.85 / 4.0

GPA — B.S. Computer Science, Wuhan University

91%

test accuracy — 6-class Sentinel-2 land cover

89.2% IoU

attention U-Net reproduction (vs 91.1% reported)

128 / 2,400

Kaggle crop-type classification ranking

Awards & Certifications

- Merit Scholarship — University of the Punjab · 2021-2025
- Deep Learning Specialization — Coursera certificate · 2025
- 2nd place — Inter-university data science hackathon · 2025

Languages

English

IELTS 7.5 (2026)

Urdu

Native

References

Dr. Faheem Shahzad — Research Supervisor, University of Health Sciences — [email]
Dr. Ali Ammar — Program Coordinator, University of Health Sciences — [email]