

Rusham Elahi

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Research interests: computer vision for Earth observation, change detection, distribution shift.

EDUCATION

Beaconhouse National University, Lahore, Pakistan

Sep 2021 – Jun 2025

BSc Computer Science

Dean's Honor List

PUBLICATION

- T. Fatima*, R. Elahi*, *et al.* (*equal contribution, 5 of 8 authors), "Data-Driven Approach to Assess and Identify Gaps in Healthcare Set Up in South Asia," **ICONIP 2024** (CORE Rank A), Springer CCIS vol. 2297, pp. 199–217. DOI | [arXiv:2409.14194](https://arxiv.org/abs/2409.14194)

RESEARCH EXPERIENCE

SCIT CAIR Lab, Beaconhouse National University, Lahore

Jan 2024 – Jun 2025

AI Researcher – Supervised by Dr. Usman Nazir (University of Oxford)

- Built the Earth Engine implementation and scoring method for the ICONIP 2024 study above, combining travel time, gridded population, and nightlights to rank underserved districts across South Asia.
- Mapped flood inundation across ~240,000 km² of Sindh and South Punjab from Sentinel-1 SAR in Google Earth Engine, using speckle filtering, pre/post-flood differencing and permanent-water removal.
- Trained YOLOv5 on satellite imagery to detect schools and hospitals in flood zones; performed spatial intersection analysis in QGIS to quantify infrastructure damage.

PROJECTS

Transformer Change Detection with Foundation-Model Backbones | *PyTorch, BIT, DINOv2, DOFA* [GitHub](#)

- Reproduced BIT change detection in PyTorch (F1 0.903 on LEVIR-CD vs. 0.893 reported), then swapped its encoder for DINOv2 and DOFA behind a patch-token adapter. Zero-shot LEVIR→WHU-CD: frozen DINOv2 features held F1 0.781 vs. 0.704 for the ResNet baseline, despite a lower in-domain F1 (0.77 vs. 0.90), while fine-tuning the same backbone collapsed to 0.386 — frozen features transferred better than fine-tuned ones.

Flood Segmentation with Geospatial Foundation Models | *Prithvi-EO-2.0, PyTorch, Grad-CAM*

- Deployed NASA-IBM's Prithvi-EO-2.0 (300M) as a Hugging Face Space for Sentinel-2 flood segmentation; independently scored IoU 0.817 / F1 0.899 on Sen1Floods11, +0.145 over NDWI, plus Grad-CAM for failure modes. [Live demo](#)

Single-Image Metric Measurement | *OpenCV, Mask R-CNN, PyTorch* [GitHub](#)

- Calibrated a phone camera from 55 checkerboard views (0.085 px mean per-image / 0.68 px RMS reprojection error), fine-tuned Mask R-CNN to segment the target (val mask IoU 0.96), and recovered real-world dimensions in mm via a homography onto an ISO ID-1 card; every prediction over-estimated, traced to out-of-plane parallax with the object sitting ~20 mm above the reference plane.

Healthcare Resource Predictor | *NumPy, scikit-learn, pandas* [GitHub](#)

- Decision Tree, Random Forest and Gradient Boosting written from scratch in NumPy, matching scikit-learn on 15,756 WHO/World Bank records; 78.5% accuracy on held-out years 2020–2023 under a time-based split.

LocatePro (BSc Final Year Project) | *XGBoost, Google Earth Engine, Python, QGIS, PostgreSQL*

- Collected 12,000+ business POIs via Google Places API; engineered nightlight, population, land-use and Landsat NDWI features in Google Earth Engine as inputs to an XGBoost model predicting business location suitability.

WORK EXPERIENCE

DeviceAlchemy.ai, California, USA (Remote)

Jun 2026 – Sep 2026

Junior Machine Learning Engineer (Contract) – built resumable pipelines that pull multi-million-record scientific datasets through public APIs into sharded parquet, and ran batched graph-neural-network inference to embed ~160k structures for downstream property prediction.

Adamant Platforms (Remote)

Jun 2026 – Present

Software Engineer (Contract) – ship features on a production insurance CRM (Laravel/Angular and React/FastAPI, Docker on AWS), including AI chatbots, a bilingual client portal and an 8-workflow n8n lead-intake pipeline on Postgres.

Faust Future, Germany (Remote)

Nov 2025 – Jan 2026

Freelance Software Engineer – built a generative AI pipeline with the Gemini API on Next.js + Supabase, and shipped 7+ custom Whop applications with authentication, payments, and multi-tenant access control.

Systems Limited, Lahore, Pakistan

Sep 2024 – Oct 2024

AI Intern – built and trained neural networks in TensorFlow with the AI team.

TECHNICAL SKILLS

ML & Computer Vision: Python, PyTorch, TensorFlow, scikit-learn, XGBoost, NumPy, pandas, OpenCV, Hugging Face, CNNs and vision transformers, object detection (YOLOv5), instance segmentation (Mask R-CNN), semantic segmentation (ViT backbones), camera calibration and homography, model interpretability (Grad-CAM)

Geospatial & Data: Google Earth Engine, QGIS, Sentinel-1/2, Landsat, SQL, PostgreSQL, Streamlit

Software & AI Tooling: Next.js, React, TypeScript, Node.js, FastAPI, Laravel, Supabase, Docker, AWS, n8n, Gemini API, agentic coding (Claude Code, Cursor)