

# Hayat Ullah Abid

The Institute of Geographical Information Systems (IGIS)  
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## PROFESSIONAL SUMMARY

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As a Geo-Informatics Engineer, I am an inventive spatial data scientist, proficient in GIS, enterprise geospatial systems, IoT-based telemetry, machine learning, and full-stack web development. With a track record of contributing to multiple national-level projects, I bring a wealth of experience and a proven ability to deliver impactful results. Eager to continue achieving more, I am dedicated to leveraging my skills and expertise to drive positive change and innovation.

## EDUCATION

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**Bachelor of Engineering, Geo-Informatics, 2020 – 24**  
NUST, Islamabad, Pakistan  
GPA: 3.74/4

High Achiever Scholarship, NUST  
NUST High Achiever Award

**A-levels, Science, 2017 – 2020**  
Roots IVY International, Islamabad, Pakistan  
Grade: A

High Achiever Scholarship

**O-levels, Science, 2015 – 2017**  
The Fazle Haq College, Mardan, Pakistan  
Grade: 7 A's

High Achiever Gold Medal  
Fully Funded Scholarship,  
Government of Pakistan (KPK)

## RESEARCH PUBLICATIONS

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### Journal Manuscripts

**Abid, H. U.,** Zafar, M., Siddiqui, M. S., Arslan, M., Shah, W. U. *Machine Learning-Based Land Use and Land Cover Classification for Assessing Land Surface Temperature in Swat Valley, Pakistan.* (Manuscript ready for submission)

### Conference Papers & Presentations

**Abid, H. U.,** Farooq, M., Arslan, M., Aslam, A. *Promoting Sustainable Livelihoods in Shangla: A Geospatial Analysis for Organic Farming Suitability.* Accepted for Oral Presentation, SUPTM 2026 (MDPI / Sciforum)

**Abid, H. U.,** Zafar, M., Arslan, M., Essa, M. *Unlocking the Potential of Blockchain Technology for Land Parcel Tokenization in Pakistan.* IC-WEES 2023, Islamabad, Pakistan

## SELECTED RESEARCH PROJECTS

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**GeoMetro Cockpit: Multi-Country Territory Planning & Web GIS Platform**  
Geometro GmbH, Barbing, Germany

07/2024 – present

- Developed core features for a multi-country Web GIS cockpit supporting Germany, Austria, Switzerland, France, Belgium, and Italy
- Implemented ZIP-code mapping, instant visualization, legends, pop-ups, export tools, and country-specific viewers
- Improved data handling, UI workflow, and backend performance for enterprise geo-marketing use cases
- Collaborated on scalable geospatial architecture to support large, multi-national datasets

## **Cross-Border Logistics Tracking & Geo-Analytics Platform**

10/2025 – present

*NUST, Pakistan*

- Developing a microservices-based geospatial system for real-time truck tracking and routing
- Implemented offline GPS synchronization and telemetry analytics across CIS, Iran, Azerbaijan, Georgia, and Turkey
- Integrated AWS IoT, Valkey, S3, and GraphHopper for scalable routing and data ingestion
- Designed system architecture to support cross-border logistics and real-time decision-making

## **AI-Based Military Common Operating Picture**

07/2023 – 05/2024

*Final Year Design Project*

- Designed an AI-driven battlefield management system for real-time situational awareness
- Automated operational workflows using computer vision and deep learning techniques
- Reduced manual intervention by enabling intelligent machine-assisted decision support
- Focused on optimizing efficiency, coordination, and strategic execution in field operations

## **Precision Agriculture: Remote Sensing-Based System Characterization**

03/2024 – 02/2025

*NUST, Pakistan*

- Developed remote sensing-based methodologies to optimize agricultural inputs at small farm scales
- Processed high-resolution satellite datasets for crop system characterization
- Designed and validated input-management strategies for economically significant crops
- Contributed to sustainable precision agriculture practices through data-driven analysis

## **Glacier and Glacial Lake Inventory of Northern Pakistan (GLOF-II Project)**

11/2023 – 07/2024

*Pakistan Meteorological Department, Islamabad*

- Created updated glacier and glacial lake inventories for northern Pakistan
- Generated standardized geospatial datasets describing glacier extent and characteristics
- Contributed data to the Global Glaciers Inventory for climate risk assessment
- Supported hazard analysis related to Glacial Lake Outburst Floods (GLOFs)

## **Canada Day Night Planner – Location-Intelligent Event Planner**

05/2025 – 06/2025

*Freelance Project*

- Built a full-stack event planning application using React, Express.js, and Google Maps/Places APIs
- Developed intelligent venue routing based on user profiles (Singles, Couples, Families)
- Integrated Stripe for secure multi-item checkout and dynamic product customization
- Delivered a responsive, map-driven platform with downloadable itineraries

## **National Common Operating Picture for Disaster Management**

05/2023 – 09/2023

*National Disaster Management Authority (NDMA), Islamabad*

- Developed a web-based geospatial platform for multi-hazard disaster management
- Implemented early warning and risk assessment capabilities
- Integrated spatial data pipelines using GeoServer and GDAL
- **Technologies:** React, Django, GeoServer, GDAL

## **Reserve Sites Management Plan, AlUla, Saudi Arabia**

09/2023 – 12/2023

*International Union for Conservation of Nature (IUCN)*

- Delineated conservation zones using spatial optimization techniques

- Applied CLUZ and Marxan to assess land-use patterns and biodiversity priorities
- Identified high-value preservation areas for sustainable ecosystem management
- **Skills:** Marxan, Spatial Analysis, Conservation Zoning, ArcGIS Pro, Excel

**Sustainable Rural Development in Shangla: Organic Farming Site Selection** 09/2023 – 01/2024  
*Spatial Decision Support System Project*

- Developed a Spatial Decision Support System (SDSS) using GIS, Python, and AHP
- Identified optimal sites for organic farming to support rural employment
- Addressed coal-mining-related unemployment through sustainable land-use planning

**Real-Time Geo-Environmental Monitoring System** 09/2023 – 01/2024  
*Integrated Geo-Technologies, Term Project*

- Developed a real-time monitoring system using NodeMCU, DHT11, and GPS sensors
- Streamed live environmental and location data into a Linux-based VM database
- Built a Django dashboard for visualization and analysis of sensor data

**Cropland Mapping Using Random Forest and ANN** 09/2023 – 01/2024  
*Machine Learning, Term Project*

- Applied Random Forest and Neural Networks on fused optical–radar datasets
- Achieved 99.62% accuracy (RF) and 99.82% accuracy (ANN) for cropland classification
- Evaluated model performance and identified optimization opportunities

**Intel Image Classification Using CNN** 01/2024 – 01/2024  
*Machine Learning, Term Project*

- Developed a CNN-based image classification model using the Intel dataset
- Achieved 95.5% training accuracy and 80% testing accuracy over 20 epochs
- Fine-tuned convolutional, pooling, and dense layers with pre-trained weights

**Loan Repayment Rate Prediction** 10/2023 – 11/2023  
*Machine Learning, Term Project*

- Analyzed multivariate loan applicant data to predict repayment probability
- Implemented KNN, Decision Tree, and Logistic Regression models
- Supported data-driven risk assessment for banking operations

**Map Shop** 02/2023 – 06/2023  
*Web GIS, Term Project*

- Developed a web-based platform for on-demand customized map creation
- Enabled drag-and-drop map design, data integration, and secure payment
- Automated map generation and download post-purchase

**Network Analysis for Electric Pole Placement** 02/2023 – 06/2023  
*GIS Applications, Term Project*

- Conducted point-to-point, coverage, fleet optimization, and OD cost matrix analyses
- Optimized electric pole placement and electricity distribution planning

### **Topographic Mapping of NUST Using GPS**

02/2023 – 06/2023

*GPS Surveying, Term Project*

- Collected field data using GPS surveying techniques
- Processed spatial data in MicroSurvey CAD to generate a topographic map
- Supported campus planning and infrastructure development

### **R Shiny Financial Dashboard**

09/2022 – 01/2023

*Spatial Data Analysis, Term Project*

- Developed an interactive financial dashboard using R Shiny
- Visualized spatial distribution of financial indicators through maps
- Enabled real-time exploratory data analysis

### **Aviation Star: Pilot's Logbook**

09/2022 – 01/2023

*Database Management Systems, Term Project*

- Built a flight planning and logging platform for pilots
- Enabled spatial analysis of pilot experience across regions
- Supported strategic assignment of expert pilots

### **Site Suitability for Hospital Using 3D Photogrammetry**

02/2022 – 06/2022

*Photogrammetry, Term Project*

- Generated high-resolution DEMs from drone imagery using Pix4D
- Produced a 3D model of Askari 7 from stereoscopic imagery
- Identified optimal hospital sites based on multi-criteria analysis

### **Web-Based Routing Platform**

02/2022 – 06/2022

*Data Structures & Algorithms, Term Project*

- Developed a routing platform for walking, cycling, and driving modes
- Implemented shortest-path algorithms with multi-parameter optimization

### **3D Design of Two-Seater Bicycle for Himalayan Terrain**

09/2021 – 01/2022

*Computer Aided Drawing, Term Project*

- Designed a two-seater bicycle optimized for high-altitude environments
- Considered center of gravity, elevation constraints, and structural stability

### **Vegetation Analysis of Punjab, Pakistan**

09/2021 – 01/2022

*Introduction to Remote Sensing, Term Project*

- Analyzed satellite imagery to assess crop quality and temporal variation
- Provided insights into agricultural trends for sustainable crop management

## **WORK EXPERIENCE**

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### **Full Stack GIS Developer**

07/2024 – present

*Geometro GmbH, Barbing, Germany*

- Contributed to GeoMetro Cockpit, ASB Viewer, and multiple Web GIS modules across enterprise platforms

- Delivered 50+ feature enhancements including ZIP-code management, dynamic visualization, authentication, and country-wide layers
- Implemented PDF and CSV export tools for geospatial data reporting
- Improved application performance, usability, and backend stability across geospatial systems

### GIS Engineer

05/2023 – 07/2024

*KFA Software Pvt. Ltd., Islamabad, Pakistan*

- Developed GIS algorithms for automated weather map interpolation
- Engineered a web-based disaster management platform for multi-hazard early warning systems
- Contributed to national glacier and glacial lake inventories for Pakistan
- Prepared standardized geospatial datasets for integration into the Global Glaciers Inventory

### Web GIS Intern

06/2022 – 03/2023

*GIS Plus Total Solution Pvt. Ltd., Islamabad, Pakistan*

- Collaborated on Web GIS application development and spatial analysis projects
- Performed map digitization and geospatial data preparation
- Assisted in GIS programming and visualization tasks across multiple client projects
- Gained hands-on experience in end-to-end geospatial workflows

## AWARDS AND ACHIEVEMENTS

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**Winner – Partnership for Climate Action (NUST, 2024):** Led team to 1st place, proposing climate-resilient solutions (carbon tax, water treatment, EIA) for climate-induced migration crisis.

**Finalist – FICS 2024 (Finding Innovative & Creative Solutions):** Presented startup idea at global pitching event; aligned with UN SDGs and COP29 initiatives.

**IDEAS 2024 Showcase:** Final Year Project featured at Pakistan's premier defence exhibition.

## TECHNICAL SKILLS

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- **Programming & Frameworks:**  
JavaScript (React, Node.js, Express, Google Earth Engine, React Native)  
Python (Django, ArcPy, GDAL, Rasterio, NumPy, GeoPandas)  
C++, C#, R, Git
- **Databases & Backend:**  
PostgreSQL / PostGIS, MySQL, MongoDB  
AWS (RDS, DynamoDB, S3), REST API development, Spatial indexing & optimization
- **ESRI & GIS Software:**  
ArcGIS Desktop, ArcGIS Pro, ArcGIS Server (publishing & service management), ArcGIS Enterprise / Portal, ArcScan  
QGIS, Erdas Imagine, Marxan, Pix4D, Meshroom, AutoCAD, MicroSurvey CAD, GIMP, LISA
- **Web Mapping & OGC Services:**  
Leaflet, React-Leaflet, Mapbox, MapLibre, OpenLayers, MapQuest, OSM  
GeoServer, WMS/WFS/WMTS, Tile caching & scale optimization
- **Machine Learning & GeoAI:**  
TensorFlow, PyTorch, YOLO, CNN, ANN, Computer Vision, LLM Integration

- **IoT & Embedded Systems:**  
AWS IoT Core, ESP32/Arduino  
GPS (NEO-6M), Accelerometer (ADXL345)  
DHT11/22, Gas/Environmental/Sound sensors  
MQTT / HTTP Telemetry, Real-time tracking & sensor integration

## CO-CURRICULAR ACTIVITIES

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<b>Office Bearer (Treasurer)</b> , Adventure Club, NUST Islamabad, Pakistan	<i>09/2023 – 05/2024</i>
<b>Office Bearer (Treasurer)</b> , Book Club, NUST Islamabad, Pakistan	<i>09/2022 – 08/2023</i>
<b>Team Lead</b> , Admin Coordination and Verification, Wall of Hope, NUST, Pakistan	<i>2021 – 2024</i>
<b>Team Lead</b> , Admin Coordination, SDG STUDENT HUB, NUST Islamabad, Pakistan	<i>09/2021 – 08/2023</i>
<b>Director</b> , Finance, Adventure Club, NUST Islamabad, Pakistan	<i>09/2022 – 08/2023</i>
<b>Director</b> , Admin Events, Adventure Club, NUST Islamabad, Pakistan	<i>09/2021 – 08/2022</i>
<b>Team Member</b> , Finance, Adventure Club, NUST Islamabad, Pakistan	<i>09/2021 – 08/2022</i>
<b>Team Member</b> , Parliamentary Debates, Debating Society, NUST Islamabad, Pakistan	<i>10/2020 – 08/2022</i>
<b>Team Member</b> , Finance, NUST Cyber Security Club, NUST Islamabad, Pakistan	<i>10/2020 – 08/2022</i>
<b>Team Member</b> , Capital Civilization, Pakistan Ideological Civilization, Pakistan	<i>08/2021 – to date</i>
<b>Team Member</b> , School Organizing Committee, Orientation NUST Islamabad, Pakistan	<i>09/2021 – 08/2022</i>
<b>Director</b> , Sponsorships, GIS Day NUST, Pakistan	<i>08/2021</i>

## REFERENCES

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### **Dr. Ejaz Hussain**

Associate Dean, Professor, Institute of Geographical Information Systems  
NUST Islamabad, Pakistan  
Email: ejaz@igis.nust.edu.pk

### **Dr. Ali Tahir**

Associate Professor, Institute of Geographical Information Systems  
NUST Islamabad, Pakistan  
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### **Syeda Maria Zafar**

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