

CURRICULUM VITAE

Personal information

Name	• Muhammad Abu Bakar
Position	• Geospatial Data Specialist
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Professional experience

11/2025 – present	Geospatial Data Specialist Beagle Systems, Hamburg Beagle Systems flies long-range drones beyond visual line of sight (BVLOS) to monitor pipelines, utilities and other infrastructure. • Developed an open-source drone LiDAR pipeline that georeferences point clouds with PPK, classifies power-line scenes, rebuilds missing conductors from their sag and rates nearby vegetation by risk; tree-fall analysis in progress. • Built an AI-driven right-of-way and construction-site monitoring pipeline: deep-feature-matching georeferencing, a fine-tuned foundation model for detection, an open-source VLM to verify it, and real-time inference on an NVIDIA Jetson. • Fine-tuned a building-segmentation foundation model on in-house labels created from 10 cm orthophotos and scaled it across the Cologne area. • Built a PostGIS and Tiler backend that serves large GeoTIFFs to the frontend as map tiles, and supported flight planning with pre-flight checks and new geodatabase data.
03/2024 – 10/2025	Geospatial (EO) Data Scientist, part-time Karuna Technology UG, Germany • Fine-tuned a pretrained deep-learning model on in-house training data to map urban tree canopies from aerial imagery, then tracked their health with Planet NDVI and NDWI time series in Google Earth Engine to flag underperforming trees. • Projected the long-term ecosystem services of the mapped trees through a tree-benefits API, from carbon storage to further environmental benefits, estimating the urban canopy's value over the coming decades. • Built Google Earth Engine workflows that clean multi-year Sentinel-1 radar time series with speckle filtering and apply an equation to derive soil-moisture maps, showing where golf courses suffer from water stress.
04/2021 – 02/2024	GIS Specialist & Data Engineer MapTransfer, Germany • Managed the end-to-end geodata workflow for a construction company: georeferenced construction plans and orthophotos, converted them into cloud-optimized GeoTIFFs, uploaded them to AWS S3, and set up QGIS with PostgreSQL as the customer's secure front end. • Designed and authored several GIS courses for students and professionals, covering LiDAR processing, spatial analysis, Spatial SQL, ALKIS and GeoServer. • Converted AutoCAD data in QGIS into accurate, ALKIS-compliant GIS layers for telecom infrastructure projects. • Built interactive Web GIS applications in OpenLayers, serving WMS layers through GeoServer from PostgreSQL.

Education

2017 – 2020	MSc Geology University of Freiburg, Germany Thesis: Simulation of multispectral and hyperspectral imaging techniques for mapping of epithermal ore deposits in vegetated zones.
2016 – 2020	MSc Remote Sensing & Geographic Information Systems National University of Sciences and Technology, Pakistan Thesis: Development of an open-source Python-based slope stability model that incorporates remote sensing and geotechnical data for slope failure assessment.
2012 – 2015	BSc Geology Bahria University, Pakistan Thesis: Petrophysical analysis of Joya Mair – Well 4.

Academic projects

	Glacier mass balance of Mýrdalsjökull from historical imagery and DEMs, showing the melting rate doubled after 2000 (Landsat, Sentinel-2); snow cover and precipitation variability, 2000–2015 (MODIS, TRMM); snow-cover change in the Kabul Basin and its impact on water resources (Landsat 7); land cover, erosion and morphometry of Mauna Kea (Landsat 8, ASTER).
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Skills

Geospatial AI	Fine-tune foundation models for detection and segmentation on drone and aerial imagery, and run open-source LLMs and VLMs as quality gates in production pipelines, from GPU servers down to the edge.
LiDAR	Take drone LiDAR from raw scans to deliverables: PPK georeferencing, sensor calibration, point-cloud classification and power-line analytics.
Remote sensing	Turn SAR, multispectral and hyperspectral data into maps that answer questions, from Google Earth Engine time series to centimeter-scale drone imagery.
Spatial data	Model, clean and convert vector data at scale, from ALKIS cadastre and CAD plans to analysis-ready GIS layers, in GeoPandas, PostGIS and QGIS.
Data engineering	Build the plumbing behind it: PostGIS databases, cloud storage on AWS, containerized pipelines and tile services that feed web frontends.
Programming	Python every day; Spatial SQL, R and Bash where they fit.
Geology	Trained geologist with a BSc and MSc: numerical modeling and petrophysics.

Languages

English	C2
German	B2

Signature

Freiburg im Breisgau, 14 October 2026