ANANDA SHABRINA PUTRI GUNAWAN

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EDUCATION

Universitas Gadjah Mada (UGM) **Yogyakarta, Indonesia**
B.Sc. in Cartography and Remote Sensing, Faculty of Geography; GPA 3.61/4.00 (Cum Laude) *Aug 2022 – Jul 2026*

- **Thesis:** Micro-Poverty Spatial Modelling via Graph Convolutional Network (defense score 90.78/100). Built the full pipeline from scratch: OSMnx road-graph construction of Central Jakarta, engineered node features, Laplacian spectral positional encoding, graph autoencoder pre-training, GCN fine-tuning, SHAP, LISA and hit-rate validation against PKH beneficiary data.
- **Relevant coursework:** GIS, remote sensing, digital image processing, cartography, spatial databases and infrastructure, spatial programming, geospatial statistics, geographic information visualization.
- **Teaching Assistant, GIS and Remote Sensing Laboratories (Aug 2024 – Jun 2025):** taught WebGIS development, spatial programming and geodatabase workflows (JavaScript, OpenLayers, PostgreSQL/PostGIS, QGIS, ArcGIS, R, Google Earth Engine); mentored 21 students in Geospatial Statistics and guided 11 students to complete 8 web/mobile GIS applications with code review.
- **Scholarship:** Bank Indonesia Scholarship recipient (2024, 2025).

PROFESSIONAL EXPERIENCE

Ministry of Public Works (Kementerian PU) – Pusdatin **Jakarta, Indonesia**
Infrastructure Geospatial Data & Information Systems (MagangHub) *Sep 2026 – Present*

- **WebGIS attendance monitoring:** Developed a geospatial attendance dashboard for Ministry offices nationwide (React/TypeScript, FastAPI, PostgreSQL/PostGIS) integrated with the Ministry's external attendance API, with live KPIs for in-radius, out-of-radius and unverified check-ins, per-office recaps, unit-level distribution and hourly check-in/check-out charts.
- **Geofence and national monitoring:** Implemented 1,000 m office geofence analysis with distance bands, a national monitoring view and tracking of official duty, leave and dispensation status, filterable by work unit.
- **Historical analytics module:** Built daily-to-six-month temporal aggregation, employee-level and office-level monitoring, attendance trend visualization and 1 km spatial clustering of check-in locations.
- **Privacy by design:** Deployed a public demo with a strictly restricted API so that no employee personal data is exposed outside the Ministry network.
- **Sermo Dam Emergency Response Plan (RTD) WebGIS:** Contributed to technical planning and geospatial database design for a public dam-safety WebGIS (Next.js) covering flood scenarios such as PMF, four emergency status levels (Normal, Waspada, Siaga, Awas), evacuation zones, evacuation routes, assembly points and shelters.
- **Remote sensing:** Assessed agricultural drought in Bekasi by combining Sentinel-1 SAR backscatter and Sentinel-2 vegetation indices with Random Forest classification in Google Earth Engine; processed and mosaicked Sentinel and Landsat imagery for North Sumatra and Riau Islands in ERDAS IMAGINE.
- **Data integration and web:** Prepared and integrated infrastructure datasets, including Papua irrigation networks and InaRISK disaster-risk layers, for geoportal and decision-support applications; built responsive React interfaces and institutional landing pages.
  Links: Attendance WebGIS: webgis-pu-attendance.vercel.app | RTD Sermo: rtdsermo.vercel.app

Spatial Data Lab – Harvard Center for Geographic Analysis **Remote**
Research Assistant, NSF Spatiotemporal Innovation Center *Mar 2026 – Aug 2026*

- **Research scope:** Conducted applied GeoAI research on topology-aware micro-poverty mapping in Central Jakarta under Prof. Abolghasem Sadeghi-Niaraki (Fellow, Spatial Data Lab, Harvard CGA).
- **Graph and features:** Built a road graph of 20,546 street nodes and 28,805 edges across 44 wards with 19 features: network centrality (closeness, betweenness, PageRank, degree), street morphology, proximity to waterways, railways and amenities, building density and 8 Laplacian spectral encodings.
- **Modelling:** Benchmarked a 2-layer residual GCN against Ridge, Random Forest, XGBoost and MLP with identical features and folds; target derived by label propagation from 625 geocoded PKH beneficiary points (96.7% geocoding yield).
- **Leakage audit:** Identified and closed three leakage pathways (graph adjacency, label bleed, selection leakage) by drawing a ward-level 26/9/9 split before any scaling or propagation, with 5-fold ward-grouped cross-validation.
- **Key finding:** Measured a 1.43-point R^2 gap between non-spatial (out-of-bag 0.93) and spatial-holdout (−0.50) evaluation; diagnosed failure through residual Moran's I (≈0.99), LISA, MAUP aggregation, SHAP and adjacency ablation (R^2 −0.60 with vs −3.09 without adjacency).
- **Policy translation:** Framed outputs as a field-verification screening layer for PKH/DTSEN rather than an eligibility tool; GCN flagged 83.0% of beneficiaries within 50 m versus a 79.9% class-matched baseline.
- **Dissemination:** Presented at the 2026 Symposium on Spatiotemporal Data Science (STDS); developing a journal article with an international collaborator.
  Links: STDS 2026 slides Google Slides deck

Ministry of Energy and Mineral Resources (ESDM) **Jakarta, Indonesia**
GIS Developer Intern, Directorate General of Mineral and Coal *Sep 2025 – Nov 2025*

- **Automation toolboxes:** Engineered 4 Python/ArcPy toolboxes for nationwide mining-concession data: OverlapContextAnalyzer (overlap detection with context), Axis-Align Fix & Report (axis-order correction), Vertex-to-Report (vertex-level reporting) and Coordinate2SHP (coordinate tables to shapefiles).
- **Data quality:** Investigated recurring geometry and topology errors in concession boundaries, diagnosed root causes and automated corrections, reducing manual troubleshooting and improving reliability for government reporting.
- **Regulatory compliance:** Built auditable per-block compliance matrices covering zone intersections, buffers and thematic layers, with structured technical reports that make field-mapping decisions traceable.
- **RAG prototype:** Prototyped a regulation-retrieval system using OCR ingestion of regulations, hybrid dense and BM25 retrieval, and PostgreSQL/pgvector to speed up evidence-based data verification.

Agricola Nusantara Baramineral **Sleman, Indonesia**
Geospatial Analyst Intern *Feb 2025 – May 2025*

- **Spatial analysis:** Conducted GIS analysis and thematic mapping for mining operations, environmental impact assessment and reclamation-site screening in West Kalimantan using ArcGIS, QGIS, Python and GeoPandas.
- **Decision support:** Integrated spatial datasets and environmental indicators to support land assessment and site prioritization; produced interactive dashboards and periodic operational reports for management.
- **Text analytics:** Built a web-scraping and NLP pipeline that processed 10,000+ mining-industry articles to identify stakeholders, environmental issues and emerging trends for a GIZ-supported project.

Universitas Gadjah Mada **Sleman, Indonesia**
Research Assistant, ESTARFM Remote Sensing Research *Feb 2025 – Jun 2025*

- Implemented ESTARFM spatio-temporal fusion of Landsat 8 (30 m) and MODIS imagery in Google Earth Engine to produce dense time series for monitoring rice-cropping rotation and land-cover dynamics.
- Co-authored a peer-reviewed publication in Jurnal Geografi, Edukasi dan Lingkungan (DOI: 10.22236/jgel.v10i1.20142).

Jakarta Satu – Dinas Cipta Karya, Tata Ruang dan Pertanahan DKI **Jakarta, Indonesia**
GIS & Machine Learning Intern, One-Map Unit *Jan 2025 – Feb 2025*

- Implemented an interactive swipe-basemap feature with ArcGIS Maps SDK for JavaScript, creating and modifying map objects and layers for side-by-side comparison in the provincial One-Map (Satu Peta) WebGIS.
- Developed a backpropagation neural-network spatial prediction model for Jakarta's Golden Triangle to support urban planning, and validated outputs against ground truth with senior government GIS staff before public WebGIS publication.

SELECTED PROJECTS

GeoQC – *Open-source geospatial QA/QC toolkit, creator and maintainer* Jul 2026 – Present

- **What it does:** Finds and fixes errors in vector GIS data in one command (geoqc check, geoqc fix); results open directly in QGIS. Published on PyPI as v0.2.0 (pip install geoqc).
- **Validation and repair:** Detects self-intersections, invalid rings, duplicate vertices, slivers, overlaps, gaps, spikes, dangles and overshoot/undershoot; repairs with minimal shape change, preview/apply/undo, a per-feature fix log and review flags. Never edits the source dataset.
- **Road networks:** Repairs road networks with endpoint snapping, intersection noding, duplicate-segment removal and minimum-connector planning for disconnected islands.
- **Built for Indonesian data:** Ships presets for bidang tanah, kawasan hutan, batas administrasi, jalan and a cross-layer konsesi vs kawasan hutan rule; checks CRS consistency, axis order and datum shifts.
- **Scale:** Streams GeoPackage, Shapefile, GeoJSON and GeoParquet in bounded Arrow chunks and runs parallel audits with memory-aware scheduling; outputs issue layers and HTML reports.
- **Engineering:** One validation engine shared by Python API, CLI, hardened FastAPI upload endpoint and React web client; 99 commits, 440+ automated tests, CI on Ubuntu and Windows, automated PyPI publishing, MIT license.
  Stack: Python, GeoPandas, Shapely, Pyogrio, PyProj, Apache Arrow, FastAPI, React, pytest, Ruff, mypy, GitHub Actions
  Links: GitHub: github.com/nandaisnanda/GeoQC

GeoLogix AI – *Geospatial data quality and weather-risk decision-support platform* Jul 2026 – Sep 2026

- **Road network QA:** Processed the full Greater Jakarta road graph (703,926 nodes, 1,708,734 edges) to detect dangling nodes, disconnected components (BFS) and one-way inconsistencies (Tarjan SCC); refined persistence rules to cut ~180,000 raw candidates to 736 reviewable findings.
- **POI validation:** Measured Haversine distance from 46,979 POIs to 745,268 road segments and flagged 2,072 outliers (4.4%) with a Tukey IQR fence and confidence score; manually reviewed 32 outliers to document false-positive sources.
- **Weather risk:** Built an H3 resolution-7 grid (1,079 cells) combining Open-Meteo rainfall with CHIRPS 2020–2024 Getis-Ord Gi* hotspots (348 significant cells) through AHP weighting (CR = 0) and weighted linear combination.
- **Prioritization:** Ranked 2,945 findings by severity, WorldPop population density and ease of fix, validated by hand calculation and three deterministic runs.
- **Automation and reliability:** 4 scheduled GitHub Actions pipelines (weekly OSM refresh, twice-weekly QA, 6-hourly weather) logging every run to PostGIS; resolved runner memory exhaustion, API rate limits (HTTP 429) and 64-bit ID overflow; 114 unit tests.
  Stack: Python, OSMnx, osmium, GeoPandas, H3, FastAPI, PostgreSQL/PostGIS (Supabase), React, deck.gl, MapLibre, Vercel, Render
  Links: GitHub: github.com/nandaisnanda/geologix | Demo: geologix.vercel.app

OmniSite – *AI-driven telecom tower site selection platform* Aug 2026

- **Site screening:** Screens a clicked point or up to 100 uploaded sites with 5 concurrent public-data engines: OSM/Overpass, OpenCelliD, Google Earth Engine (SRTM, ESA WorldCover, WorldPop, VIIRS night lights, JRC surface water) and a 10-year Open-Meteo wind-gust archive.
- **Scoring policy:** Converts 7 measured signals into a 0–100 score with PROCEED/REVIEW/AVOID verdicts; treats unmeasured signals as unknown, refuses to score with fewer than 4 of 7 signals and caps unverified sites at conditional review.
- **Analytics:** Collocation vs greenfield recommendation from tower inventory, coverage-gap finder ranked by unserved population, and K-means (silhouette-selected k) plus Isolation Forest site segmentation.
- **Engineering:** Trilingual UI (English, Chinese, Indonesian; 267 keys each), CSV/XLSX batch screening on a background worker pool, quota-aware API budgets, optional authentication and rate limiting; 97 offline tests and CI with lint, type checks, Docker build and credential scanning.
  Stack: Python, Streamlit, Google Earth Engine, scikit-learn, Shapely, Docker, GitHub Actions
  Links: GitHub: github.com/nandaisnanda/OmniSite-AI-Driven-Telco

GeoDash – *Interactive spatial analytics dashboard, NawanSpatial* Jul 2025

- Built a WebGIS dashboard where users upload GeoJSON, CSV or zipped Shapefile data, view it on a Leaflet map with marker clustering, and explore it through an attribute table, header editor and filters.
- Added a dynamic chart builder, smart analytics (correlation and outlier detection), PDF export, and Supabase authentication with protected routes and password reset; deployed on Vercel.
  Stack: React, TypeScript, Vite, Tailwind CSS, shadcn/ui, Leaflet, Recharts, Supabase
  Links: Demo: geodashbynawanspatial.vercel.app

rumahKita – *AI-assisted housing suitability WebGIS; 4th Place, MAPID WebGIS Competition* 2025

- Built an AI-assisted housing recommendation WebGIS that scores residential location suitability from green-space, zoning, disaster-risk and public-facility layers.
- Weighted criteria with fuzzy multi-criteria decision analysis (MCDA) and classified suitability with XGBoost, reaching a 96% F1 score.

Jakarta Fire Vulnerability Mapping – *1st Place, Jak Space University Competition (Jakarta Satu)* 2024

- Integrated multi-source spatial risk factors in Python and ArcGIS to model fire vulnerability across DKI Jakarta, reaching 95% model accuracy.
- Translated results into an ArcGIS StoryMaps decision-support narrative for provincial government stakeholders.

Walking Tax of Mega-Infrastructures – *Pedestrian network research, Los Angeles vs Central Jakarta* 2026

- Modelled cognitive impedance in pedestrian routing around mega-infrastructure in two cities; following peer review, added sensitivity sweeps and validated Los Angeles results with geocoded crash data (TIMS/SWITRS). Accepted at CaGIS 2026.

Other research projects 2023 – 2025

- **Forest carbon stock, West Bali National Park (Jan – Jul 2025):** integrated forest inventory with Landsat 8 and Sentinel-2 in Google Earth Engine; compared Random Forest, XGBoost and regression for pixel-level estimation.
- **Deep learning for vegetation (Jun 2025):** YOLOv8 oil-palm detection and counting on 349 annotated UAV images; Siamese UNet++ deforestation detection on multi-temporal Sentinel-2.
- **Disaster mapping (Dec 2024, Dec 2025):** Jakarta flood-risk StoryMap with Python/JavaScript automation (90% less recurring processing time); digitized North Sumatra flood/landslide areas via deep-learning segmentation for UGM's disaster-response team.
- **Air pollution susceptibility, Java (2023):** AHP across topography, rainfall, industry, mining and traffic; traffic density weighted 11.6% of vulnerability. Published in E3S Web of Conferences.

LEADERSHIP & ACTIVITIES

Head of Web Development, United Nations Association Indonesia **Mar 2026 – Jul 2026**

- Led roadmap, sprint planning and full-stack delivery (React/Next.js, Supabase/PostgreSQL) of a multilingual NGO website.

Developer, NawanSpatial (remote) **Jun 2025 – Dec 2025**

- Built GeoDash (spatial analytics dashboard) and GeoLearn (GIS and remote sensing learning platform); designed database schemas and REST APIs.

Head of Education and Culture Division, GenBI UGM **Jun 2024 – Apr 2026**

- Led digital-literacy and Python programming outreach for 50+ Bank Indonesia scholarship recipients with 100% budget compliance.

Technical Manager, Students Catalyst National Batch 4 **Aug 2023 – Apr 2024**

- Selected from 1,188 applicants (4% acceptance); led a 4-person team maintaining a learning platform with 10,000+ visitors and 4,000+ program registrations.

Mentoring Core Team, Google Developer Student Clubs UGM **Nov 2023 – May 2024**

- Mentored 8 students through the Google Solution Challenge to 100% completion; helped scale peer mentoring to 15+ universities.

Head of IT, GAMAEXPO UGM **May 2023 – Nov 2023**

- Led a 6-person web team and 3-person livestream team for a university-wide expo with 1,000+ visitors.

Head of IT, 180DC APAC Summit 2023 **Jan 2023 – Mar 2023**

- Managed end-to-end virtual-conference infrastructure (Zoom, OBS Studio) for a multi-day regional summit.

PUBLICATIONS & CONFERENCE PAPERS

- Topology-Aware Micro-Poverty Mapping via Graph Convolutional Networks on Urban Road Network Graphs. *2026 Symposium on Spatiotemporal Data Science* (accepted and presented; journal article in development). Slides: Google Slides deck
- Mapping the Walking Tax of Mega-Infrastructures: A Comparative Urban Network Analysis of Pedestrian Cognitive Friction in Los Angeles and Central Jakarta. *CaGIS 2026 Conference* (accepted; journal version in development with Dr. Paulo Anciaes, UCL).
- Analisis Pola Rotasi Tanam Padi Menggunakan Model Fusi Spasial Temporal ESTARFM pada Citra Landsat 8 dan MODIS. *Jurnal Geografi, Edukasi dan Lingkungan*, 10(1). DOI: 10.22236/jgel.v10i1.20142.
- Anthropogenic PMx Air Pollution Susceptibility Using AHP Method in Java Island, Indonesia. *E3S Web of Conferences*, 2023.

AWARDS

- 1st Place, Jak Space University Competition, Jakarta Satu, DKI Jakarta: GIS fire-vulnerability decision-support project (2024)
- 4th Place, MAPID WebGIS Competition: rumahKita AI housing recommendation system (2025)
- Bank Indonesia Scholarship (2024, 2025)
- Top 10, [Re]Power Energy Policy Hackathon: GeoPilot clean-energy planning concept (2024)
- Semifinalist, Indonesia Studentpreneur (IDEAS) Business Plan Competition (2023)

CORE TECHNICAL SKILLS

- **GIS & Spatial Analysis:** ArcGIS Pro, ArcPy, QGIS, ERDAS IMAGINE, spatial QA/QC, topology repair, network analysis, geofencing, MCDA (AHP, fuzzy, WLC), suitability modelling, Moran's I, LISA, Getis-Ord Gi*, H3
- **Remote Sensing:** Google Earth Engine, Sentinel-1 SAR, Sentinel-2, Landsat 8, MODIS, SRTM, image mosaicking, vegetation indices, land-cover classification, image fusion (ESTARFM), change detection
- **Programming & Data:** Python (GeoPandas, Shapely, Rasterio, GDAL, PyProj, OSMnx, NetworkX, H3, scikit-learn, PyTorch, PyTorch Geometric), R, SQL, TypeScript, JavaScript
- **Databases:** PostgreSQL/PostGIS, Supabase, pgvector, spatial database design
- **WebGIS & Engineering:** React, Next.js, Vite, Tailwind CSS, Leaflet, deck.gl, MapLibre, OpenLayers, ArcGIS Maps SDK for JavaScript, FastAPI, Streamlit, Docker, Git, GitHub Actions, pytest, Vercel, Render
- **Machine Learning & GeoAI:** Random Forest, XGBoost, Graph Convolutional Networks, graph autoencoders, YOLOv8, UNet++, K-means, Isolation Forest, SHAP, spatial cross-validation, RAG
- **Languages:** Indonesian (native), English (professional working proficiency)