

Bishal Dhungana

West Palm Beach, FL | beesal13dh@gmail.com | [LinkedIn](#) | [Portfolio](#) | [GitHub](#)

CAREER SUMMARY

I'm a Geospatial Data Scientist working across geospatial engineering, applied AI, and cloud data platform engineering, with a focus on disaster resilience and critical infrastructure. I started my career as a Geomatics Engineer in Nepal, doing GNSS and UAV surveys and building municipal geodatabases. I then did graduate research at Florida Atlantic University on flood hazard modeling and environmental justice, which led to a peer-reviewed publication on flood hazard exposure and social vulnerability in the U.S.

I now work as a Data Scientist supporting Florida Power & Light, Florida's largest electric utility. I lead the data and platform side of an AI-based infrastructure inspection program: setting technical requirements, building the data pipelines and cloud infrastructure behind it, and serving as subject-matter expert on vendor model development. I also build the GIS applications used for infrastructure monitoring and disaster response, including a portal used during Hurricane Milton.

Outside of work, I contribute to open-source geospatial and AI tools. I've published a Python package for road-centerline extraction, built agentic AI systems for querying spatial and hazard data, and built a flood and storm-surge exposure pipeline for utility assets. I'm also a co-author on PyWMP, an open-source watershed modeling tool, and on the manuscript describing it, currently under peer review.

PROFESSIONAL EXPERIENCE

Data Scientist (Geospatial and AI), The Spear Group, for Florida Power & Light | Jupiter, FL | Apr 2025 - Present

Technical lead across FPL's AI and geospatial infrastructure inspection program, from vendor selection through data engineering to production deployment.

Program and vendor work

- Contributed to technical requirements during initial RFP preparation for a multi-million dollar AI vendor engagement covering infrastructure inspection.
- Serve as subject-matter expert through the vendor model development process, reviewing progress and coordinating validation and benchmarking against enterprise requirements.

Data engineering for AI

- Set technical standards for two vendor-developed models: an asset detection model (25+ equipment types) and a switch-state classification model (open/closed). Both are still in vendor development; validation is pending.
- Built a pipeline joining 8 million+ drone inspection images with 350,000+ historical condition assessment reports through spatial and temporal joins, enriching images with asset and condition metadata and writing the results back via batched API calls.
- Led training dataset preparation and delivery to AI vendors across 25+ asset types and 400+ condition classes. Built a Streamlit app so internal teams and vendors could pull images by asset, condition, or class instead of searching the full image set by hand.

Platform and infrastructure

- Manage spatial databases (PostgreSQL/PostGIS), feature services, and cloud-native architecture on AWS (Lambda, S3, SageMaker).
- Designed an AWS CDK framework for infrastructure-as-code, with standardized naming, tagging, and deployment patterns used across ML and application workloads.
- Built a data integration platform (Python, SQL, DuckDB) for schema publishing and quality validation, and a FastAPI/React API console for cross-team API management.
- Automated the integration of image metadata and model-generated detection annotations into an Esri PostGIS geodatabase, so model output could be analyzed geospatially.

Applications

- Built GIS applications (ArcGIS Enterprise, Experience Builder, Dashboards) for infrastructure monitoring and disaster response, including a portal used during Hurricane Milton to track impact, restoration, and crew deployment.

Associate Geospatial Analyst, The Spear Group, for Florida Power & Light | Jupiter, FL | Sep 2024 - Mar 2025

- Led QA/QC of LiDAR-derived power grid data for infrastructure resilience work, including pole hardening.
- Managed PostGIS databases and automated QA workflows in FME to streamline data storage and validation.
- Built a FastAPI sidecar for heavier geoprocessing and format conversion.
- Automated geospatial workflows in Python, ArcPy, and Model Builder to improve consistency across teams.

Graduate Research Assistant, Florida Atlantic University | Boca Raton, FL | Jan 2023 - Aug 2024

- Led flood risk research using FEMA hydrologic and hydraulic methods, resulting in a peer-reviewed publication on flood hazard exposure and social vulnerability across the U.S.
- Researched environmental justice, looking at how disparities in disaster impact relate to geospatial and socioeconomic variables.
- Built an automated geoprocessing pipeline in ArcGIS Pro, cutting processing time by 50%.
- Built a Python geocoding tool to process 3 million addresses, replacing a paid service. Cut turnaround from 3 months to 1 week and saved \$20K in licensing costs.

Geomatics Engineer / GIS Intern, Freelance and ADMC Engineering Pvt. Ltd. | Nepal | Dec 2020 - Dec 2022

- Led survey teams for municipal road, control, and construction surveys. Ran GNSS landmark surveys and UAV topographic surveys.
- Designed municipal geodatabases (land use, soil, cadastral, resource maps) with topology and attribute rules.
- Served as GIS expert for Nepal's Survey Department land use hand-over program, training 40+ officials and engineers in spatial analysis and database management.
- Ran topographic mapping and transmission line surveys using differential GNSS and UAV technology.

EDUCATION

MSc, Geosciences (GIS Concentration), Florida Atlantic University, Jan 2023 - Dec 2024

BSc, Geomatics Engineering, Tribhuvan University, Aug 2016 - Apr 2021

PUBLICATIONS & RESEARCH

Dhungana, B.; Liu, W. Urban-Rural Exposure to Flood Hazard and Social Vulnerability in the Conterminous United States. ISPRS Int. J. Geo-Inf. 2024, 13, 339. <https://doi.org/10.3390/ijgi13090339>

Mandal, A. K.; Thapa, A. K.; Thapa Chhetri, M.; Dhungana, B.; Bloetscher, F.; Yong, Y.; Su, H. PyWMP: A Unified Python Framework for Multi-Fidelity 1D, 2D, and Hybrid Event-Based Flood Modeling (2026). Manuscript under peer review, DOI pending. Co-author (4 of 7) on both the manuscript and the open-source software. [Software repository and citation](#)

OPEN-SOURCE SOFTWARE

Self-directed contributions, built outside of my employment.

Road-Centerline [Repo](#)

A published Python package (pip install) that extracts road centerlines from polygon geometries in any CRS. CLI and Python API.

Python, GeoPandas, PyProj, pygeoops, PyPI, MIT license

HazardMCP [Repo](#)

An MCP server unifying FEMA, USGS, NOAA, NWS, and NASA hazard data behind one AI-agent interface, with one-call risk summaries and map rendering.

Python, FastMCP, NOAA/USGS/FEMA/NASA APIs, Folium, Docker

SurgeExposure [Repo](#)

A pipeline overlaying NOAA storm-surge and flood data against building footprints to score per-asset flood exposure, with a map and API.

Python, DuckDB spatial, GeoPandas, FastAPI, PostGIS, AWS, Docker

3DEP LiDAR Terrain Builder [Repo](#)

Generates DEM, DSM, hillshade, slope, aspect, and contour products from USGS 3DEP lidar, via a browser AOI tool paired with a local processing pipeline.

Python, PDAL, GDAL, RichDEM, AWS EPT/S3, GitHub Pages, GitHub Actions

Geospatial Data Copilot [Repo](#)

A natural-language agent that turns plain-English questions into spatial SQL queries, with map rendering and semantic search over inspection notes.

Python, LangGraph, Ollama, DuckDB spatial, FastAPI, Chroma, Folium

GeoCoder [Repo](#)

Converts spreadsheets of U.S. addresses into geocoded points and building footprints using free OpenStreetMap APIs. Web app and notebooks.

Python, GeoPandas, Nominatim/Overpass APIs, static web app

Conversational AI Assistant [Repo](#)

A LangChain RAG chatbot with a history-aware retriever for multi-turn, context-grounded conversations, citing sources in every answer.

Python, LangChain, Ollama, Chroma, Streamlit

RomanNepaliAI [Repo](#) | [Live Demo](#)

Converts romanized Nepali to Devanagari live in-browser, plus a CLI that batch-translates SRT subtitles through pluggable backends.

Python, FastAPI, Hugging Face Transformers, Vanilla JS, pytest, GitHub Actions

TECHNICAL SKILLS

AI/ML: PyTorch, TensorFlow, OpenCV, LangChain, LangGraph, RAG, Model Context Protocol, vector databases

Geospatial: ArcGIS Pro/Enterprise/Online, PostGIS, DuckDB Spatial, GDAL, PDAL, GeoPandas, LiDAR/point cloud processing, Overture Maps

Engineering: Python, JavaScript/TypeScript, R, SQL, FastAPI, React, ETL pipelines, CI/CD, testing

Cloud: AWS (Lambda, S3, SageMaker, ECR/ECS), AWS CDK, Docker, IAM, secrets management, VPC/network security

Field: GNSS/GPS survey, UAV survey (FAA Part 107), differential GNSS, geodatabase design

CERTIFICATIONS

Machine Learning Specialization, Deep Learning Specialization, Data Science with R Specialization, GIS Specialization, FAA Part 107 Remote Pilot Certificate