KUNLE S. OGUNTOYE

Data Scientist | Engineer

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Personal Website | **Linkedin** | **Google Scholar page**

SUMMARY

Innovative researcher and data scientist with a strong background in civil engineering, artificial intelligence, and machine learning algorithms. As a PhD candidate at Iowa State University, I develop predictive models and multimodal sensing systems for pavement performance, infrastructure monitoring, and digital twin applications. My expertise spans data and software engineering, drone-based photogrammetry, and geospatial information system analytics—bridging data science and engineering to enhance decision-making, safety, and sustainability of civil infrastructure.

EDUCATION

Iowa State University (ISU), Ames, IA

- **Doctor of Philosophy, Intelligent Infrastructure Engineering** **Jan. 2022–Dec 2026**
- **Graduate Minor in Computer Science** **Jan. 2022–Dec 2026**
- **Master of Science, Intelligent Infrastructure Engineering** **Jan. 2022–May 2024**

University of Ibadan, Nigeria

- **Bachelor of Science, Civil Engineering – 6.5/7.0** **Jun. 2014-Jul. 2019**

CERTIFICATIONS

- AWS Certified Machine Learning- Specialty **September 2023**
- Coursera – Machine Learning by Stanford online **March 2023**
- Coursera – Generative AI with Large Language Model (LLM) **August 2023**
- Udacity nano degree – Computer Vision **March 2023**
- FAA remote pilot license **January 2023**

WORK EXPERIENCE

Iowa State University (ISU), Ames, IA **Jan. 2022 – December 2026**
Data Scientist | Researcher

- Developed and orchestrated an extraction, loading, and transformation (ELT) pipeline using Apache Airflow for batch processing and ingestion of Iowa DOT raw pavement performance data into Google Cloud BigQuery.
- Developed advanced SQL queries for fast automatic segmentation of roadways into user-defined road lengths in the seamless BigQuery cloud service.
- Developed high-speed predictive analytics models for forecasting pavement conditions using multimodal data, including maintenance text records and nationwide pavement datasets, enhancing predictive accuracy and decision-making compared to traditional, cost-prohibitive software.
- Optimized machine learning models on cleaned datasets to accurately predict future concrete strength, improving model reliability and performance.
- Developed a comprehensive buried utility interconnection knowledge database for an AI-based fuzzy model, enabling accurate automatic mapping of underground utilities without excavation.
- Developed a web application using React and Django for utility engineers to rapidly generate underground utility maps prior to excavation, reducing wait times for contractors and increasing overall hazard awareness by 60%.
- Identified critical missing data in pavement infrastructure big data and applied large language models alongside tree-based algorithms like XGBoost to accurately predict missing maintenance information, enhancing data completeness and reliability.
- Developed an automated object detection framework for aboveground utility assets using drone imagery, leveraging Faster R-CNN and YOLO algorithms, facilitating the creation of high-quality datasets for automatic utility mapping and improving overall mapping efficiency.

Geographical Information System Specialist / UAV Operations

- Designed and implemented a full-stack geospatial data processing platform web application for Iowa gravel road analysis, enabling users to automatically and rapidly localize surface defects such as corrugation, ruts, potholes, etc, with high accuracy.
- Developed comprehensive data collection plans, including ground control point (GCP) maps in ArcGIS Pro, improving data quality and operational efficiency.
- Operated UAVs as a licensed remote pilot and coordinated multi-computer workflows to rapidly process imagery into orthophotos and DEMs, enhancing data turnaround and accuracy for geospatial analysis.
- Developed automated ArcGIS Python toolboxes incorporating logic for DEM analysis, enabling rapid detection of pavement distress such as rutting, potholes, corrugation, and loose aggregates, reducing inspection time by over 70% compared to traditional foot-on-ground surveys and improving decision-making efficiency.
- Coordinated with airport and local County engineers to ensure regulatory compliance and safe UAV operations, enabling efficient and risk-free data collection for infrastructure assessment.

Musco Sport Lighting, Urbandale, IA

Machine Learning Engineer Intern (Computer Vision) **May 2023–Aug 2023**

- Championed the design and deployment of an end-to-end MLOps pipeline using Mlflow, TensorBoard, and AWS, improving deep learning experiment tracking and GPU utilization by 15%.
- Spearheaded the design and execution of a data collection strategy, leading field teams in installing and calibrating camera systems for people monitoring and counting across multiple parks.
- Collaborated within an Agile environment, completing my summer internship project ahead of schedule through iterative development, effective communication within the team, and cross-team coordination.
- Developed optimized algorithms and scripts to stitch key features from dual-camera images with overlapping views.
- Developed end-to-end machine learning models on AWS using S3 and SageMaker's built-in algorithm.
- Conducted hyperparameter tuning on YOLOv5, leading to improved object detection of soccer balls in video frames.

Seflam SGl, Lagos, Nigeria
Graduate Project Manager **Feb. 2021 – Dec. 2021**

– an engineering, procurement, and construction (EPC), company that offers construction and project management services to Oil and Gas companies.

- Championed the 3D modeling of all mechanical and safety equipment at Nigeria Liquefied Natural Gas facility using LiDAR point cloud data and Leica Cyclone software, enhancing design accuracy and safety compliance. The digital models improved maintenance workflows and reduced reliance on 2D drawings, cutting inspection time by 50%
- Collaborated with the project management team and the third-party logistics to track, monitor, and resolve project-related issues, reducing delays and improving project efficiency.
- Managed project bidding documentation, task scheduling, and comprehensive risk assessments, ensuring timely delivery and compliance with client and regulatory requirements.
- Selected as company representative at the 2021 National Oil and Gas Conference, strengthening brand visibility and industry presence
- Designed and delivered training programs for new employees and interns on proprietary software, accelerating onboarding and improving team productivity.

Nexant Consulting LLP, Lagos, Nigeria
Graduate Civil Engineer **June 2020 – Feb. 2021**

- Led on-site quality control for 50+ material batches; enforced compliance for concrete and rebar, reducing rejection rates by 18% through real-time slump, air content, and compressive strength testing.
- Conducted 40+ phased inspections across formwork, rebar placement, pouring, and curing; flagged and resolved 25 critical deviations (e.g., dowel misalignment, honeycombing) before final acceptance.

Morgan Omonitan and Abe Ltd., Lagos, Nigeria
Undergraduate Intern **Aug. 2017- Feb. 2018**

- Developed a fully automated Microsoft Excel spreadsheet with VBA macros for pile foundation design (axial, lateral, and settlement analysis), cutting design time by 70% and enabling real-time capacity checks for 200+ piles across 5 bridge projects.
- Prepared detailed structural member specifications (rebar schedules, connection details, and tolerances) using AutoCAD and Revit, ensuring 100% compliance.
- Modeled and designed 5+ reinforced concrete and steel structures (beams, columns, slabs, and trusses) in SAP2000 and Robot Structural Analysis, optimizing section sizes to reduce material costs by 12% while meeting strength and serviceability limits.
- Performed 10+ on-site construction inspections, verifying formwork alignment, concrete cover, weld quality, and bolt torque against approved drawings—resolving 18 non-conformances before concrete placement to prevent rework.

SKILLS: [Github: https://github.com/Kunle-xy]

- Continuous Integration and Continuous Deployment (CI/CD)nwith Github Actions
- Programming language: Python, JavaScript, and C++
- Data Science and Engineering: AWS (Glue, Athena, Kinesis, Data Pipeline, Aurora, Elastic Map Reduce), Apache Spark, SQL, Apache Airflow, Apache Kafka, Databricks, Snowflakes
- MLOps and software stacks: WandB, Mlflow, Docker, PostgreSQL, AWS Dynamo DB, Lambda, Agile development, Azure, Linux, Flask, Django, CSS, HTML, Kubernetes, NextJS, Express, and React.

Other non-technical skills: team player, PowerPoint presentation, problem-solving, leadership, and teaching.

PROJECTS (Freelance and class projects)

- Investigated the benefits of Deep Kernel Gaussian Processes - Paper
- Leveraged Retrieval-Augmented Generation and large language model through Replicate to develop a web application that logs daily user data and creatively makes generations based on users writing style and logged preferences – Paper | Code
- Developed a Monte Carlo Tree Search algorithm for a draughts game to varying levels of difficulty in Java
- Developed admissible heuristics and implemented A* algorithm to arrive at a goal state for 8 puzzle problems
- Led a team of four to victory in a hackathon competition with AI-driven solutions (YOLOv5 for detecting maize diseases) for sustainable agriculture. Built the full-stack web application using React for the front-end and Django/PostgreSQL for the back-end. – Code
- Image and sound processing class projects using Matlab, OpenCV, Fourier Transform, and Python
- Probabilistic model of events using Hidden Markov Model (class project) –
- Developed a Retrieval-Augment Generation (RAG) application that seamlessly queries PDF documents for knowledge

extractions using Langchain, Weaviate, and Streamlit – Code | Presentation
- HumanlyAI: Developed a web application that addresses ChatGPT's lack of references to initial generations on similar prompts (still under construction) using React and Vite. – Code
- Trained Long Short-Term Memory (LSTM) model in predicting future highway pavement performance index using historical data
- Product Recommender System: Developed using AWS Personalize, boosting customer retention by 25%.

LEADERSHIP AND SERVICE EXPERIENCE

ISU Graduate and Professional Student Senator **2024-2025**
- Collaborated with fellow senators in institutionalizing new laws and resolutions for the good of the graduate students' community
- Served as an award review committee member

Academic Paper Reviewer
- Transportation Research Board **2024**
- Transportation Research Record **2026**
- ASCE International Conference of Transportation and Development (ICTD) **2025**
- Journal of Transportation Engineering: Part B, Pavements **2025**

Data Science Club, Vice President **September 2022–August 2023**
- Organized training events for club members on different data science modules.

Hult prize competition (Global), The University of Ibadan, Head of Logistics **2018**
- At the time, I organized the university's largest entrepreneurial competition.
- I acquired the necessary funds from sponsors by presenting the club's vision and goals.