Ibrahim Balogun

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EDUCATION

- **University of Delaware** — Newark, Delaware
  Ph.D. - Civil Infrastructure Systems Engineering; GPA: 3.92/4.00 — *Sept 2019 - May 2022*

- **University of Lagos** — Lagos, Nigeria
  M.S. - Civil and Environmental Engineering; GPA: 4.88/5.00 — *Sept 2018 - Aug 2019*

- **University of Lagos** — Lagos, Nigeria
  B.S. - Civil and Environmental Engineering; GPA: 4.21/5.00 — *Oct 2010 - Aug 2015*

EXPERIENCE

- **U.S Department of Transportation Tier 1 University Transportation Center**: — Sept 2019 - May 2022
  Developed Machine Learning algorithm to control non-stationarity of class I railway track geometry defects.
  Investigated railroad accident (collision and derailment) on major North American railway tracks using the Federal Railroad Administration (FRA) data.
  Conduct track squat failure test on selected track with deep neural networks.
  Performed exploratory analysis on track routine and corrective maintenance data.
  Prepared documents to facilitate funding acquisition from the Department of Transportation to improve railroad infrastructure durability and sustainability.

- **Southbridge, LLC - Lagos, Nigeria**: — Aug 2017 - Sept 2018
  Developed engineering plans, as well as cost and time estimate for the emergency construction of concrete batching plant.
  Designed and analysed 7km concrete pavement linking the Lagos Refinery to the federal highway.
  Conduct dynamic analysis of frame structure using state-of-the-art software (ETABS,STAAD-PRO and TEKLA).
  Generated working drawing, reconcile as-built drawings and supervised civil infrastructure works (drainage and sewer system).
  Executed other assigned functionalities including site meetings and technical report writing.

- **IAA Associates, LLC - Lagos, Nigeria**: — Oct 2015 - Aug 2017
  Provided structural design, detail and supervision of concrete and steel structures.
  Determined pile load bearing capacity, pile sizes, and positions in accordance with structural standards.
  Examined structural reliability and probabilistic study of a ten (10) floors multi-level car park using schmidt rebound hammer and ultrasonic pulse velocity.

- **Teaching and Research Assistant—University of Delaware**: — Aug 2019 - Sept 2020
  Proctored examinations, coordinated lab sections, and support office hours for Transportation Engineering, Spring 2021.
  Tutored and graded 50 students in Construction and Materials, Spring 2020.
  Tutored and graded 75 students in Transportation Engineering, Fall 2020.
  Analyzed a netCDF file to predict the yearly temperature difference of Delaware using R geo-spatial RastaVIS package, Summer 2020.
  Collected data from Delaware Digital Mapping database to resolve problems on wind speed and wind gust using ArcGIS package, Summer 2020.

SKILLS SUMMARY

- **Languages/Libraries**: Python(Scikit-learn,Numpy, Scipy, Pandas,matplotlib/seaborn,TensorFlow/Keras, OpenCV), R.
- **Tools**: Microsoft Office, ArcGIS.
- **Models**: Machine Learning(Deep Learning), Classification(Decision Tree, Random Forest, Support Vector Classifier),Regression, PCA, Clustering,Visualization
- **Statistical Programming**: Parameter Estimation, Maximum Likelihood Method, Testing of Hypothesis, Confidence Intervals

PROJECTS

- **Electric Vehicles with Machine Learning Implementations (University of Toronto, Canada)**: In this study, we explored the adaptability of ML techniques to the safety of sustainable transportation.

- **Handwritten Recognition (University of Delaware, USA)**: In this project, we leveraged on the MNIST data set to build an Android App that detects hand written digits. The classifiers such as (Random forest, AdaBoost, SVM, and XGBoost) improved the accuracy on existing methods by 30 percent.

- **Crash Frequency Analysis (University of Howard, Virgin Islands,USA)**: Applied machine learning techniques to sort casual inference of accidents data (2014 - 2019) from the department of transportation, Virgin Islands. The analysis show that potential cause and effect relationships regarding crashes are dependent on the highway alignments and deliberate violations of traffic rules.

- **Geotechnical Consolidation Test (University of Lagos, Nigeria)**: The project involved the use of both experimental and analytical models to investigate the behavior of cohesionless soil under varying load activation. (Project Cost - $6,700)

- **Pile Load Test Supervision of Falomo Shopping Centre (Ikoyi, Lagos, Nigeria)**: 6-storey commercial development founded on large diameter (800mm 900mm) bored piles, Precast Concrete sheet piles as boundary and basement support elements. (Project Cost - $67,500)
- **Structural Health Monitoring of Residential Apartment at Oniru, (Victoria Island, Lagos, Nigeria)**: Existing 5-Storey Building with all floors experiencing vibration. (Project Cost - $10,000)
- **Structural Design of Nigeria Liquefied Natural Gas (NLNG) Units Buildings, (Bonny Island, Port Harcourt, Nigeria)**: Design, analysis, and construction. (Project Cost - $250,000)
- **Non-destructive Evaluation of Mixed-Used development, (Temple Road, Ikoyi, Lagos, Nigeria)**: Existing 12-Storey Building was examined on structural reliability. (Project Cost - $35,000)
- **Structural Appraisal of MTN GOLDEN PLAZA, (Victoria Island, Ikoyi, Lagos, Nigeria)**: Existing 10-Storey office complex founded on large diameter bored piles; some floors experiencing vibration. (Project Cost - $15,000)

PUBLICATIONS

- **2021**: Ibrahim Balogun and Nii Attoh-Okine. Random Forest-Based Covariate Shift Addressing Non-Stationarity of Railway Track Data. "ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering", Volume 7 Issue 3 - September 2021.https://doi.org/10.1061/AJRUA6.0001141
- **2021**: Komolafe Oladayo, Ibrahim Balogun and Yetunde Abiodun. Comparison of Square and Circular Isolated Pad Foundations in Cohesionless Soils."Arid Zone Journal of Engineering, Technology and Environment",AZOJETE, vol. 17, no. 2, pp. 197-210, Jun.2021
- **2021**: Balogun, I., and Attoh-Okine, N. "Hybrid Reduction Techniques With Covariate Shift Optimization in High-Dimensional Track Geometry." ASME. J. Comput. Inf. Sci. Eng. February 2022; 22(1): 011010. https://doi.org/10.1115/1.4051597
- **2019**: Ibrahim Balogun, and Kolawole Olonade. Investigation into Sulphate Attack Resistance of Common Cement Brands in Nigeria. Journal of Engineering Research, Faculty of Engineering, University of Lagos, 2019.

PUBLICATIONS UNDER REVIEW

- **2021**: Grace Ashley, Prosper Anyidoho, Ibrahim Balogun, Nii Attoh-Okine. Prediction of Track Geometry Defect Severity Using Machine Learning Techniques. "Transportation Research Board Journal".
- **2021**: Ibrahim Balogun, Mark Leadingham, Dominique Gulliot and Nii Attoh-Okine. Deep Learning Approach to Railroad Defect Detection."IEEE Big Data Journal"
- **2021**: Arhin, S. and Balogun, I. Exploring Factors Contributing to crash Frequencies Using Causal Inference: A Case Study for USVI. "Advances in Data Science and Adaptive Analysis (ADSAA)".
- **2021**: Ibrahim Balogun,Ahmed Lasisi and Nii Attoh-Okine. Machine Learning Application for Sustainable Transportation: A case study of electric vehicles. "IEEE Big Data Journal".

CONFERENCES AND PRESENTATIONS

- **2021**: Ibrahim Balogun, and Nii Attoh-Okine. Machine Learning Approach Towards Anomaly Detection in Railway Infrastructure Systems. "Annual Inter-University Symposium on Infrastructure Management(AISIM)",Austin Texas 2021.
- **2019**: Ibrahim Balogun, and Kolawole Olonade. Harnessing Local Construction Materials for Sustainable Rural Infrastructure Development in Nigeria. "Nigeria Society of Engineers, Abuja", 2019.
- **2019**: A. Lasisi, M. O. Sadiq, I. Balogun, A. Tunde-Lawal and N. Attoh-Okine, "A Boosted Tree Machine Learning Alternative to Predictive Evaluation of Nondestructive Concrete Compressive Strength," 2019 18th IEEE International Conference On Machine Learning And Applications (ICMLA), Boca Raton, FL, USA, 2019, pp. 321-324, doi: 10.1109/ICMLA.2019.00060
- **2019**: Ibrahim Balogun. Concrete Material Sustainability in Africa. "Innovation-Science-Engineering-Education ISEE AFRICA, Nairobi Kenya, 2019.
- **2018**: Ibrahim Balogun. Alkaline Activation of Calcined Lateritic Soil as Alternative Binder in Cement-Based Production for Low-Cost Housing. "University of Lagos Annual Research Conference and Fair, Nigeria, 2018.
- **2015**: Ibrahim Balogun. Comparison of Computer Based Yield Line Theory and Finite Element Method of a 7-storey. Bachelor's thesis submitted to the Department of Civil and Environmental Engineering, University of Lagos, 2015.

VOLUNTARY ACTIVITY

- **2020**: Reviewer: Journal of Construction and Building Materials (Elsevier).
- **2020 till Date**: Reviewer: Journal of Advances in Data Science and Adaptive Analysis (ADSAA).
- **2020 till Date**: Reviewer: ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering.

Honors and Awards

- **2019**: University of Lagos, Civil Engineering Department - Best Graduating Student (Structure) 4.88/5.00
- **2019**: Finalist (Nigeria) Innovation-Science-Engineering-Education ISEE AFRICA, Nairobi Kenya
- **2019**: Finalist (Nigeria) 5th Doctoral School on LC3 (Limestone Calcined Clay Cement), Lausanne, Switzerland, 2019.
- **2019**: Winner - University of Delaware Intramural Sports Championship (Table Tennis Men Single), 2019.
- **2018**: University of Lagos (Graduate Research Assistantship)($2,300/Month).
- **2018**: University of Lagos (Graduate Research Fellowship)($1,500/Month).
- **2014**: 2nd Place, Inter-University Competition 2014, Nigerian Institute of Civil Engineering Students Association, OAU, Ile-Ife, Nigeria
- **2012-2015**: Agbami Medical and Engineering Professional Scholarship (University of Lagos)($500/year).
- **2012-2015**: MTN Science and Technology Scholarship (University of Lagos)($1000/year).
- **2012-2015**: University of Lagos Endowment Scholarship (Above 90% GPA)($1000/year).

Training and Certifications

- **2021**: Certificate in Graduate Railroad Engineering Program (University of Delaware)
- **2021**: Boot camp Training: Annual Inter-University Symposium on Infrastructure Management (University of Texas, Austin)
- **2020**: Introduction to Machine Learning   (Cousera)
- **2019**: Graduate Engineering Training Program   (University of Delaware)
- **2014**: Certificate of Participation, Unilever Future Leadership Program   (University of Lagos, Nigeria)
- **2013**: Health Safety, and Environment(HSE 1,2,3),British International Safety Organization
- **2019**: Innovation-Science-Engineering-Education ISEE AFRICA, Nairobi Kenya

Professional Licenses and Affiliations

- **2022**: Professional Engineer (PE) Anticipated Jan, 2022
- **2021**: Fundamentals of Engineering (FE) Anticipated Nov, 2021
- **2020**: Associate Member, American Society of Civil Engineer (ASCE)
- **2020**: Member, American Railway Engineering and Maintenance-of-Way Association (AREMA)
- **2020**: Member, Institute of Transportation Engineers (ITE)

Voluntary Activity

- **2020**: Reviewer: Journal of Construction and Building Materials (Elsevier).
- **2020**: Reviewer: Journal of Advances in Data Science and Adaptive Analysis (ADSAA).
- **2020**: Reviewer: ASCE-ASME Journal of Risk and Uncertainty in Engineering Systems, Part A: Civil Engineering.

Interests

- **Machine Learning and Data Analytics, Transportation Infrastructure Systems Resilience, Artificial Intelligence for Transportation, Autonomous Vehicles, Sustainable Transportation Systems**: .

Referee

- **Available upon request**: