# Kwabena Kwayisi KISSIEDU

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## EDUCATION

**Bachelor Of Science in Civil Engineering (First Class Honors), GPA:3.74**          **September 2019 – August 2023**
Kwame Nkrumah University of Science and Technology (KNUST)                                                    **Kumasi, Ghana**
**Relevant Coursework:** Reinforced Concrete Design, Steel and Timber Design, Structural Dynamics, Structural Engineering, Computer Programming (Python), Systems Engineering II (Intro to Finite Element Analysis)

## RESEARCH INTERESTS

- Physics-Informed and Generative Models for Damage Simulation and Synthetic Data Generation
- AI-Driven Geometric Digital Twins and Robotics
- Computer Vision for Structural Assessment
- AI for Sustainable Materials and Additive Manufacturing

## RESEARCH / PROJECT EXPERIENCE

*Personal Research Projects*                                                                                       **March 2024 – Present**
**Concrete Crack Segmentation model** GitHub
- Achieved a high-performance Dice Score of 0.93 on the test set by developing a U-Net based semantic segmentation model in PyTorch, enhanced with attention mechanisms for precise pixel-level damage localization.
- Implemented calculated class weighting to effectively handle inherent class imbalance in the crack dataset.

**Construction Site Safety Detection model** GitHub
- Developed a real-time safety detection model using YOLOv8 to automatically detect the presence or absence of Personal Protective Equipment (PPE) such as helmets and safety vests.
- This model serves as a foundation for a more advanced system incorporating dense captioning to provide contextual risk assessment, moving from simple detection to intelligent scene understanding.

**Traffic Car Counter model:** GitHub
- Developed an end-to-end, real-time vehicle monitoring system using YOLOv8 for multi-class object detection (cars, trucks, buses) and the SORT algorithm for robust object tracking.
- The system accurately counts vehicles crossing a user-defined virtual line, achieving 99% vehicle counting accuracy on test footage, demonstrating core competencies in video stream processing.

**Concrete Strength Prediction Model:** GitHub
- Applied machine learning to a practical problem by developing a Random Forest Regression model to predict concrete compressive strength.
- The model was successfully used to identify and implement a concrete mix with a 10% higher predicted strength for a live construction project (The Ark Phase 2 project, Oak Plaza Suites).

*Research Assistant*                                                                                       **December 2024 – Present**
**Fatigue Life Prediction of Locally Manufactured Steel Reinforcement Bars from Scrap Metals Using Artificial Neural Networks and Numerical Simulation**
Structural Engineering Lab, Department of Civil Engineering, K.N.U.S.T.  **| Supervisor:** Dr. Evans Amponsah
- Developing an Artificial Neural Network-based Fatigue Life prediction model using experimental fatigue test data.
- Optimizing the model for accurate Fatigue Life prediction.
- Comparing model predictions with experimental fatigue test results and numerical simulations to assess model accuracy.
- Performing sensitivity analysis to determine the influence of selected factors on Fatigue Life.

*Research Assistant*                                                                                       **January 2024 – Present**
**Assessment of Fatigue Life of Locally Manufactured Steel Reinforcement Bars for Sustainable Construction in Ghana.**
Structural Engineering Lab, Department of Civil Engineering, K.N.U.S.T.  **| Supervisor:** Dr. Evans Amponsah
- Developed a numerical model to predict the fatigue life of locally manufactured rebars from scrap metals.
- Evaluating the fatigue life of locally manufactured steel reinforcement bars from scrap metals.
- Investigating the factors influencing fatigue resistance in the local manufacturing process.
- Assessing the potential for integrating locally produced bars into sustainable construction practices.

*Final Year Thesis*                                                                                       **July 2023 – August 2023**
**Increasing Block Tariffs for water and their effect on households with shared metered connections**
Kwame Nkrumah University of Science and Technology **| Supervisor:** Prof. Emmanuel Amponsah Donkor
- Compiled data on the tariff structures of ten countries from IB-Net.

- Developed models to estimate the water bills for a dataset of household types and water consumption.
- Created visualizations of analysis results.
- Compared tariff structures of countries under study and suggested restructuring where necessary.

## PUBLICATIONS

**(Upcoming 2025)** - Assessment of Fatigue Life of Locally Manufactured Steel Reinforcement Bars for Sustainable Construction in Ghana.

**(Upcoming 2025)** - Fatigue Life Prediction of Locally Manufactured Steel Reinforcement Bars from Scrap Metals Using Artificial Neural Networks and Numerical Simulation.

## TECHNICAL SKILLS

**Machine Learning and Data Science**
- **Languages & Version Control:** Python, Git
- **Core Frameworks:** Pytorch, Tensorflow, with a specialization in PyTorch
- **Specialized Libraries:** Ultralytics (YOLO), OpenCV, Keras, Scikit-learn, CVZone, Skorch, PIL, Albumentations
- **Data Science and Visualization:** Pandas, Seaborn, Matplotlib
- **ML Operations:** Data Annotation (Label Studio), Data Augmentation (Torch Transforms, Albumentations)

**Structural Analysis and Simulation**                    View Structural Engineering Portfolio
- **Numerical Simulation:** ABAQUS
- **Structural Analysis:** ProtaStructure, Midas

**Building Design and BIM**                    View Structural Engineering Portfolio
- **Building Information Modeling (BIM):** Autodesk Revit

**3D Design and Synthetic Environments**
- **3D Modeling:** Blender 3D
- **3D Sculpting:** ZBrush
- **3D Texturing and Rendering:** Substance Painter, Blender3D, Marmoset Toolbag 5
- **Character Creation:** Character Creator
- **3D Environment Building:** Unreal Engine, Unity
- **3D Animation and Photo Editing:** Adobe After Effects, Adobe Photoshop, Adobe Illustrator

**Professional skills**

Project supervision, Project Management

## WORK EXPERIENCE

**Co - Founder**
**The Anthracite Limited**                    **July 2024 – Present**
- Researching sustainable construction methods and providing innovative BIM solutions for structural and architectural design needs.
- Driving the company's mission to pioneer construction of Ghana's first 3D printed Green Building estate.

**Consultant Engineer**
**Consulting Steel, Roads and Concrete (SRC) Engineers**                    **November 2023 – September 2024**
- Performed structural design and detailing for a diverse portfolio of large-scale projects, including industrial, residential and medical facilities.
- Served as the representative consultant for "The Ark Phase 2" project, advising on optimum structural solutions and utilizing my ML model to resolve on-site concrete strength issues.
- Spearheaded the adoption of Autodesk Revit for structural detailing, boosting work efficiency and output presentation by about 20%.

**Freelance 3D Designer**                    **September 2023 – Present**
**Dobiison Ghana Limited**
- Creating high-quality 3D characters, assets and immersive VR/AR experiences for a diverse range of clients including Unilever Ghana, MTN and SuCasa Properties.

**Freelance Structural Engineer**                    **June 2024 - Present**
**Ekodek Engineering and Construction**
- Collaborated on the structural design and detailing of numerous residential, commercial and public works projects using Autodesk Revit. Projects include Pineapple Hill Residential Building and Onyx Properties Warehouse.

**Engineering Intern**
**Production Department, Contracta Construction UK**                          **September 2021 – December 2022**

- Supervised construction of retaining walls, pile foundations and composite slabs.
- Performed site surveys to map out road network for road expansion project.
- Performed checks and took stock of vehicles and construction materials.
- Diligently managed skilled and unskilled labour.
- Revised detail drawings for construction of the New Kejetia Market.
- Assisted in management of the company's project database.

## TEACHING EXPERIENCE

**CE 452 - Computer Applications in Civil Engineering -** KNUST                          **June 2025 – July 2025**

- Invited by Dr. Evans Amponsah to teach BIM using Revit to the final year Civil Engineering class of 300 students.
- Class lasted for a period of 3 weeks, with two sessions per week.
- Prepared a detailed course outline with tasks for each week.
- Tutored students on optimized building modeling techniques for coordination with other engineering disciplines.

**Revit Tutor -** SRC Engineers                          **May 2024**

- Organized in-house training at Consulting Steel, Roads and Concrete Engineers in the use of Autodesk Revit for 3D structural design and detailing.

**Revit Tutor -** KSTU                          **February 2024**

- Tutored a group of industry professionals in Revit for 3D building modeling.
- Tutorials span over the course of two weeks.

**CE 263 - COMPUTER AIDED DESIGN -** KNUST                          **February 2023**

- Tutored a group of 50 students in the use of Autodesk AutoCAD for structural detailing.

**Class Teacher -** Victory Bible Church International, Shalom Sanctuary                          **January 2024 - present**

- Instructor of the Joshua Class.

## AWARDS

**Best Student in Civil Engineering Design (CED) Project [Structural Engineering] - 2023**:
- Final year capstone project that subjects students to a real-life Civil Engineering Design (CED) project.
- Competed with 300 students across KNUST's two campuses for the spot of best student in CED.
- Won the Associated Consultancy award for second- best student in CED (Structures).

## COURSERA COURSES

**Supervised Machine Learning – Regression and Classification**
Stanford Online & DeepLearning.ai
**Advanced Learning Algorithms**
Stanford Online & DeepLearning.ai
**PyTorch Ultimate 2024: From Basics to Cutting-Edge**
Packt

## MEMBERSHIPS AND ORGANIZATIONS

National Society of Black Engineers (NSBE)                          Men's President **–** VISA KNUST (2022-2023)
Engineers Without Borders (EWB)                          Men's Vice-President **–** VISA KNUST (2021-2022)
Ghana Engineering Students' Association (GESA)
Civil Engineering Students' Association (CESA)

## REFEREES

Available upon request.