# OSAZEE ERO

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## PROFESSIONAL SUMMARY

Highly accomplished Machine Learning Researcher and Engineer with a Ph.D. from the University of Waterloo. Proven track record in developing innovative AI-driven solutions for additive manufacturing, with expertise in computer vision, deep learning, and natural language processing. Skilled in a range of programming languages and machine learning tools. Strong leadership and mentorship experience, with a passion for advancing knowledge and fostering collaborative environments.

## EDUCATION

**University of Waterloo**                                                                                              *Waterloo, Canada*
- *Ph.D.*, *Mechanical and Mechatronics Engineering,*                                                *July. 2024*
- **Thesis:** In-Situ Monitoring and Quality Assurance Algorithms for Laser Powder-Bed Fusion using Optical Tomography
- **Specialization:** Advanced Image Processing (99/100), Pattern Recognition (94/100), Additive Manufacturing (96/100)

**University of Lagos**                                                                                                    *Lagos, Nigeria*
- *MSc.* in Systems Engineering (GPA: 4.67/5.00)                                                     *June. 2016*
- **Specialization:** artificial intelligence, machine learning and optimization

**University of Benin**                                                                                                     *Benin, Nigeria*
- *B. Eng in Electrical/Electronic Engineering (GPA: 4.36/5.00)*                             *November. 2011*

## TECHNICAL SKILLS

**Programming** (12+ years): Python, JavaScript, C#, C++, SQL, MongoDB, MATLAB

**Machine Learning Tools** (5+ years): TensorFlow, Keras, PyTorch, OpenCV, Scikit-Learn, Pandas, NumPy, SciPy, Django

**Data Analysis:** (5+ years): Data Visualization (Matplotlib, Seaborn), Big Data Platforms (Hadoop, Spark), Statistical Analysis (SPSS, SAS), A/B Testing

**AI Specializations:** Computer Vision, Natural Language Processing, Reinforcement Learning, Deep Learning, Generative Models.

**Developer Tools** (5+ years):  Git, Gitlab, Agile, Docker, Kubernetes, Eclipse, VSCode, PyCharm

**Infrastructure** (3+ years):  AWS Sage Maker, Azure, GCP, Linux.

## WORK EXPERIENCE

**Machine Learning Researcher**                                                                    Sep. 2020 – Jul. 2024
*Multi-Scale Additive Manufacturing Lab, Mech. & tron. Eng., University of Waterloo*          *Waterloo, Canada*
- Investigated and addressed challenges in in-situ quality assurance methodologies for laser-powder bed fusion (LPBF) Additive Manufacturing (AM) process, leveraging advanced artificial intelligence techniques.
- I Applied various machine learning techniques such as PCA, K-Means, Self-organizing maps, ConvLSTM2D, CNN, LSTM, XGBoost, etc. to identify flaws in parts fabricated using LPBF AM process.
- Analyzed large volumes of scientific image data using advanced computer vision methods such as U-Net, GANs, YOLO, Fast R-CNN etc. improving defect detection accuracy by 96%.
- Conducted comprehensive data preprocessing and feature engineering such as normalization, data binning, dimensionality reduction, transformation etc., leading to a 15% increase in model performance and reliability.
- Published research findings in two top-tier journals, contributing to the advancement of knowledge in the field of additive manufacturing and machine learning.
- Presented research at international conferences, garnering attention from leading experts and fostering collaborative opportunities.
- Mentored junior researchers and graduate students, guiding them in machine learning methodologies and contributing to the lab's overall research output.

**Lead Software Developer (Part-time)**                                    Jan. 2023 – June 2024

*Optifab Technologies, University of Waterloo*                              *Waterloo, Canada*

- Leveraged a comprehensive suite of tools, including Microsoft Teams, Git, GitHub, Azure DevOps, SonarQube, Docker, Kubernetes, MySQL, and MongoDB, to develop and deploy a 3D application that optimized smart scan laser patterns for metal additive manufacturing, reducing print time by over 10% and enhancing operational efficiency by 60% through collaborative cross-functional teamwork.
- Led the development of advanced AI-driven software solutions for 3D printing, ensuring defect-free manufacturing and enhancing production efficiency by 85%.
- Provided expert knowledge on AI and machine learning techniques, facilitating the integration of cutting-edge technology into manufacturing processes.
- Conducted thorough code reviews, resulting in a 90% reduction in bugs and improved code quality.
- Presented technical insights and progress reports to executive leadership, aiding in strategic decision-making and securing additional funding for research and development.

**Electronics Lecturer**                                                   Jul. 2013 – Aug. 2020

*Electrical/Electronic Department, University of Benin*                     *Benin, Nigeria*

- Taught and developed curriculum for multiple courses including Programming with C, Python, MATLAB, Instrumentation, Electric Circuits, Microprocessors and Microcontrollers, educating over 650 students annually.
- Supervised and mentored over 100 final-year student projects, guiding research and development in intelligent control of autonomous systems, resulting in 75% of projects achieving top grades.
- Collaborated with colleagues to review and improve departmental curriculum, leading to a 65% improvement in course content and structure.

## PUBLICATIONS

1. Optical tomography and machine learning for in-situ defects detection in laser powder bed fusion: A self-organizing map and U-Net based approach (2023). *Additive Manufacturing*
2. An Integrated Fuzzy Logic and Machine Learning Platform for Porosity Detection using Optical Tomography Imaging during Laser Powder Bed Fusion (2024)". *International Journal of Extreme Manufacturing*.
3. On the application of in-situ monitoring systems and machine learning algorithms for developing quality assurance platforms in laser powder bed fusion:A review (2023).". *Journal of Manufacturing Processes,*
4. Topology optimization for metal additive manufacturing: current trends, challenges, and future outlook (2023)." *Virtual and Physical Prototyping*

## CONFERENCE PRESENTATIONS

1. **Ero, O**, Taherkhani, K., & Toyserkani, Optical tomography and machine learning for in-situ defects detection in laser powder bed fusion: A self-organizing map and U-Net based approach (Poster). *Holistic Innovation in Additive Manufacturing, 1-2 June 2021*
2. **Ero, O**, Taherkhani, K., Yasmine Hemmati & Toyserkani, An Integrated Fuzzy Logic and Machine Learning Platform for Porosity Detection using Optical Tomography Imaging during Laser Powder Bed Fusion (Oral). *Holistic Innovation in Additive Manufacturing, 27-28 June 2023*

## PERSONAL PROJECTS

1. Developed a hand-controlled virtual laboratory using OAK-D camera for real-time gesture detection, trained hand detection models using the Egohands dataset and TensorFlow's ssd_mobilenet_v1_coco model, converted the trained models to blob format for deployment, and established TCP connections to link detections to Unity 3D game engine for interactive simulation and control.
2. Created a Unity game, where players use arrow keys to control a ball navigating through obstacles; incorporated a camera to capture ball's perspective images; collected images and input commands via a Python interface to train a convolutional neural network (CNN) for autonomous navigation, achieving a Testing F1-Score of about 88%; and integrated Unity with Python for seamless data collection and game control.
3. Implemented image colorization using Deep Learning with a U-Net architecture, achieving a PSNR of 28 dB and SSIM of 0.92 on historical photographs from the COCO dataset.

4. Evaluated and compared three unsupervised feature learning methods for detecting and classifying diseases in medical images, specifically focusing on the localization of abnormalities in chest X-rays, using CNN-based weakly supervised feature localization, ORB-SVM, and Autoencoder networks.

## AWARDS

- OpenCV AI Competition 2021 Phase 1 Winner
- Iranian Student Memorial Engineering Graduate Scholarship based on academic excellence on June 2024
- University of Waterloo Graduate Research Studentship, April 2017
- University of Waterloo International Doctoral Student Award, April 2017
- National Information Technology Development Agency (NITDA) Scholar, Nigeria, September 2020
- University of Lagos Second Best Graduating Student - Systems Engineering Graduate Class (4.67/5.00), June 2016.
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## PROFESSIONAL CERTIFICATIONS

**Machine Learning Engineer Nanodegree (Udacity) - November 2021**

*Certificate*: [Udacity](Udacity)

- Software Engineering Fundamentals, Machine Learning in Production using Amazon SageMaker,
- Training and deploying a Sentiment analysis and Plagiarism detection model based on XGBoost achieving an accuracy of 92% and 85% respectively.
- Trained neural networks and a Random Forest classifier on large datasets using Amazon SageMaker, achieving F1 scores of 0.89 and 0.93.
- Developed and fine-tuned a custom Convolutional Neural Network for dog breed classification, achieving an accuracy of 94% on the test dataset.

## LEADERSHIP EXPERIENCE

**Course Adviser** Sep. 2016 – 2018

*University of Benin, Electrical/Electronic Department* *Benin, Nigeria*

- Provided academic guidance and counseling to students on course selections and career paths.
- Coordinated curriculum development activities in collaboration with faculty members.
- Organized seminars and workshops to inform students about academic opportunities and advancements.
- Resolved academic disputes and student grievances effectively.

**Engineering Experiment Coordinator** Sep. 2016 – 2019

*University of Benin, Electrical/Electronic Department* *Benin, Nigeria*

- Designed and developed experiments to support engineering courses and research projects.
- Managed procurement, maintenance, and calibration of laboratory equipment.
- Ensured compliance with safety regulations and protocols in laboratory environments.
- Provided training to students and faculty on experimental procedures and equipment usage.

## VOLUNTEER EXPERIENCE

**Machine Learning Instructor and Mentor** Sep. 2016 – 2020

*University of Benin, Electrical/Electronic Department* *Benin, Nigeria*

- Developed and delivered comprehensive lesson plans and materials on machine learning topics, ensuring accessibility for diverse student backgrounds.
- Led interactive workshops and provided personalized mentorship, guiding students through hands-on projects to build and deploy machine learning models, fostering a collaborative and supportive learning environment.

**National Youth Service Corps** March. 2012 – April 2013

*STEM Educator trainer* *Bayelsa, Nigeria*

- Volunteered as a STEM educator trainer, teaching high school students how to build fun applications using Arduino and organizing competitions to enhance their motivation and learning outcomes.