OSAZEE ERO

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EDUCATION

University of 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, Nigeria

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

University of Benin, Nigeria

- ***B. Eng*** *in Electrical/Electronic Engineering (November. 2011)*
  GPA: 4.36/5.00

TECHNICAL SKILLS

Programming (12+ years): Python, JavaScript, C#, 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, Reinforcement Learning, Deep Learning, Generative Models.
Developer Tools (5+ years): Git, Gitlab, Agile, Docker
Infrastructure (3+ years): AWS Sage Maker, Linux.

WORK EXPERIENCE

Machine Learning Researcher Sep. 2020 – Jul. 2024
Multi-Scale Additive Manufacturing Lab, Mech. & tron. Eng., University of Waterloo *Waterloo, Canada*

- Leveraged advanced AI techniques and machine learning models (PCA, K-Means, ConvLSTM2D, CNN, etc.) to enhance in-situ quality assurance for the LPBF Additive Manufacturing process, achieving a 96% defect detection accuracy and a 15% increase in model performance.
- Analyzed large volumes of scientific image data using computer vision methods (U-Net, GANs, YOLO, Fast R-CNN) and contributed to research published in top-tier journals and presented at international conferences.
- Mentored junior researchers and graduate students in machine learning methodologies, significantly contributing to the lab's research output.

Lead Software Developer (Part-time) Jan. 2023 – June 2024
Optifab Technologies, University of Waterloo *Waterloo, Canada*

- Developed and deployed a 3D application to optimize smart scan laser patterns for metal additive manufacturing, reducing print time by over 10% and improving operational efficiency by 60%.
- Provided expert AI and machine learning guidance, conducted code reviews reducing bugs by 90%, and presented technical insights to executives, securing additional R&D funding.

Electronics Lecturer Jul. 2013 – Aug. 2020
Electrical/Electronic Department, University of Benin *Benin, Nigeria*

- Developed and taught courses in programming (C, Python, MATLAB), instrumentation, and microprocessors, educating over 650 students annually.
- Supervised 100+ final-year projects on intelligent control of autonomous systems, with 75% achieving top grades, and collaborated on curriculum improvements, enhancing course content by 65%.

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.

PROFESSIONAL CERTIFICATIONS

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

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.