

# Hadiza Umar Yusuf

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**Google Scholar:** [Hadiza Yusuf](#)

## Research interests

Machine Learning for Cyber-Physical Systems, Reinforcement Learning, Trustworthy Artificial Intelligence, Software Verification and Testing

## Education

### University of Michigan-Dearborn (UM-D)

Ph.D. in Computer & Information Sciences

CQPA: 3.95/4.0

MI, United States

Sept. 2024 – April 2028

### Carnegie Mellon University (CMU)

MS in Engineering Artificial Intelligence

CQPA: 3.78/4.0

Kigali, Rwanda

Aug. 2022 – May 2024

### Federal University of Technology Minna (FUTM)

B.Tech in Mathematics, minor in Statistics

CGPA: 4.58/5.0

Minna, Nigeria

Feb. 2014 – Oct. 2018

## Honors and scholarships

Lakshmi Subramanian CMU-Africa Student Excellent Award	2024
Mastercard Foundation Scholars Impact Award	2024
Future Leader Climate, Aspen Institutes	2023
Mastercard Foundation Scholarship	2022
InterMaths Erasmus Mundus Partial Scholarship	2022
Best Female Graduating Student (School of Physical Sciences, FUTM)	2018
Silver medal (National Mathematical Competition for University Students - NMC Abuja)	2018

## Research experiences

### Falsification of AI-enabled Cyber-Physical Systems

Supervisor: Professor Khoulood Gaaloal (UM-D)

Sept. 2024 – Present

- Aim: Develop a falsification technique that combines stochastic optimization and reinforcement learning to improve fault detection in AI-enabled CPS.

- Conducted empirical analysis to categorize CPS models and identify verification challenges specific to AI systems.

[Website in Progress](#), [Publication-1](#), [Publication-2](#)

### Counterfactual-Guided Debugging of Cyber-Physical System

Supervisor: Professor Khoulood Gaaloal (UM-D)

May 2025 – August 2025

- Aim: to develop a framework (DeCaF) for debugging cyber-physical systems through counterfactual-guided explanations that identify minimal input changes preventing system failures.

- Contributed to the training data generation phase through simulation-based robustness-guided search.

- Assisted in the evaluation of counterfactual models across multiple Simulink CPS benchmarks.

Submitted for publication

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<sup>1</sup>Some repositories are private and require my supervisor's permission to share.

### **Prosthetics Design for Low-Resource Environments**

Mentors: Professor Moise Busogi (CMU)

May 2023 – August 2024

- Aim: to improve access to customized prosthetics in low-resource settings using smartphone-based digital reconstruction and data-driven prediction of mechanical functionality.
- Contributed to digital reconstruction and data synthesis, processing smartphone video data and generating datasets for model training and validation.
- Assisted in the machine learning and case study stages, implementing predictive models and evaluating their performance in customized prosthetic fabrication scenarios.

[Publication-1](#), [Publication-2](#)

### **Data-Driven Material Prediction for 3D Printing**

Mentors: Professor Conrad Tucker (CMU)

Jan. 2024 – May 2024

- Aim: to predict material properties of 3D-printed parts using data-driven methods that link specimen test results, printing conditions, and geometry.
- Contributed to the data synthesis process, generating and pre-processing simulation data under varying printing parameters for model training.
- Implemented and tuned the multi-layer perceptron (MLP) model used to predict material properties and evaluated its accuracy on unseen data.

[Publication](#)

### **Adaptive Education for African Languages (ED-GPT)**

Mentors: Professor Azzizuddin Biyabani (CMU)

Oct. 2023 – Dec. 2023

- Constructed LLM pipeline for context-based answer generation for high school STEM subjects in Kinyarwanda.
- Evaluated model using sentence similarity, Levenshtein distance, and sequence matcher and achieved 98% accuracy with sentence similarity.

More about the work and code are available on [github](#).

### **Re-implementation of Polyphonic Piano Transcription**

Mentors: Professor Bhiksha Ramakrishnan (CMU)

Oct. 2023 – Dec. 2023

- Re-implemented [Dasam et al.'s](#) multi-state autoregressive AMT model by applying label smoothing to the algorithm.
- Achieved stability in the model with low label smoothing values.

Our re-implementation code is also on [github](#).

### **DTMF Demodulation using Simple Neural Networks**

Mentors: Professor Mike Perkins (CMU)

May 2023 – Aug. 2023

- Aim: to design an experiment for accurate DTMF signal decoding using power spectral analysis.
- Implemented DTMF tone identification through signal processing and neural network training.
- Captured and processed real-time DTMF signals on Arduino Nano Sense BLE and Raspberry Pi for live tone detection.

[Publication](#), [Code on Github](#).

## teaching experiences

**Teaching Assistant, College of Computer Engineering (CMU)** Fall 2023  
18751-RW: Applied Stochastic Processes

- Assist with preparing and grading homework, holding weekly recitations, and answering questions about the course material and homework problems to 53 graduate students.

**e-Tutor, Centre for Open Distance & eLearning (FUTM)** Feb. 2021 - Jul. 2022

Mathematics and Statistics course

- Tutored 100-level and 200-level students of the computer science department in Mathematics and statistics courses.

- Interacted with students online and responded to their queries synchronously and asynchronously.

- Assessed students' performances in assignments, quizzes, tests, and examinations.

*Average student rating: 4/5.*

**Instructor, Merrion IT**

Oct. 2020 - Mar. 2022

- Instructed over 70 high school students of the New Horizon College, Minna in programming with python, graphic design using Blender, and web design using Mobirise.

- Guided students in carrying out hands-on projects.

- Assessed students' performance and gave feedback based on positive reinforcement learning

**Teaching Assistant, Department of Computer Science (College of Education Katsina-Ala)**

Apr. 2019 - Mar. 2020

Assisted in teaching, evaluating, grading, and mentoring students in the following courses: BASIC Programming Language, Effective Use of Microsoft Packages, and Numerical Analysis.

**Science Teacher, Talented Heroes**

May 2013 - Aug. 2013

Taught High school students science subjects as follows: Chemistry, Basic Science and Basic Technology.

*Average student rating: 4.3/5.*

## Other experiences

**ALforEducation**

South Africa (Remote)

Apprentice

May 2024 - Aug. 2024

Developed a comprehensive entrepreneurship toolkit for primary school students of low-income communities for an eight-week project with Talent Mine Academy.

Presented a comprehensive final report covering leadership journey, key learnings, and future aspirations to peers and network members at African Leadership Academy South Africa.

**Ignite Research Academy**

Minna, Nigeria

Human Resources Director

Jan. 2021 - May 2023

Led end-to-end volunteer recruitment, orientation, and training while co-organizing webinars on African student scholarships, fostering a community of 266+ undergraduates and graduates.

**Advanced Engineering Innovation Research Group**

Minna, Nigeria

Program Administrator

Feb. 2021 - Jul. 2022

Research Assistant

Oct. 2020 - Aug. 2022

- Organized three conferences on Artificial Intelligence for Clean Energy funded by the Royal Academy of Engineering, UK, drawing participants from seven universities in Nigeria.

- Recruited and trained 180+ student interns in various batches on emerging IT skills and soft skills
- Actively participated in clean energy research. [website](#)

**Information Technology Services, Federal University of Technology Minna** Minna, Nigeria

Intern May 2017 - Aug. 2017

- Developed a dynamic non-active website using HTML and CSS
- Assisted with troubleshooting issues logs in the institution's faculties

## Talks and Mentions

**Session Speaker: Emerging Trends in Verification of AI-enabled CPS** March 2026  
International Conference on Machine Learning, Artificial Intelligence and Data Science.  
[Speakers Profile](#)

**Featured in an Article: Everyone has something to give in their own little space** May, 2024  
Mastercard Foundation: Impact Stories. [Article](#)

**Presenter: Searching for and Choosing Graduate Schools** Aug. 2022  
Ignite Research Academy Webinar. [Video](#)

## Skills

### Programming/ML Frameworks

Proficient in Python programming, MATLAB, Simulink, PyTorch, TensorFlow, TensorFlow lite, scikit-learn, pandas, numpy...

Familiar with C\C++, Spark, Hadoop, OpenCV, NLTK & spaCy, Git and Cloud platforms (AWS, Azure, GCP).

### Languages

English (fluent), Hausa (fluent), Igbie (Basic)

## Volunteering

Leadership Board Member: LifeWise Academy Dearborn, MI	Aug. 2025 - Present
Student Volunteer: 28th MODELS 2025 Conference, Grand Rapids, MI	Oct. 2025
Mentor: Wolverine Mentors Collective (Graduate Students Edition)	April 2025 - Present
Mentor: Afrisnet	Aug. 2024 - Present
Student volunteer: African Business Heroes Grand Finale	Nov. 2023
Student volunteer: 11th ICLR 2023 conference	May 2023
Student volunteer: STEM Women Lead Series, Kigali, Rwanda	Nov. 2022

## Other interests

Swimming, Traveling, Drawing and Painting.