SUNDAY OLUWADAMILOLA USMAN
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EDUCATION

2021 – present **Ph.D. Systems and Industrial Engineering**
University of Arizona, United States
CGPA: 3.83/4.0
Advisor: Dr. Hongyue Jin

2021 – 2023 **M.Sc. Industrial Engineering**
University of Arizona, United States
CGPA: 3.9/4.0
Advisor: Dr. Hongyue Jin

2015 – 2020 **BSc. Industrial Engineering with Honors**
University of Ibadan, Nigeria
CGPA: 6.4/7.0
Thesis: Sites suitability analysis for a solar power plant using analytical hierarchy process and geographic information systems.
Advisor: Dr. Oluseye Adebimpe

2009 – 2012 **West African Examinations Council (WAEC)**
School for the gifted, Gwagwalada, Nigeria

RESEARCH INTEREST

Sustainability; Lifecycle assessment; Technoeconomic analysis; Optimization of energy systems; Geographic information system (GIS), Artificial intelligence

RESEARCH EXPERIENCE

2024 – present **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: Techno-economic analysis of molten salt electrolysis for rare earth metal reduction
Funding Source: Critical Materials Innovation Hub, United States
Project Status: Ongoing
Advisor: Dr. Hongyue Jin
Synopsis: To perform techno-economic analysis for rare earth metals reduction process through molten salt electrolysis and compare the result with state-of-the-art technologies.
Duties: Developed the material and energy flows, identified major cost drivers, reviewed literature, and compared total cost of the novel technology setup with state-of-the-art technologies, and preparing manuscript.

2023 – present **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: Lifecycle assessment of magnet-to-magnet recycling for clean energy applications in the United States
Funding Source: Urban Mining Company, United States
Project Status: Ongoing
Advisor: Dr. Hongyue Jin
Synopsis: To perform lifecycle assessment for magnet-to-magnet recycling from waste magnet material for clean technology applications and compare the result with state-of-the-art technologies.
Duties Developed lifecycle inventory for the proposed technology, performed the lifecycle impact assessment, reviewed literature, carried out a comparative lifecycle assessment with existing industries, interacted with other decision-making experts, and preparing manuscript.

2023 – present **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: Lifecycle assessment of engineered bacteriophage technology for rare earth metal extraction
Funding Source: National Science Foundation, United States
Project Status: Ongoing
Advisor: Dr. Hongyue Jin
Synopsis: To perform lifecycle assessment for rare earth metals extraction through engineered bacteriophage technology and compare the result with state-of-the-art technologies.
Duties Developed lifecycle inventory for the proposed technology, performed the lifecycle impact assessment, reviewed literature, carried out a comparative lifecycle assessment with existing industries, interacted with other decision-making experts, and preparing manuscript.

2022 – present **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: Quantitative analysis of battery recycling
Funding Source: REQYRD Technologies and Materials, United States
Project Status: Ongoing
Advisor: Dr. Hongyue Jin
Synopsis: To quantify the material, energy, and equipment utilization for a novel battery recycling technology and its environmental impact on respiratory effects, carcinogens, noncarcinogens, acidification, ozone depletion, global warming, smog, eutrophication, ecotoxicity, and fossil fuel depletion.
Duties: Developed lifecycle inventory for the proposed technology, performed the lifecycle impact assessment, reviewed literature, carried out a comparative lifecycle assessment with existing industries, interacted with other decision-making experts, and prepared a manuscript for a paper publication as the first author.

2022 – 2023 **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: Molten salt electrolysis for rare earth metal reduction
Funding Source: Critical Materials Innovation Hub, United States
Project Status: Completed
Advisor: Dr. Hongyue Jin
Synopsis: To perform lifecycle assessment for rare earth metals reduction process through molten salt electrolysis and compare the result with state-of-the-art technologies.
Duties: Developed the lifecycle inventory, performed the lifecycle impact assessment, reviewed literature, and carried out a comparative lifecycle assessment with state-of-the-art technologies, prepared manuscript, and published a collaborative journal article.

2021 – 2023 **Graduate Research Assistant**
Systems and Industrial Engineering, University of Arizona, United States
Project Title: A lifecycle assessment of a novel energy generation from municipal solid waste
Funding Source: AMP Robotics, United States
Project Status: Completed
Advisor: Dr. Hongyue Jin
Synopsis: Analyzing the type and extent of environmental impacts resulting from developing a new energy industry. In this research, we are primarily concerned with how various processes produce emissions that affect human health and increase global warming.
Duties: Developed the lifecycle inventory, performed the lifecycle impact assessment, reviewed literature, carried out a comparative lifecycle assessment with existing industries, and interacted with other decision-making experts.

2019 – 2020 **Undergraduate Research Assistant**
Industrial and Production Engineering, University of Ibadan, Nigeria
Project Title: Suitable site assessment for a solar power plant with analytical hierarchy process and geographic information systems.
Project Status: Completed
Advisor: Dr. Oluseye Adebimpe
Synopsis: To develop a model that selects cost-effective areas for solar power plants using a combination of operations research methods and Geographic Information Systems.
Duties: Conceptualized the project idea, reviewed literature, interacted with other decision-making experts, wrote the research proposal, developed the questionnaire for investors, prepared manuscript, and published a collaborative journal article.

2019 – 2020 **Team Lead for Research and Development**
Industrial and Production Engineering, University of Ibadan, Nigeria
Project Title: Design of a foldable traveling bag.

Project Status: Completed
Advisor: Dr. Babatunde Odedairo
Synopsis: To develop a foldable bag that is lightweight and compact when not in use without compromising its functionality.
Duties: Reviewed literature, interacted with other decision-making experts, and developed the questionnaire production team, and presented findings to the University and interested investors in Nigeria.

2019 – 2020 **Undergraduate Research Assistant**
Industrial and Production Engineering, University of Ibadan, Nigeria
Project Title: Use of multi-objective techniques for production planning - case study of a cement factory.
Project Status: Completed
Advisor: Dr. Ademola Adeyeye
Synopsis: To determine efficient and effective methods for solving optimization problems encountered during cement factory cost minimization and cost maximization.
Duties: Conceptualized project idea, reviewed literature, interacted with other decision-making experts, wrote the research proposal, and developed the questionnaire production team, and presented findings in a multidisciplinary annual event.

2019 – 2020 **Undergraduate Research Assistant**
Industrial and Production Engineering, University of Ibadan, Nigeria
Project Title: Plant layout and facility design (A case Study of a production company)
Project Status: Completed
Advisor: Prof. Olusegun Akanbi
Synopsis: To design a facility layout that ensures that production inputs flow smoothly and smoothly at the lowest possible cost.
Duties: Reviewed literature, interacted with other decision-making experts, and wrote the research proposal, and presented findings in a multidisciplinary annual event.

PEER-REVIEWED PUBLICATIONS (LINK → GOOGLE SCHOLAR)

1. O. A. Adebimpe, & **S. O. Usman** "A GIS-AHP Approach for Evaluating Site Suitability for Solar Power Plant: A Case Study of Ewekoro LGA., Nigeria", *Nigerian Journal of Technology*. 41(4), 2022, pp. 680 - 692. DOI: 10.4314/njt.v41i4.6

2. Holcombe, B., Sinclair, N., Wasalathanthri, R., Mainali, B., Guarr, E., Baker, A. A., **Usman, S. O.**, Kim, E., Sen-Britain, S., Jin, H., McCall, S. K., & Akolkar, R. (2024). Sustainable and Energy-Efficient Production of Rare-Earth Metals via Chloride-Based Molten Salt Electrolysis. *ACS Sustainable Chemistry & Engineering*, *12*(10), 4186–4193. https://doi.org/10.1021/acssuschemeng.3c07720

3. Olawade, D. B., Fapohunda, O., Wada, O. Z., **Usman, S. O.,** Ige, A. O., Ajisafe, O., & Oladapo, B. I. (2024). Smart waste management: A paradigm shift enabled by artificial intelligence. *Waste Management Bulletin, 2*(2), 244–263. https://doi.org/10.1016/j.wmb.2024.05.001

4. Alipanah, M., **Usman, S. O.,** Saha, A. K., & Jin, H. (2024). Designing profitable supply chains for lithium-ion battery recycling in the United States. *Clean Technologies and Recycling, 4*(1), 22–42. https://doi.org/10.3934/ctr.2024002

5. Olawade, D.B., Teke, J., Fapohunda, O., Weerasinghe, K., Usman, S.O., Ige, A.O., Clement David-Olawade, A., 2024. Leveraging artificial intelligence in vaccine development: A narrative review. Journal of Microbiological Methods 224, 106998. https://doi.org/10.1016/j.mimet.2024.106998

MANUSCRIPT IN PREPARATION/SUBMITTED

1. **S.O. Usman**, Sweta Balchandani, Shoaib Khan, Carson Potter, Hongyue Jin* "Technoeconomic Analysis and Life Cycle Assessment of Artificial Intelligence based Municipal Solid Waste Identification, Sortation, and Downstream Waste-to-Energy Conversion" *Manuscript in preparation.*

2. **S.O. Usman**, Nighat Afroz Chowdhury, Mike Irish, Aaron Palumbo, Hongyue Jin* "A comparative lifecycle assessment of recovering critical minerals from lithium-ion batteries via two-step sulfur dioxide leaching" *Manuscript in preparation.*

3. **S.O. Usman**, Benjamin Holcombe, Rohan, A., Hongyue Jin* "Techno-economic Analysis of Rare Earth Metal Reduction via Molten Salt Electrolysis" *Manuscript in preparation*.

4. David B. Olawade*, Oluwaseun Fapohunda, **S.O. Usman**, Abiola Akintayo, Ayokunle O. Ige, Yemi A. Adekunle, Adedapo O. Adeola *"*Artificial Intelligence in Computational and Materials Chemistry: Prospects and Limitations" *Submitted*

ORAL AND POSTER PRESENTATIONS

- RM Shahbab, V Roy, Y Yao, A John, N Shakelly, X Zhou, HN Ahmed, **SO Usman**, SMM Rahman, C Nath, H Jin, F Zhao, JW Sutherland (September 2024). Techno-Economic Assessment (TEA) and Life Cycle Assessment (LCA) of Critical Materials Innovation Hub Technologies. Critical Material Innovation Hub Conference, Iowa. Poster Presentation

- **Sunday Usman** (April 2024). Life Cycle Assessment (LCA) for Dimensionally Stable Anode (DSA) for Sustainable Nd Metal Reduction. Critical Material Innovation Hub Conference, Colorado. Oral Presentation

- Neha Shakelly, Sameer Kulkarni, **Sunday Usman**, Yue Yao, Xiaoyu Zhou, Albin John, Hongyue Jin, Fu Zhao, John W. Sutherland (April 2024). Life Cycle Assessment, Techno-economic Analysis, and Design of Experiments for CMI Technologies. Critical Material Innovation Hub Conference, Colorado. Poster Presentation

- John W. Sutherland, Hongyue Jin, Fu Zhao (February 2024). Techno-Economic Assessment (TEA) and Life Cycle Assessment (LCA) of Critical Materials Innovation Hub Technologies. Critical Material Innovation Hub Conference, Iowa. Poster Presentation

HONORS, AWARDS AND RECOGNITIONS

2024	Interviewed by the Department of Systems and Industrial Engineering, University of Arizona as the First Outstanding Ph.D. Nigerian Student (Link)
2024	Roots for Resilience Fellowship, University of Arizona, $7,000 (Link)
2024	Departmental Travel Funding, University of Arizona, $450
2023	Data Science Fellowship, University of Arizona, $7,000
2023/2024	University of Arizona, Systems & Industrial Engineering, Graduate Research Assistantship
2021-2024	University of Arizona Foundation
2022-2023	Graduate Professional Student Council Scholarship
2022/2023	University of Arizona, Systems & Industrial Engineering, Graduate Research Assistantship
2021/2022	University of Arizona, Systems & Industrial Engineering, Graduate Research Assistantship
2021	First Nigerian and the only Ph.D. student admitted for Systems and Industrial Engineering in the Fall 2021 cohort, University of Arizona, United States
2020	Second best graduating student Undergraduate
2017 – 2020	Federal Government Merit Scholarship Award
2015 – 2020	Dean's Roll of Honor (5 Stars)
2017	Kogi State Bursary Award
2012	Best Graduating Student in Junior High School

TEACHING EXPERIENCE

2015 – 2020 **Academic Head**
RBCF, University of Ibadan (~50 students)
- Facilitated sessions in Algebra I, Algebra II, and Calculus.

2016 **Tutor**
Department of Industrial Engineering, University of Ibadan (~40 students)
- Taught operations research, engineering economics, value engineering, engineering probability and statistics, project planning and control and simulation.

2013 – 2014 **Tutor**
Department of Mathematics, God's Plan High School (~28 students)
- Tutored students in mathematics and organized competitions to help them apply what they had learned.

WORK EXPERIENCE

2023 **Proposal writing**
University of Arizona
Department of Systems and Industrial Engineering
Responsibilities:

- During the proposal development stage, I built maps using ArcGIS Pro for "[Federal] "Global Centers Track 1: Global Center for Sustainable Li-lon Battery Recycling (SLIBaR) with Low Water Consumption", other senior personnel at the University of Arizona, $379,619 for Jin (PI: Qing Hao, Aerospace and Mechanical Engineering, UArizona). Prime sponsor - National Science Foundation, total requested fund: $4,999,565, 12/2023-11/2028, submitted" to gain better understanding of the problem statement and potential solutions.

2020 **Business Development Associate**
Foreign admits, India
Responsibilities:

- Executed Decision making strategies to improve profitability.
- Coordinated team members to analyze the performance of different departments and ensure that the set objectives are met.
- Built a network of student representatives (Ambassadors) in various Universities in Nigeria.

2018 – 2019 **Data Analytics Intern**
GisKonsult Limited, Nigeria
Responsibilities:

- Managed, analyzed, and visualized spatial and non-spatial data to solve complex problems with conflicting alternatives.
- Applied operations Research techniques in building a predictive model for selecting least-cost suitable areas for sitting a solar power plant.
- Solved complex transportation problems with statistical analysis and Network Analyst in ArcGIS.
- Facilitated an in-depth understanding of operations problems and the result that will be achieved.

2018 **Industrial Trainee**
University College Hospital, Nigeria
Responsibilities:

- Performed regular investigations of different systems so as to improve performance and increase productivity.
- Collected and analyzed data and developed models, often using spreadsheets, databases and pragmatic, numerical approaches to solve complex problems.
- Initiated regular checks of purchased items used in project design and ensuring that they comply with the design specifications.
- Completed various projects from design stage to construction stage.

2017 **Industrial Trainee**
Hallelujah Technical Works, Nigeria
Responsibilities:

- Restored all failed equipment through the application of the corrective maintenance actions.
- Reported daily on how processes are to be improved to increase productivity.
- Promoted processes that are efficient and reliable to meet predetermined objectives.

LEADERSHIP AND EXTRACURRICULARS

2024 **Vice President, African Graduate Student Association, University of Arizona**

- Provided support to more than 300 African students in linking up with professionals to navigate and excel in their chosen fields.

2019 – 2020 **Protocol Team Head, Industrial Engineering Department**

- Deployed various strategies in facilitating the overall success for Industrial Engineering Student Association (IESA) competition among over 250 students.

2016 – 2019 **Hall Representative, RBCF, University of Ibadan**

- Facilitated sessions between student teachers and students for addressing their academic problems.

2018 **GIS, Energy Production and Infrastructure Associate, Xodus Energy**

- Using GIS and Operation research techniques to determine suitable criteria for decision-based problems.

PROFESSIONAL ORGANIZATIONS

2024 American Center for Life Cycle Assessment

2024 Southern Arizona Environmental Management Society Inc.

2024 American Chemical Society

2024 Elected to Arizona Alpha Chapter of Mu Sigma Rho, the National Honor Society in Statistics

2023 Graduate Member of National Society of Black Engineers

PROFESSIONAL DEVELOPMENT

2024 **A Circular Economy of Metals: Towards a Sustainable Societal Metabolism (40 hrs.)**

Center: Coursera, University of Leiden

Overview:

- An examination of sustainable metal production options, focusing on a circular economy to increase metal recycling while reducing the need for fresh metal production.

2024 **Life Cycle Assessment (23 hrs.)**
Center: Coursera, University of Michigan
Overview:
- Quantitative and qualitative analysis of systems, processes, and products with respect to their environmental consequences.

2024 **Rare Earth Elements: Mine to Magnet and Markets (7 hrs.)**
Center: Colorado School of Mines, Golden, Colorado
Overview:
- An accelerated course on the fundamentals, applications, and economic markets of rare earth permanent magnets in clean energy technologies.

2024 **Energy and Environment (22 hrs.)**
Center: Coursera, Dartmouth College
Overview:
- Application of high-level scientific principles to solve real-world environmental problems.

2024 **Municipal Solid Waste Management in Developing Countries (22 hrs.)**
Center: Coursera, École Polytechnique Fédérale de Lausanne
Overview:
- Design of waste management systems in a way that maximizes the social and environmental benefits.

2023 Certified Peer Review Course, Elsevier

2023 ACS Reviewer Lab, American Chemical Society

2023 **Rare Earth Elements: Mine to Magnet and Beyond (6 hrs.)**
Center: Colorado School of Mines, Golden, Colorado
Overview:
- An accelerated course organized by renowned researchers of the Critical Materials Institute with a focus on the importance and challenges associated with the production of rare earth metals.

2023 Preventing harassment and discrimination. University of Arizona

2023 Active shooter training, University of Arizona

2023 Harassment and Discrimination Prevention, University of Arizona

2021 FERPA Training: For Staff, University of Arizona

2021 FERPA Training: For Instructors and Instructional Support Teams, University of Arizona

2021 Teaching Assistant Policy Training Online (TATO), University of Arizona

2021 Information Security Awareness, University of Arizona

2020 **Introduction to Solar Cells (23 hrs.)**
Center: Coursera, Technical University of Denmark
Overview:
- Fundamentals renewable energy sources and their various advantages.

2018– 2019 **Geographic Information System (6 months)**
Center: GISKonsult, Ibadan, Nigeria
Overview:
- Spatial and non-spatial data collection, analysis and interpretation for effective decision making.

2017– 2018 **Enterprise Resource Planning (3 months)**
Center: University of Ibadan, Ibadan, Nigeria
Overview:
- ES Fundamentals with SAP covering Business Processes, Enterprise System Knowledge, SAP ERP Navigation and Reporting, Procurement to pay, Accounting Concepts, Sales to cash and inventory management integration.

PEER REVIEW ACTIVITY

2024 - present Peer Reviewer (September 2024 – September 2027), International Journal of Energy and Environmental Sciences, New York, United States.
- Appointed to evaluate and review scholarly manuscripts in the field of energy and environmental science for publication.

2024 Sustainability and Renewable Energy Judge for 69th Annual Southern Arizona Research, Science and Engineering Foundation, High School, Health Science Innovation Building, University of Arizona.

2024 Energy and Change Judge for 69th Annual Southern Arizona Research, Science and Engineering Foundation, Middle School, Virtual.

2024 Judge for Poster Presentations, Middle School Science Fair, Imago Dei Middle School, Arizona.

SKILL AND INTERESTS

Software and Programming: Microsoft office suites, AutoCAD, Python, R, Simapro, MATLAB, and ArcGIS Pro, ARENA

Languages: English, Hausa, and Yoruba

Interests and Hobbies: Problem solving, solving puzzles, public speaking, presentation, and playing saxophone.

VOLUNTEERING AND COMMUNITY SERVICES

2024 **Vice President**
Organization: African Graduate Student Association, University of Arizona
Members: Over 80 students

2023 **Student Staff: Bonder Foundation**
Theme: 2023 INFORMS Annual Meeting at Phoenix Convention Center
Organization: INFORMS, United States
Attendance: Over 15,000 Participants

2019 **Team Lead: Geocoding**
Theme: Integrating Analytical Hierarchy Process with Geographic Information Systems
Organization: GISKonsult, Nigeria
Attendance: 40 Participants

2018 **Student Coordinator**
Theme: Various applications of operation research tools in solving real world problems.
Organization: Industrial Engineering Student Association, University of Ibadan
Attendance: 50 Participants

2017 **Academic Coordinator**
Theme: Analytical Mind Sharpening
Organization: RBCF, University of Ibadan, Nigeria
Attendance: 100 Participants

REFERENCES

References furnished upon request.