

Innocent Nyalala, PhD

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Summary

Highly motivated and results-oriented faculty with a PhD in Agricultural Electrification & Automation specializing in the intersection of Artificial Intelligence, Computer Vision, and Machine Learning. Proven track record of conducting cutting-edge research with significant contributions to high-impact journals, developing innovative technology solutions for real-world challenges in agriculture and healthcare, and securing grant funding. Experienced educator and mentor with a strong commitment to academic service and institutional development, particularly since joining IIT Madras Zanzibar in October 2024. Adept at leveraging interdisciplinary collaboration and advanced technical skills to drive impactful research and cultivate the next generation of engineers and scientists.

Research Interests

My research focuses on designing efficient machine learning (ML) and computer vision systems to automate decision-making in agriculture and healthcare. My expertise spans:

- Artificial Intelligence (AI), Machine Learning (ML), Deep Learning
- Computer Vision, Digital Image Processing
- Natural Language Processing (NLP), particularly for low-resource languages (e.g., Swahili)
- Internet of Things (IoT), Embedded Systems, Data Science
- Applications in Agricultural Technology (AgTech) and Healthcare Informatics

I am dedicated to bridging algorithmic innovation with real-world challenges, developing robust, low-latency tools for resource-constrained environments through the integration of AI, edge computing, and sensor fusion techniques. My work since joining IIT Madras Zanzibar in October 2024 has focused on leveraging these areas for impactful projects in agriculture, healthcare, and language technologies (see Current Projects).

Current Projects

Since joining IIT Madras Zanzibar in October 2024, my work has focused on:

- **AI for Smart Agriculture and Sustainability:** Developing and applying AI techniques to enhance agricultural practices, improve resource management, and promote sustainability, including post-harvest technologies and food processing optimization.
- **AI for Medical Imaging - Placental Imaging:** Focusing on the application of AI, particularly computer vision and machine learning, to analyze placental images for improved diagnostics, morphology prediction, and volume estimation.
- **Swahili Speech and Text Processing:** Researching and developing NLP tools and techniques specifically for the Swahili language, with potential applications in both agriculture and healthcare.
- **Blockchain for Spice Supply Chain:** Investigating the use of blockchain technology to improve transparency, traceability, and efficiency in the spice supply chain.

Research Collaborations

I collaborate with researchers at the following institutions:

- Prof. Chen Kunjie - Nanjing Agricultural University
- Dr. Nirav Bhatt - IIT Madras Chennai & Zanzibar
- Dr. Sunil Sazawal - Executive Director, CPHK, Professor and Director Research (Medical), Subharti University
- Dr. Tushar Shinde - IIT Madras Zanzibar
- Dr. Jiayu Zhang - Xuzhou University of Technology, Xuzhou, China
- Dr. Soumya Banerjee - University of Cambridge, UK
- Dr. Vikranth H. Nagaraja - University of Oxford, UK

Academic Appointments

Assistant Professor , School of Engineering & Science, IIT Madras Zanzibar	Oct 2024 – Present
<ul style="list-style-type: none">Engaged in teaching and research activities in machine learning, computer vision, and AI applications (see Research Interests & Current Projects).Actively involved in curriculum development and supervising MTech student research projects (see Supervision section).Contributing to institutional service through key committee memberships and administrative roles (see Academic Service sections).	
Part-time Lecturer , Department of Computer Science, Egerton University	Apr 2022 – Dec 2024
<ul style="list-style-type: none">Delivered lectures and conducted practical sessions on core computer science courses to computer science and actuarial science students.	
Part-time Lecturer , Department of Literature, Language and Linguistics, Egerton University	Sept 2022 – Dec 2024
<ul style="list-style-type: none">Delivered IT courses in programming, AI, DBMS & design, software engineering, and research methods to library information science students.	
Doctoral Researcher , Nanjing Agricultural University, College of Engineering	Sept 2017 – Dec 2023
<ul style="list-style-type: none">Conducted cutting-edge research in computer vision and machine learning tailored to agricultural applications.Authored four first-author publications in high-impact Q1 journals, significantly advancing the field.Collaborated on over 14 peer-reviewed research articles, demonstrating teamwork and academic productivity.	
Part-time Lecturer , Department of Accounting, Finance and Management, Egerton University	Jan 2023 – Apr 2023
<ul style="list-style-type: none">Provided instruction on Supply Chain Information Systems.	
Part-time Lecturer , Department of Information Technology, Maseno University	Feb 2022 – Aug 2022
<ul style="list-style-type: none">Taught various IT-related courses to undergraduate students	
Part-time Tutorial Fellow , Department of ICT & Engineering, Zetech University	Jan 2017 – Aug 2017
<ul style="list-style-type: none">Taught and supported students in various ICT courses.	
Tutorial Fellow , Department of Computer Science, The East African University	Sept 2016 – Aug 2017
<ul style="list-style-type: none">Conducted tutorials and grading for computer science courses.	
Part-time Lecturer , Department of Computer Science & Information Technology, Kabarak University	Sept 2016 – Dec 2016
<ul style="list-style-type: none">Delivered lectures in computer science and IT disciplines.	

Professional Experience

Lead Consultant , NiTS Consulting	Jan 2013 – Present
<ul style="list-style-type: none">Provide comprehensive ICT consulting, specializing in software/hardware requirements analysis, network assessment, and system integration.Deliver expert IT maintenance, technical support, repair, and disaster recovery services for diverse clients.Implement robust IT security measures and conduct user training to ensure functional and secure client IT environments.	
IT Technical Support Intern , Simbanet (K) Ltd	Jan 2013 – Aug 2013
<ul style="list-style-type: none">Contributed to the technical support team by providing IT assistance to clients.Performed installation and configuration of WiMAX internet services.Identified client needs and provided tailored hardware and software solutions.	

- Delivered high-quality customer service, ensuring timely and accurate feedback and effective resolution of IT issues.

IT Technical Support Intern, Kenya Power, IT & T Department

Sept 2011 – Dec 2011

- Installed and configured computer hardware, operating systems, and applications.
- Monitored and maintained the stability and security of computer systems and networks.
- Performed repair and routine maintenance of computer and printer hardware.
- Assisted in the creation of procedural documentation and generated relevant reports.

Education

PhD Nanjing Agricultural University, Nanjing, China, Agricultural Electrification & Automation

Sept 2017 – Dec 2023

- Thesis: Research on Agricultural Products Volume Estimation Method Based on Depth Imaging and Machine Learning Technology
- Supervisor: Prof. Chen Kunjie

M.Sc. Nanjing Agricultural University, Nanjing, China, Computer Science & Technology

Sept 2013 – July 2016

- Thesis: Research and Development of an Intelligent Control and Monitoring System based on Arduino for the Greenhouse Environment
- Supervisors: Profs. Bai Zhentian & Xu Huanliang

Bach. Kabarak University, Nakuru, Kenya, Business Management Information Technology (IT Major)

Sept 2009 – Nov 2012

- Thesis: Knowledge-based Prime Insurance Management System
- Honors: Second Class Upper Division

Professional Certifications

Certificate of Network Support Specialist (N+ Focus) Institute of Advanced Technology (IAT), Nakuru, Kenya

July 2013 – Aug 2013

- Grade: Distinction
- Focused on network setup, troubleshooting, and maintenance.

Certificate of User Support Professional (A+ Focus) Institute of Advanced Technology (IAT), Nakuru, Kenya

Sept 2012 – Oct 2012

- Grade: Distinction
- Concentrated on providing effective user support and IT service management.

Supervision

I currently supervise the following MTech students at IIT Madras Zanzibar:

- Mr. Patrick Vincent Ndowo (ZDA24M007)
- Ms. Twamaa Hababuu Makame (ZDA24M002)
- Mr. Shivam Vyas (ZDA24M003)

Grants Applied For

Seed Grants for New African Principal Investigators (SG-NAPI)

Submitted

Principal Investigator: Innocent Nyalala

27 March 2025

Publications

22. **Rectifying the extremely weakened signals for cassava leaf disease detection** Feb 2025
Zhang Jiayu, Baohua Zhang, *Innocent Nyalala*, Peter Mecha, Junlong Chen, Kunjie Chen, Junfeng Gao
Computers and Electronics in Agriculture (IF=7.7) [10.1016/j.compag.2025.110107](https://doi.org/10.1016/j.compag.2025.110107)
21. **A salient feature establishment tactic for cassava disease recognition** 2024
Jiayu Zhang, Baohua Zhang, Zixuan Chen, *Innocent Nyalala*, Kunjie Chen, Junfeng Gao
Artificial Intelligence in Agriculture (IF=8.2) [10.1016/j.aiia.2024.11.004](https://doi.org/10.1016/j.aiia.2024.11.004)
20. **Online chicken carcass volume estimation using depth imaging and 3-D reconstruction** 2024
Innocent Nyalala, Zhang Jiayu, Chen Zixuan, Chen Junlong, Kunjie Chen
Poultry Science (IF=3.8) [10.1016/j.psj.2024.104232](https://doi.org/10.1016/j.psj.2024.104232)
19. **MAIANet: Signal modulation in cassava leaf disease classification** 2024
Jiayu Zhang, Baohua Zhang, Chao Qi, *Innocent Nyalala*, Peter Mecha, Kunjie Chen, Junfeng Gao
Computers and Electronics in Agriculture (IF=7.7) [10.1016/j.compag.2024.109351](https://doi.org/10.1016/j.compag.2024.109351)
18. **Drying process optimization of garlic slices in closed-loop heat pump drying system by Box-Behnken design** 2022
Liu Haolu, Khurram Yousaf, Zhenwei Yu, Asad Riaz, *Innocent Nyalala*, Muhammad Waqas Alam Chattha, Kunjie Chen
Journal of Food Processing and Preservation (IF=2) [10.1111/jfpp.16190](https://doi.org/10.1111/jfpp.16190)
17. **On-line weight estimation of broiler carcass and cuts by a computer vision system** *Innocent Nyalala*, Cedric Okinda, Nelson Makange, Tchalla Korohou, Qi Chao, Luke Nyalala, Zhang Jiayu, Zuo Yi, Khurram Yousaf, Liu Chao, Chen Kunjie 2021
Poultry Science (IF=3.8) [10.1016/j.psj.2021.101474](https://doi.org/10.1016/j.psj.2021.101474)
16. **Prediction of precise subsoiling based on analytical method, discrete element simulation and experimental data from soil bin** Nelson Richard Makange, Changying Ji, *Innocent Nyalala*, Idris Sunusi, Samwel Opiyo 2021
Scientific Reports (IF=3.8) [10.1038/s41598-021-90682-w](https://doi.org/10.1038/s41598-021-90682-w)
15. **Detecting the early flowering stage of tea chrysanthemum using the F-YOLO model** 2021
Chao Qi, *Innocent Nyalala*, Kunjie Chen
Agronomy (IF=3.3) [10.3390/agronomy11050834](https://doi.org/10.3390/agronomy11050834)
14. **Weight and volume estimation of poultry and products based on computer vision systems: a review** 2021
Innocent Nyalala, Cedric Okinda, Chen Kunjie, Tchalla Korohou, Luke Nyalala, Qi Chao
Poultry Science (IF=3.8) [10.1016/j.psj.2021.101072](https://doi.org/10.1016/j.psj.2021.101072)
13. **Weight and volume estimation of single and occluded tomatoes using machine vision** 2021
Innocent Nyalala, Cedric Okinda, Qi Chao, Peter Mecha, Tchalla Korohou, Zuo Yi, Samuel Nyalala, Zhang Jiayu, Liu Chao, Kunjie Chen
International Journal of Food Properties (IF=3.1) [10.1080/10942912.2021.1933024](https://doi.org/10.1080/10942912.2021.1933024)
12. **Influence of environmental conditions on drying efficiency and heat pump performance in closed and open loop drying of paddy** 2020

Khurram Yousaf, Haolu Liu, Xu Gao, Chao Liu, Adnan Abbas, **Innocent Nyalala**, Muhammad Ahmad, Muhammad Ameen, Kunjie Chen

Drying Technology (IF=2.7) [10.1080/07373937.2019.1691011](https://doi.org/10.1080/07373937.2019.1691011)

11. **Separation of partially occluded rice kernels and variety classification based on computer vision** 2020

Tchalla Korohou, Cedric Okinda, **Innocent Nyalala**, Torotwa I., Mwangi E., Wang X., He R., Ding Qishuo

International Agricultural Engineering Journal

10. **Egg volume estimation based on image processing and computer vision** Cedric Okinda, 2020

Yuwen Sun, **Innocent Nyalala**, Tchalla Korohou, Samwel Opiyo, Jintao Wang, Mingxia Shen

Journal of Food Engineering (IF=5.3) [10.1016/j.jfoodeng.2020.110041](https://doi.org/10.1016/j.jfoodeng.2020.110041)

9. **Wheat Grain Yield Estimation Based on Image Morphological Properties and Wheat Biomass** 2020

Tchalla Korohou, Cedric Okinda, Haikang Li, Yifei Cao, **Innocent Nyalala**, Lianfei Huo, Mouloumdèma Potcho, Xiang Li, Qishuo Ding

Journal of Sensors (IF=1.4) [10.1155/2020/1571936](https://doi.org/10.1155/2020/1571936)

8. **A review on computer vision systems in monitoring of poultry: A welfare perspective** 2020

Cedric Okinda, **Innocent Nyalala**, Tchalla Korohou, Celestine Okinda, Jintao Wang, Tracy Achieng, Patrick Wamalwa, Tai Mang, Mingxia Shen

Artificial Intelligence in Agriculture (IF=8.2) [10.1016/j.aiia.2020.09.002](https://doi.org/10.1016/j.aiia.2020.09.002)

7. **A machine vision system for early detection and prediction of sick birds: A broiler chicken model** 2019

Cedric Okinda, Mingzhou Lu, Longshen Liu, **Innocent Nyalala**, Caroline Muneri, Jintao Wang, Hailin Zhang, Mingxia Shen

Biosystems Engineering (IF=4.4) [10.1016/j.biosystemseng.2019.09.015](https://doi.org/10.1016/j.biosystemseng.2019.09.015)

6. **Tomato volume and mass estimation using computer vision and machine learning algorithms: Cherry tomato model** 2019

Innocent Nyalala, Cedric Okinda, Luke Nyalala, Nelson Makange, Qi Chao, Liu Chao, Khurram Yousaf, Kunjie Chen

Journal of Food Engineering (IF=5.3) [10.1016/j.jfoodeng.2019.07.012](https://doi.org/10.1016/j.jfoodeng.2019.07.012)

5. **Production of Activated Carbon From Sludge and Herb Residue of Traditional Chinese Medicine Industry and Its Application for Methylene Blue Removal** 2019

Zhenwei Yu, Qi Gao, Yue Zhang, Dandan Wang, **Innocent Nyalala**, Kunjie Chen

BioResources (IF=1.747) [10.15376/biores.14.1.1333-1346](https://doi.org/10.15376/biores.14.1.1333-1346)

4. **Asphyxia occurrence detection in sows during the farrowing phase by inter-birth interval evaluation** 2018

Cedric Okinda, Mingzhou Lu, **Innocent Nyalala**, Jiawei Li, Mingxia Shen

Computers and Electronics in Agriculture (IF=7.7) [10.1016/j.compag.2018.07.007](https://doi.org/10.1016/j.compag.2018.07.007)

3. **Detection of an onset of farrowing by classification of crated sow's activities** 2018

C. Okinda, Mingxia Shen, JiaWei Li, L. Nyalala, LongShen Liu, MingZhou Lu, GuangYue Zhang

International Agricultural Engineering Journal <https://shorturl.at/twlu9>

2. **Research on range-based localisation algorithm with virtual force and time synchronisation in wireless sensor and actor networks** 2016

Wang Haoyun, Ke Wang, Duo Li, **Innocent Nyalala**, Yingjun Xiong, Huanliang Xu

International Journal of Communication Networks and Distributed Systems (IF=1) [10.1504/IJC-NDS.2016.076650](https://doi.org/10.1504/IJC-NDS.2016.076650)

1. Intelligent energy saving system

2015

Cedric Sean Okinda, **Innocent Nyalala**, Zhang Chi, Shen Mingxia

International Journal of Emerging Technology and Advanced Engineering. <https://shorturl.at/jqRQL>

Conference Presentations

Integration of Multi-Omics and Meta Data for Metabolic Modelling of Gestational Diabetes and Gestational Hypertension to Unravel Disease Mechanisms, Potential Biomarkers and Intervention Targets

8-10 April 2025
Seattle, WA, USA

MOMI Consortium Convention, Gates Foundation

Sayan Das, **Innocent Nyalala**, Sunil Sazawal, AMANHI Tanzania

Academic Service - Review Contributions

Ad-hoc Reviewer for Peer-Reviewed Journals

2019 – Present

- Artificial Intelligence in Agriculture (Elsevier, 2020-2022, 2025)
- Biosystems Engineering (Elsevier)
- Computers and Electronics in Agriculture (Elsevier, 2024-Present)
- Drying Technology (Elsevier)
- International Agricultural Engineering Journal
- International Journal of Food Properties (Taylor & Francis)
- Journal of Animals (MDPI, 2024-Present)
- Journal of Electronics (MDPI, 2024-Present)
- Journal of Food Engineering (Elsevier, 2019-2023)
- Journal of Food Processing and Preservation (Wiley)
- Journal of Sensors (MDPI, 2024-Present)
- Poultry Science (Elsevier)
- Scientific Reports (Nature Portfolio, 2023)
- Smart Agricultural Technology (Elsevier, 2025)

Academic Service - Administration

In-Charge of Computing Resources, IIT Madras Zanzibar

Feb 2025 – Present

Member, MTech Project Committee, IIT Madras Zanzibar

Nov 2024 – Present

Member, Faculty Recruitment Committee, IIT Madras Zanzibar

Nov 2024 – Present

Head of Department, Department of Computer Science, The East African University

Jan - Aug 2017

Senate Member, University Senate, The East African University

Jan - Aug 2017

Skills & Technologies

- **Programming Languages:** Python, R, MATLAB, Java, C++, C, HTML, CSS
- **AI/ML/DL Libraries Frameworks:** TensorFlow, Keras, PyTorch, scikit-learn, pandas, numpy, matplotlib, seaborn, NLTK, spaCy, Hugging Face Transformers
- **Computer Vision Libraries:** OpenCV, scikit-image
- **Databases SQL:** SQL (including MySQL, PostgreSQL), SQLite
- **Statistical Software:** R, SAS, STATA, SPSS
- **Tools Platforms:** Git, Docker (Basic Proficiency), LaTeX, Microsoft Office Suite, Google Cloud (Familiarity), AWS (Familiarity)
- **Operating Systems:** Windows, macOS, Linux
- **Hardware Embedded Systems:** Arduino, Raspberry Pi, various sensors (depth cameras, environmental sensors, etc.)

Languages

- **English:** Fluent (Professional working proficiency)
- **Swahili:** Native
- **Luo:** Native
- **Chinese (Mandarin):** Intermediate proficiency (Demonstrated by studies in China)

Honors & Awards

China Scholarship Council (CSC), PhD Scholarship , Nanjing Agricultural University	2017 – 2023
Excellent in Both Studies and Behavior Award , Nanjing Agricultural University	2020
China Scholarship Council, Master Scholarship , Nanjing Agricultural University	2013 – 2016
Excellent International Student Leader Award , Nanjing Agricultural University	2014

Professional Memberships

Association for the Advancement of Artificial Intelligence (AAAI) , Member ID: 638956	2024 – Present
Association for Computing Machinery (ACM) , Member ID: 5070064	2024 – Present
Internet Society (ISOC) , Kenya Chapter	2022 – Present
International Association of Engineers (IAENG) , Member ID: 259573	2017 – Present

Leadership Experience

President , International Students Association, Nanjing Agricultural University, China	2013 – 2014
Youth Chairperson , Holy Trinity Catholic Parish Church, Nakuru, Kenya	2009 – 2012

References

References: Available upon request.