Joseph Adeola

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Profile Summary

Highly motivated recent graduate in Intelligent Robotics with proven expertise in deep learning, SLAM, and computer vision. Possessing 2+ years of experience developing software for robotic applications. Proficient in Python, C++, and ROS, and familiar with developing deep learning algorithms for computer vision tasks.

Education

Erasmus Mundus Masters, Intelligent Robotic Systems
University of Zagreb, Croatia & University of Girona, Spain — *Sept 2022 - June 2024*
Grade: Excellent (9.05/10), *View Courses*

Bachelor of Science in Mathematics
University of Ilorin, Nigeria — *Oct 2016 - Aug 2021*
Grade: First-Class Honors (4.92/5.0), Rank: 1/9388, University Valedictorian

Skills

Programming:	Python, C++, JavaScript, R, C, Rust, MATLAB
Libraries & Frameworks:	PyTorch, TensorFlow, Keras, ROS, OpenCV, Pandas, NumPy, Scikit-Learn
Robotics & AI:	SLAM, Sensor Fusion, Motion Planning, Control Systems, Deep Learning, Reinforcement Learning
Tools & Technologies:	Docker, Git, Linux, Gazebo, OMPL, PDDL, LaTeX
Data Science:	Data Wrangling, Statistical Analysis, Data Visualization, MS Excel
Soft Skills:	Communication, Leadership, Teamwork, Problem-Solving, Academic Writing, Teaching

Research & Work Experience

ViCOROB Institute, Girona, Spain
Senior Technician — *Oct 2024 - Present*

- Contributing to the European Commission-funded Horizon 2020 project "Intelligent Total Body Scanner for Early Detection of Melanoma (iToBoS)" Link to the project page
- Developing distributed multi-robot control software components for a 4-robot system performing automated patient body mapping, implementing real-time coordination modules in C++
- Designing and implementing computer vision and machine learning algorithms for high-precision lesion detection and classification using Python and OpenCV
- Creating data fusion algorithms to merge multi-view imagery into comprehensive 3D body maps
- Developing and supporting the integration of ML models and robotic control systems with existing medical infrastructure
- Contributing to scientific publications on novel approaches in automated medical imaging and early melanoma detection

AI Research Intern — *June 2023 - July 2024*

- Researched and implemented deep learning models for skin lesion detection, significantly improving early melanoma detection capabilities and achieving a 24% performance improvement over commercial state-of-the-art detectors.
- Managed large-scale databases, developed machine learning models, and created software for automating data cleaning processes, improving diagnostic accuracy and model performance.
- Developed a data preprocessing pipeline incorporating innovative hair removal techniques, resulting in cleaner datasets and more accurate model predictions, crucial for precise melanoma screening.
- Implemented AI explainability pipelines, improving transparency in model application and increasing trust in AI-assisted medical diagnostics.
- Collaborated with cross-functional teams to integrate models into existing medical imaging systems, boosting operational efficiency and diagnostic accuracy.

Department of Physics, University of Ilorin, Nigeria
Graduate Research Assistant — *June 2021 - Nov 2021*

- Collected, cleaned, and managed large-scale datasets for multiple research projects using Python and MS Excel, ensuring 99.9% data accuracy and completeness.
- Developed and implemented Python algorithms and Windows software to automate data cleaning processes, increasing efficiency by 40% and reducing manual errors by 60%
- Analyzed complex datasets to make accurate predictions and contribute to significant research findings, published in reputable journals.
- Assisted in the development and implementation of experimental protocols, improving research accuracy and reliability.

Projects

For a comprehensive portfolio, visit my GitHub Projects Page.

Computer Vision & Image Processing

- iToBoS Annotation Tool: Desktop application (React, Electron, Vite) for YOLO-format annotations. Increased efficiency by 40%, reduced errors by 25%. GitHub
- Camera Calibration: OpenCV/Python system for extracting camera parameters with sub-millimeter accuracy. GitHub
- Stereo Visual Odometry: Real-time system for KITTI dataset with 96.5% trajectory accuracy. GitHub
- Skin Lesion Detection: Compared CNNs and Vision Transformers for melanoma detection (78% sensitivity, 76% specificity). GitHub

Robotics & Autonomous Systems

- Pose-Based EKF SLAM: Real-time SLAM system with centimeter-level mapping accuracy. GitHub
- Multi-Robot Swarm Control: Implementation of Reynolds' flocking rules in ROS/Gazebo. GitHub
- Multi-Modal Human-Swarm Interaction: Interface with vision, speech, and LLMs (92% command accuracy). GitHub
- Autonomous Exploration Framework: End-to-end system for exploration, mapping, and manipulation. Demo
- Quadcopter Control System: Implemented PID controllers for roll, pitch, yaw, and altitude with real-time gain tuning. Achieved stable flight control in both simulation and physical Tello drones. GitHub
- SCARA TS60 Robot Design Simulation: Designed and implemented simulation for a SCARA-type industrial robot including kinematics, dynamics, and visualization. GitHub

Data Science, Machine Learning & AI

- Privacy-Preserving Federated Learning: Framework with differential privacy, only 2.8% accuracy loss. GitHub
- Contrastive Metric Embedding: Unsupervised similarity learning (93.2% clustering accuracy). GitHub
- CNN-Based Image Classification: Compared ResNet, VGG, DenseNet architectures (92.3% accuracy). GitHub
- Sentiment Analysis on Stanford Sentiment Treebank: Developed preprocessing pipeline and optimized ML models achieving 87% classification accuracy. GitHub
- Reinforcement Learning for Motion Planning: Q-Learning for navigation with 35% reduced planning time. GitHub
- Automated Research Data Cleaning System (DINData): Developed a Windows application for ionospheric numerical digisonde data cleaning, increasing efficiency by 40%.GitHub

Localization & Path Planning

- EKF Map-Based Localization: Line feature-based position estimation. GitHub — PDF
- Particle Filter Localization: Algorithm for Kobuki Turtlebot position estimation. GitHub — PDF
- Optimization-Based Path Planning: Implementation of A*, RRT, RRT*, and RPS algorithms. GitHub
- PDDL-Based AI Planning: Developed domain models and problem instances for Blocks World and office robotics tasks, validated with Metric-FF/popf planners. GitHub
- Multi-Robot Gazebo Spawning: ROS package for multi-robot simulations. GitHub

Web Development

- TabiWilson Photography Website: Responsive portfolio site with 40% increased client inquiries. GitHub
- Personal Portfolio Page: Interactive showcase of projects and skills. Link
- Cryptocurrency Price Tracker: Flask-based web application with real-time price tracking via CoinGecko API and interactive Plotly.js charts for technical indicators (SMA, EMA, RSI, MACD). GitHub

Technical Reports

- Enhancing Autonomous Exploration and Navigation in Unknown Environments: A Software Architecture for Turtlebot Robot - **Joseph Adeola**, Preeti Verma, and Moses Ebere - Demo — PDF
- Event-Based Feature Tracking Using the Iterative Closest Point Algorithm - **Joseph Adeola**, Preeti Verma, and Moses Ebere - Demo — PDF
- Controlling a Swarm of Robots in a Simulator using Reynolds' Rules - **Joseph Adeola**, Khawaja Ghulam Alamdar, Moses Chuka Ebere, Nada Elsayed Abbas - GitHub — PDF
- Multi-Modal Human-Swarm Interaction Using Vision, Speech & Multi-Agent LLMs - **Joseph Adeola**, Moses Ebere - GitHub — PDF
- Pose-Based EKF SLAM using ICP Scan-Matching on a Kobuki Turtlebot - **Joseph Adeola**, Moses Ebere, and Preeti Verma - GitHub — PDF
- Robust Coordination and Control of Multi-Robot Systems Using Consensus Protocols - **Joseph Adeola**, Khawaja Ghulam Alamdar, Moses Ebere, Nada Elsayed Abbas - GitHub — PDF
- A Kinematic Control System for a Mobile Manipulator, based on the Task-Priority Redundancy Resolution Algorithm - Moses Ebere, **Joseph Adeola**, and Preeti Verma -PDF
- Pigmented Skin Lesion Detection in Clinical Images Using Deep Learning Methodologies - **Joseph Adeola** - GitHub — PDF

Publications

- Bello, S.A., Yusuf, K.A., Ige, S.O., **Joseph, O.A.**, et al. (2022). DINData: A Windows software to reformat and clean digisonde numeric dataset. *ESS Open Archive.*

Manuscripts Under Review

- The iToBoS dataset: skin region images extracted from 3D total body photographs for lesion detection - Anup Saha, **Joseph Adeola**, *et al. Submitted to Scientific Data (Nature Portfolio), January 2025. (view)* Contribution: Led the development of data preprocessing pipelines and annotation tools, and contributed to dataset curation and quality control.

Conferences & Workshops

- Indoor Positioning Systems Workshop *October, 2023*
  Organized by EU aeroSTREAM Project, Karlovac, Zagreb.
- 5th Conference on Mathematical Science and Applications *November, 2021*
  Organized by The Saudi Association for Mathematical Science (SAMS) in *collaboration with King Abdullah University of Science and Technology (KAUST)*
- International Model United Nations (IMUN) Conference 47.0, *Virtual Edition.* *March, 2021*

Leadership Experience

- **Center for Distance Learning Brand Ambassador**, *University of Ilorin, Nigeria.* *Jan 2022*
  - Promoted the center's programs and initiatives to prospective students, enhancing its visibility and appeal.
- **Platoon Leader**, *NYSC Orientation Camp, Kebbi State, Nigeria.* *Nov 2021 - Dec 2021*
  - Led a group of 125 corp members, coordinated activities, and ensured effective communication and cooperation within the platoon.
- **Program Director**, *STEM Innovation Hackathon, University of Ilorin, Nigeria.* *Jan 2021*
  - Supervised registration of 5,000 participants and led an innovation team to convert disposed tires into usable chairs creatively.
- **Academic Director**, *Deeper Life Campus Fellowship, University of Ilorin, Nigeria, Aug 2019 - May 2021*
  - Organized tutorials, taught math classes, and kept records of over 100 church members' academic performance.
- **Team Lead**, *Faculty of Physical Sciences Quiz and Debate Club, Unilorin* *Jun 2019 - Jun 2021*
  - Led and mentored the debate team, conducted interviews, and organized competitions.

Teaching Experience

Math & Programming Tutor *Nov 2019 - Mar 2021*
BLUE Private Tutors, Nigeria

- Provided weekly one-on-one and small group tutoring to 28 undergraduate students in Mathematics, C programming, and Python.
- Developed customized learning plans that improved students' grades by an average of 15%.
- Created and implemented interactive coding exercises, increasing student engagement by 30%.
- Mentored students in building problem-solving skills and confidence, resulting in a 95% pass rate for advanced science courses.

Mathematics Tutor *Nov 2016 - May 2021*
National Association of Mathematics Students, Unilorin, Nigeria.

- Tutored 148 students across a comprehensive range of undergraduate mathematics courses, including Calculus, Linear Algebra, and Differential Equations.
- Designed and conducted bi-weekly mock exams, providing detailed feedback that improved student performance by 20% on average.
- Organized and led study groups for challenging topics, increasing student retention rates.
- Received "Outstanding Tutor" award for two consecutive years based on student evaluations and academic improvement metrics.

Volunteering Experience

- **Student Mentor**, *Kingdom Scholars Community, USA.* *May 2024 - Present*
  - Guide students through international scholarship applications and provide support during the application process.
- **Scholarship Award Committee Member**, *Unilorin Intl. Scholarship Forum.* *May 2024 - Present*
  - Review applications for financial support and mentor students in their scholarship pursuits.
- **Facilitator, Digital Skills Acquisition Program**, *Department of Mathematics, Unilorin.* *Nov 2021*
  - Volunteered to teach Introduction to Python for data science in a five-day skill acquisition program organized for 48 undergraduate students.
- **Climate Change Advocate**, *Save Sahara Network, Nigeria.* *Mar 2021 - Present*
  - Volunteered in a campaign for environmental preservation that opposes climate-disrupting activities and encourages tree planting.
- **Student-Peer Mentor**, *Dareworld Students' Association* *Jan 2020 - Aug 2021*
  - Mentored two freshmen yearly, providing guidance, counseling, and academic support.

Honors & Awards

- ITExperience Google Project Management Career Scholarship Award, 2023
- Erasmus Mundus Joint Masters Degree Scholarship Award, 2022
- Education USA (Nigeria) Scholarship Award, 2022.
- Valedictorian, University of Ilorin, 36th Convocation (1st out of 9,338 graduates), 2021
- Best Graduating Student, Faculty of Physical Sciences, University of Ilorin, 2021
- Best Graduating Student, Department of Mathematics, University of Ilorin, 2021
- University of Ilorin International Scholarship Forum Award, 2021
- Scholar of the Year Award, National Association of Mathematics Students, University of Ilorin Chapter, 2021
- Bronze Medalist, International Youth Mathematics Challenge, 2019
- MTN Foundation Scholarship Award, MTN Nigeria, 2019
- University Senate Scholarship Award, University of Ilorin, 2017-2020

Professional Memberships

- Member, Data Science Association *Nov 2021 - Present*
- Member, Nigerian Mathematical Society *May 2021 - Present*
- Member, Data Science Nigeria *July 2020 - Present*

Languages

English - (Highly Proficient)