

Moses Muiruri Njau

AI/ML Engineer | Full Stack Developer | Innovation Leader

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Professional Summary

Innovative Computer Science student with demonstrated expertise in AI/ML systems, robotics, and full-stack development. Proven track record of leading high-impact projects from conception to deployment, including context-aware emotional intelligence models for humanoid robots and scalable payment infrastructure solutions. Passionate about leveraging technology for social good, with experience spanning conversational AI, IoT automation, and community-driven platforms serving thousands of users.

Technical Skills

Programming Languages: Python, JavaScript/TypeScript, PHP, C, SQL, HTML/CSS

AI/ML Frameworks: PyTorch, HuggingFace Transformers, OpenAI API, RASA, TensorFlow

Frontend Technologies: React, Angular, Three.js, Canvas API, RxJS, SCSS

Backend Frameworks: Laravel, Node.js, RESTful APIs

Robotics: NAOqi SDK, ROS, Arduino, ESP32

Databases: MySQL, MongoDB

Cloud & DevOps: Ubuntu VPS, Git, Vercel, SSL/TLS

Specialized Systems: Speech Recognition (Whisper ASR), NLP, Computer Vision, IoT Sensors

Payment Integration: Stripe API, PayPal SDK

Tools & Platforms: Docker, Webpack, Shell Scripting, Primavera P6

Education

Bachelor of Science in Computer Science

Jomo Kenyatta University of Agriculture and Technology (JKUAT)

Expected Graduation: November 2026 | GPA: 3.74/4.00 (Dean's List)

Specializations: Artificial Intelligence & Machine Learning • Backend Systems Engineering • IoT & Automation

Key Coursework: Data Structures & Algorithms, Machine Learning, Distributed Systems, Database Systems, Object-Oriented Programming, Computer Networks, System Analysis & Design, Probability & Statistics

Professional Experience

AI/ML Engineer – Robotics & Conversational AI

Social Robotics Lab, JKUAT | *June 2025 – Present*

Spearheaded the development of groundbreaking context-aware emotional intelligence models for humanoid robots (NAO & Pepper), transforming traditional robotic interactions into empathetic, culturally-sensitive conversations addressing critical social issues including FGM prevention, early marriage education, and girls' rights advocacy.

- **Advanced AI Architecture:** Engineered sophisticated NLP pipelines optimized for Kiswahili-English code-switching, implementing custom tokenization and linguistic processing algorithms designed for low-resource environments with robust offline fallback mechanisms
- **Multi-modal Sensory Integration:** Designed and implemented seamless coordination systems between robotic perception modules (microphone arrays, camera vision, touch sensors) and AI-generated responses, incorporating real-time gesture execution, emotional mirroring through LED expressions, and dynamic gaze-following behaviors
- **Speech Emotion Recognition Systems:** Developed proprietary speech emotion recognition models capable of detecting subtle emotional nuances in conversational tone, enabling robots to respond with appropriate empathy levels and tone-adaptive speech patterns
- **Real-world Deployment & Testing:** Successfully deployed NAO and Pepper robots in diverse educational and community settings including classrooms, clinics, and community events, achieving measurable improvements in audience engagement and educational retention rates

- **Cross-functional Collaboration:** Led intensive collaboration sessions with domain experts, ethicists, and social impact specialists to translate complex ethical guidelines and cultural sensitivity requirements into deployable AI-driven behaviors and conversation frameworks
- **Performance Optimization:** Implemented advanced caching mechanisms and model quantization techniques to ensure smooth real-time operation even in bandwidth-constrained environments typical of rural Kenya deployment scenarios

Technologies: Python, NAOqi SDK, OpenAI API (ChatGPT), HuggingFace Transformers, Speech Emotion Recognition (SER), Whisper ASR, PyTorch, RASA, TTS, LED/motion scripting

Frontend Developer, IoT & Web

JHUB Africa | May 2024 – September 2024

Led end-to-end development of an innovative IoT-driven environmental monitoring system specifically designed to prevent costly losses in breeding material storage facilities through precise environmental condition tracking and predictive analytics.

- **IoT System Architecture:** Designed and implemented comprehensive sensor network infrastructure utilizing temperature, humidity, and light intensity sensors with custom calibration protocols, ensuring measurement accuracy within $\pm 0.5^{\circ}\text{C}$ and $\pm 2\%$ RH across diverse storage environments
- **Real-time Dashboard Development:** Built sophisticated React-based monitoring dashboard with Tailwind CSS styling, featuring dynamic data visualization components including time-series charts, trend analysis graphs, and customizable alert thresholds with real-time WebSocket data streaming
- **Stakeholder Communication Platform:** Created compelling, conversion-optimized landing page that effectively translated complex technical IoT concepts into clear value propositions for non-technical stakeholders, resulting in enhanced project buy-in and funding support
- **Full-cycle Project Leadership:** Orchestrated complete project development lifecycle from initial problem identification and stakeholder requirement gathering through prototype deployment and user acceptance testing, maintaining agile development practices and sprint-based delivery milestones
- **Data Analytics Integration:** Implemented advanced data processing pipelines for environmental data analysis, incorporating predictive modeling algorithms to forecast potential storage condition risks and generate automated alerting systems for proactive intervention
- **Technical Presentation Excellence:** Delivered comprehensive technical presentations to diverse stakeholder groups including investors, facility managers, and technical teams,

successfully translating complex IoT architecture and data insights into actionable business intelligence recommendations

Key Technologies: React.js, Tailwind CSS, IoT Integration, WebSocket APIs, Data Visualization Libraries, UI/UX Design, Sensor Calibration, Predictive Analytics

Full Stack Engineer (Contract)

IKylocalDigital | November 2024 – May 2025

Architected and delivered comprehensive payment infrastructure transformation and business intelligence platform for SMB clients, encompassing multi-gateway payment processing, real-time analytics dashboards, and scalable reporting systems serving thousands of transactions monthly.

- **Advanced Frontend Architecture:** Engineered sophisticated React-based business analytics dashboard featuring interactive KPI visualizations, multi-dimensional data filtering, real-time chart updates with seamless API integration, JWT-based authentication systems, and comprehensive error handling with user-friendly fallback interfaces
- **Payment Systems Engineering:** Developed complete end-to-end Stripe payment infrastructure including checkout session management, webhook event processing, recurring billing automation, and comprehensive PCI-DSS compliant transaction handling, while maintaining backward compatibility with existing PayPal systems
- **Database Architecture & Optimization:** Designed and implemented normalized multi-gateway database schema supporting complex transaction reconciliation workflows, achieving 40% improvement in query performance through strategic indexing, query optimization, and connection pooling implementations
- **Backend API Development:** Built high-performance Laravel RESTful API ecosystem with comprehensive endpoint documentation, rate limiting, caching mechanisms, and robust error handling, supporting concurrent user sessions and real-time data synchronization across frontend applications
- **Automated Communication Systems:** Implemented sophisticated event-driven email automation workflows including transaction receipts, payment failure notifications, card expiry reminders, and customer engagement campaigns, reducing manual customer support overhead by 60%
- **Infrastructure & DevOps:** Managed complete deployment pipeline across Ubuntu VPS environments, implementing comprehensive security hardening including firewall configurations, SSL certificate automation, performance monitoring, and achieving sustained 99.9% uptime through proactive system maintenance

- **Reporting & Business Intelligence:** Created automated PDF report generation system with branded templates, supporting dynamic data visualization, scheduled report delivery, and customizable business metrics tracking for executive dashboard consumption

Technologies: React, Laravel, Stripe API, PayPal SDK, MySQL, RESTful APIs, JWT Authentication, Ubuntu VPS, SSL/TLS, PDF Generation (TCPDF/Dompdf), WebSocket, Caching Systems

Cashier / Customer Service Representative

Equity Bank Limited | *May 2022 – September 2022*

Delivered exceptional customer service while contributing to operational improvements in digital banking and security protocols.

- **Customer Excellence:** Managed high-volume client interactions with focus on regulatory compliance and data privacy
- **Process Innovation:** Implemented email automation improvements and contributed to endpoint security enhancements
- **Digital Transformation:** Assisted clients with digital onboarding and modern banking services adoption

Key Projects & Contributions

Smart Nyuki - AI-Powered Beekeeping Innovation

Founder & CEO | *2024 – Present*

Conceptualized, developed, and launched comprehensive AI-driven smart beekeeping platform combining advanced IoT sensor networks, machine learning analytics, and intuitive mobile dashboards to revolutionize traditional apiculture practices and address critical challenges facing Kenya's beekeeping industry.

- **Comprehensive IoT Architecture:** Engineered sophisticated sensor ecosystem including temperature, humidity, sound/vibration detection, and weight monitoring systems with LoRaWAN connectivity, enabling real-time hive health monitoring across distributed apiaries with 99.2% data transmission reliability
- **Machine Learning Development:** Built proprietary predictive algorithms analyzing swarm behavior patterns, queen bee health indicators, and optimal harvesting timing

predictions, achieving 87% accuracy in early swarm detection and reducing colony loss rates by 34% during pilot testing phases

- **Cross-platform Mobile Application:** Developed comprehensive React Native mobile application featuring intuitive dashboards, push notification alerting systems, GPS-based hive location tracking, and offline-capable data synchronization for rural beekeepers with limited connectivity
- **Strategic Partnership Development:** Established critical collaboration with Yatta Beekeepers Cooperative, securing real-world testing environment with 50+ active hives and facilitating iterative product development based on authentic user feedback from experienced beekeepers
- **Team Leadership & Management:** Successfully recruited, mentored, and coordinated multidisciplinary team of 6 specialists including hardware engineers, mobile developers, data scientists, and field testing coordinators, maintaining project momentum through agile development methodologies
- **Investment & Recognition Achievements:** Secured recognition among Kenya's top 4 innovations by Ministry of ICT, qualified for HICOOL Global Entrepreneurship Competition representing Kenya internationally, and successfully pitched to government officials and private investors for continued funding support
- **Market Validation & Impact:** Conducted extensive field testing across three counties in Kenya, demonstrating average 23% increase in honey production efficiency and 41% reduction in hive management time for participating beekeepers, validating commercial viability and social impact potential

ELP TechHub Centralized Alumni Platform

Software Contributor & Technical Architect | *January 2023 – October 2023*

Led technical development of comprehensive alumni management and opportunity matching platform addressing critical challenge of losing contact with thousands of Equity-sponsored scholars after high school graduation, creating sustainable ecosystem for career development and mentorship connectivity.

- **Scalable Database Architecture:** Designed robust PostgreSQL database schema supporting complex user profile management, educational history tracking, geographical distribution analysis, and dynamic opportunity matching algorithms capable of serving 10,000+ concurrent users with sub-second query response times
- **Intelligent Matching Algorithms:** Developed sophisticated machine learning-based job matching system utilizing natural language processing for skill extraction from user profiles, geographic proximity calculations, and academic background correlation, achieving 78% user satisfaction rate in opportunity relevance matching

- **Security & Authentication Systems:** Implemented comprehensive user authentication and authorization framework including multi-factor authentication, role-based access control, data encryption protocols, and GDPR-compliant data handling procedures ensuring platform security and regulatory compliance
- **Community Engagement Features:** Built advanced networking capabilities including cohort-based user grouping, peer mentorship matching algorithms, discussion forum integration, and event management systems enabling sustained alumni engagement across Kenya's 47 counties
- **Administrative Dashboard:** Created comprehensive administrative interface featuring user analytics, opportunity management workflows, communication broadcast systems, and detailed reporting capabilities enabling Equity Group Foundation to track program effectiveness and alumni success metrics
- **Performance & Scalability:** Optimized platform architecture for high-traffic scenarios through implementing Redis caching layers, database connection pooling, CDN integration for static assets, and horizontal scaling capabilities supporting projected growth to 50,000+ users
- **Impact Measurement & Analytics:** Integrated comprehensive analytics tracking user engagement patterns, career progression monitoring, successful job placements, and mentorship relationship effectiveness, providing quantifiable evidence of platform's social impact and return on investment

Sauti Ya Kenya - Authentic Swahili TTS Development

Open Source Technical Contributor | *May 2025 – Present*

Contributing specialized expertise to Msingi AI's flagship initiative developing culturally-authentic Kenyan Swahili Text-to-Speech technology, addressing critical gap in African language representation within global AI systems and speech synthesis platforms.

- **Linguistic Data Processing:** Led comprehensive data preprocessing workflows for Swahili audio corpus preparation, implementing advanced phonetic normalization algorithms, accent variation cataloging, and code-switching pattern analysis to ensure authentic Kenyan Swahili representation in training datasets
- **Neural Architecture Contributions:** Collaborated on designing custom neural network architectures optimized for Swahili phonetic characteristics, including tonal variation modeling, consonant cluster handling, and seamless English-Swahili code-switching capabilities reflecting natural Kenyan communication patterns
- **Community Testing & Validation:** Orchestrated extensive community-driven testing programs across diverse Swahili dialect speakers, collecting feedback on pronunciation accuracy, naturalness ratings, and cultural appropriateness assessments to iteratively improve model performance

- **Open Source Development:** Maintained active contributions to GitHub repository including code documentation, bug fixing, feature enhancement proposals, and community issue resolution, fostering collaborative development environment within African AI research community
- **Cultural Authenticity Assurance:** Worked closely with Swahili linguists and cultural experts to ensure AI-generated speech reflects genuine Kenyan linguistic patterns rather than generic or colonially-influenced pronunciation standards, preserving authentic African voice identity

Futuristic Spider Chart Visualization Interface

Senior Frontend Developer (Freelance - Fiverr) | April 2025 – May 2025

Delivered cutting-edge, highly interactive data visualization component exceeding client expectations through innovative use of modern web technologies, creating visually stunning interface featuring neumorphic design principles and complex mathematical visualizations.

- **Advanced 3D Visualization:** Implemented sophisticated Three.js-powered spider chart system featuring 20+ dynamically animated data points with smooth interpolation, toggle functionality for individual metrics, responsive resizing algorithms, and performance-optimized rendering capable of handling real-time data updates at 60fps
- **Complex Animation Systems:** Developed intricate CSS3 and JavaScript animation sequences including morphing transitions, particle effect backgrounds inspired by Blueyard.com aesthetic, hover-state micro-interactions, and gesture-responsive UI elements creating premium user experience
- **Modular Architecture Design:** Built comprehensive Angular component library following SOLID principles with strict TypeScript implementation, parameterized configuration systems, injectable service architecture, and comprehensive unit test coverage achieving 95% code coverage metrics
- **Responsive Design Excellence:** Implemented mobile-first design approach with breakpoint-optimized layouts, touch-gesture support for mobile interactions, cross-browser compatibility testing, and accessibility compliance meeting WCAG 2.1 AA standards for inclusive user experience
- **Performance Optimization:** Achieved exceptional performance metrics through lazy loading implementations, efficient memory management, optimal rendering techniques, and bundle size optimization resulting in <3-second load times and smooth animations across all device categories
- **International Deployment:** Integrated comprehensive internationalization (i18n) framework supporting multiple language variants with dynamic content loading, RTL language support, and culture-specific formatting ensuring global accessibility and market readiness

Leadership & Community Impact

Google Developer Student Clubs (GDSC)

IoT & Automation Lead | *August 2024 – Current*

- Mentored 150+ students in IoT development and automation systems
- Organized 36+ technical workshops and hands-on training sessions
- Partnered with Angaza Elimu to deliver certification bootcamps

Equity Leaders Program Technology Hub

Vice President | *August 2024 – Current*

- Co-led tech initiative connecting 400+ ELP alumni through virtual communities
- Organized industry partnerships with Microsoft, EMTech, and Andela
- Established sustainable peer-led learning groups across multiple specializations

Certifications

ALX Software Engineering Programme - Front-end Specialization (October 2024)
12-month intensive program covering React, JavaScript, TypeScript, Python, and systems programming

IBM Data Fundamentals Certificate (July 2024)
Hands-on experience with Python data science libraries and exploratory data analysis

Oracle Primavera P6 Training (November 2022)
Project lifecycle management and resource scheduling expertise

Additional Certifications: Mindler Entrepreneurship & Life Skills, Equity Bank OSH General Staff Training

Awards & Recognition

- **Dean's List** - JKUAT (Current GPA: 3.74/4.00)
 - **Top 4 Kenya Innovation** - Ministry of ICT Recognition for Smart Nyuki
 - **International Qualifier** - HICOOL Global Entrepreneurship Competition (China)
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Referees

- **Samwel Mwaura**

Mentor and Career Instructor, Safaricom PLC

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- **Patrick Waithera**

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- **Lawrence Nderu**

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References available upon request