

COLLEEN MARASHA

Computer Engineer | Edge AI · Embedded Systems · Mechatronics

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Harare, Zimbabwe

Profile

Computer engineer specialising in machine learning that runs on-device: compressing models to fit microcontrollers, integrating sensors and actuators, and building systems that keep working without a network. BEng dissertation awarded a Distinction. Currently reading for an MSc in Mechatronics and Artificial Intelligence.

Education

University of Zimbabwe

MSc Mechatronics and Artificial Intelligence (MECHART)

Sept. 2026 – Present

Harare, Zimbabwe

University of Zimbabwe

BEng (Hons) Computer Engineering — Dissertation: Distinction

Aug. 2022 – Aug. 2026

Harare, Zimbabwe

Experience

JobSim Enterprise

Sept. 2024 – Aug. 2025

Software Engineering Attaché / Industry Attachment

Harare, Zimbabwe

- Built Zimbabwe's national electronic tax compliance integration (ZIMRA FDMS) against the Fiscal Device Gateway API v6.0: a Flask REST service handling multi-rate VAT calculation, credit/debit note offsets, fiscal day reconciliation and automated Z-report generation.
- Secured the full receipt chain with SHA-256 hashing, RSA-2048 and ECC ECDSA sequential signature validation over mutual TLS, producing tamper-evident records satisfying ZIMRA audit requirements.
- Designed and deployed a helpdesk ticketing system that lifted attended customer claims by 95%; analysed usage data to identify recurring issues and improve service delivery.

I-Train Africa

Dec. 2024 – Apr. 2025

Product Management Intern

Abuja, Nigeria (Remote)

- Translated survey and market data into learner segmentation insights that directly shaped curriculum and product decisions for digital learning platforms.

Projects

Clarion — Offline Edge-AI Alert System | TensorFlow, TFLite, ESP32-S3

2025 – 2026

- Trained an audio event classifier to 91.5% weighted F1-score across 3,435 validated data points, deployed on an ESP32-S3 microcontroller with a React Native companion app, running fully offline with no cloud dependency.
- Compressed a 300 MB model to 80.7 KB INT8 — a 99.97% reduction — through knowledge distillation, with quantitative analysis of the accuracy trade-off at each stage.

AgroLink — Agricultural Intelligence Platform | Laravel 13, MySQL 8.4, React Native, Python

Current

- Built a hybrid ML model forecasting seed demand 6–8 weeks ahead across 60+ districts and 7 agro-ecological zones, blending planting calendars, live weather data and aggregated scan activity.
- Designed a three-layer anti-counterfeiting system: HMAC-SHA256-signed QR codes, per-bag serialisation supporting 99,999+ bags per lot, and GPS fraud mapping of duplicate scans, with a USSD/SMS fallback for feature-phone users.

github.com/ColleenMarasha/agrolink-api

Gungwa — IoT Water Delivery Platform | LTE Cat-1, MQTT, FastAPI, React Native

Current

- Specified a solar-assisted, SIM-connected IoT tank sensor (LTE Cat-1 with 2G fallback, US\$30–45 target BOM) enabling proactive delivery before customers run dry.

NFL Draft Prediction — GCI Tokyo | Python, LightGBM, XGBoost, CatBoost, Optuna

2026

- Progressed from a baseline AUC of 0.808 to 0.837 in an AUC-scored prediction challenge through a rank-average ensemble of LightGBM, XGBoost, CatBoost and Random Forest with Optuna hyperparameter tuning, cross-validation and feature engineering.

Technical Skills

Machine Learning: TensorFlow, Keras, TFLite, LightGBM, XGBoost, CatBoost, Optuna, scikit-learn, quantisation & knowledge distillation

Embedded & Hardware: ESP32-S3, microcontroller deployment, edge inference, sensor integration, IoT (LTE Cat-1, MQTT)

Languages & Frameworks: Python, TypeScript, JavaScript, PHP, SQL; Flask, FastAPI, Laravel 13, Next.js, React Native

Security: SHA-256, HMAC, RSA-2048, ECC ECDSA, X.509, mutual TLS

Tools & Infrastructure: MySQL, Redis, Git, GitHub Actions, Vercel, Railway, Cloudflare, VS Code