Shelton Ngwenya

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Professional Summary

Entry-level software engineer with experience delivering end-user products and device-integrated systems (IoT telemetry, dashboards, full-stack apps). Comfortable debugging across hardware/software boundaries.

Work Experience

Arigel — Precision Agriculture Web App (Freelance Developer) **Oct 2024 – Sept 2025**

React • Node.js • MySQL • REST/OpenAPI • Docker/CI • GeoJSON + Shapefiles • ISOXML (.prt) *Remote (Pretoria, South Africa)*

- Built and delivered a full-stack precision-ag web mapping app (React, Node.js, MySQL) for creating and managing field blocks.
- Implemented snapping grid and topology validation to ensure accurate block placement and clean geometries for downstream use.
- Developed geospatial interoperability: Shapefile ingest, GeoJSON processing pipeline, and ISOXML (.prt) prescription import/export for sprayer/tractor workflows; adopted by 2 farms (~1,400 ha).
- Shipped a production-ready REST API with CORS configuration and OpenAPI/Swagger documentation to support integration, testing, and maintainability.
- Delivered Dockerized deployment with GitHub Actions CI and handover/runbook documentation; achieved sub-800 ms user-perceived performance for initial load and core map interactions on 4G.

Johnson Controls — Product Engineer Intern **Jan 2023 – Sept 2023**

Python • IoT (MQTT, Zigbee/Wi-Fi) • REST • ArcGIS/AI Suite • Power BI • Jira/Confluence *Cork, Ireland*

- Onboarded and configured 25+ IoT devices (occupancy, air-quality, energy) into OpenBlue Cloud; troubleshot connectivity and validated end-to-end telemetry with product/demo teams.
- Owned onboarding/integration execution in Jira and documented decisions + procedures in Confluence/runbooks to improve repeatability during demos/field support.
- Built ETL pipelines for IoT telemetry and delivered Power BI dashboards for building analytics; performed end-to-end testing and supported deployments.
- Developed an ArcGIS + ArcGIS AI Suite HVAC-detection prototype from geospatial data; team placed top-10 in an internal tech challenge.
- Built a desktop automation UI to streamline nested REST API workflows for demo teams, reducing manual steps and configuration errors.

Education

Munster Technological University **2021 – 2024**

Honours BSc, Software Development *Cork, Ireland*

- Core courses: Embedded Systems Engineering; Security for Embedded Systems; Operating Systems Development; Data Structures and Algorithms; Discrete Mathematics; Distributed Systems; Machine Learning; Big Data.

Final Year Project

Sheldifier: Indoor Air Quality Management System **May 2024**

Python • Raspberry Pi • InfluxDB • Zigbee2MQTT • StatsModels *AQMS*

- Designed and deployed an IoT-based closed-loop control system to monitor CO_2, VOC, and $PM_{2.5}$ levels in classrooms using a Raspberry Pi gateway and distributed gas sensors.
- Improved indoor air quality by 18% during occupancy by automatically activating exhaust fans via Zigbee relays.
- Predicted CO_2 spikes 1 day ahead using ARIMA/SARIMA models (MAE = 28 ppm) and linked predictions to 47 user surveys via logistic regression to understand perception.
- Stored over 300,000 time-series samples in InfluxDB for analytics; project selected for poster presentation at the SURE Network Conference 2024.

Personal Projects

Home Lab — Secure Self-Hosted Services & Monitoring **Oct 2024 – Ongoing**

Docker • Prometheus/Grafana • Tailscale • Bash/Python

- Built monitoring + alerting for host/containers/uptime using Prometheus (`node_exporter`, cAdvisor) and Grafana dashboards.
- Secured private service access via Tailscale (tailnet-only reverse proxy/HTTPS), and integrated Zigbee2MQTT sensors into the stack.
- Wrote short triage notes/runbook steps for common alert patterns (high CPU/memory, container restart loops, service unreachability).

Traffic-Light Controller **June 2024 – Ongoing**

C/C++ • STM32F446RE • Python • SUMO • POSIX • TLV/UART • Segger SystemView *traffic-sim*

- Designed UML-based state-machine firmware on STM32 (FreeRTOS) for X/Y junctions; achieved deterministic phase timing with $\leq$5 ms jitter verified via Segger SystemView.
- Implemented minimal TLV protocol with CRC16 and resynchronization; developed C-based parser/encoder for streaming lane count data over UART from host to controller.
- Built Linux C TLV diagnostic tool that decodes byte streams to JSON, tracks frame statistics, and provides debugging snapshots for analysis.
- Validated adaptive green-extension algorithm vs fixed-time baseline in SUMO; used reproducible Python scripts to ingest simulation/controller outputs, perform CSV/log analysis, and generate evidence for debugging and regression checks.

Technical Skills

Languages: Python, C/C++, JavaScript, SQL, Bash
Frameworks & Platforms: React, Node.js, FreeRTOS, REST APIs, OpenAPI
Embedded & IoT: STM32 (F4), ESP32, Raspberry Pi, UART, Zigbee, MQTT, Zigbee2MQTT
Systems & DevOps: Linux, Docker, GitHub Actions (CI/CD), Ansible, Prometheus/Grafana
Databases & Analytics: MySQL, InfluxDB, Power BI, StatsModels (ARIMA/SARIMA)
Geospatial & Domain: GeoJSON, ISOXML (.prt), Shapefiles, ArcGIS
Tools: Git, Jira/Confluence, SUMO, Segger SystemView