Medical-Device Software / Data Engineer

RAYNHARDT VAN ZYL

Medical-device software engineering | Embedded reliability | Verification | Traceable delivery

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PROFILE

- Electronic engineer with an M.Eng in Electronic Engineering with a robotics focus, currently titled Data Engineer at Xyall with a software-engineering focus developing C#, Python, and C software for the Tissector Table Top medical-device product.
- Current medtech context brings together precision robotics, digital pathology, and molecular-pathology laboratory workflow integration.
- Prior production embedded background spans low-level firmware, hardware validation, low-power optimisation, and release documentation across **> 1M** shipped devices; transferable reliability evidence includes robust update and rollback workflows, code reviews, and test evidence.

EXPERIENCE

Data Engineer

Xyall

20 July 2026 – Present

- Perform software-engineering work in C#, Python, and C for the Tissector Table Top automated tissue-dissection product.
- Work in a medtech environment where precision robotics, digital pathology, and molecular-pathology laboratory workflow integration meet.

Firmware Engineer

Lightsense – AZOTEQ (PTY) LTD

May 2024 – July 2026 Paarl, ZA

- Built and standardised dual-target test stubs and hardware-facing validation workflows to reduce hardware dependency during development.
- Contributed to embedded code architecture, code reviews, release workflows, and release documentation that connect commit history, review notes, test results, and production handover.
- Designed and shipped robust OTA/bootloader workflows with A/B images, SHA-256 verification, and rollback guards across USB DFU and BLE SMP, reducing field-recovery risk and enabling staged rollouts.
- Developed low-level embedded C firmware, RTOS/TMOS components, and HAL modules for WCH772 BLE and STM32G071 platforms, including board bring-up, PCB tuning, peripheral integration, and production debugging.
- Integrated embedded BLE systems with Garmin and Android clients, supporting protocol validation, interoperability testing, and field debugging.

CORE SKILL AREAS

- **Medical-device software:** C#, Python, and C for the Tissector Table Top product in a precision-robotics, digital-pathology, and laboratory-workflow environment.
- **Verification and evidence:** CI-on-hardware, HIL validation, test stubs, smoke/regression tests, code reviews, test procedures, release documentation.
- **Reliability and recovery:** A/B firmware images, SHA-256 verification, rollback guards, staged rollouts, production debugging, release handover.
- **Production firmware:** embedded C, C++, RTOS/TMOS, HAL development, MCU bring-up, interrupts, DMA, linker scripts, memory maps.
- **Low-power hardware:** deep-sleep scheduling, peripheral gating, DMA offload, power profiling, PCB tuning, sensor systems.
- **Connected systems:** BLE, USB DFU, BLE SMP, Garmin/Android integration, protocol validation, interoperability testing.

EDUCATION

B.Eng, Electrical and Electronic Engineering

Stellenbosch University

2017 – 2020

- E&E Top 20 in 2017, 2018, 2019, and 2020; Golden Key member and DW Ackermann scholarship recipient.

M.Eng, Electronic Engineering

Stellenbosch University

2021 – 2023

- Research: low-cost autonomous rover with heterogeneous FPGA/ARM compute, prototype implementation, and published article.

- Optimised system-level power through deep-sleep scheduling, peripheral gating, and DMA offload, achieving a **38%** reduction in idle current for production devices.
- Production exposure includes firmware shipped across **> 1M** devices and multiple MCU families including nRF52, STM32, RP2040/RP2350, WCH, FMD, APT, HopeRF, and related low-cost platforms.

R&D Consultant

Independent

August 2023 – May 2024 George, ZA

- Designed an acoustic early-warning system for WWF conservation work, using distributed microphones and signal-processing techniques to detect and localise lion vocalisations.
- Contributed to a Cape Town electricity-grid monitoring system, supporting sensor integration, data acquisition, and field validation.
- Built a solar tracking controller prototype for a local solar company, covering embedded control logic, actuator control, and hardware bring-up.
- Delivered embedded R&D prototypes using embedded C, embedded Rust, and Python, with supporting mechanical design in Inventor and PCB design in EAGLE.

Business Analyst / Engineering Consultant

PSG Financial Services / PSG Head Consultants

Jan 2023 – Jul 2023

- Analysed financial-services workflows, mapped operational processes, and identified bottlenecks affecting adviser and client-support operations.
- Worked with stakeholders to document business requirements, review company processes, and propose practical optimisations for management review.
- Participated in project planning, research, data analysis, simulations, technical reporting, proposals, and presentations under senior guidance.

Visiting Scholar

KU Leuven

Oct 2022 – Dec 2022 Leuven, BE

- Developed FPGA/ARM prototype workflows to accelerate CasADi-based numerical optimisation for robotics research.
- Collaborated on hardware/software integration, prototype implementation, and performance evaluation with the KU Leuven engineering research team.

Cloudline

Cloudline

Jan 2021 – Oct 2022

- Supported airship flight-test campaigns, including instrumentation setup, calibration, data collection, and post-test analysis for system validation.
- Assisted with troubleshooting and performance evaluation of flight-test measurements to improve reliability of collected data.

TOOLCHAINS & DEBUG

Git · GitLab · CMake · cargo · probe-rs · OpenOCD · J-Link · STM32CubeMX · nRF Connect · CMSIS-DSP · defmt · GDB RTT · Logic Analyser · Oscilloscope · FMD IDE · MounRiver Studio - WCH · CDK - APT · Keil uVision - HopeRF

MCUS & BOARDS

STM32 · nRF52 · RP2040/RP2350 · ESP32-S3 · FMD · WCH · APT · HopeRF · NyQuest · Raspberry Pi

HARDWARE

Altium · EAGLE · Inventor · Power profiling · PCB tuning · Sensor systems · Actuator control

ACHIEVEMENTS

- Shipped firmware to **> 1M** devices in production.
- Built standardised test stubs and hardware-facing validation workflows for dual firmware targets.
- Reduced idle system current by **38%** through deep-sleep scheduling and peripheral power management.
- Connected commit history, review notes, test results, and production handover through release documentation.

PUBLICATIONS

- Heterogeneous computing for low-cost robotic platforms, MATEC Web of Conferences (2023).

LANGUAGES

Afrikaans ●●●●●

English ●●●●●

Green Link Solutions

Green Link Solutions

Jun 2021 – Dec 2021

- Designed and developed sensors and sensor systems with emphasis on PCB design and embedded firmware.
- Prototyped, tested, and analysed sensor designs and provided actionable recommendations for improvement.

Enerdyne

Enerdyne

Apr 2021 – Dec 2021

- Contributed to product prototyping and software development, including OpenGL components and mainframe integrations.
- Performed testing, validation, and technical documentation for prototypes and releases.

Software Engineer

Hexabyte

Jun 2019 – Dec 2019

- Assisted in software development, design, testing, and maintenance; collaborated with development teams to deliver projects on schedule.

PROJECTS & PUBLICATIONS

CI on Hardware

Firmware validation / HIL

Production practice

- Hardware-facing test rigs and regression workflows using J-Link RTT, local/CI runners, smoke tests, and release evidence capture for embedded firmware.

Heterogeneous Computing for Low-Cost Robotic Platforms

Research / FPGA + ARM

2023

- Developed a heterogeneous FPGA/ARM compute architecture and low-cost autonomous rover prototype; demonstrated practical robotics acceleration and published in MATEC Web of Conferences (2023).

Robotic Arm Design

Mechanical & Embedded

On hold

- Modular robotic arm platform focused on mechanical design, embedded motor control, and jerk-limited trajectories.

Dutch

INTERESTS

Squash, CrossFit, cycling, 3D printing, rock climbing, self-sufficient aquaponics, robotics, embedded AI.

Asynchronous Impulse Based SNN Framework

Rust / neuromorphic systems

In progress

- Rust-based asynchronous spiking neural network framework exploring event-driven simulation, memory-safe concurrency, and scalable scheduling.

Aquaponics, Solar Tracking, and Algorithmic Trading

Independent engineering interests

Ongoing

- Closed-loop aquaponics and vertical farming concepts; sensor-fusion solar tracking; transformer-based algorithmic trading prototypes.