JIMMY NSENGA

AI & Software Architect • Engineering Lead • Applied Researcher

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EXECUTIVE PROFILE

Senior software architect and engineer with 20 years of experience building production software, signal-processing systems and applied AI. I work across architecture and implementation, from AI agents and speech pipelines to web, mobile and backend systems. As co-founder and CTO of Syntone, I set the technical direction and lead development of its broadcast intelligence platform. Earlier roles combined hands-on engineering with technical leadership in transport, healthcare, IoT and applied research. I have eight years of R&D experience, 65+ peer-reviewed publications and three granted patents. I enjoy mentoring junior developers.

CORE COMPETENCIES & TECHNICAL SKILLS

Agentic AI Engineering	AI-assisted software delivery using written specifications, explicit architecture, security and cost constraints, automated tests and evaluations, and human review. Agent and prompt architecture; MCP / FastMCP; tool use and function calling; structured outputs; RAG and reranking; knowledge-graph grounding; tracing and observability; hosted and open-weight models; cost and latency optimisation
Speech & Audio	Audio fingerprinting and watermarking, acoustic matching, phonetic localisation; real-time broadcast ingestion (DVB-T2, HLS); ASR/TTS pipelines, WER evaluation; voice UX for low-literacy and low-bandwidth users
Software Engineering	Python (FastAPI); TypeScript/JavaScript (Angular, Node); microservices and event-driven pipelines; REST APIs; PostgreSQL, vector and NoSQL stores; Docker, Kubernetes, CI/CD; AWS, Railway; automated testing (pytest, Playwright); Odoo ERP
Mobile Development	Cross-platform mobile applications in Flutter (Dart) for Android and iOS, from UI to integration with REST APIs and backend services, sharing the same backends as the web frontends
Edge AI & IoT	On-device inference on ARM/NPU, TinyML, model compression; sensor fusion, telemetry pipelines, digital twins, model-predictive optimisation; 3D and geospatial visualisation (Three.js, Leaflet)
Languages	English (full professional), French (full professional), Dutch (B1.3, currently following an advanced course towards B2)

PROFESSIONAL EXPERIENCE

Co-Founder & CTO, Syntone Media — Brussels & Wemmel, Belgium | 2025 – present

- Built the agentic layer: LLM agents over a custom MCP server exposing typed analytics tools (aggregation, time-zone-aware dayparting, entity search), knowledge-graph grounding, and LLM classification of advertising content (sector, theme, product) under structured-output contracts.
- Designed the model-invocation architecture: cheap DSP stages (fingerprinting, recurrence detection) gate expensive inference, cutting compute and bandwidth about 100× against always-on processing, measured in production across European and African markets.
- Introduced an AI-assisted engineering workflow based on written specifications, explicit technical constraints, automated tests and evaluations, and human review before merge.
- Built the evaluation harness for speech models: same-utterance benchmarking of commercial ASR providers, WER with per-condition breakdowns, cost and latency profiling, including custom evaluation metrics.

Frontend Tech Lead, Nomad Digital — Mechelen, Belgium | 2019 – 2025

- Led the frontend team for six years (backlog planning, prioritisation, code review) on the TypeScript frontend of a production-critical, real-time train fleet-monitoring platform for rail operators.
- Developed custom embedded charts displaying train fleet analytics directly on the geolocated map.
- Developed an LLM-based user interface for specifying train architecture.

- Prototyped LLM-based passenger services and camera-based passenger counting inside the Docker/Kubernetes microservices platform.

Engineering Lead, MkulimaGPT, Gates Foundation Tanzania, remote | 2023 – 2024

- Led engineering of an LLM advisory assistant for smallholder farmers, funded under the Gates Foundation Global Grand Challenges: text and voice over WhatsApp, Swahili-first, designed for low-literacy users, covering conversation design, prompt architecture, the ASR/TTS chain and grounding in agronomic knowledge and live IoT sensor data.
- Results published in peer-reviewed venues (Heliyon 2024, AJAFS 2024).

Software Engineer, TAKTIK 2018

- Multi-device streaming platform: HLS, DVB and Smart TV SDKs.

Consultant, HiMeta Technologies 2017

- Co-developed a watermark-based fingerprinting algorithm, later patented with me as a co-inventor (WO2018211326A1).
- Delivered it as a containerised DSP microservice pipeline in a four-month mission.

Senior R&D Engineer, CETIC Gosselies, Belgium | 2009 – 2017

- SEAMPAT (Wallonia, WB Health): software architect of a medication reconciliation platform; specified the REST API contracts and the integration with existing medical record software (Omnipro, Xperthis), designed hybrid AES/RSA encryption, built the Angular apps for patients and doctors, and led two Java developers and one DevOps engineer.
- TRICARE (Wallonia): wrote the business requirements of the proposal, designed the system for monitoring elderly people with non-intrusive sensors, developed the ML anomaly detection algorithm in Python, and led two Scala developers.
- SAVE (Logistics Wallonia): designed a µW-class autonomous vision system, including the low-power wireless analysis; developed the embedded OCR algorithm for smart meters in MATLAB with C code generated by Embedded Coder, and led three developers.
- Alstom mission: refactored a self-driving train simulator into a component-based MATLAB architecture, modelled the braking system and generated C/C++ code automatically.
- Contributed to European and Walloon R&D programmes in elderly-care monitoring, eHealth and EEG-based assistive systems, as co-investigator or key technical personnel.

PhD Researcher, imec / KU Leuven Leuven, Belgium | until 2009

- Designed DSP architectures for 60 GHz wireless systems under strict silicon-area and power constraints.

TEACHING & RESEARCH

Honorary Senior Lecturer, ACEIoT, University of Rwanda Remote | 2020 – present

- Designed and teaches graduate courses in embedded system-level design and edge-AI systems.
- Supervises PhD and MSc research with published outcomes.
- Building a course on the governance of agentic software engineering.

Publications	Author and co-author of 65+ peer-reviewed publications (h-index 15)
Patents	Three granted patents, in multi-antenna beamforming and in fingerprint-based audio watermarking

EDUCATION & CREDENTIALS

PhD in Digital Signal Processing, KU Leuven / imec, 2009
MSc in Electrical Engineering, Faculté polytechnique de Mons (FPMs / UMONS), 2004