

Senior connected-product engineer with 14+ years shipping end-to-end embedded, mobile, and cloud systems for international clients. CSSLP-certified; deep experience in Bluetooth and cellular IoT firmware, iOS and macOS apps, and AWS-hosted backends, with a focus on secure boot, OTA update systems, and long-lifecycle field reliability. Picks up new platforms and toolchains quickly.

RELEVANT EXPERIENCE

Director, Connected Product Engineer (Firmware, Mobile, Cloud)

January 2014–Present (12 y)

NRB Tech Ltd

- Architect and ship end-to-end connected products spanning embedded firmware, iOS/macOS/Android apps, and cloud infrastructure for 10+ international clients across North America, Europe, and Asia
- Hands-on senior IC on firmware and iOS; directs subcontractor teams of up to 3 only where client scope requires
- Take technical ownership of architecture, security, and lifecycle — secure boot, OTA with rollback, manufacturing provisioning, and multi-year firmware maintenance
- **AirTurn** — Bluetooth pedals, remotes, apps, and developer SDK for music and accessibility (10+ year engagement)
 - Migrated long-running firmware to a modern, field-updatable platform on nRF Connect SDK / Zephyr RTOS, with signed OTA and automatic rollback across 6+ device models
 - Designed and built iOS, macOS, and Android apps live on all three stores, providing firmware updates, analog calibration, and shareable configuration profiles
 - Delivered third-party iOS/Android SDK adopted by major music apps including forScore and OnSong, with GATT-based device discovery and background-safe event delivery
 - Building next-generation Swift 6 companion app with AccessorySetupKit and an extracted BLE SDK for the v5 hardware generation
- **KēZ** — LTE-M vehicle security platform: end-to-end firmware, iOS app, and AWS backend
 - Engineered embedded device with cellular and BLE coexistence, voltage-aware power states, and modem watchdogs for 24/7 monitoring at minimal vehicle-battery draw
 - Built PKI security architecture using ECDSA, ECDH, and AES-GCM-256; shared C cryptography library with unit tests deployed across firmware, mobile, and server
 - Shipped iOS app with StoreKit 2 subscriptions across three tiers, JWS verification, and backend-synced entitlement gating of LTE-M remote features
 - Implemented dual-transport device comms — CoreBluetooth locally, MQTT over LTE-M when remote — with automatic failover; live BLE diagnostics for field service
 - Delivered cloud backend on AWS (EC2, S3, CodeDeploy) running Ubuntu with Node.js / TypeScript, PostgreSQL, Mosquitto MQTT, and Redis, with CI/CD release pipelines
- **Positive Grid** — Bluetooth and USB MIDI foot controllers for guitar amplifiers
 - Migrated firmware platform to the latest nRF Connect SDK / Zephyr; implemented class-compliant USB MIDI on a memory-constrained nRF52840
 - Built BLE and USB DFU update paths with secure signing and rollback, in a single update package supporting multiple hardware revisions
 - Established a hermetic, reproducible release pipeline with formal SDK-patch management over the vendor SDK
- **Wiggle** — Home energy monitoring app for UK households (NRB Tech product; in beta testing)
 - Built a native SwiftUI iOS app and a Python / FastAPI / PostgreSQL backend that turn Octopus Energy tariffs, Home Mini smart-meter telemetry, and EV charging data into usage, cost, and unusual-usage insights
 - Integrated Enode for EV, battery, and heating device linking with member-initiated control; two households onboarded on staging and TestFlight builds distributed to testers
 - Implemented passkeys, Sign in with Apple, and household membership; established separate staging and production environments with encrypted backups and tested restore and data-erasure drills
- **ROUTES** (Second Nature Studio) — Distributed, sensor-driven public light installation (awaiting deployment)
 - Designed a central master and 6 Raspberry Pi panel controllers with real-time MQTT animation sync and pedestrian speed-and-direction sensing; remote-managed over Tailscale with cellular and Wi-Fi failover
- Active contributor to open source projects including **Zephyr RTOS** and **RxAndroidBle**, focused on Bluetooth Low Energy and embedded systems

Head of Development

January 2012–April 2014 (2y)

Akkroo Ltd, London, UK

- Led all engineering for an offline-first mobile and web platform for trade-show lead capture, later acquired by Integrate
- Served Fortune 500 clients including Adidas, Morgan Stanley, IBM, and Cisco at major trade shows and events
- Architected the offline-first mobile and web platform with automatic synchronisation and a REST API that processed thousands of leads per event
- Recruited and managed a team of 2 engineers, establishing coding standards, review processes, and deployment practices

EDUCATION AND TRAINING

(ISC)² Certified Secure Software Lifecycle Professional (CSSLP)

March 2021

Learning Tree International

Certified

MEng Electronic Engineering

July 2011

Durham University, Durham, UK

First Class Honours

TECHNICAL SKILLS

- **Operating Systems:** macOS, iOS, Android, Linux (Ubuntu, CentOS, Yocto/Buildroot familiarity), Windows
- **Programming Languages:**
 - **Expert:** C, Swift, Python, JavaScript/TypeScript
 - **Proficient:** C++, Java, Objective-C, SQL, Bash, HTML/CSS
 - **Familiar:** Kotlin, MATLAB, $\text{\LaTeX}$
- **Frameworks & Libraries:**
 - **Mobile:** SwiftUI, UIKit, CoreBluetooth, AccessorySetupKit, StoreKit 2, SwiftData, Combine, async/await, Actors, Android SDK, React Native
 - **Embedded:** Zephyr RTOS / nRF Connect SDK (Nordic nRF54, nRF52, nRF53), Nordic nRF5 SDK, ESP-IDF, MCUboot
 - **Backend & Web:** FastAPI, Node.js, Express, REST APIs, WebSockets, MQTT (Mosquitto), Protocol Buffers
- **Tools & Technologies:**
 - **Connectivity:** Bluetooth Low Energy, LTE-M, NB-IoT, Wi-Fi, USB MIDI, USB DFU, Tailscale, Quectel BG77
 - **Cloud & DevOps:** AWS (EC2, S3, CodeDeploy, Lambda), Docker, CI/CD, Mosquitto, Nginx, Apache
 - **Databases:** PostgreSQL, MySQL, MongoDB, Redis, Realm
 - **Security:** PKI, ECDSA, ECDH, AES-GCM, TLS, secure boot, signed firmware, OTA with rollback
 - **Development:** Xcode, Android Studio, CLion, VS Code/Cursor, Git, Docker, generative-AI tooling for engineering

CORE COMPETENCIES

- **Technical Architecture:** End-to-end system design across embedded firmware, mobile applications, and cloud infrastructure
- **Security Engineering:** Practical cryptography, PKI, secure boot, signed OTA with rollback, and secure communication across firmware, mobile, and cloud

INTERESTS

- Sustainability and energy efficiency — particular interest in connected-product applications for home energy and decarbonisation
- Running, cycling, and swimming

REFERENCES

Available on request