

Mickael RENAULT

Sensing Firmware & Algorithms Engineer | Technical Team Lead

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SUMMARY

Sensor firmware and algorithms engineer with 10+ years building real-time, embedded sensing systems across consumer electronics: sports/fitness, wearables/audio, and smart home. Track record of taking products from early-stage R&D to mass-production at startup, mid-size, and large-company scale. Combines hands-on depth in algorithm design and firmware architecture with real people leadership, including a 10-engineer distributed team led from alpha through launch. Open to a Team Lead / Manager role in sensing firmware and algorithms.

CORE EXPERTISE

Sensing & Algorithms:	Sensor fusion, real-time calibration, motion detection & tracking, predictive/physics-based modeling, signal processing, 3D simulation & visualization
Firmware:	Embedded architecture (ARM Cortex-M0/M4, embedded Linux), driver development, OTA update, factory diagnostics & validation, low-power design
Leadership:	Team leadership & mentoring, cross-functional technical negotiation, end-to-end ownership (DRI), knowledge-management systems, onboarding & process design
Languages/Tools:	C, C++, Python; Git, Jupyter; AI-assisted tooling & architecture

SELECTED RECENT WORK (2025–2026)

- **Sensing algorithm design & cross-team validation infrastructure.** Designed a lightweight real-time algorithm that added a new context-detection capability to a wireless-audio product using existing sensing: no added hardware, power, or cost. Validated at scale with the QA/Automation team by co-designing the instrumentation interface for automated testing, shifting the team's role from handing off algorithms for validation to building the validation infrastructure itself.
- **Cross-functional 3D sensor visualization & simulation tool.** Built a frame-by-frame 3D replay engine (Python + Blender) for sensor failure analysis, with physics-based error modeling and embedded-ready processing pipeline. Resolved cross-team friction by giving engineers a shared, unbiased view of the sensing system. Used across teams from day-to-day technical collaboration to leadership review.
- **AI-optimized internal knowledge platform.** Identified a systemic gap: teams restarting from scratch on each new program with little knowledge transfer, and built a full internal engineering handbook (timeline, deliverables, lessons learned), deployed as a live internal web service. Designed to be AI-agent-navigable from day one with LLM entry point, search index, and manifests.
- **Independent product R&D.** Led an independent, self-directed R&D effort evaluating a new health-sensing product concept end-to-end: competitive/market analysis, UX research, and functional hardware prototyping.

PROFESSIONAL EXPERIENCE

Apple Inc. — Sensor Firmware & Algorithms Engineer

Sep 2019 – Present · Los Angeles, CA

Sensing Platform Bring-up & Technical Leadership (2023–2026)

- Technical lead across two sensing programs: owned architecture decisions, represented engineering in cross-functional design reviews, and surfaced risks early. Kick-started firmware architecture ahead of team scale-up and delivered firmware for prototyping platforms across multiple leadership demo cycles.
- Led multi-sensor array design through extensive simulation (Python, Blender), converging on the final production configuration. Delivered initial algorithms for motion compensation and spatial awareness.
- Primary owner (DRI) for Sensing Firmware across two consecutive programs: architecture, bring-up, factory diagnostics, calibration flows, and validation. Resolved a critical compliance constraint on one of them by migrating the codebase from C++ to C, and re-validated end-to-end with no schedule slip.
- Owned the platform's cross-functional reference material (architecture diagrams, configuration definitions, validation procedures) relied on by multiple teams daily.
- Scaled two programs: onboarded 15+ engineers and established issue-tracking and sprint-planning standards adopted team-wide.
- Mentored summer interns through user study, algorithm design, performance analysis, and cross-functional review.

Ambient Sensing R&D — Sensor Hub Prototyping & Home Climate Algorithms (2021–2023)

- Led design and development of two generations of sensor-hub research prototypes for controlled in-home data collection, integrating HomeKit bridging and multi-modal environmental and presence sensing to support home-climate and comfort algorithm research.
- Built an end-to-end data collection pipeline and backend with real-time web visualization, supporting multi-user/multi-device studies.
- Designed room-level temperature characterization and predictive algorithms for indoor thermal behavior; built a real-time analysis server with interactive projections and visualizations.

- Built iOS apps for real-time sensor monitoring, comfort analytics and user studies, aggregating home and wearable data (skin temp).
- Led cross-functional collaboration with platform software, iOS sensing, and energy teams for demos and technical alignment.

Smart Home Speaker — Ambient Sensing (2019–2021)

- Owned ambient light and environmental sensor placement, calibration, firmware drivers, and algorithms on an embedded platform, including a device self-heating temperature compensation algorithm.
- Enhanced the user experience through new sensing capabilities: environment- and context-aware features, control loops, and capacitive touch integration for on-device controls.

Simplehuman LLC — Embedded Software Engineer

Dec 2018 – Sep 2019 · Torrance, CA

- Shipped production firmware for the Sensor Mirror Hi-Fi: ALS, capacitive-touch, calibration, ESD recovery, and light-control algorithms.
- Implemented robust application-level OTA updates (dual-bank method), enabling safe in-field firmware upgrades.
- Developed the calibration model for the mixed-LED lighting system, delivering accurate, consistent light output across units.

Game Your Game, Inc. (GAMEGOLF PRO) — Team Lead & Embedded Software Engineer

May 2016 – Dec 2018 · San Francisco, CA

Connected wearable for golf players: led new-generation product development of a low-power embedded system, from alpha through launch.

- Led a team of 10 engineers, coordinating distributed teams across California, Ireland, and Ukraine; reported directly to VP and CEO.
- Owned roadmap prioritization, task decomposition, feedback cycles, and documentation across engineering and executive stakeholders.
- Designed firmware architecture for low-power CPUs (Cortex-M4, Cortex-M0) and real-time on-device algorithms: swing detection, activity/power management, on-the-fly 9-axis IMU calibration, embedded sensor fusion.
- Designed golf-specific motion models in MATLAB; filed 2 provisional US patents (motion detection, battery management).
- Built a machine learning pipeline (genetic algorithm, C/Python) for swing detection, with feature propagation to the firmware over BLE.

Early Career — Embedded Systems, R&D & Entrepreneurship

- **SportSense — Project Lead & Embedded Systems Engineer** (Sep 2014 – Apr 2016, Antibes, France, part-time) — Self-initiated entrepreneurship project incubated at the University of Nice: full end-to-end hardware/firmware/software design for a sensor network for the national gymnastics training center (ToF sensors, PCB design, Bluetooth, embedded Linux); the project earned the University of Nice Foundation's Entrepreneurship Award.
- **CNRS GeoAzur — Firmware Developer, Professional Seismometer** (Dec 2014 – Jun 2015, Sophia Antipolis, France, part-time) — End-to-end development: Python DSP and seismic data analysis, real-time visualization UI, SEED-compliant data storage backend.

EDUCATION

Master of Sciences in Electrical Engineering — Embedded Systems 2016

University of Nice Sophia Antipolis, France

Certificate in Small Business Management & Entrepreneurship 2015

University of Nice Sophia Antipolis, France

SKILLS

Programming	C, C++, Python
Embedded Platforms	ARM Cortex-M0/M4, embedded Linux, Raspberry Pi, Bluetooth/BLE SoCs
Sensors	Ambient light (ALS), 9-axis IMU, ToF (depth/ranging), passive-infrared (PIR) presence, temperature/humidity, air quality (CO2, PM2.5), capacitive touch, in-ear/proximity detection, ultrasonic
Algorithms	Sensor fusion, motion detection & tracking, real-time calibration, predictive modeling, signal processing, genetic algorithms/ML, physics-based sensor error modeling, 3D visualization (Blender)
Firmware	Drivers, OTA update, factory diagnostics & validation, ESD & error recovery, low-power architecture
Software & Data	Real-time sensor data pipelines (ingest → SQL aggregation → remote visualization) for large-scale studies, web backends, HomeKit integration, iOS app development
Leadership & Process	Team leadership, mentoring, cross-functional negotiation, end-to-end ownership (DRI), knowledge-management systems, AI-accessible documentation design
Languages	English (fluent), French (native)

PATENTS & AWARDS

US Patent 62/778,654 (2019) — Electronic tag for shot detection

US Patent 62/557,225 (2016) — Motion and gesture analysis from a magnetic and inertial measurement unit

Entrepreneurship Award — University of Nice Sophia Antipolis Foundation (2015)

Junior Project Award — STMicroelectronics, E-Same Contest (2015)

Elite Athlete, French National Team — Trampoline (2009–2015)