

Wenzheng WANG

PHD CANDIDATE IN ENGINEERING SCIENCES · EMBEDDED SYSTEMS ENGINEER

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Summary

PhD Candidate at Sorbonne University/CNRS, holding an Engineering Degree (M.Sc.) in Embedded Systems and recipient of **two IEEE Best Paper Awards**. Specialized in analog electronics and signal processing for physiological sensing and NIRS, emphasizing model-driven and validation-driven design. Developed an end-to-end **dual-core BLE** wearable platform and a **real-time** Python analytics pipeline that resolves fidelity-latency trade-offs for continuous monitoring.

Education

PhD in Engineering Sciences

SORBONNE UNIVERSITY

- Thesis: "Design and Implementation of a Versatile Embedded Platform for Multimodal Physiological Signal Monitoring"
- Advisors: Prof. S. Feruglio (HDR); Assoc. Prof. J. Denoulet

Paris, France

Nov. 2023 - Present

Master of Engineering in Embedded Systems

PARIS INSTITUTE OF DIGITAL TECHNOLOGY (ISEP)

- Graduated with honors (Mention: Très Bien)

Paris, France

2021 - 2023

Bachelor of Science in Vehicle Engineering

LANZHOU INSTITUTE OF TECHNOLOGY

- Strengths in Microcontroller Principles and Electronic Systems

Lanzhou, China

2016 - 2020

Professional Experience

PhD Researcher

SORBONNE UNIVERSITY COMPUTER SCIENCE LABORATORY (LIP6)

Paris, France

Nov. 2023 - Present

Engineered a physiological sensing transmitter on a dual-core embedded platform, achieving 4 kHz multi-channel sampling and sustained **416 kbps** throughput with zero packet loss. Optimized the wireless protocol using a non-integer connection interval to mitigate electromagnetic interference, reducing artifacts by **54%** while ensuring precise five-phase time-division multiplexing for concurrent multi-wavelength PPG and ExG acquisition. Developed a **10 ms** low-latency end-to-end Python analytics pipeline for reliable packet decoding, phase-accurate demultiplexing, artifact correction, and signal quality assessment. Implemented a **dual-path** SpO₂ estimation framework combining physics-based modeling and machine learning inference, integrating outputs via a quality-aware fusion strategy for robust continuous monitoring and unified multimodal interpretation.

Teaching Assistant

Paris, France

SORBONNE UNIVERSITY & POLYTECH SORBONNE

Nov. 2023 - Present

Delivered **64 hours/year** across lectures (CM), tutorials (TD), and labs (TP) for the BSc EEA and MSc SESI programs. Led Microcontrollers labs for 3 groups (45 students): prepared TP subjects, delivered hands-on sessions, and administered in-class quizzes. Ran Analog Electronics practicals for 4 groups (60 students), delivering 8-hour full-day TP per group and grading lab reports with quantitative feedback (32 hours/year). Taught Simulation of Electronic Circuits (14 hours/year) for 1 group (**13** students), and proctored the course final exam. Delivered an additional **guest lecture** to the final year MSc SESI cohort on emerging research topics.

Master's Internship

Paris, France

SORBONNE UNIVERSITY COMPUTER SCIENCE LABORATORY (LIP6)

Feb. 2023 - Sept. 2023

Developed a NIRS-based **opto-electronic workflow** to assess ankle ligament status after ligamentoplasty, coupling Monte-Carlo light-transport modeling with bench validation. Benchmarked MCML and MCmatlab against analytical transmittance and achieved **<5%** relative error with MCML; ran 2M-photon simulations across 450-1600 nm, sweeping source-detector spacing from 0.05 to 1.0 cm (0.05 cm step) to identify an optimal 0.4 cm geometry. Designed a motorized ankle positioning fixture in Fusion 360 and validated kinematics using a 3D-printed prototype.

Bachelor's Internship

Wuhan, China

DONGFENG MOTOR CORPORATION

Sept. 2019 - Dec. 2019

Supported casting and welding operations by tracking process parameters, assisting quality inspections, and maintaining documentation.

Designed and revised vehicle driveshaft components in **CATIA/AutoCAD**, producing manufacturing-ready **3D drawings** with tolerancing.

Skills

Languages

English (Professional working); French (Professional working); Chinese (Native)

Programming & Computing

C/C++; Python (scientific stack, signal processing + ML prototyping); R; Verilog; CUDA

Embedded Platforms

Nordic Zephyr ecosystem, STM32 family, Verilog-based prototyping, dual-core architecture

Engineering Tools

MATLAB/Simulink, Keil MDK-ARM 5, Quartus, Altium Designer, LTspice, AutoCAD, Fusion 360, Solidworks

Publications

• JOURNAL

[1] A Review of Chronic Lateral Ankle Instability and Emerging Alternative Outcome Monitoring Tools in Patients following Ankle Ligament Reconstruction Surgery [PDF]

Journal of Clinical Medicine

I. SALIBA, A. HARDY, W. WANG, R. VIALLE, S. FERUGLIO

2024

This review analyzes clinical management of chronic lateral ankle instability and highlights limitations of current postoperative outcome assessment. It surveys emerging non-invasive monitoring modalities (e.g., bioelectrical/mechanical impedance and NIRS) and outlines opportunities for more objective, longitudinal follow-up after ligament reconstruction. DOI: 10.3390/jcm13020442

• INTERNATIONAL CONFERENCES

[2] Preliminary Development of an Opto-electronic System for Ankle Instability Assessment [PDF]

6th BioSMART

W. WANG, H. LI, I. SALIBA, A. HARDY, J. DENOULET, S. FERUGLIO

2025

Developed a preliminary opto-electronic approach for ankle instability assessment using NIRS modeling and simulation-driven design. The study provides evidence that optical signatures can support discrimination between ligament conditions, establishing a foundation for future wearable assessment tools. DOI: 10.1109/BioSMART66413.2025.11046076

[3] Design of a Multi-Channel Wireless System for Physiological Signals Acquisition [PDF]

23rd IEEE NEWCAS

W. WANG, H. LI, R. VIALLE, J. DENOULET, S. FERUGLIO

2025

Designed and implemented a multi-channel wireless platform for physiological signal acquisition, targeting high-fidelity sensing under constrained wireless latency and bandwidth. The system architecture and validation results support real-time mobile health monitoring and provide a scalable basis for edge-enabled analytics.

[4] Optimizing the Monte-Carlo simulation program for NIRS modeling of biological tissues in optoelectronic devices [PDF] [GitHub]

31st IEEE ICECS

W. WANG, S. LI, I. SALIBA, A. HARDY, R. VIALLE, J. DENOULET, S. FERUGLIO

2024

Optimized a Monte Carlo simulation workflow for NIRS modeling in biological tissues, improving usability and computational efficiency for optoelectronic design iterations. The updated tool was validated on single and multi-layer tissue scenarios, enabling more reliable optical propagation estimation for device prototyping. DOI: 10.1109/ICECS61496.2024.10849250

• NATIONAL CONFERENCES

[5] Système Opto-électronique Préliminaire pour l'Évaluation de l'Instabilité de la Cheville (in French) [PDF]

GDR SOC2

W. WANG, H. LI, I. SALIBA, A. HARDY, J. DENOULET, S. FERUGLIO

2025

Proposed a preliminary NIRS-based methodology for non-invasive ankle ligament assessment, supported by a multi-layer tissue model centered on the ligament region. Initial reflectance experiments indicate measurable differences across ligament conditions, motivating portable diagnostic workflows.

[6] Outil pour la conception de systèmes NIRS dans les tissus biologiques (in French) [PDF]

GDR SoC2

W. WANG, S. LI, I. SALIBA, J. DENOULET, S. FERUGLIO

2024

Presented a design-oriented simulation toolchain for NIRS optoelectronic systems in biological tissues. The tool supports modeling and analysis of light transport to accelerate prototyping and evaluation in biomedical NIRS applications.

Honors & Awards

Best Student Paper Award

Paris, France

6TH IEEE INTERNATIONAL CONFERENCE ON BIO-ENGINEERING FOR SMART TECHNOLOGIES (IEEE BioSMART)

2025

First Place in Young Professional Competition

Paris, France

23RD IEEE INTERNATIONAL NEW CIRCUITS AND SYSTEMS CONFERENCE (IEEE NEWCAS)

2025

Extracurricular Activities

VOLUNTEER EXPERIENCE

Paris 2024 Olympic and Paralympic Games

Paris, France

DRIVER

2024

- Member of the passenger fleet during the Games

MIDI 2021 Music Festival - Taihu Edition

Suzhou, China

STAGE CONTROL

2021

- Managed audio systems and coordinated communications during performances