

SANTIAGO F. SCAGLIUSI

drsantiscagliusi@gmail.com | +34 653 080 131 | linkedin.com/in/santifs | github.com/santifs | santiagofs.com

EDUCATION

- PhD in Electronics Technology** Jun. 2024
University of Seville, Spain Thesis: *Wearable device for continuous bioimpedance monitoring in heart failure*
- MSc in Biomedical Engineering and Digital Health** Sep. 2020
University of Seville, Spain *Best Master's Thesis Award (Telefonica Spain)*
- Double BSc in Electrical Eng. & Industrial Electronics Eng.** Oct. 2019
University of Seville, Spain

EXPERIENCE

- Assistant Professor in Electronics Engineering (Tenure-Track)** Oct. 2023 – Present
University of Seville *Seville, Spain*
- Designed and taught undergraduate coursework in **MSP430 Assembly, Embedded Systems, and Computer Architecture** for 220+ students, covering MCU architecture, C/Assembly programming, peripheral drivers (UART, I2C, SPI), interrupt-driven firmware, ISA design, and pipelining.
 - Built and deployed a **full MSP430 instruction set simulator** as a web application (santiagofs.com/msp430simulator), using **AI-assisted development** (Claude Code) to accelerate UI prototyping while personally designing the instruction decoder, memory model, and execution engine for step-by-step debugging of assembly programs.
- PCB Design Consultant** Jun. 2025 – Nov. 2025
PBSCO (Photobooth Company) *California, USA (Remote)*
- Designed a **high-current (25A) power distribution PCB with integrated USB 3.0 hub** for a commercial LED lighting system controlled by an iPad. Handled full schematic capture, component selection, layout, and manufacturing coordination over an 8-month engagement.
 - Managed **mixed-domain design challenges**: high-speed USB 3.0 signal integrity (impedance-matched differential pairs), high-current power delivery (thermal management, copper pours, sense resistors), and digital control logic — all on a single board.
- Technical Lead – Electronics** Jul. 2023 – Oct. 2023
Biothink (Healthcare Technology Startup) *Seville, Spain*
- Diagnosed and resolved critical design flaws in a **multi-microcontroller PCB system** (STM32-based), supporting board bring-up and validation so hospital certification testing could resume within two weeks.
 - Implemented digital filtering algorithms for the NTC temperature sensing chain, reducing measurement error by **10%** and improving reliability across the operating temperature range.
- Researcher in Electronic and Biomedical Engineering** Jan. 2021 – Jul. 2023
University of Seville & Institute of Microelectronics *Seville, Spain*
- Led the end-to-end design of **VOLUM**, a wearable device for continuous bioimpedance monitoring in heart failure patients, including analog front-end design, **4-layer mixed-signal PCB** layout, and bare-metal **C firmware** for STM32 and Nordic NRF52 **ARM Cortex-M** MCUs.
 - Wrote low-level **SPI/I2C drivers** for the AD5940 analog front-end, implemented **interrupt-driven data acquisition with DMA**, integrated the BLE stack on the NRF52, and validated system performance for 72+ hours of continuous operation on a coin cell battery.
 - Developed a **self-calibration algorithm** for the AD5940 AFE that reduced bioimpedance measurement error from 5% to **under 1%**, validated against the clinical-grade Impedimed SFB7 and published at IEEE Biosensors 2023.
 - Built Python and Matlab **signal processing pipelines** for bioimpedance spectroscopy, including Cole-Cole model fitting, volume estimation, and circadian rhythm analysis from real patient data.
 - Research resulted in **6 publications** (3 journals, 3 conferences), a **patent application**, a university **spin-off company**, and €20,000 in entrepreneurship funding.
- Fulbright Scholar – Predoctoral Research** Sep. 2022 – May 2023
Swarthmore College *Pennsylvania, USA*
- Discovered and characterized a **previously undocumented low-frequency artifact** in segmental bioimpedance measurements caused by electrode mismatch — a systematic error that had gone unnoticed in the field and caused measurement deviations of up to **90%**.

- Designed a correction method combining **LTspice circuit simulation** with experimental validation on the Nordic NRF52, reducing the artifact's impact to **<2% error**. Co-authored 2 IEEE publications with Prof. Maggie Delano on the findings (EMBC 2023, IWIS 2023).

TECHNICAL SKILLS

Firmware & Embedded: C (bare-metal firmware, low-level drivers, RTOS concepts), ARM Assembly, MSP430 Assembly, Python, Matlab

Computer Architecture: MCU architecture, ISA, pipelining, interrupt-driven firmware, memory-mapped peripherals

Microcontrollers: STM32 (Cortex-M), Nordic NRF52 (Cortex-M4), TI MSP430 (16-bit RISC)

Protocols & Interfaces: SPI, I2C, UART, USB 3.0, BLE, DMA, GPIO

Validation & Debug: Board bring-up, GDB, JTAG/SWD, logic analyzers, oscilloscopes, system integration, Git

Mixed-Signal & Hardware: PCB design (KiCad, Altium, Fusion 360), LTspice, AD5940 AFE drivers, bioimpedance spectroscopy, calibration, power boards (up to 25A)

Languages: Spanish (native), English (advanced — TOEFL 105/120), Italian (basic)

AWARDS & HONORS

- 2025** 1st Place, Pfizer Innomakers4Health — BioPatch: non-invasive patch for breast cancer detection
- 2024** Best Researcher Under 30 in Experimental Sciences — City Council of Seville
1st Place, HackForGood Spain — national hackathon, 1,000+ participants
Nodal Award – Shark Tank Edition (\$2,100) — IMFAHE International Program
- 2023** Best Paper Award — 16th International Workshop on Impedance Spectroscopy (IWIS), Germany
1st Place, Three Minute Thesis Competition (3MT[®]) — 48 PhD candidates
- 2022** Fulbright Predoctoral Research Grant — 1 of 15 recipients, U.S.–Spain exchange
- 2021** 1st Place, XVI Entrepreneurship Ideas Competition — University of Seville (110 entries)
1st Place, II University Spin-offs Competition — University of Seville (11 spin-offs)
Top 5, European Innovation Academy — 400+ participants, 55+ teams
- 2020** Best Master's Thesis in Biomedical Engineering — Telefonica Spain

PUBLICATIONS

Journals

- [1] **S. F. Scagliusi** et al., “Bioimpedance Spectroscopy-Based Edema Supervision Wearable System for Noninvasive Monitoring of Heart Failure,” *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1–8, 2023.
- [2] **S. F. Scagliusi** et al., “Body Posture Determination for Heart Failure Patients from Ankle Orientation Measurements,” *IEEE Access*, 2023.
- [3] **S. F. Scagliusi** et al., “From Bioimpedance to Volume Estimation: A Model for Edema Calculus in Human Legs,” *MDPI Electronics*, vol. 12, no. 6, 2023.
- [4] D. Martín Fernández, . . . , **S. F. Scagliusi** et al., “DC Electrical Stimulation Enhances Proliferation and Differentiation on N2a and MC3T3 Cell Lines,” *J. Biol. Eng.*, 2022.
- [5] P. Pérez García, . . . , **S. F. Scagliusi** et al., “Oscillation-Based Spectroscopy for Cell-Culture Monitorization,” *Frontiers in Electronics*, 2022.
- [6] E. Rando Carrión, P. Pérez García, **S. F. Scagliusi** et al., “A Plethysmography Capacitive Sensor for Real-Time Monitoring of Volume Changes in Acute Heart Failure,” *IEEE Trans. Instrum. Meas.*, 2021.

Conferences

- [7] **S. F. Scagliusi** et al., “A Novel Wearable Device for Continuous Bioimpedance Monitoring in Congestive Heart Failure Patients,” *16th Int. Workshop on Impedance Spectroscopy (IWIS)*, 2023. **Best Paper Award**.
- [8] **S. F. Scagliusi** et al., “Enhancing the Precision of AD5940 Segmental Bioimpedance Measurements through Self-Calibration,” *IEEE Biosensors Conf.*, 2023.
- [9] **S. F. Scagliusi** & M. Delano, “Characterization and Correction of Low Frequency Artifacts in Segmental Bioimpedance Measurements,” *IEEE EMBC*, 2023.
- [10] A. Pliego Prenda, . . . , **S. F. Scagliusi** et al., “Bioimpedance Simulations for the Monitoring of Fluid Overload in Heart Failure Patients,” *BIOSTEC*, 2023.
- [11] **S. F. Scagliusi** et al., “A Low Power Approach to Body Position Estimation for HF Patient Monitoring by an Ankle Positioned IMU,” *37th DCIS*, 2022.
- [12] M. Puertas, . . . , **S. F. Scagliusi** et al., “Modeling Edema Evolution with Electrical Bioimpedance: Application to Heart Failure Patients,” *XXXVI DCIS*, 2021.