Federico Leva

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Passionate about device and system solutions for applications with social, environmental, and medical impact

● EDUCATION AND TRAINING

01/11/2020 - Ongoing (graduation expected on 03/2024)
PH.D. STUDENT IN ICT - University of Modena and Reggio Emilia, Modena, Italy

- Design of passive and active nanoelectrode biosensor systems for recording the extracellular activity of in-vitro neuronal cells via modeling and simulation to guide project partners' fabrication and experiments.
- Extensive use of FEM TCAD (Sentaurus) and Multiphysics (COMSOL) tools to study, in time-dependent, DC, and frequency-dependent small-signal AC regimes, complex ion-based biophysical and electrosensing systems constituted of neurons, electrolytes, nanoelectrode sensors, actuators, and electronic readout circuits.
- Derivation of lumped-element equivalent circuit models, essential for upscaling model complexity to large networks and systems, to gain insight into all relevant figures including transfer-function, noise, and SNR.
- Share main achievements during project progress meetings and contribute to a list of technical project deliverables and scientific publications.

This research activity contextualizes in the H2020 UE research project *IN-FET* (Ionic Neuromodulation For Epilepsy Treatment), in collaboration with international partners: IBM Research GMBH (CH), University of Maastricht (NL),SISSA (IT), University of Sheffield (UK), IUNET (IT), MCS GMBH (DE).

01/02/2023 - 01/05/2023
PH.D. RESEARCH VISIT - TU Wien, Institute of Biomedical Electronics, Wien, Austria

Research visit within Professor G. Zeck's group that routinely performs electrical imaging of the retinal ganglion cells activity with active CMOS-MEA hardware. The visit is meant to: i) acquire practice with state-of-art experimental setups; ii) learn more about possible extensions of the developed COMSOL Multiphysics simulation framework and include more realistic neuron dynamics and morphology as well as readout circuits; iii) interpret and reproduce the spatiotemporal generation and propagation of neuronal signals.

2018 – 2020
MSc ELECTRONICS ENGINEERING - University of Modena and Reggio Emilia, Modena, Italy

Thesis Vertical nanowire devices for neuron activity sensing and stimulation

Final grade 110/110 cum laude

Study and optimize the design of passive and active vertical nanoelectrode devices as sensors/actuators to detect/stimulate the intracellular activity of neuron cells using TCAD (Sentaurus) and SPICE tools.

2015 – 2018
BSc BIOMEDICAL ENGINEERING - University of Bologna, Cesena, Italy

Thesis Detection of sport activities by means of inertial sensors

Final grade 110/110 cum laude

Test the accuracy of an integrated MEMS board in classifying a various range of sports activities based on the type and cadence of movements. Pose estimation during walking activity based on inertial sensor data.

2010 – 2015
HIGH SCHOOL DIPLOMA IN ELECTRONICS - Technical school "Enrico Mattei", Urbino, Italy

Thesis Remote-controlled mower

Final grade 100/100 cum laude

Development of a radio-controlled mower via PCB design and programming of MCUs.

WORK EXPERIENCE

2015 - Ongoing
STUDENT TUTORING

Tutoring of science, math, and engineering subjects aimed at high school and university students.

Summers between 2013 - 2015
CURRICULAR AND INDUSTRIAL INTERNSHIPS

Development of electrical panels for robotic/automation systems | Maintenance of computers and operating systems | Troubleshoots of electron devices.

PROFESSIONAL SKILLS

Experienced in design and simulation with COMSOL Multiphysics and Sentaurus TCAD | Knowledge of MATLAB and Simulink | Mastery of PSpice, HSpice, LTSpice | Confidence with CADENCE and LabView | Familiar with oscilloscopes and other main electronic measurement devices | Basics of PCB design and development

LANGUAGE SKILLS

ENGLISH certified IELTS with level C1.

ADDITIONAL INFORMATION

COMMUNICATION AND INTERPERSONAL SKILLS

Presenter and Tutor
Good communication skills acquired in holding conferences, presenting projects, and during my experiences of summer camps entertainer, students tutoring, guitar course volunteer- teacher, and judo co-trainer.

MANAGEMENT AND LEADERSHIP SKILLS

Coordinator of academic projects
In my team-manager roles, I successfully: i) assessed time/effort/cost/maturity level; ii) led the groups by orchestrating the tasks of individual members; iii) reported technical and management deliverables.

HOBBIES AND INTERESTS

Sports and Outdoor Activities
I love spending my free time practicing sports and physical activities, especially outdoors: if I had time, I would go mountain biking every day.

JOURNAL AND CONFERENCE PUBLICATIONS

http://personale.unimore.it/rubrica/pubblicazioni/255510

ATTENDED EVENTS

- Federation of European Neuroscience Societies (FENS) Forum Conference with a poster contribution entitled "Novel field-effect-transistor nanoelectrode probes for active intracellular electrophysiology: a simulation study", Paris, 2022.

- Neurotechnology Summer School at the Netherland Institute of Neuroscience (NIN) with a poster contribution entitled "Numerical simulation analysis of nanoelectrode devices for in-vitro neural sensing", Amsterdam, 2022.

- Società Italiana di Elettronica (SIE) conference with a poster contribution entitled "A Mixed-Mode   Simulation Framework to Investigate Neuronal Signal Transduction and Sensing at Nanoelectrodes", Pizzo Calabro (VV), 2022.