Curriculum Vitae

Simone Benatti

Personal Data

Date of birth **28/09/1974**.
Place of birth **Mirandola (MO)**.
Citizenship **Italian**.
Permanent address **Via Dante Alighieri, 15 - 41037 Mirandola (MO)**.

Short Bio

Dr. Simone Benatti received a PhD. degree in Electrical Engineering and Computer Science from the University of Bologna, in 2016 (PhD. advisor prof. Luca Benini). During his PhD., Dr. Benatti designed a complete HMI for prosthesis control, implementing a fully-functional framework for EMG gesture recognition based on an embedded real-time SVM classifier. After this project, he worked on designing and optimizing energy-efficient embedded systems for biopotential (EMG and EEG) acquisition and processing, in collaboration with the IIS lab at ETHZ, Zurich. In 2015, during a six month visiting period at BWRC - University of California, Berkeley (supervisor prof. Jan Rabaey), he designed the control module of an implantable Brain-Machine Interface for PTSD (Post Traumatic Stress Disease). He currently holds a postdoctoral position at the University of Bologna. His research interests focus on energy-efficient embedded systems for IoT and biomedical applications. This includes hardware/software codesign to efficiently address performance, as well as advanced algorithms. In this field, he has published more than 40 papers in international peer-reviewed conferences and journals, with more than 930 citations and an H-index of 17 [Google Scholar]. He has ongoing collaborations with several international research institutes, such as ETHZ, UC Berkeley, EPFL, TU Graz, FBK and Politecnico di Torino. Dr. Benatti is recipient of the GHAIA grant (H2020-MSCA-RISE-2017, G.A. 777822). Previously, from 2006 to 2012, he was employed as design and R&D engineer of electromedical devices at Lean srl, where he was involved in international industrial projects with companies such as Erydel, ST Micorelectronics, Arthrocare, Medical Vision, Livanova, Baxter et *al.*

Current Position

Nov 2021 - Today **Assistant Professor (RTD-B)** *University of Modena e Reggio Emilia*
Embedded systems for energy efficient signal processing
Simone Benatti works on developing embedded and wearable systems for edge computing, in IoT, medical IoT, and multimodal interaction for HMI design. He is actively researching methods and approaches for brain-machine interfaces used in real-time detection and analysis of neural diseases, such as Autism Spectrum Disease (ASD) and epilepsy. Particular emphasis is directed towards innovative hardware platforms and the application of edge computing on biosignals, exploring HW/FW codesign to define a benchmark computing platform for ultra low power signal processing. He is coordinating a small research group with 2 PhD. students and several master students.

Record of Employment

2021 (Mar-Oct) **Assistant professor (RTD-A)**
University of Bologna

2016 - 2021 **Postdoctoral Researcher**
University of Bologna

2019 (Jun-Sept) **Visiting Researcher**
BWRC, University of California, Berkeley
Real time framework for hand gesture recognition
As part of the GHAIA project, I worked on the design of a low power platform for EMG pattern recogntion, based on a novel NMIC and a PULP-based multicore processor.

2015 **Visiting Scholar (Advisor prof. Jan Rabaey)**
BWRC/SWARM LAB, University of California, Berkeley
Closed loop implantable neuromodulation system
As part of the SUBNETS project, I designed a digital control module for an implantable neuromodulator.

2013 - 2016 **PhD student in Electrical Engineering and Computer Science (Advisor prof. Luca Benini)**
Micrel Lab, DEI, University of Bologna
Body sensor networks for bio-medical applications and HMI
As part of a collaboration between INAIL prosthetic center and the University of Bologna, I worked on the design of the first fully-embedded and real time arm prosthetic controller based pattern recognition algorithms. On top of that, I started exploring novel approaches to design Human Machine Interfaces for biosignal edge processing.

2005 - 2012 **R&D Engineer and System Designer of electromedical devices**
Lean srl, Medolla
Embedded system design
During my work at Lean srl I was involved in the design of several medical devices, with national and international partnerships where I was responsible for system and hardware design.

Education

Jul. 2016 **PhD degree in EECS**, *University of Bologna*,
Thesis: Advanced Interfaces for HMI in Hand Gesture Recognition,
Advisor: Prof. Luca Benini.

Oct. 2005 **II level Master in mathematical models for applications**, *University of Bologna*,
Stage: Lean srl.

Oct. 2004 **Violin Diploma**, *Conservatorio di Cesena*.

Mar. 2004 **Master degree in Electrical Engineering**, *University of Bologna*,
Thesis: Technical requirements of a Dialysis filter for artificial kidney therapy,
Advisor Prof. Silvio Cavalcanti.

Research Projects and Industrial Collaborations

2020-Ongoing **PEDESITE: Personalized Detection of Epileptic Seizure in the Internet of Things (IoT) Era**

To achieve breakthrough seizure detection and forecasting, this project proposes an ambitious multi-disciplinary solution that will rely on ultra-low-energy embedded systems connected to multi-parametric sensing wearables, and a central computing platform to tune the machine learning technology and lead to optimal personalized seizure detection and forecasting algorithms. The project will use an agile and adaptive organization to optimize interaction between the data science and engineering groups enveloping these innovative IoH solutions and the clinical studies providing patients' data an testing the performance of these solutions in hospital and ambulatory environments. In the project I work on the design of a complete body area network (EEG patch, smarglasses and a mutisensor wirstband, as well as on the design of a distributed algorithm for multisensor epilepsy detection.)

2019-Ongoing **NeuroSoNew: Early autism detection on newborns with automated EEG analysis**

As part of a collaboration between the University of Bologna, the FBK (Fondazione Bruno Kessler) and the University of Trento, we are working on the design of a wearable low-cost device for EEG analysis to target early autism detection on newborns and children, targeting all the design levels, from analog acquisition and sensors design to the algorithm development. In this project I have the scientific responsibility for the University of Bologna, where I am developing a wearable fully standalone EEG acquisition system and a CCA based algorithm to monitor neural correlates on the newborns.

2019-Ongoing **GHAIA-Geometric and Harmonic Analysis with Interdisciplinary Applications**

GHAIA will promote excellence in pure and applied mathematical research. European researchers from Italy, Spain and France will have the extraordinary opportunity to visit to the worldwide leading Universities in US and Taipei as well as to receive some of the best researchers from South America. In this way the project will be able to contribute to some paramount challenges, such as data analysis, models of brain functionality, human and artificial vision. As part of the GHAIA project I am spending several months at UC Berkeley, doing research on novel embedded platforms for edge-computing.

2016-Ongoing **Design of efficient digital architecture for ultra low power devices**

As part of the collaboration between the University of Bologna and ETHZ, (and, from 2019, also with TU Graz) we are working on the multilevel approach in the definition and design of ultra low power digital architectures for biomedical wearable/ implantable applications, exploring systems, algorithms and tradeoffs in the design of such systems. I am also exploring the design of low power high-density EMG/EEG systems and the integration of EMG systems with ultrasounds, to have a better mapping of motoneuronal activity on the muscular response.

2018-2019 **Energy efficient IoT node for Industrial monitoring (Industrial collaboration)**

As part of a project that involved GD group and the University of Bologna, I'm working on the design of an ultra-low power IoT node for industrial monitoring. The goal of the project is to have a WSN based on LoRa nodes which can be used to monitor industrial assembly machine, by providing sensor data and information for self-awarness of the devices.

2015-2018 **SONIC**

Systems On Nanoscale Information fabriCs (SONIC) is a multi-University research project focusing on the design of robust, energy efficient, and intelligent computing platforms using emerging nanoscale devices, which are inspired by the information processing principles found in biological and communication scenarios. In this project, I have collaborated with UC Berkeley in the analysis and implementation of HDC (Hyper Dimensional Computing), a novel pattern recognition algorithm.

2015-2016 **SUBNETS**
The Systems-Based Neurotechnology for Emerging Therapies (SUBNETS) program was created in response to the need of cope with the effects of neuropsychological illness brought on by war, traumatic injuries, and other experiences. Current approaches—surgery, medications, and psychotherapy—can often help to alleviate the worst effects of illnesses such as major depression and post-traumatic stress, but they are imprecise and not universally effective SUBNETS is part of a broader portfolio of programs within DARPA that support President Obama's brain initiative for intractable neuropsychological illness. As part of this project during my PhD internship, I worked on digital system design for an implantable control module and on efficient low power algorithms for feature extraction in epilepsy detection applications.

2013-2015 **Design of an embedded prosthetic hand controller based on EMG pattern recognition**
As part of a 2 years project that involved the INAIL prosthetic center and the University of Bologna, I worked on the design and development of a embedded system for the control of a poliarticulated prosthetic hand. The goal of the project is to overcome the SoA approach in the prosthetic hand control. In fact the controllers of commercial prostheses are based on counter intuitive encoded sequences of muscular contraction and do not restore an intuitive control of the artificial limb. The challenge of this project was the the study and the implementation of pattern recognition algorithms on low power embedded microcontrollers, to obtain a real time classification (< 300ms) of the EMG activation pattern acquired during a muscular contraction, restoring an intuitive control of the artificial hand. After the collection of 2 benchmark datasets on healthy subjects and upper limb amputees, we tuned and implemented a SVM algorithm on a commercial microcontroller and we developed also the control strategy and the hand driver of the prosthesis to restore the natural control of the artificial hand.

Industrial R&D Projects

2012 **Drug Compounder**
The project aimed the design of a microcompunder system for drug mixing and compounding. The system is intended for hospital deployment and was commissioned by BBRAUN Avitum. In this project I designed the system architecture and the electronic boards (schematics and PCB) of the μCompounder system.

2011-2012 **System for pH and NH measurement in gastric juice during gastroscopy**
In the project commissioned from NiSo Biomed, we developed HW and FW of a medical device for gastric juice screening. I designed the mixed signal control board (Class 2 BF) that acquire the analog pH and NH signals and control the actuators. One major challenge is that the system is body invasive (gastroscopy) and requires careful electronic design of the insulation circuitry.

2009-2010 **System for RBC drug loading**
I designed the system architecture, and the electronic boards of a machine for a patented treatment in which a drug is delivered directly in the RBC(red blood cells). The electronic part of the system is composed by 3 boards connected via a CAN bus. This solution allows an intrinsically safe and simple communication protocol for a modular device. I designed the whole system composed by the control electronic for DC and stepper motor actuation, the sensing circuitry and the communication interfaces.

2006-2008 **PCR system based on a LAB-ON chip.**
For STM we developed a prototype of the PCR (Polymerase Chain Reaction) controller based on the ST Lab-On-Chip. In this project I worked on the control algorithm for the thermal management of the heating-cooling cycles (PID) and on the board debug.

2006-2008 **System for control of pressure and flow of saline solution during arthroscopic surgery.**
I started to work on this project, commissioned by Medical Vision and Arthrocare Corporation, during my master's internship studying the fluidodinamical model of a intra-corporeal cavity and developing an algorithm to measure the internal pressure of the cavity indirectly, without *in-loco* sensor placement. I continued working as part of the R&D team in the followings 2 years designing the sensor electronics, working on the CAN bus communication FW and on the system bootloader. I also worked on the design of a patented system on closed loop control of pressure-flow based on the optical recognition of hemoglobin vs bone-debris via IR-UV sensors.

Research Interests

My research interests are related to embedded systems for IoT applications, wearable electronics and biosignal edge-computing for low power devices, with particular emphasis on HMI applications. I am interested in embedded pattern recognition, human-centric closed-loop systems, and algorithm optimization tailored to real-time resource-constrained systems, ranging from commercial microcontrollers to novel low power multicore platforms, such as the PULP platform. I am interested in exploring solutions to optimize the sensor interfaces and applying machine learning and deep learning techniques on PPG, EMG, EEG, and ECoG signals to cope with the biosignals' high variability. All these activities are finalized to the design optimization for low power digital processing in medical applications and, more generally, for developing embedded wearable systems in a reduced form factor at extreme energy efficiency. The activities carried out during the last years span over the following research lines.

Pattern Recognition Based Controls for HMIs
This research started in 2013, focuses on the design of a natural control framework for a prosthesis. On top of this project, I started exploring the use of Machine Learning algorithms to enable next-generation interfaces for biosignal processing. Machine learning, and more recently, deep learning, can tackle biosignal processing's fundamental challenges, related to the high variability of the signal and to several subject-dependent features.
A major advantage of the deep learning approach consists of removing manually-extracted signal features since a deep network automatically learns a good representation of the signal during the training step. As a result, it will be possible to generalize over the high variability of the biopotentials to design novel computational frameworks for advanced Human Machine Interfaces. In this field, I am actively working on embedded solutions for HMI, ranging from epilepsy and autism detection to prosthesis control. Exploring how to process the neural signals to obtain information with a low computational effort, I am interested in strategies to execute PCA, CNN, TCN and other algorithms on embedded low power platforms.

Low Cost ExG Sensor Interface
High-quality signal acquisition is crucial in the design of reliable wearable systems. Typically, medical-grade ExG sensors are based on high-performance analog circuitry for signal amplification and filtering. As a result, embedded design suffers from higher costs and lower system scalability. My research in this field focuses on exploring novel sensor interfaces and on combining heterogeneous signals to improve the system performance. By combining feature extraction and filtering with pattern recognition strategies, I am exploring techniques to enable automated processing and limit human intervention, especially in "time-critical" scenarios. These solutions could be used in applications where a minimally intrusive interface is required, such as smart patches, in-ear plug, consumer BMI or implantable devices.

Applications on Low power Digital Architecture for IoT Applications
Finally, I am trying to draw knowledge and inspiration from my previous research interests to understand how to implement the solutions mentioned above on energy-efficient embedded systems. The limited computational power and the reduced memory footprint hamper the deployment of computationally intensive tasks on conventional microcontrollers, hence I am exploring how to adapt and optimize algorithms on resource-constrained platforms, searching for the most efficient architectural approach and for an effective HW/SW codesign.

Grants

2020 Marie Curie Action travel grant for visiting research period (3 months) : 2020-MSCA-RISE-2017,G.A. 777822

2019 Marie Curie Action travel grant for visiting research period (3 months) : 2020-MSCA-RISE-2017,G.A. 777822

Awards

2014 Best paper award in BioCAS conference [3]

2014 Best paper award candidate in BIOSIGNALS conference

2015 Best paper award candidate in BIOSIGNALS conference

Abilitations

ING-INF01 Abilitazione Scientifica Nazionale alle funzioni di Professore Universitario di seconda fascia, settore concorsuale 09/E3- ELETTRONICA (2020-2029)

ING-INF05 Abilitazione Scientifica Nazionale alle funzioni di Professore Universitario di seconda fascia, settore concorsuale: 09/H1- SISTEMI DI ELABORAZIONE DELLE INFORMAZIONI (2021-2030)

Other professional activities

Editorial Boards

2020 Guest editor for the IEEE Transactions on Computers : Special Issue of Smart Edge Computing and IoT

2020 Editorial Board of Wearable Electronics (specialty section of Frontiers in Electronics)

Technical Program Committes

2020 TPC member of Design, Automation and Test in Europe (DATE) conference, track A-Sustainable Computing

2018 TPC member of IEEE International Conference on E-health Networking, Application and Services (Healthcom) 2018

Reviewer for international Conference and Journal

Reviewer for:

- Design, Automation and Test in Europe (DATE) conference
- Human activity sensing corpus and its applications (HASCA) Workshop (hosted by Ubicomp-ISWC)
- IEEE International Conference on Biomedical Circuits and Systems (BioCAS)
- IEEE Transactions of Biomedical Ciruits and Systems (TBCAS)
- IEEE Sensors Conference
- MDPI Applied Science Journal

Invited Talks

2020 Invited speaker: Department of Electronic Systems, School of Engineering, Newcastle University, Newcastle 20/6/2020. Title: "Energy efficient edge acquisition and processing for biosignals"

2019 Invited speaker: 2nd International Congress on Mobile Devices and Seizure Detection in Epilepsy- Lausanne 6/9/2019. Title: "Novel technologies for chronic EEG recordings"

Teaching Activities

Bachelor and Master Courses

2020 **Professore a Contratto** for the course of *ELETTRONICA I e LABORATORIO (80h)* University of Modena e Reggio Emilia

2015-2020 **Tutor Didattico (teaching assistant)** for the course of *ARCHITETTURE E PROGRAMMAZIONE DEI SISTEMI ELETTRONICI T-A (30h)* University of Bologna

PhD Courses

2019 **Lecturer for the PhD Course** of *EMBEDDED SYSTEM DESIGN FOR WEARABLE APPLICATIONS (20h)* University of Trento

Seminars

2016-2017 **Seminary lessons** of *Hardware-Software Design of Embedded Systems*

Students' Supervision

PhD students co-advising

2019 **Alessio Burrello (University of Bologna)**
Machine Learning and Deep Learning for Embedded Systems

2019 **Marcello Zanghieri (University of Bologna)**
Deep Learning approaches for Temporal Signal Analysis in embedded applications

2019 **Velu Kumaravel (University of Trento)**
Embedded systems design for investigating the neural substrates of core perceptual and cognitive functions in infants

2017 **Mattia Salvaro (University of Bologna)**
A fully-wearable non-invasive SSVEP-based BCI system enabled by AR techniques for daily use in real environment

2016 **Fabio Montagna (uiniversity of Bologna)**
Energy-efficient parallel architectures for ultra-low power biosignal processing

2016 **Victor Javier Kartsch Morinigo (University of Bologna)**
Embedded Body Area Network for Advanced Human Machine Interaction

Master students

2019 **Marcello Zanghieri**
CNN based analysis for EMG gesture recongition on embedded systems

2018 **Velu Kumaravel**
Real time Embedded System for Analysis of a Galvanic Skin Response

2016 **Fabio Montagna**
Scalability of Neuromodulation Algorithms for Ultra Low Power Brain Machine Interfaces

2016 **Victor Javier Kartsch Morinigo**
Online Alpha Wave detector: an Embedded hardware-software implementation

2015 **Alberto Girolami**
Embedded implementation and characterization of a pattern recognition system for an hand gesture based controller

2015 **Marco Tomasini**
Design and implementation of a wearable device for acquisition and processing of biomedical signals

2014 **Matteo Rossi**
Analysis of the CANBUS applied to prosthetic systems

Relevant Technical Skills

- Very good knowledge of C language and of embedded microcontroller systems and tools.
- Very Good knowledge of architectural level design of medical devices.
- Very Good experience in mixed signal electronic design (schematics and PCB) with CAD design tools (Mentor PADS and Altium Designer)
- Good experience with Matlab for offline data analysis, signal processing and machine learning algorithms.
- Very Good electronic lab experience (oscilloscope, tester, soldering, PCB debug, etc).
- Wide experience with sensors and actuators (DC and Stepper motors, quad encoders, current sensing, analog sensors for biosignal monitoring, H-bridge conditioning circuitry, etc).
- Basic knowledge of Python language.
- Basic experience in digital design with Verilog/SystemVerilog and Modelsim.

Publications

Journal Papers

[1] **A Versatile Embedded Platform for EMG Acquisition and Gesture Recognition** *Benatti S.,Casamassima F., Milosevic B.,Farella E., Schönle P., Fateh S., Burger T., Huang Q., Benini L.* , in IEEE Transactions on Biomedical Circuits and Systems, vol. 9, no. 5, pp. 620-630, Oct. 2015 (> **130 Citations**)

[2] **Power Line Interference Removal for High-Quality Continuous Biosignal Monitoring With Low-Power Wearable Devices** *Tomasini M., Benatti S., Milosevic B., Farella E. and L. Benini* , in IEEE Sensors Journal, vol. 16, no. 10, pp. 3887-3895, May15, 2016 (> **50 Citations**)

[3] **A Prosthetic Hand Embedded controller Based on Soft Computing Pattern Recognition Control Strategies** *Benatti.S, Milosevic B.,Farella E., Benini L.* , in MDPI Sensors,2017 (> **40 Citations**)

[4] **A sEMG Based Human-Robot Interface for Robotic Hands based on Machine learning and Synergies** *Meattini R., Benatti S., Scarcia U., De Gregorio D., L. Benini, Melchiorri C.* , in IEEE Transactions on Components, Packaging and Manufacturing Technology, 2018

[5] **A Machine Learning Approach for Automated Wide-Range Frequency TaggingAnalysis in Embedded Neuromonitoring Systems** *Montagna F.,Buiatti M., Benatti S., Rossi D., Farella E., Benini L.* , in Methods Journal, Elsevier, 2017

[6] **A Sensor Fusion Approach for Drowsiness Detection in Wearable Ultra Low Power Systems** *Katsch V., Benatti S., Schiavone D., Rossi D., and Benini L.* , in SI in advanced Multisensor Fusion for Body Area Network, Information Fusion, Elsevier, 2017

[7] **Flexible, Scalable and Energy Efficient Bio-Signals Processing on the PULP Platform: A Case Study on Seizure Detection** *Montagna F., Benatti S., Rossi D.,* in Journal of Low Power Electronics and Applications (JLPEA) 7 (2), 2016

[8] **A Minimally Invasive Low-Power Platform for Real-Time Brain Computer Interaction based on Canonical Correlation Analysis** *Salvaro M. Benatti S Guermandi M. and Benini L.,* in IEEE Journal for Internet of Things (JIOT),2018

[9] **Online Learning and Classification of EMG-Based Gestures on a Parallel Ultra-Low Power Platform using Hyperdimensional Computing** *Benatti S., Montagna M., Kartsch V., Rahimi A., Rossi D. and Benini L.,* in IEEE Transactions on Biomedical Circuits and Systems, 2019

[10] **BioWolf: A Sub-10-mW 8-Channel Advanced Brain–Computer Interface Platform With a Nine-Core Processor and BLE Connectivity** *Kartsch V., Tagliavini G., Guermandi M. ; Benatti S., Rossi D., Benini L.* in IEEE Transactions on Biomedical Circuits and Systems,2019

[11] **Robust Real-Time Embedded EMG Recognition Framework Using Temporal Convolutional Networks on a Multicore IoT Processor** *Zanghieri M, Benatti S. Burrello A., Kartsch V. ,Conti F., Benini L.* in IEEE Transactions on Biomedical Circuits and Systems, 2019

[12] **An Ensemble of Hyperdimensional Classifiers: Hardware-Friendly Short-Latency Seizure Detection with Automatic iEEG Electrode Selection.** *Burrello, A.; Benatti, S.; Schindler, K.; Benini, L.; Rahimi, A.* in IEEE JOURNAL OF BIOMEDICAL AND HEALTH INFORMATICS - ISSN:2168-2194, Year: 2020

[13] **Scalable and energy efficient seizure detection based on direct use of compressively-sensed EEG data on an ultra low power multi-core Architecture** *Aghazadeh R.; Frounchi J.; Montagna F.; Benatti S.* in COMPUTERS IN BIOLOGY AND MEDICINE - ISSN:0010-4825 vol. 125 Year 2020

[14] **Modular Design and Optimization of Biomedical Applications for UltraLow Power Heterogeneous Platforms.** *De Giovanni, E.; Montagna, F.; Denkinger, B.; Machetti, S.; Peon-Quiros, M.; Benatti S.; Rossi, D.; Benini, L.; Atienza, D.* in IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS, 2020

[15] **Embedded Streaming Principal Components Analysis for Network Load Reduction in Structural Health Monitoring.** *Burrello, Al.; Marchioni, A.; Brunelli, D.; Benatti, S.; Mangia, M.; Benini, L. in IEEE Internet of Things Journal(JIOT), 2020*

[16] **A Wearable Biosensing System with In-Sensor Adaptive Machine Learning for Hand Gesture Recognition** *Zhou A. Moin A. Rahimi A., Menon A. , Benatti S. , Alexandrov G. , Tamakloe S. , Ting J. , Yamamoto N. , Khan Y., Burghardt F., Benini L. , Arias A. , Rabaey J. NATURE ELECTRONICS, Volume 4, pages 54–63 (2021)*

[17] **Efficient Transform Algorithms for Parallel Ultra-Low-Power IoT End Nodes** *Benedetta Mazzoni, Simone Benatti, Luca Benini, Giuseppe Tagliavini. NIEEE Embedded Systems Letters (10/3/2021)*

Conference Papers

[1] **Analysis of Robust Implementation of an EMG Pattern Recognition Based Control** *Benatti S., Farella E., Gruppioni E. and Benini L.* in: International Conference on Bio-inspired Systems and Signal Processing 2014 (BIOSIGNALS 2014), INSTICC, Angers, France, pages 45-54, ScitePress, 2014.

[2] **Towards EMG Control Interface for Smart Garments** *Benatti S., Farella E. and Benini L.* n Proceedings of the 2014 ACM International Symposium on Wearable Computers: Adjunct Program, Seattle,2014, Pages 163-170, ACM, 2014.

[3] **EMG-Based Hand Gesture Recognition with Flexible Analog Front End** *Benatti S., Milosevic B., F.Casamassima F., Schönle P., Bunjaku P. , Fateh S., Huang Q., Benini L.* , in proceedings of the 2014 IEEE Biomedical Circuits and Systems Conference (BioCAS), Lausanne 2014, pages 57-61, IEEE 2014.

[4] **Multiple biopotentials acquisition system for wearable applications** *Benatti S., Milosevic B.,Tomasini M.,Farella E., Schönle P., Bunjaku P. ,Roveri G., Fateh S., Huang Q., Benini L.* , Biostec 2015

[5] **Hybrid EMG classifier based on HMM and SVM for hand gesture recognition in prosthetics** *Rossi M., Benatti S., Farella E.and Benini L.* in: IIEEE International Conference on Industrial Technology (ICIT), Seville, 2015, pp. 1700-1705. (> **60 Citations**)

[6] **Digitally controlled feedback for DC offset cancellation in a wearable multichannel EMG platform** *Tomasini M., Benatti S., Casamassima F., Milosevic B., Fateh S., Farella E.and Benini L.* , in proceedings of the 2014 IEEE Biomedical Circuits and Systems Conference (BioCAS), Lausanne 2014, pages 57-61, IEEE 2014.

[7] **Experimental evaluation of a sEMG-based human-robot interface for human-like grasping tasks** *Meattini R., Benatti S., Scarcia U., Benini L., Melchiorri C.* in 2015 IEEE International Conference on Robotics and Biomimetics (ROBIO), Zhuhai, 2015, pp. 1030-1035.

[8] **Hyperdimensional biosignal processing: A case study for EMG-based hand gesture recognition** *Rahimi A., Benatti S., Kanerva P., Benini L., Rabaey JM* in2016 IEEE International Conference on Rebooting Computing (ICRC), San Diego, CA, 2016, pp. 1-8. (> **70 Citations**)

[9] **A contactless three-phase autonomous power meter** *Villani C, Benatti S., Brunelli D., Benini L.* , in IEEE SENSORS, Orlando, FL, USA, 2016, pp. 1-3.

[10] **Sampling Modulation: an Energy Efficient Novel Feature Extraction for Biosignal processing** *Causo M., Benatti S., Frappe A., Cathelin A., Farella E., Kaiser A., Benini L., Rabaey JM.* , in proceedings of the 2016 IEEE Biomedical Circuits and Systems Conference (BioCAS), Shanghai 2016

[11] **Scalable EEG Seizure Detection on an Ultra Low Power Multi-Core Architecture** *Benatti S., Montagna F., Rossi D., Benini L.* , in proceedings of the 2016 IEEE Biomedical Circuits and Systems Conference (BioCAS), Shanghai 2016

[12] **Design Challenges for Wearable EMG Applications** *Milosevic B., Benatti S., Farella E.* , in proceedings of the 2017 IEEE Design, Automation & Test in Europe Conference & Exhibition (DATE)

[13] **A wearable EEG-based Drowsiness Detection System with Blink Duration and Alpha Waves Analysis** *Kartsch V., Benatti S., Rossi D., Benini L.* , in proceedings of the 2017 IEEE EMBC

[14] **A sub-10mW real-time implementation for EMG hand gesture recognition based on a multi-core biomedical SoC.** *Benatti S., Rovere G., Bosser J., Montagna F., Farella E., Glaser F., Schonle P., Burger T. Fateh S., Huang Q., Benini L.* in proceedings of the 7th IEEE International Workshop on Advances in Sensors and Interfaces (IWASI), 2017

[15] **Towards a novel HMI paradigm based on mixed EEG and indoor localization platforms.** *Salvaro M., Kartsch V., Benatti S., Milano M., Benini L.* in proceedings of the 1st IEEE New Generation of Circuits and Systems Conference (NGCAS), Genova, Italy. September 7-9, 2017

[16] **PULP-HD: Accelerating Brain-Inspired High-Dimensional Computing on a Parallel Ultra-Low Power Platform.** *Montagna F., Rahimi A., Benatti S., Rossi D., Benini L.* in proceedings of the Design Automation Conference (DAC),2018

[17] **An EMG Gesture Recognition System with Flexible High-Density Sensors and Brain-Inspired High-Dimensional Classifier.** *Moin A., Zhou A., Rahimi A.m Benatti S., Menon A., Tamakloe S., Ting J. Yamamoto N., Khan. Y., Burghardt F., Benini L., Arias A. and Rabaey J.* in proceedings of IEEE International Symposium on Circuits and Systems (ISCAS), 2018

[18] **Smart Wearable Wristband for EMG based GestureRecognition Powered by Solar Energy Harvester** *Kartsch V., Benatti S., Mancini M., Magno M. and Benini L.* in proceedings of IEEE International Symposium on Circuits and Systems (ISCAS), 2018

[19] **Exploring Arm Posture and Temporal Variability in Myoelectric Hand Gesture Recognition** *Milosevic B., Benatti S.and Farella E..* in The 7th IEEE RAS/EMBS International Conference on Biomedical Robotics and Biomechatronics, BioRob. 26-29 August 2018,Enschede, NL

[20] **Compressed Sensing Based Seizure Detection for an Ultra Low Power Multi-core Architecture** *Aghazadeh R., Montagna F., Benatti S., Frounchi J., Rossi D.*, in proceedings of International Conference on High Performance Computing and Simulation (HPCS), 2018

[21] **A Wearable Device for Minimally-Invasive Behind-the-Ear EEG and Evoked Potentials** *Guermandi M., Benatti S., Kartsch V., Benini L.* in in proceedings of the 2018 IEEE Biomedical Circuits and Systems Conference (BioCAS), Cleveland, Ohio. 17-19 October 2018.

[22] **A PULP-based Parallel Power Controller for Future Exascale Systems** *Andrea Bartolini, Davide Rossi, Antonio Mastrandrea, Christian Conficoni, Simone Benatti, Andrea Tilli, Luca Benini*, 26th IEEE International Conference on Electronics, Circuits and Systems (ICECS),2019

[23] **A Cost-Effective Embedded Platform for Scalable Multichannel Biopotential Acquisition** *Benatti S., Guermandi M., Benini L.* in Bodynets, 2018

[24] **A Wearable device for Brain Machine Interaction with Augmented Reality Head-Mounted Display** *Salvaro M., Benatti S. Kartsch V., Guermandi M. Benini L.*, in Bodynets, 2018

[25] **Ultra Low-Power Drowsiness Detection System with BioWolf** *Kartsch V., Benatti S, Guermandi M., Montagna F., Benini L.*, in IEEE Neural Rehabilitation Conference (NER), 2019

[26] **An Energy-Efficient IoT node for HMI applications based on an ultra-low power Multicore Processor** *Kartsch V., Guermandi M., Benatti S, Montagna F.,Benini L.*, in IEEE Sensors Applications Symposium, SAS 2019

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Languages

Italian Native

English Fluent

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