CV OF PhD. MICHELE MAGNO

[redacted]

E-MAILS: [redacted]

CURRENT POSITIONS: HEAD OF THE TEACHING CENTER AT ETH ZURICH, DEPARTMENT OF ELECTRICAL ENGINEERING AND INFORMATION TECHNOLOGY (ITET)
SENIOR RESEARCHER AND LECTURER.

PERSONAL INFORMATION

- Date of birth: December 9th, 1976
- Citizenship: Italian
- Marital Status: married

Languages

- Italian Mother Tongue
- English: Fluent in writing and speaking
- Other languages: German (A1) Spanish (A1), and French (A2).

Degrees and Academic certification

(Certificate can be sent on request)

- 2004: Master degree at the Excellence center "Advanced Research Center on Electronic Systems" ARCES, University of Bologna (Italy). Thesis title: "Monitoring of mobile terminals in a wireless network with the SNMP" under the supervision of Prof. Tullio Salmon Cinotti.
- 2010: PhD degree in Electrical Engineering at University of Bologna (Italy) under the supervision of Prof. Luca Benini. Dissertation title: *"Reconfigurable low-power systems for distributed monitoring."*
- 2017: Associate professorship Scientific Qualification obtained For Electronic Engineering from Ministry of Education, Universities and Research, Italy
- 2018: Associate professorship Scientific Qualification received For Computer Science from Ministry of Education, Universities and Research, Italy
- 2019: Full professorship Scientific Qualification received For Electronic Engineering from Ministry of Education, Universities and Research, Italy

PROFESSIONAL EXPERIENCES

Academic Positions

- Since January 2020: Head of the Teaching Center for Project-based learning at ETH Zurich Switzerland, Dept. of Information Technology and Electrical Engineering,
- January 2020--currently. Visiting Full professor at Mid Universisity Sweden.
- 2017-Currently: Senior researcher and lecturer at ETH Zurich Switzerland, Dept. of Information Technology and Electrical Engineering
- January 2019-December 2019. Visiting researcher at Mid Universisity Sweden.
- 2013-2017: post-doctoral researcher at ETH Zurich Switzerland, Dept. of Information Technology and Electrical Engineering, Integrated Systems Laboratory (Prof. Luca Benini)
- 2012-currently: technical support consultant at University of Bologna, Italy, Department of Electrical, Electronic and Information Engineering (DEI) – Microelectronic group (Prof. Luca Benini)
- Nov. 2014-April 2015: visiting researcher at Sophia Antipolis University of Nice, France, Laboratoire d'Electronique, Antennas et Télécommunications (LEAT). (Prof. Alain Pegatoquet)
- May 2012- October 2013: post-doctoral researcher at Tyndall and College Cork, Ireland, School of Engineering, Embedded systems group (Emanuel Popovici/Brendan O'Flynn).
- May 2011- August 2011: visiting academic guest at Tyndall Institute Cork, Ireland, Wireless Sensor Networks group (Brendan O'Flynn).
- May 2010-May 2012: post-doctoral researcher University of Bologna, Italy, Department of Electrical, Electronic and Information Engineering

(DEI) – Microelectronic group (Prof. Luca Benini)

- December 2005 –May 2010. Research Fellow and PhD student University of Bologna, Italy, Department of Electrical, Electronic and Information Engineering (DEI) – Microelectronic group (Prof. Luca Benini)

Teaching experience

Sept 2021-currently: Lecturer of "Embedded systems" (227-0124-00L) at Dept. of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.

- Sept 2018-currently: Lecturer of "Machine Learning on Microcontroller" (227-0155-00L) at Dept. of Information Technology and Electrical Engineering, ETH Zurich, Switzerland.
- Jan 2022-currenctl as head of the D-ITET center PBL and main supervisor: Supervision of over 200 students involved in their bachloer thesis or master thesis.
- Sept 2020-currently Lecturer of Projects and Seminars (P&S) course "Smart Patched" 227-0085-49L at ETH Zurich, Dept. of Information Technology and Electrical Engineering.
- Sept. 2015- currently: Lecturer of Projects and Seminars (P&S) course "Microcontrollers for sensors and internet of things" at ETH Zurich, Dept. of Information Technology and Electrical Engineering..
- Nov 2013-2028: technical support and tutor for bachelor, master and Ph.D. students in *Digital circuits and systems* at the Department of Information Technology and Electrical Engineer at ETH Zurich. Average of 3 master thesis and seven-semester projects per year.
- February 2006 – 2013: Lecturer in the course "Hardware-Software Design Methodologies" at University of Bologna, Department of Electrical, Electronic and Information Engineering (DEI).
- February 2006 – 2013: Technical support and tutoring for bachelor, master, and Ph.D. at University of Bologna, Department of Electrical, Electronic and Information Engineering (DEI), with an average of a couple of master's and bachelor's thesis per year.
- February 2016: instructor at Master in City sciences at Universidad Politecnica de Madrid. Lecture in " Energy for Smart Cities" (Organizer Prof. Oscar Garcia)
- May 2012 - October 2013: teaching assistant for the course of Embedded systems and tutor for master, bachelor and Ph.D. students at University College Cork, School of Engineering.
- September 2010 - June 2011. Lab assistant in *Embedded System Co-Design* at the University of Trento, Department of Industrial Engineering (prof. Davide Brunelli).

Industrial experience

- Current solid collaboration with the top technology companies such as STMicroelectornics, Analog Devices, IBM Research Zurich, Texas Instruments, TDK, Infineon, and application companies as Hilti, Honeywell among many others.
- Since 2021 and currently. Member of the STMircoelectonics Council as an academic expert on smart sensors with tiny machine learning and embedded systems. https://www.st.com/
- 2018-2021: Scientific Advisor at Mithras an ETH Zurich Spinoff for self-sustaining wearable and medical devices. https://mithras.tech/
- 2012- 2018: Technical consultant for Verde LED, Cork, Ireland. The main

project is on a smart light wireless control system (www.verdeled.com)

- From 2016 – 2017: consultant for Medicon Ingegneria, Bologna, Italy Main project wireless monitor system for logistic applications (http://www.mediconingegneria.it/)
- November 2013-currently: an academic member of the Texas Instruments University Program. (Contact Person Nuria Llin)
- November 2016-currently: technical advisor for SHelmet (http://www.shelmet.it/). A spin-off of the University of Bologna. (Will be officially launched at the end of 2017)
- May 2011-August 2011: Visiting researcher at Tyndall Institute, Ireland, Wireless Sensor Network Group (Dr. Brendan O'Flynn)
- April 2005-December 2005: Student grant on "FPGA for supercomputer" at Cineca, Supercomputer center in Bologna.
- February 2004-March 2005. Software engineer to CMP spa. In Bologna
- January 2006-December 2016: Worked in collaboration with many companies during in European projects and university partnerships, among others STMicroelectronics, NXP, Texas Instruments.

Project Leadership and Management experience

- **Main Recent Swiss Funded Projects**
  - May 2020-April 2023: Principal Investigator of **AeroSense: a novel MEMS-based surface pressure and acoustic IoT measurement system for wind turbines.** An SNF-Bridge project 4082-0_187087.
  - April 2015- March 2018: principal investigator of **ER-SEE**. An international project with University Zagreb and the University of Skopje founded by SNF on energy efficient wireless sensors network.
  - April 2014–April 2023: Principal Scentist of **Brainsee**. Founded by Armasuisse on the topic embedded brain-inspired algorithm for long-range video surveillance.
  - September 2018 – August 2022: Principal Scientist of **A compact low-power measurement system for a complete parameter of interest reconstruction in rockfall experiments.** Collaborative project with the Institute for Snow and Avalanche Research SLF.
- **Main international projects**
  - Jan 2022-December 2025 Principal Investigator of the ERA-NET + EJP CHIST-ERA (20CH21_203783) **Towards ecologically valid symbiosis of BCI and head-mounted VR displays: focus on collaborative post-stroke neurorehabilitation**
  - April 2020-March 2024 Principal investigator of the ERA-NET + EJP CHIST-ERA (20CH21_186991) **Analog PROcessing of bioinspired VIsion Sensors for 3D reconstruction**
  - January 2019 – December 2021 Principal Investigator of **Zero-power sensing for underwater monitoring**. A Naval Research Global project (ONRG NICOP - N62909-19-1-2018 U.S. Office).
  - *April 2010-April2013:* technical leader in **GENESI** (Green sEnsor NEtworks for Structural monitoring) project (http://genesi.dl.uniroma1.it/), Funded under EU SEVENTH FRAMEWORKPROGRAMME
  - Jan 2013-Dec.2013: technical contributor in "From **WSN**

Testbeds to CPS Testbeds an **EIT-ICT Labs"** project.

- April 2010 to March 2013: technical leader in **END - Models, Solutions, Methods and Tools for Energy-Aware Design** an Eniac JU project. http://www.eniac-end.org/
- March 2010-March 2013: technical contributor in **CHIRON** (Integrated Healthcare Approach For Home, Mobile And Clinical Environmental) an Artemis Sub-program ASP2 project.
- Jan.2009-March 2011: technical leader in **SCALOPES** (SCalable LOw Power Embedded platformS) project (http://www.scalopes.eu/), Funded under ARTEMIS (Advanced Research & Technology for EMbedded Intelligence and Systems) sub-programme. Duration: 2 years;
- June 2013–August 2013: technical contributor **iBAN-MED**. Irish National project on Intelligent Body Area network Medical Applications
- *Jan 07 – Dec 09*: technical contributor for DEIS in **PRIN** National project on *Low-power wireless video sensors: hardware-software platform design.* Founded under Italian government.
- *Dec 05 – Dec 06*: technical Contributor for DEIS in the **SUMMIT** project (Servizi Ubiquitari MultiMediali per l'Innovazione tecnologica e Telematica) Ubiquitous Multimedia Services for Innovation Technology and Telemetric, co-funded by Regione Emilia Romagna, Italy.

Activities in IEEE/ACM Professional societies

- Senior Member IEEE since 2016
- Member of Association for Computing Machinery ACM since 2017.
- Special Session Chair of Elsiver Sustainable Computing: Informatics and Systems Jouurnal (IF = 4.03)
- Associate Editor IEEE ACCESS; Guest Editor IEEE Sensors Journal.
- Reviewer for many IEEE and ACM Jorunal, among Others IIE Transaction IEEE Industrial Informatic, IEEE Transaction Industrial Electronic, IEEE Intenet of Things Jorunal.
- Program Committee Member and/or Chiar in many international conferences and symposia (ACM/IEEE DATE, IEEE SAS, IEEE IWASI, and IEEE WiMob, among many others)

SCIENTIFIC AND TECHNICAL PROFILE

Main Achievements:

- **Design of low power digital systems and Wireless Sensor Network.** I worked extensively on the design of low power embedded systems and wireless sensors networks. I developed original hardware(analog-digital) and software co-designed systems for machinery monitoring, structural health monitoring, home, and office automation, body sensor networks application, wearable devices, honey bee monitoring and for other application domains. In this area technology transfer has been achieved by companies, in particular, Verde Led in Cork, Ireland, and Medicom is Bologna, Italy. Low Power Sensor node designed in ETH are used in active collaboration with WSL Institute for Snow and Avalanche Research SLF.

- **Environmentally powered distributed sensing systems.** In this topic, I investigated and developed high-efficiency energy-harvesting solutions in various application domains from E-health to building energy efficiency. This work has produced several high-level publications (more than 20) and industrial prototypes. I was involved with several industrial (i.e. STMicroelectronics, Bombardier Zurich) and university partners in EU funded projects. I am currently leading a project targeting the design of visual+auditory smartwatch powered entirely by energy harvesting and a smart helmet. These projects have been challenging at the Texas Instruments innovation contest achieved the TOP 4 (Nov 2015) and first place (Nov. 2016).
- **Embedded video surveillance and indoor monitoring.** The main goal of my work in this area was to monitor indoor areas with embedded low power devices. Different novel solutions have been designed and developed, for example, one of first academic ultra-low power smart cameras developed that could detect people with onboard classifier (published work has been referenced 40 times) and abandoned/removed object. I was also active in the area of indoor localization with inertial sensors and Bluetooth communication.
- **Ultra-low power wake-up the radio.** I designed and developed a nano-watt wake up radio receiver for reducing the overall power consumption of wireless communication. I pioneered exploiting an ultra-low power solution, which can run part of the main radio protocol autonomously to reduce the overall power consumption further. Many of these techniques and devices are currently used from several Universities in Europe. A patent with a similar concept for a zero-power receiver for touch communication and touch sensors has been patenting and it won the ETH Spark Award 2018 as best 5 inventions of ETH.
- **Biosensors and Bioinformatics:** In this area, I am currently working in collaboration with the wearable group in ETH Zurich to design tactile biosensors and developed innovative algorithms for signal processing, data-fusion and knowledge discovery from array data. The goal is to allow long-term monitoring and automatic detection of anomalies.
- **Machine learning and data mining:** In this area, I am interested in sensor data processing and automatic information extraction for low power performance. I am currently investigating classification algorithms in indoor and outdoor scenarios for wearable and home/office applications. I am also currently following two funded Swiss projects, which aim to investigate the potential of neural networks in embedded platforms. Moreover, a smart bracelet designed in ETH exploiting neural network in a microcontroller for emotion detection won the best paper award in an IEEE Workshop IWASI in June 2017. I am realizing (Sept 2019) an open-software library for the neural network on ARM-Cortex-M family in collaboration with ARM.

Technical Skills

- **Embedded Software development:** Strong knowledge of OSs with different programming languages such as C, C++, Java, Visual Basic, x86 Assembler, Android. I have developed software and hardware for various embedded machine-learning applications. For instance: machine learning for people and detection, machinery failure detection, emotion detection, and context recognition. I have an excellent knowledge of simulations and measurement software such as MATLAB and LabVIEW

and of several machine-learning algorithms such as decision trees, Naïve Bayesian, KNN, etc. and good basics of novel neural network algorithms. I have an excellent knowledge of microcontroller/microprocessor architectures at hardware and software level. I have used different types of microcontroller/microprocessor and FPGA (VHDL) for embedded systems such as Atmega8, Altera FPGA Cyclone II/III; Cortex A9, Stm-SPEAR, TI MSP430 and Sitara, STM32, and many others.

- **Hardware and Electronics**: I have an excellent background in electronics at the analog and digital level including analog sensor interfaces; DC-DC converters; thermal, solar, kinetic and RF energy harvesters; photodiodes; etc. Excellent knowledge of lab tools and equipment for building, debugging, and evaluation of prototypes such as an oscilloscope, multi-meters, instruments for measuring power consumption. I worked with many PCB CAD Environments (ORCAD, Eagle, PADS, and ALTIUM) to design and to develop prototypes typically for wireless sensor networks and embedded systems. Microcontroller/Microprocessor. I have an excellent knowledge of microcontroller/microprocessor architectures at hardware and software level. I have used different types of microcontroller/microprocessor and FPGA (VHDL) for embedded systems such as Atmega8, Altera FPGA Cyclone II/III; Cortex A9, Stm-SPEAR, TI MSP430 and Sitara, STM32, and many others.
- **Sensors and Wireless communication:** I worked with different types of sensors with both analog and digital interfaces at the hardware and software level. Most known are 9-axes motion sensors; pyroelectric infrared sensors; video sensors; gas, thermal, light, humidity sensors; and microphones, with serials or other interfaces. Excellent knowledge of protocols and devices for wireless sensor networks: Bluetooth/B. Low Energy, Zigbee, ad-hoc radio, dealing with software stack, as well as the design of low power radios. A Zero-Power Touch sensor and receiver has been patent, and it won the ETH Spark Award 2018 as one of best 5 inventions.
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ADDITIONAL INFORMATION

Industrial Awards & Patents

- Octorber 2021: ETH Spark Award 2021. Best 20 invention for the paper "Wake-up radio for Ultrawide band communication"
- February 2019: CISCO Innovation Challenge Semifinalist. Best 35projects on over 2000 worldwide project for "Smart Concrete: A self-sustaining smart sensor for the durability of concrete monitoring". Running up for the final decision in April 2019.
- March 2018: ETH Spark Award 2018 as the best five inventions of 2017 for "Zero-Power Receiver for Touch Communication and Touch Sensing."
- September 2017: EU Patent submission: "Zero-Power Receiver for Touch Communication and Touch Sensing."
- November 2015: Top 4 Team of Texas Instruments Innovation Contest 2015"Energy Neutral Multisensors Wearable Bracelet
- November 2016: Award for First team for "Shelmet: a self-sustaining smart helmet for motor-bikers" at Texas Instruments Contest 2016, Automotive. Role: Advisor Professor.

- November 2016: Award "Capitani dell'anno 2016, Automotive" Modena, 12-11-2016- Shelmet: a self-sustaining smart helmet for motor-bikers.

Academic Awards

- December 2011: Best Paper Awards: International Conference on Intelligent Sensors, Sensor Networks and Information Processing (ISSNIP) 2011;
- November 2014: Award for a short visiting professorship with Labex Network at Sophia Antipolis France.
- November 2015: Best Paper Award at the Embedded Software and MicroElectronics "Green your electronics: less power, more value" eSame 2015 Conference for his paper and presentation "An Autonomous Multi-Sensor Wearable Device with Human Body Harvesting."
- March 2015: Best Poster Award: Murphy, F.E.; Popovici, E.; Whelan, P.; Magno, M., "Development of an heterogeneous wireless sensor network for instrumentation and analysis of beehives," in Instrumentation and Measurement Technology Conference (I2MTC), 2015 IEEE International , vol., no., pp.346-351, 11-14 May 2015
- September 2016: Best paper award at SPIE's Remote Sensing and Security+Defence International Symposia held 24-29 September 2016 in Edinburgh, United Kingdom, for the paper Cavigelli, L., Bernath, D., Magno, M. and Benini, L., Computationally efficient target classification in multispectral image data with Deep Neural Networks.
- April 2016: Best Poster Award at the ACM/IEEE International Conference on Information Processing in Sensor Networks 2016 for his paper and poster presentation "KinetiSee-A Perpetual Wearable Camera Acquisition System with a Kinetic Harvester".
- June 2017: Best paper award at The 7th IEEE International Workshop on Advances in Sensors and Interfaces for the paper: Michele Magno, Michael Pritz, Philipp Mayer, Luca Benini "DeepEmote: Towards multi-layer neural networks in a low power wearable multi-sensors bracelet" presented on 15th of June 2017.
- September 2017: Best paper award at IEEE NGCAS 2017 for the paper: Magno, Michele, et al. "Energy Efficient System for Tactile Data Decoding Using an Ultra-Low Power Parallel Platform." CAS (NGCAS), 2017 New Generation of. IEEE, 2
- March 2018: Best Paper Award at IEEE Sensors Applications Symposium 2018 for the paper, Mayer, Philipp, Michele Magno, and Luca Benini. "Combining microbial fuel cell and ultra-low power event-driven audio detector for zero-power sensing in underwater monitoring." In *Sensors Applications Symposium (SAS), 2018 IEEE*, pp. 1-6. IEEE, 2018.
- April 2018: Best poster award at the 5th Workshop in Devices, Materials, and Structures for Energy Harvesting and Storage from the Institute of Physics (IoP)for "Toward Zero-power Smart Sensing Leveraging Micro-Energy Harvesting".
- April 2018: Best Poster Award at the ACM/IEEE International Conference on Information Processing in Sensor Networks 2018, for the paper: Strebel, Raphael, and Michele Magno. "Zero-power receiver for touch communication and touch sensing."
- July 2018: Finalist two designs in the best three on the design contest ACM/IEEE International Symposium on Low Power Electronics and Design for "A Micro-Watt Smart Audio Detector for Zero-Power Always-

On Sensing" and "ZeroTouch: Zero-Power Smart Receiver for Touch Communication and Sensing for Internet of Thing and Wearable Applications"

- September 2018: Excellent paper award at at the 20th IEEE International Conference on E-health Networking, Application & Service for the paper Xiaying Wang, Michele Magno, Lukas Cavigelli (all IIS, ITET, ETH Zurich); Mufti Mahmud (Nottingham Trent University, UK); Claudia Cecchetto and Stefano Vassanelli (University of Padova, Italy); Luca Benini (IIS, ITET, ETH Zurich). "Rat Cortical Layers Classification extracting Evoked Local Field Potential Images"
- March 2019: Best presentation award at IEEE Sensors Applications Symposium 2019 for the paper "SmartAid: A Low-Power Smart Hearing Aid For Stutterers" by Moritz Scherer, Kiran Menachery, Michele Magno
- June 2019: Best paper aware at the 8th IEEE International Workshop on Advances in Sensors and Interfaces for the paper: Manuel Eggimann, Michele Magno, Stefan Mach, Luca Benini "A RISC-V Based Open Hardware Platform for Always-On Wearable Smart Sensing" presented on 14th of June 2019.

5 selected invited talks for projects/industrial collaborations.

- October 2021 and May 2022: Invited to the STMicroelectronics Technology Conucnil on the topic "Ultra-Low-Power IoT Nodes"
- April 2019: Invited keynote speech for the Topical Session "Machine Learning" at the IEEE World Forum of Internet of Things. Talk Title: "Smart Sensing in the IoT Era: Machine Learning on Ultra Low Power Microcontrollers".
- July 2019: Invited speech at ETH Material and Process Symposium in the session "My Story" title of the talk: "Science Translated to Meaningful Applications; Mithras: Smart and Self-sustaining wearable device.
- September 2019: Invited Speech at 3rd Energy Harvesting Society Meeting 2019 (EHS 2019). Talk Title: "Is Energy Wearable?: Toward Self-Sustaining Smart Wearable and IoT Devices".
- November 2019: Swiss Innovation Forum 2019. I was invited by the ETH transfer to represent ETH at the Forum and show the invention "Zero-power touch receiver and sensors"

REFERENCES

- Prof. Luca Benini, IIS, ITET; ETH Zurich, luca.benini@iis.ee.ethz.ch
- Dr. Perry Bartelt, Leader of the RAMMS group of WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland, bark@slf .ch
- Giovanni Frattini, R&D Design Manager at Analog Devices Giovanni.Frattini@analog.com
- Dr. Armin Wellig, Innovation Leader, Honeywell International Sarl,Rolle, Switzerland Armin.Wellig@Honeywell.com
- Prof. Alain Pegatoquet, University of Nice, Alain.pegatoquet@unice.fr
- Dr. Brendan O'Flynn, Head of a group of Wireless Sensor Network at Tyndall Institute Cork, brendan.oflynn@tyndall.ie
- Dr. Andrea Mazzone, Innovation & Technology Management, Bombardier Transportation andrea.mazzone@rail.bombardier.com