europass

Tommaso Polonelli

Date of birth: [redacted]

Nationality: Italian

Gender: Male

CONTACT

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ABOUT ME

Always had a passion for electronics and mechanics, therefore I decided to orient my studies towards a technical field since high school. Believing that it is important to support the theory with practical experience, I have had solid and extended experiences in the industrial sector before moving to the research field. Proved to be able to collaborate and lead a multi-cultural team and to adapt me to new places and environments.

WORK EXPERIENCE

01/10/2020 – CURRENT – Zurich, Switzerland

Postdoctoral researcher & Lecturer

ETH Zurich

- Senior member of an experimental center named Project Based Learning in the electronic department of ETH Zurich. It combines research, teaching activities, flagship projects and technology transfer among industrial partners;
- Teaching activities and lectures, theory, practical exercises, and student-customized projects;
- Research and team manager: teamwork organization between engineers, PhDs, and external partners among multi-disciplinary contexts;
- Experience with EU and SNF proposals and other related financial instruments for innovation;
- Personal research contribution in the field of wireless sensor networks, IoT, indoor localization, low power design, energy harvesting, radio protocols and ultra low power interfaces, zero-power wake-up circuits, parallel programming in C, edge AI on constrained MCU, unmanned aerial vehicles, embedded systems, wearable devices, power management techniques.

HONOR and AWARDS

- Finalist of the Spark Award for the most promising invention that resulted in a patent application in the past year (https://ethz.ch/en/industry/researchers/ip/sparkaward.html)
- Selected by the 18th International Conference on Wireless and Mobile Computing, Networking and Communications as the winner of the "best paper award" for the excellent scientific contribution.

PBL Education topolonelli@ethz.ch https://pbl.ee.ethz.ch/
Gloriastrasse 35, 8092, Zurich, Italy
https://www.youtube.com/watch?v=m9-spY1ruAQ&t=2s

01/11/2017 – 30/10/2020 – Bologna, Italy

Ph.D.

University of Bologna

- Mastering most of LPWAN protocols: LoRaWAN, ZigBee, BLE, WiFi, BLE Mesh, Custom 868MHz MACs, 4G, NB-IoT, UWB, Long Range modulations, OOK, and others.
- Mastering C, C++, ASM, Python, Java, JavaScript and parallel programming for low-power MCUs;
- Mastering the hardware design;
- Design of new sensors and applications for structural health monitoring;
- Ultra-low power wake-up radio;
- IoT distributed synchronization approaches;
- UAVs and open source drones for machine learning approaches;
- Teaching support for bachelor and master courses;

HONOR and AWARDS

- Selected by the IEEE EUC 2018 – 16th International Conference on Embedded and Ubiquitous Computing as the winner of the "best paper award" for the excellent scientific contribution.
- Selected by the "Associazione Capitani dell'Anno" as the winner of the "Captains of the Year Innovation Auto & Moto". Best innovator of the year for the presentation of SHelmet project that has deepened futuristic concepts as "Smart Helmet" and energetically autonomous devices. (http://www.capitanidellanno.com/portfolio-item/capitani-auto-moto/).
- More than 20 publications at international conferences and journals. Full list is available at: HTTPS://SCHOLAR.GOOGLE.IT/CITATIONS?USER=IAQMV1IAAAAJ&HL=IT&OI=AO

DEI Education tommaso.polonelli2@unibo.it Viale Risorgimento 2, 40100, Bologna, Italy

01/12/2017 – 30/09/2020 – Italy

Electronics engineer

Freelancer

- Industrial IoT, WSN, Smart Systems;
- Hardware design for sensors and embedded systems;
- Firmware design for sensors and embedded systems;
- R&D consultant.

Manufacturing

01/07/2019 – 30/01/2020 – London, United Kingdom

Visiting Ph.D.

Imperial College London

- UWB ranging for localisation and high-speed data transfer;
- Hardware design;
- Real-time UAV control;
- Teaching support for bachelor and master courses.

01/05/2016 – 30/01/2017 – Budrio, Italy

Electronics engineer

MediCon Ingegneria s.r.l.

- Research and development of non-commercial wireless prototypes based on Sub-GHz modules with the aim of data collection;
- System deployment based on Sub-GHz modules for sensor sampling and data collection, evaluated by TI CC1310 architecture, and related gateway 2G/4G.

Manufacturing

EDUCATION AND TRAINING

01/11/2017 – 30/10/2020

Ph.D - Electronic, Telecommunication Technologies and Computer Science
University of Bologna

01/09/2013 – 30/06/2017

Master Degree in Electronic Engineering
University of Bologna

LANGUAGE SKILLS

MOTHER TONGUE(S): Italian

OTHER LANGUAGE(S):

English

Listening	Reading	Spoken production	Spoken interaction	Writing
C2	C2	C2	C1	C2

German

Listening	Reading	Spoken production	Spoken interaction	Writing
A1	A1	A1	A1	A1

DIGITAL SKILLS

C Java Parallel C Proficient in Python, Java, Javascript, C, C++ and some knowledge of Matlab Python for statistic Machine learning algorithms (e.g. neural networks, support vector machine) Improving Deep Neural Networks Artificial Neural Network - Multi Layer Perceptron Ottime competenze nell'uso dei sistemi operativi Unix (Linux, MacOS) e Windows Hardware and networking Altium Designer; (Full proficiency, daily use) LTSPICE STM32CubeIDE Linux C++ MATLAB Git Python LaTeX ARM Cortex M4 based MCU RISC-V PCB Eagle Tools: Eclipse, Intellij, Maven, SVN, Git, LATEX Virtualization (VMware vSphere VMWare vSAN) PuTTY Experience in using version control systems such as git and Svn Microsoft office(WordExcel Powerpoint Outlook) Adobe (Adobe Photoshop, Adobe Lightroom, Adobe Premiere, Adobe Bridge, Adobe)

PUBLICATIONS

A low cost, highly scalable wireless sensor network solution to achieve smart LED light control for green buildings

Magno, M., Polonelli, T., Benini, L., & Popovici, E. (2014). A low cost, highly scalable wireless sensor network solution to achieve smart LED light control for green buildings. *IEEE Sensors Journal*, *15*(5), 2963-2973.

Slotted aloha on lorawan-design, analysis, and deployment

Polonelli, T., Brunelli, D., Marzocchi, A., & Benini, L. (2019). Slotted aloha on lorawan-design, analysis, and deployment. *Sensors*, *19*(4), 838.

Slotted aloha overlay on lorawan-a distributed synchronization approach

Polonelli, T., Brunelli, D., & Benini, L. (2018, October). Slotted aloha overlay on lorawan-a distributed synchronization approach. In *2018 IEEE 16th International conference on embedded and ubiquitous computing (EUC)* (pp. 129-132). IEEE.

Energy-efficient context aware power management with asynchronous protocol for body sensor network

Magno, M., Polonelli, T., Casamassima, F., Gomez, A., Farella, E., & Benini, L. (2017). Energy-efficient context aware power management with asynchronous protocol for body sensor network. *Mobile Networks and Applications*, *22*(5), 814-824.

An accurate low-cost Crackmeter with LoRaWAN communication and energy harvesting capability

Polonelli, T., Brunelli, D., Guermandi, M., & Benini, L. (2018, September). An accurate low-cost Crackmeter with LoRaWAN communication and energy harvesting capability. In *2018 IEEE 23rd International Conference on Emerging Technologies and Factory Automation (ETFA)* (Vol. 1, pp. 671-676). IEEE.

NB-IoT Versus LoRaWAN: An Experimental Evaluation for Industrial Applications

Ballerini, M., Polonelli, T., Brunelli, D., Magno, M., & Benini, L. (2020). NB-IoT Versus LoRaWAN: An Experimental Evaluation for Industrial Applications. *IEEE Transactions on Industrial Informatics*, *16*(12), 7802-7811.

A multi-protocol system for configurable data streaming on IoT healthcare devices

Polonelli, T., Brunelli, D., Girolami, A., Demmi, G. N., & Benini, L. (2019, June). A multi-protocol system for configurable data streaming on IoT healthcare devices. In *2019 IEEE 8th international workshop on advances in sensors and interfaces (IWASI)* (pp. 112-117). IEEE.

Experimental evaluation on NB-IoT and LoRaWAN for industrial and IoT applications

Ballerini, M., Polonelli, T., Brunelli, D., Magno, M., & Benini, L. (2019, July). Experimental evaluation on NB-IoT and LoRaWAN for industrial and IoT applications. In *2019 IEEE 17th International Conference on Industrial Informatics (INDIN)* (Vol. 1, pp. 1729-1732). IEEE.

A lorawan wireless sensor network for data center temperature monitoring

Polonelli, T., Brunelli, D., Bartolini, A., & Benini, L. (2018, September). A lorawan wireless sensor network for data center temperature monitoring. In *International Conference on Applications in Electronics Pervading Industry, Environment and Society* (pp. 169-177). Springer, Cham.

A Flexible, Low-Power Platform for UAV-Based Data Collection From Remote Sensors

Polonelli, T., Qin, Y., Yeatman, E. M., Benini, L., & Boyle, D. (2020). A Flexible, Low-Power Platform for UAV-Based Data Collection From Remote Sensors. *IEEE Access, 8*, 164775-164785.

An ultra-low power wake up radio with addressing and retransmission capabilities for advanced energy efficient MAC protocols

Polonelli, T., Magno, M., & Benini, L. (2016, April). An ultra-low power wake up radio with addressing and retransmission capabilities for advanced energy efficient MAC protocols. In *2016 15th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)* (pp. 1-2). IEEE.

An energy optimized jpeg encoder for parallel ultra-low-power processing-platforms

Polonelli, T., Battistini, D., Rusci, M., Brunelli, D., & Benini, L. (2019, September). An energy optimized jpeg encoder for parallel ultra-low-power processing-platforms. In *International Conference on Applications in Electronics Pervading Industry, Environment and Society* (pp. 125-133). Springer, Cham.

A wake-up receiver with ad-hoc antenna co-design for wearable applications

Polonelli, T., Le Huy, T., Lizzi, L., Ferrero, F., & Magno, M. (2016, April). A wake-up receiver with ad-hoc antenna co-design for wearable applications. In *2016 IEEE Sensors Applications Symposium (SAS)* (pp. 1-6). IEEE.

Ultra-low energy pest detection for smart agriculture

Brunelli, D., Polonelli, T., & Benini, L. (2020, October). Ultra-low energy pest detection for smart agriculture. In *2020 IEEE Sensors* (pp. 1-4). IEEE.

H-Watch: An Open, Connected Platform for AI-Enhanced COVID19 Infection Symptoms Monitoring and Contact Tracing.

Polonelli, T., Schulthess, L., Mayer, P., Magno, M., & Benini, L. (2021, May). H-Watch: An Open, Connected Platform for AI-Enhanced COVID19 Infection Symptoms Monitoring and Contact Tracing. In *IEEE International Symposium on Circuits and Systems (ISCAS 2021)*.

ISO 690

Structural Health Monitoring system with Narrowband IoT and MEMS sensors

Brunelli, D., Di Nuzzo, F., Polonelli, T., & Benini, L. (2021). Structural Health Monitoring system with Narrowband IoT and MEMS sensors.

An open platform for efficient drone-to-sensor wireless ranging and data harvesting

T Polonelli, M Magno, V Niculescu, L Benini, D Boyle

Embedding Temporal Convolutional Networks for Energy-efficient PPG-based Heart Rate Monitoring

A Burrello, DJ Pagliari, PM Rapa, M Semilia, M Risso, T Polonelli, ...

Development of a wireless, non-intrusive, MEMS-based pressure and acoustic measurement system for large-scale operating wind turbine blades

S Barber, J Deparday, Y Marykovskiy, E Chatzi, I Abdallah, G Duthé, ...

NETWORKS AND MEMBERSHIPS

- **IEEE Member**
- **YES Europe**

DRIVING LICENCE

- **Driving Licence:** A1
- **Driving Licence:** A2
- **Driving Licence:** A
- **Driving Licence:** B

HONOURS AND AWARDS

10/2018
Best paper award
Selected by the IEEE EUC 2018 – 16th International Conference on Embedded and Ubiquitous Computing as the winner of the "best paper award" for the excellent scientific contribution.

11/2016
Captain of the year 2016
Selected by the "Associazione Capitani dell'Anno" as the winner of the "Captains of the Year Innovation Auto & Moto". Best innovator of the year for the presentation of SHelmet project that has deepened futuristic concepts as "Smart Helmet" and energetically autonomous devices. (http://www.capitanidellanno.com/portfolio-item/capitani-auto-moto/).

11/2016
TI Innovation Challenge 2016
• Winner of the university contest organized by Texas Instruments. Awarded as the best project in the Automotive category among more than 1,000 universities in Europe, Africa, Middle East (http://www.ti.com/ww/eu/TIIC2016/).

• Project name: SHelmet (http://www.shelmet.it/);

• Team Leader.

01/2016
Talent Lab Seeds for the Future
Member of the ten Italian students selected by Huawei, MIUR and MISE for the two-week training project "Talent Lab Seeds for the Future 2016" (http://www.talentlab.it/progetto-2016/).

HOBBIES AND INTERESTS

Motorcycles

road, racetrack, off-road

Agricolture

Farming

Vegetables and fruit cultivation

tree pruning

Mechanical repairs

Experience in maintenance and repairing of:

- Cars
- Motorbikes
- Tractors
- Agricolture tools

Bologna, 27/05/2022