

# Francesco Paissan

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## Education

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### BSc Student in Physics

UNIVERSITY OF TRENTO

Trento, Italy

Sept. 2018 - Present

### International Summer School for Young Physicists (ISSYP)

PERIMETER INSTITUTE

Ontario, Canada

### High school Diploma

LICEO SCIENTIFICO "A. ROSMINI"

Rovereto, Italy

Sept. 2013 - July 2018

- Thesis title: "Sealion: coding elements and some aspect of robot's dynamics."

## Experience

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### Research Intern

MONTREAL INSTITUTE OF LEARNING ALGORITHMS (MILA) - UDEM

Montreal

5 Sept. - Present

- Supervised by prof. Ravanelli, I am investigating novel techniques for scaling neural architectures on tiny devices, in particular for speech processing applications.

### Research Fellow

E3DA UNIT - BRUNO KESSLER FOUNDATION

Trento, Italy

Oct. 2018 - Present

- Research in the fields of machine learning and computer vision for computational and energy constraint devices;
- Development and implementation of classification algorithms using data from Ultra-Low-Power smart vision sensors;
- Exploring new techniques for the optimization of Deep Neural Networks for embedded devices.
- Innovating Smart Vision Sensors for on-chip color classification using neuro-memristive architectures.
- **Derivables:** 5 international workshops, 2 journal papers (1 under review), 2 conference papers (1 under review), 1 symposium paper under review.

### Scientific collaborator

SPEECHBRAIN, MILA

Trento, remotely

Sept. 2021 - Present

- Contributing to the extension of speechbrain for EEG processing. In particular, we are benchmarking state-of-the-art solutions for different EEG paradigms (e.g. steady-state visually evoked potential, motor imagery and event related potential decoding).
- **Deliverables:** several contributions to the open-source toolkit.

### Scientific collaborator

NATIONAL INSTITUTE FOR NUCLEAR PHYSICS

Rome, remotely

Jan. 2021 - Present

- Firmware development for amplifier card for SiPM read-out in the liquid argon veto;
- Design and implementation of machine-learning based trigger logics for real-time rejection of muon-induced events in which a neutron is captured on  $^{40}\text{Ar}$  generating scintillation light in LAr.
- **Derivables:** internal notes for collaborators, experiment's slow control, 1 conference papers accepted and 1 under review.

### Occasional provision of services (Technician)

ROMA TRE UNIVERSITY

Partially remote

Jan. 2022 - Apr. 2022

- Support in study, research and analysis of data acquisition systems and lab instrumentation control in the context of the "ENVISION" project of the Italian Space Agency (ASI).

### Data Visualization Analyst

AMBER AGRICULTURE

Chicago - Remote, Italy

June 2019 - July 2019

- Data analysis and visualization for Wireless Sensors Network debugging and management.

### Intern student

E3DA UNIT - BRUNO KESSLER FOUNDATION

Trento, Italy

July 2017 - August 2017

- Development of a step counter and activity detection algorithm based on IMU signal data.

## Software developer for robotics

*Rovereto, Trento*

WITTED SRL

2016

- Software developer and co-author of the ArcheoROV project, an underwater drone.
- I developed a ROS-based autonomous control system for simplifying robot control. Furthermore, I coordinated the development of a software architecture which enables communication using both wireless and wired network infrastructures.
- **Derivables:** 1 pre-print manuscript, robot prototype.

## Skills

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<b>Programming</b>	C/C++, (Embedded) C, OpenCV, MongoDB, MySQL, Dart, Flutter, ROS, Git, GPIB, PHP
<b>Scientific computing</b>	Python, Mathematica, MATLAB, R (beginner)
<b>AI/ML frameworks</b>	PyTorch, TensorFlow, Keras, Scikit-learn, Speechbrain
<b>Embedded platforms</b>	ARM Cortex series, Beaglebone, Raspberry Pi, ASUS Thinkerboard, Arduino

## Academic activities

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<b>2022</b>	Coordinator of the DCASE "Low-Complexity Acoustic Scene Classification" task
<b>2021</b>	Seminar "Emerging opportunities of machine learning in physics", INFN Roma3
<b>2021</b>	Reviewer for DATE 2022
<b>2021</b>	Reviewer for ACM Transactions on Embedded Computing Systems
<b>2021</b>	Reviewer for EMBC 2021
<b>2020</b>	Reviewer for DATE 2021

Also, I had the opportunity to review manuscripts on behalf of Elisabetta Farella, PhD. See the list of conferences and journals below:

<b>2020</b>	Journal: Transactions on Computers - Special Issue on Edge Computing and IoT
<b>2019</b>	IEEE International Workshop on Advances in Sensors and Interfaces
<b>2019</b>	UbiComp

## Projects

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### MARVEL

BRUNO KESSLER FOUNDATION

*Present*

MARVEL aspires the convergence of a set of technologies in the areas of AI, analytics, multimodal perception, software engineering, HPC as part of an Edge-Fog-Cloud Computing Continuum paradigm, to support data-driven real-time application workflows and decision making in modern cities, showcasing the potential to address societal challenges very effectively.

### LEGEND200

INFN - ROMA3

*Present*

The LEGEND collaboration is comprised of over 250 researchers from about 50 institutions from around the world, working together to develop the largest 76Ge neutrinoless double-beta decay experiment in history. By combining the technological expertise and experience from the GERDA experiment and MAJORANA DEMONSTRATOR, LEGEND is expected to reach a design sensitivity two orders of magnitude greater than its predecessors.

### City Sensing

BRUNO KESSLER FOUNDATION

*Present*

One of the core fields in which research at FBK is focusing is smart cities and societies - a challenging topic and growing trend. For this, different Research Units of the Digital Society line are involved in the development of novel technologies. In particular, my role inside this project is the development of novel vision technologies - from algorithms to the design of custom boards - for IoT nodes. A particular focus is given to power management and energy-efficiency (in order to optimize scalability of the networks), considering also performance and complexity tradeoffs.

## Languages

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<b>English</b>	Intermediate level - B2; professional reading, writing, and speaking
<b>German</b>	Intermediate level - B1; fluent in conversation
<b>Italian</b>	Native language

## Awards

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- 2022** Best demo award GTTI MMSP - Italy SPS Meeting
- 2018** Third place in national volleyball championship, cat. U19
- 2017** Winner of the FBK Junior Marathon, among three best interns of the year
- 2015** Third place in national volleyball championship, cat. U15
- 2015** Honorable student award from "Liceo A. Rosmini" - Rovereto
- 2015** Second place for "Innovation and strategy" in Worldchamp. FLL

## Other educational activities

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- 2020** Brainhack Donostia Conference, XXII Giambiagi winter school, Data Science UA Conference
- 2019** Summer school on cognitive robotics, Acquasens summer school
- 2018** International Summer School for Young Physicists

## Supervised Students

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- 2022** Mohamed Sahabdeen Anisha, Wamiq Raza, Mariam Jamal, Annarita Barone
- 2021** Brugnara Michele, Mohamed Sahabdeen Anisha
- 2020** Ancilotto Alberto
- 2019** Homa Priya Tarigopula

## Publications

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- F. PAISSAN**, V. P. KUMARAVEL, E. FARELLA, "Interpretable Convolutional Neural Networks for bad channel detection in raw EEG signals", IEEE SAS2022 2022
- I. MARTÍN-MORATÓ, **F. PAISSAN**, A. ANCILOTTO, T. HEITOLA, A. MESAROS, E. FARELLA, A. BRUTTI, T. VIRTANEN "Low-complexity acoustic scene classification in DCASE 2022 Challenge", SUBMITTED TO DCASE WORKSHOP 2022 2022
- A. BRUTTI, **F. PAISSAN**, A. ANCILOTTO, AND E. FARELLA "Optimizing Phinet Architectures for the detection of Urban Sounds on low-end devices", EUSIPCO2022 2022
- I. ABRITTA COSTA, A. BUDANO, N. BURLAC, **F. PAISSAN**, G. SALAMANNA, AND D. TAGNANI "The Front-End electronics for the liquid Argon detector of the LEGEND-200 experiment", UNDER REVIEW FOR IEEE NSS MIC RTSD 2022 2022
- I. ABRITTA COSTA, G. ARAUJO, L. BAUDIS, E. BOSSIO, N. BURLAC, R. DECKERT, M. FOMINA, K. GUSEV, P. KRAUSE, A. LUBASHEVSKIY, E. MONDRAGON, **F. PAISSAN**, L. PAPP, N. RUMYANTSEVA, G. SALAMANNA, S. SCHÖNERT, M. SCHWARZ, E. SHEVCHIK, D. TAGNANI, D. ZINATULINA "The LEGEND-200 LAr instrumentation: from design to commissioning", NEUTRINO CONFERENCE 2022
- L. ZANELLA, Y. WANG, N. DALL'ASEN, A. ANCILOTTO, **F. PAISSAN**, E. RICCI, E. FARELLA, A. BRUTTI, M. PISTORE "Responsible AI at the edge: towards privacy-preserving smart cities", UNDER REVIEW FOR ITAL-IA WORKSHOP 2022
- A. ANCILOTTO, **F. PAISSAN**, E. FARELLA, "On the role of smart vision sensors in energy-efficient computer vision at the edge", UNDER REVIEW FOR PERVASIVE AND RESOURCE-CONSTRAINED AI WORKSHOP 2022 2021
- F. PAISSAN**, A. ANCILOTTO, A. BRUTTI, E. FARELLA, "Scalable neural architectures for end-to-end environmental sound classification", ACCEPTED AT IEEE ICASSP2022 2022
- F. PAISSAN**, A. ANCILOTTO, E. FARELLA, "PhiNets: a scalable backbone for low-power AI at the edge", ACM TRANSACTIONS ON EMBEDDED COMPUTING SYSTEMS. 2021
- V. P. KUMARAVEL, **F. PAISSAN**, E. FARELLA, "Towards a Domain-specific Neural Network Approach for EEG Bad Channel Detection", IEEE SIGNAL PROCESSING IN MEDICINE AND BIOLOGY SYMPOSIUM 2021
- F. PAISSAN**, M. LECCA, E. FARELLA, M. GOTTARDI, "A High-Dynamic Range Vision Sensor with Neuro-Memristive Skin Detection for Edge Computing", UNDER REVIEW ON IEEE TRANSACTIONS ON NEURAL NETWORKS AND LEARNING SYSTEMS. 2021

MARVEL PROJECT CONSORTIUM, "MARVEL: Multimodal Extreme Scale Data Analytics for Smart Cities Environments", ACCEPTED TO 2021 INTERNATIONAL BALKAN CONFERENCE ON COMMUNICATIONS AND NETWORKING (BALKANCOM) 2021

**F. PAISSAN**, M. GOTTARDI, E. FARELLA, "Enabling energy efficient machine learning on a Ultra-Low-Power vision sensor for IoT", 2020 SYSTEM-LEVEL DESIGN METHODS FOR DEEP LEARNING ON HETEROGENEOUS ARCHITECTURES WORKSHOP CO-LOCATED WITH DATE21. 2021

E. LORIA, **F. PAISSAN**, A. MARCONI, "Exploiting General-Purpose In-Game Behaviours to Predict Players Churn in Gameful Systems", 2019 INTERNATIONAL GAME ANALYTICS WORKSHOP CO-LOCATED WITH AIIDE19. 2019

**F. PAISSAN**, G. CERUTTI, M. GOTTARDI, E. FARELLA, "People/Car Classification using an Ultra-Low-Power Smart Vision Sensor", 2019 IEEE INTERNATIONAL WORKSHOP ON ADVANCES IN SENSORS AND INTERFACES. 2019

L. BEZZI, A. BEZZI, S. NASCIVERA, **F. PAISSAN**, D. PERGHEM, A. REYES, E. ROCCO, A. SAIANI, "ArcheoROV. Un ROV open hardware sviluppato specificatamente per scopi archeologici." 2016

## Referees

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### **Elisabetta Farella, PhD**

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### **Prof. Mirco Ravanelli**

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 Montreal Institute of Learning Algorithms (MILA)  
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### **Prof. Giuseppe Salamanna**

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