Alberto Giuseppe Perotti

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About me

I am a research engineer with 13 years experience [2012-2025] in wireless communications contributing to research on physical layer technologies for 4G, 5G, and emerging 6G networks, with a particular focus on 3GPP standardization. Prior to this, I spent nearly a decade [2002-2011] as a researcher in Academia, where I worked on wireless broadband terrestrial and satellite communications. I hold a Ph.D. in Electronics and Communications [2003] ad a *Laurea* degree in Telecommunications Engineering [1999] from Politecnico di Torino, Italy.

Research

Error correction codes: Low Density Parity Check (LDPC) codes, polar codes, sparse superposition codes, parallel (turbo) and serial concatenations of convolutional codes, algebraic codes (Reed-Solomon, BCH, etc.), nonlinear codes, codes for identification. [1], [2]; [17], [18], [19], [20], [21], [22], [23], [24], [25], [26], [27], [28], [29]; [55]. **Modulations and waveforms**: pilot-less coded modulations for satellite uplink; constant-envelope continuous phase modulations (CPM); trellis-coded modulation; adaptive coded modulation methods; waveforms for simultaneous information and power transfer (SWIPT). [3], [4], [5], [6]; [30], [31], [32], [33], [34], [35], [36], [37]; [56]. **AI/Machine-learning**: deep learning-based design and decoding of ultra-reliable error correction codes. [7], [8], [9], [10]; [38]. **Channel estimation and prediction**: massive MIMO channel prediction in FDD networks. [57]. **Multiple access**: orthogonal/non-orthogonal multiple access; interleaver-division multiple access; multiuser detection and interference cancellation. [11], [12]; [39], [40], [41], [42], [43], [44]. **V2X communications.** High-gain beamforming and opportunistic relay for V2V and V2I communications. [13], [14] [45]. **Cognitive radio and spectrum sensing.** Sensing of DVB signals, signal processing software optimization of sensing algorithms, RF immunity evaluations. [15], [16]; [46], [47], [48], [49], [50]; [52], [53], [54]. **Software-defined radios**: optimization of real-time wireless transceiver signal processing algorithms on digital signal processing platforms. [47], [51].

Corresponding patents: 17 granted patents, 27 pending applications, 6 patents with potential standard-essential declarations.

Further expertise

Modeling and simulation of transmission systems. Developed several link/system-level wireless system simulators for performance evaluation of lower (PHY/MAC) layer functionalities in wireless systems.
3GPP standardization. Participated as Huawei delegate to 3GPP RAN1 meetings [2015-2017].
Management and coordination of research projects. Project manager of Huawei internal research projects in cooperation with Academia:

- *5G NR FR1/FR2 V2X communications*, cooperation with Politecnico di Milano, Italy [13], [14], [45];
- *Iterative error correction codes for channels with noisy feedback*, *Iterative error correction codes for realistic wireless channels*, both in cooperation with Imperial College London, UK [8], [9], [10] [38].

Quantum Error Correction. Developer of qLDPCsim, a quantum LDPC simulator focused on decoding algorithms.
Teaching. Lectured several undergraduate and graduate courses – see detailed list below.
Editorial experience. Associate Editor-in-Chief of IEEE Communications Magazine for two years.
Programming. Matlab/Simulink, Keras/Tensorflow, Pytorch; python, C/C++, assembly languages of Intel x86 processors, TI's C6000 DSPs, ARM processors, PIC microcontrollers, Z80; GIT, SVN; Windows, Linux; GPU configuration and system maintenance.
Languages. *Italian*: mother tongue; *English*: professional working proficiency; *French*: basic.

Education

Aug 2003. Ph.D. degree in Electronics and Communications, Politecnico di Torino. Dissertation on **Design of concatenated convolutional codes with interleavers and their decoder implementation on multi-DSP systems**.
Supervisor: prof. S. Benedetto.

Mar 1999. Laurea[1] degree in Telecommunications Eng., Politecnico di Torino. Monograph on **Design and real-time DSP implementation of a CCSDS turbo decoder**.
Supervisors: prof. S. Benedetto, prof. A. Serra.

Employment

June 2013 - present Huawei Technologies Sweden/Italy. Principal research engineer, research on PHY layer of 5G/6G radio access networks; contributing to 3GPP standardization in Radio Access Networks Working Group on Radio Layer 1 - Physical layer (RAN1); management of research projects in cooperation with Academia.

April 2011 - May 2013. CSP–ICT Innovation, Torino (Italy). Head of the *Wireless Communications and Networks* research unit.

Mar 2010- Mar 2011. Assistant Professor at Università e-Campus, Novedrate (Como), Italy. Research on spectral/energy efficient wireless communication systems.

Aug 2003–Mar 2010. Post-doctoral researcher at Politecnico di Torino, Italy. Research on PHY algorithms and architectures for wireless multimedia broadband transmission, adaptive coding and modulation system for satellite communications.

Jan-Oct 2002. Sequoia Communications (no longer in business), San Diego (CA), USA. Staff member of baseband signal processing branch in Los Angeles. Development of baseband signal processing algorithms for a prototype 3G (UMTS) receiver. Head of division/supervisor: prof. Dariush Divsalar (JPL).

Jan-Aug 2002. University of California, Los Angeles (CA), USA. Visiting scholar in the Electrical Eng. Dept. Research on design of serially concatenated convolutional codes. Supervisor: prof. Richard D. Wesel.

Teaching

I taught several graduate (G) and undergraduate (UG) courses at my alma mater – Politecnico di Torino – and in other Universities, as part of Politecnico's joint programs with those institutions. All courses have been taught in Italian unless otherwise indicated.

As lecturer:

2012–13 *Software-defined radio on open-source platforms*, Telecom. Eng., (G, taught in English).

2011–12 *Software-defined radio on open-source platforms*, Telecom. Eng. (G, taught in English).

2010–11 *Trasmissione sul Canale Radiomobile* (Wireless transm.), Telecom. Eng. (UG); *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).

[1] In the Italian academic system before the 1999 reform, the *laurea* degree was the highest academic degree obtainable before Ph.D. It is considered equivalent to a masters' degree.

2009–10	*Trasmissione sul Canale Radiomobile* (Wireless transm.), Telecom. Eng. (UG); *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).
2008–09	*Wireless Transmission Systems*, Telematics Eng., (G, taught in English). *Trasmissione sul Canale Radiomobile* (Wireless transm.), Telecom. Eng. (UG); *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).
2007–08	*Trasmissione sul Canale Radiomobile* (Wireless transm.), Telecom. Eng. (UG). *Comunicazioni Elettriche* (Communication Systems), Elec. Eng., (UG).
2006–07	*Fondements de communications électriques*, Information Eng., joint program with Polytech Grenoble (UG, taught in English);
2005–06	*Fondements de communications électriques*, Information Eng., joint program with Polytech Grenoble (UG, taught in English).

As teaching assistant:

2006–07	*Trasmissione sul Canale Radiomobile* (Wireless Transm.), Telecom. Eng. (UG). *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).
2005–06	*Trasmissione sul Canale Radiomobile* (Wireless Transm.), Telecom. Eng. (UG). *Elaborazione Numerica dei Segnali* (Digital Signal Proc.), Telecom. Eng. (UG); *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).
2004–05	*Trasmissione sul Canale Radiomobile* (Wireless Transm.), Telecom. Eng. (UG). *Elaborazione Numerica dei Segnali* (Digital Signal Proc.), Telecom. Eng. (UG); *Comunicazioni Elettriche* (Communication Systems), Elec. Eng. (UG).
2003–04	*Trasmissione sul Canale Radiomobile* (Wireless Transm.), Telecom. Eng. (UG). *Elaborazione Numerica dei Segnali* (Digital Signal Proc.), Telecom. Eng. (UG);

Supervised master theses

Supervised/co-supervised twelve master theses 2009-2013.

Editorial Experience

IEEE Senior Member since 2014.
Served as editorial board member of IEEE Communications Magazine:

- *Associate Editor in Chief* from Nov 2021 to Dec 2023;
- *Lead Editor* of Mobile Communications and Networks Series from Sep 2019 to Nov 2021.
- *Associate Technical Editor* from Oct 2014 to Aug 2019;

Serving as a journal/magazine article reviewer and conference TPC member/reviewer:

Journals and Magazines (selected)

- IEEE Communications Magazine
- IEEE Transactions on Communications
- IEEE Transactions on Information Theory
- IEEE Transactions on Signal Processing
- IEEE Transactions on Wireless Communications
- IEEE Communications Letters (exemplary reviewer in 2015)
- IEEE Journal of Selected Topics in Signal Processing
- IET Communications
- Computer Communications (Elsevier)
- Wireless Personal Communications (Springer)
- European Transactions on Telecommunications (Wiley)

Conference TPC Memberships (selected)

- IEEE Global Communications Conference (Globecom)
- IEEE International Conference on Communications (ICC)
- IEEE Personal, Indoor and Mobile Radio Communications (PIMRC)
- IEEE Wireless Communications and Networking Conference (WCNC)
- IEEE International Symposium on Information Theory (ISIT)
- IEEE Information Theory Workshop (ITW)
- EuCNC & 6G Summit
- International Symposium on Wireless Communication Systems (ISWCS)

Appointments/board membership

- Springer book series Textbooks in Telecommunication Eng.: member of Editorial Advisory Board, 2024-now.
- CCABA - Advanced Broadband Communications Center at Universitat Politécnica de Catalunya: member of External Advisory Board, 2021-now.
- French National Research Agency, project proposal reviewer, 2020.

Bibliography

See also my Google Scholar profile and my complete list of publications.

Journal Articles

[1] A. Perotti and S. Benedetto, "A new upper bound on the minimum distance of turbo codes," *IEEE Transactions on Information Theory*, vol. 50, no. 12, pp. 2985–2997, 2004. DOI: 10.1109/TIT.2004.838358.

[2] A. Perotti and S. Benedetto, "An upper bound on the minimum distance of serially concatenated convolutional codes," *IEEE Transactions on Information Theory*, vol. 52, no. 12, pp. 5501–5509, 2006. DOI: 10.1109/TIT.2006.885447.

[3] A. Perotti, S. Benedetto, and P. Remlein, "Adaptive coded continuous-phase modulations for frequency-division multiuser systems," *Advances in Electronics and Telecommunications*, vol. 1, no. 1, pp. 50–58, 2010, Journal published by Poznan University of Technology, Poznan, Poland, during years 2010-2013.

[4] A. Perotti, A. Tarable, S. Benedetto, and G. Montorsi, "Capacity-achieving CPM schemes," *IEEE Transactions on Information Theory*, vol. 56, no. 4, pp. 1521–1541, 2010. DOI: 10.1109/TIT.2010.2040861.

[5] P. Remlein, M. Jasinski, and A. Perotti, "Receiver algorithm for coded multiuser CPM systems," *IET Electronics Letters*, vol. 48, no. 11, pp. 631–633, 2012. DOI: 10.1049/el.2011.3769.

[6] A. G. Perotti, M. N. Khormuji, and B. M. Popović, "Simultaneous wireless information and power transfer by continuous-phase modulation," *IEEE Communications Letters*, vol. 24, no. 6, pp. 1294–1298, 2020. DOI: 10.1109/LCOMM.2020.2981316.

[7] A. R. Safavi, A. G. Perotti, B. M. Popović, M. Boloursaz Mashhadi, and D. Gündüz, "Deep extended feedback codes," *ITU Journal on Future and Evolving Technologies*, vol. 2, no. 6, pp. 33–41, 2021. DOI: 10.52953/SNLM1743.

[8] E. Ozfatura, Y. Shao, A. G. Perotti, B. M. Popović, and D. Gündüz, "All you need is feedback: Communication with block attention feedback codes," *IEEE Journal on Selected Areas in Information Theory*, vol. 3, no. 3, pp. 587–602, 2022. DOI: 10.1109/JSAIT.2022.3223901.

[9] M. Boloursaz Mashhadi, D. Gündüz, A. G. Perotti, and B. M. Popović, "DRF codes: Deep SNR-robust feedback codes," *ITU Journal on Future and Evolving Technologies*, vol. 4, no. 3, pp. 447–460, 2023. DOI: 10.52953/DAPE6014.

[10] Y. Shao, E. Ozfatura, A. G. Perotti, B. M. Popović, and D. Gündüz, "Attentioncode: Ultra-reliable feedback codes for short-packet communications," *IEEE Transactions on Communications*, vol. 71, no. 8, pp. 4437–4452, 2023. DOI: 10.1109/TCOMM.2023.3280563.

[11] H. Wu, L. Ping, and A. Perotti, "User-specific chip-level interleaver design for IDMA systems," *IET Electronics Letters*, vol. 42, no. 4, pp. 233–234, 2006. DOI: 10.1049/el:20063770.

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[13] F. Linsalata, S. Mura, M. Mizmizi, M. Magarini, P. Wang, M. N. Khormuji, A. Perotti, and U. Spagnolini, "LoS-map construction for proactive relay of opportunity selection in 6G V2X systems," *IEEE Transactions on Vehicular Technology*, vol. 72, no. 3, pp. 3864–3878, 2023. DOI: 10.1109/TVT.2022.3217966.

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Conference Papers

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[20] A. Perotti, G. Montorsi, and S. Benedetto, "Multiprocessor implementation of an iterative turbo decoder and concatenation with an outer block code," in *International Conference on Software, Telecommunications and Computer Networks*, Ancona, Italy, Oct. 2001.

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[45] S. Mura, F. Linsalata, M. Mizmizi, M. Magarini, M. N. Khormuji, P. Wang, A. Perotti, and U. Spagnolini, "Spatial-interference aware cooperative resource allocation for 5G V2V communications," in *2022 IEEE 95th Vehicular Technology Conference: (VTC2022-Spring)*, 2022, pp. 1–6. DOI: 10.1109/VTC2022-Spring54318.2022.9860812.

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[47] S. Benco, A. Ghittino, F. L. Crespi, and A. Perotti, "Software-defined white-space cognitive systems: Implementation of the spectrum sensing unit," in *2nd workshop of COST Action IC0902*, Castelldefels, Spain, Oct. 2011.

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Book Chapters

[52] D. Riviello, S. Benco, F. L. Crespi, A. Ghittino, R. Garello, and A. Perotti, "Spectrum sensing algorithms for cognitive TV white-spaces systems," in *Cognitive Communication and Cooperative HetNet Coexistence*, M.-G. Di Benedetto and F. Bader, Eds. Springer, 2014. DOI: 10.1007/978-3-319-01402-9.

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[54] A. F. Cattoni, J. L. Buthler, O. Tonelli, L. A. Da Silva, J. P. Miranda, P. Sutton, F. L. Crespi, S. Benco, A. Perotti, and D. Riviello, "Designing a CR test bed - practical issues," in *Cognitive Radio and Networking for Heterogeneous Wireless Networks*, M.-G. Di Benedetto, A. F. Cattoni, J. Fiorina, F. Bader, and L. De Nardis, Eds. Springer, 2014. DOI: 10.1007/978-3-319-01718-1.

Non peer-reviewed publications

[55] A. G. Perotti, B. M. Popović, and A. R. Safavi, *Accumulative iterative codes based on feedback*, Jun. 2021. DOI: 10.48550/arXiv.2106.07415. [Online]. Available: https://arxiv.org/abs/2106.07415.

In preparation manuscripts

[56] A. G. Perotti and B. M. Popović, "Pilot-less direct satellite up-link by quasi-orthogonal sparse superposition codes (provisional title)," In preparation.

[57] A. G. Perotti and B. M. Popović, "FDD massive MIMO prediction based on partial reciprocity (provisional title)," In preparation.

GDPR STATEMENT

I authorise the processing of personal data contained within this CV, according to GDPR (EU) 2016/679, Article 6.1(a).