

# 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.

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## 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]. **AI/Machine-learning:** deep learning-based design and decoding of ultra-reliable error correction codes. [3], [4], [5], [6]; [30]. **Modulations and waveforms:** constant-envelope continuous phase modulations (CPM); trellis-coded modulation; adaptive coded modulation methods; waveforms for simultaneous information and power transfer (SWIPT); coded modulations for direct satellite uplink. [7], [8], [9], [10]; [31], [32], [33], [34], [35], [36], [37], [38]; [56]. **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.

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## FURTHER EXPERTISE

**3GPP standardization.** Participated as Huawei delegate to 3GPP RAN1 meetings from 2015 to 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*, cooperation with Imperial College London, UK [4], [5];
- *Iterative error correction codes for realistic wireless channels*, cooperation with Imperial College London, UK [6] [30].

**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.

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## 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<sup>1</sup> 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.
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## 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.
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## 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).

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<sup>1</sup>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	<i>Trasmissione sul Canale Radiomobile</i> (Wireless transm.), Telecom. Eng. (UG); <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng. (UG).
2008–09	<i>Wireless Transmission Systems</i> , Telematics Eng., (G, taught in English). <i>Trasmissione sul Canale Radiomobile</i> (Wireless transm.), Telecom. Eng. (UG); <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng. (UG).
2007–08	<i>Trasmissione sul Canale Radiomobile</i> (Wireless transm.), Telecom. Eng. (UG). <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng., (UG).
2006–07	<i>Fondements de communications électriques</i> , Information Eng., joint program with Polytech Grenoble (UG, taught in English);
2005–06	<i>Fondements de communications électriques</i> , Information Eng., joint program with Polytech Grenoble (UG, taught in English).

#### As teaching assistant:

2006–07	<i>Trasmissione sul Canale Radiomobile</i> (Wireless Transm.), Telecom. Eng. (UG). <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng. (UG).
2005–06	<i>Trasmissione sul Canale Radiomobile</i> (Wireless Transm.), Telecom. Eng. (UG). <i>Elaborazione Numerica dei Segnali</i> (Digital Signal Proc.), Telecom. Eng. (UG); <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng. (UG).
2004–05	<i>Trasmissione sul Canale Radiomobile</i> (Wireless Transm.), Telecom. Eng. (UG). <i>Elaborazione Numerica dei Segnali</i> (Digital Signal Proc.), Telecom. Eng. (UG); <i>Comunicazioni Elettriche</i> (Communication Systems), Elec. Eng. (UG).
2003–04	<i>Trasmissione sul Canale Radiomobile</i> (Wireless Transm.), Telecom. Eng. (UG). <i>Elaborazione Numerica dei Segnali</i> (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)
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## APPOINTMENTS/BOARD MEMBERSHIP

- Springer book series Textbooks in Telecommunication Eng.: member of Editorial Advisory Board, 2024-now.
  - CCABA - Advanced Broadband Communications Center at Universitat Politècnica de Catalunya: member of External Advisory Board, 2021-now.
  - French National Research Agency, project proposal reviewer, 2020.
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## 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. 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.
- [4] 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.
- [5] 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.
- [6] 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.
- [7] 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.

- [8] 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.
- [9] 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.
- [10] 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.
- [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.
- [12] A. R. Safavi, A. G. Perotti, and B. M. Popović, “Ultra low density spread transmission,” *IEEE Communications Letters*, vol. 20, no. 7, pp. 1373–1376, 2016. DOI: 10.1109/LCOMM.2016.2564379.
- [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.
- [14] G. Ciaramitaro, M. Brambilla, D. Tagliaferri, E. Bozzi, M. Nicoli, A. Perotti, and U. Spagnolini, “On the impact of road roughness and antenna position on vehicular communications,” *IEEE Wireless Communications Letters*, vol. 11, no. 9, pp. 1875–1879, 2022. DOI: 10.1109/LWC.2022.3185054.
- [15] A. M. Masri, C.-F. Chiasseroni, C. Casetti, and A. Perotti, “Common control channel allocation in cognitive radio networks through UWB communication,” *Journal of Communications and Networks*, vol. 14, no. 6, pp. 710–718, 2012. DOI: 10.1109/JCN.2012.00037.
- [16] D. Riviello, R. Garello, S. Benco, F. Crespi, and A. Perotti, “Spectrum sensing in the TV white spaces,” *IARIA International Journal on Advances in Telecommunications*, vol. 6, no. 3-4, pp. 109–122, 2013. [Online]. Available: <https://www.iariajournals.org/telecommunications/tocv6n34.html>.

## Conference Papers

- [17] G. Montorsi, P. Coccia, A. Perotti, R. Garello, R. Maggiora, S. Benedetto, A. Serra, E. Vassallo, and G. P. Calzolari, “DSP implementation of the newly proposed ccstds telemetry channel coding standard,” in *Proc. International Symposium on Turbo Codes*, Brest, France, Sep. 2000.
- [18] A. Perotti, G. Montorsi, S. Benedetto, G. P. Calzolari, and E. Vassallo, “Implementation of turbo codes for space communications using a multiprocessor DSP board,” in *AIAA International Communications Satellite Systems Conference*, Toulouse, France, Apr. 2001.
- [19] B. Scanavino, A. Perotti, G. Montorsi, and S. Benedetto, “Easy stopping rules for the bit error rate minimization in the iterative decoding,” in *Canadian Workshop on Information Theory*, Vancouver, Canada, Jun. 2001.
- [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.
- [21] A. Perotti, G. Montorsi, and S. Benedetto, “Error statistics of turbo decoder and performance improvement due to outer algebraic block codes,” in *ESA Workshop on Tracking, Telemetry and Channel Coding*, Noordwijk, Netherlands, Oct. 2001.
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- [25] M. Anghilieri, M. Paonni, B. Eissfeller, M. Luise, A. Perotti, A. Tarable, G. López-Risueño, and F. Zanier, “A fresh look into designing channel error protection codes for satellite navigation messages,” in *5th European workshop on GNSS signals and signal processing*, Toulouse, France, Dec. 2011.
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- [27] M. N. Khormuji, A. G. Perotti, Q. Yi, and B. M. Popović, “Multi-modal concurrent transmission,” in *2024 IEEE Wireless Communications and Networking Conference (WCNC)*, 2024, pp. 1–6. DOI: [10.1109/WCNC57260.2024.10570941](https://doi.org/10.1109/WCNC57260.2024.10570941).
- [28] A. G. Perotti, F. Berggren, and B. M. Popović, “Identification codes for wake-up signals,” in *ICC 2024 - IEEE International Conference on Communications*, 2024, pp. 3839–3844. DOI: [10.1109/ICC51166.2024.10622681](https://doi.org/10.1109/ICC51166.2024.10622681).
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- [30] E. Ozfatura, Y. Shao, A. Ghazanfari, A. Perotti, B. Popović, and D. Gündüz, “Feedback is good, active feedback is better: Block attention active feedback codes,” in *ICC 2023 - IEEE International Conference on Communications*, 2023, pp. 6652–6657. DOI: [10.1109/ICC45041.2023.10278839](https://doi.org/10.1109/ICC45041.2023.10278839).
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- [37] P. Remlein, M. Jasinski, and A. Perotti, “Multiuser coded FDM-CPM systems with MIMO transmission,” in *Eighth International Conference on Systems and Networks Communications (ICSNC 2013)*, Venice, Italy, Oct. 2013.
- [38] M. N. Khormuji, B. M. Popović, and A. G. Perotti, “Enabling SWIPT via OFDM-DC,” in *2019 IEEE Wireless Communications and Networking Conference (WCNC)*, 2019, pp. 1–6. DOI: [10.1109/WCNC.2019.8886079](https://doi.org/10.1109/WCNC.2019.8886079).

- [39] B. M. Popović, A. R. Safavi, and A. G. Perotti, “Bit-interleaved low density spread (BI-LDS) transmission,” in *2014 IEEE Wireless Communications and Networking Conference (WCNC)*, 2014, pp. 677–682. DOI: 10.1109/WCNC.2014.6952129.
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- [43] A. G. Perotti and B. M. Popović, “Non-orthogonal multiple access for degraded broadcast channels: RA-CEMA,” in *2015 IEEE Wireless Communications and Networking Conference (WCNC)*, **Awarded Best Paper in the “PHY and Fundamentals” track**, 2015, pp. 735–740. DOI: 10.1109/WCNC.2015.7127561.
- [44] P. Soldati, A. G. Perotti, and B. M. Popović, “Optimal user scheduling and rate selection for REMA broadcast-channel transmission,” in *2016 IEEE Global Communications Conference (GLOBECOM)*, 2016, pp. 1–6. DOI: 10.1109/GLOCOM.2016.7842100.
- [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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- [48] D. Riviello, S. Benco, F. L. Crespi, R. Garello, and A. Perotti, “A comparison between multi-sensor and CP-based spectrum sensing for TV white spaces,” in *3rd workshop of COST Action IC0902*, Ohrid, Macedonia, Sep. 2012. DOI: 10.13140/2.1.1261.6001.
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- [50] L. Torrero, P. Mollo, A. Molino, and A. Perotti, “RF immunity testing of an unmanned aerial vehicle platform under strong EM field conditions,” in *2013 7th European Conference on Antennas and Propagation (EuCAP)*, 2013, pp. 263–267.
- [51] F. L. Crespi, M. Maglioli, S. Benco, and A. Perotti, “A real-time video broadcasting system based on the GNU radio-USRP2 platform,” in *7th Karlsruhe Workshop on Software Radios (WSR 2012)*, Karlsruhe, Germany, Mar. 2012.

## 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.
- [53] K. Katzis, A. Perotti, and L. De Nardis, “Testbeds and implementation issues,” 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.

- [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.

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### GDPR STATEMENT

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