Paul Ferrand

Senior Researcher

27 rue Rieussec, 3 square Vauban
78220 Viroflay, France
+33 6 63 91 83 03
paul@ferrand.cc
http://www.ferrand.cc
34 ans

Current status

Since Oct.2014 **Senior Researcher**, *Huawei Technologies*, French Research Center.
I joined the Signal and Information Processing team of Huawei's research center in Paris in 2014. I am working as an internal consultant, providing expertise to other teams on prototypes and products by working closely with them to understand, model and solve hard problems they encounter during development. I also develop and maintain the simulation platforms and technological assets of my team, and I regularly publish papers and propose patents on the subjects I work on.

Since Feb.2014 **Assistant Professor in Applied Mathematics and Computer Science**.
I am a trained undergraduate/graduate professor with more than 600 hours of lectures and labs. I teach around 40 hours each year in universities on subjects related to mathematics, numerical analysis and signal processing.

Training

2009-2013 **Ph.D. in Electrical Engineering**, *INSA Lyon*, CITI Laboratory.

2008-2009 **M.Sc. in Computer Science**, *INSA Lyon*, Computer Science Department, (with honors).

2003-2008 **M.Eng. in Computer Science**, *INSA Lyon*, Computer Science Department.

Work experiences

2013-2014 **Post-doctoral fellow**, *Inria*, Socrate team, Lyon.
- Distributed interference alignment for cellular networks

2012-2013 **Assistant Professor**, *INSA Lyon*.
- Teaching classes on computer networking, network security, programming languages and databases.

2009-2012 **Ph.D. Student**, *CITI Laboratory*, INSA Lyon.
- *Advisors : Dr. Claire Goursaud and Pr. Jean-Marie Gorce*
- Cooperative communications in Body Area Networks

2009 **M.Sc. student**, *CITI Laboratory*, INSA Lyon.
- *Advisor : Pr. Marine Minier*
- Cryptanalysis of hashing functions derived from the AES block cipher

And before:.
- Research engineer in 2008-2009, implementing cryptographic primitives on embedded systems
- Part-time technical support specialist in 2005-2007 for Microsoft

Technical abilities

Maths Signal processing, statistics and machine learning, optimization theory, information theory

Programming Python, C++, C ; notions of Kotlin, Java, C#

Tools MATLAB, Numpy, Tensorflow/Keras, Mathematica, LaTeX

Systems GNU/Linux, Windows and Microsoft Server products, FreeBSD

Others

Languages Fluent in french and english; beginner in japanese and chinese.

Hobbies I play guitar and piano, and I love to spend time integrating and developing audio applications. In particular, I have been working to implement an open-souce sampler player and drum machine adapted for Raspberry Pis.

Volunteering I am a trained camp counselor and director for various non-profit youth organizations in France. In the past 10 years, I organized multiples gatherings and camps from 50 to 12000 people, including thematic camps aimed at helping teenagers develop and share their talents in music, cinema, photography and theatre.

Publication list

Journal articles

- **(j-07)** P. Ferrand, M. Maso, V. Bioglio. "High-Rate Regular APSK Constellations", **IEEE Trans. Commun., 67(3):2015–2023, 2019**.
- **(j-06)** P. Ferrand. "Mixing Oscillators for Phase Noise Reduction", **IEEE Sig. Proc. Letters, 23(11):1597–1601, 2016**.
- **(j-05)** P. Ferrand, M. Amara, S. Valentin and M. Guillaud. "Trends and Challenges in Wireless Channel Modeling for an Evolving Radio Access", **IEEE Commun. Mag., 54(7):93–99, 2016**.
- **(j-04)** G. C. Alexandropoulos, P. Ferrand, J.-M. Gorce and C. B. Papadias, "Advanced Coordinated Beamforming for the Downlink of Future LTE Cellular Networks", **IEEE Commun. Mag., 54(7):54–60, 2016**.
- **(j-03)** P. Ferrand, J.-M. Gorce. and C. Goursaud. "Approximations of the packet error rate under quasi-static fading in direct and relayed links", **EURASIP Journal on Wireless Commun. and Networking, 2015(1)**.
- **(j-02)** Y. Wu, Y. Chen, J. Tang, D. K. C. So, X. Zikun, P. Ferrand, J.-M. Gorce, C.-H. Tang, P.-R. Li, K.-T. Feng, L.-C. Wang, K. Börner. "Green Transmission Technologies for the Best Energy Efficiency and Spectrum Efficiency Tradeoff". **IEEE Commun. Mag., 52(11):112-120, 2014**.
- **(j-01)** P. Ferrand, M. Maman, C. Goursaud, J.-M. Gorce, and L. Ouvry. "Performance evaluation of direct and cooperative transmissions in body area networks". **Annals of telecommunications, 66:213–228, 2011**.

Patents

- **(b-04)** M. Guillaud, G. He, L. G. Ordóñez, P. Ferrand, A. Decurninge, J.-C. Belfiore, G. Yang. "Devices and methods for multi-antenna communications". **Submitted to the European Patent Office on the 29/08/2018**.
- **(b-03)** P. Ferrand, V. Bioglio, M. Maso. "Apparatus and Methods for Generating a Modulated Signal". **Submitted to the European Patent Office on the 07/11/2017**.
- **(b-02)** P. Ferrand, M. Duarte. "Full Duplex transceiver and receiving method". **Submitted to the European Patent Office on the 22/02/2017**.
- **(b-01)** P. Ferrand. "Mixing circuit to reduce the phase noise and frequency offset variance in local oscillators". **Submitted to the European Patent Office on the 21/02/2016**.

Conference articles

- **(c-18)** M. Guillaud, P. Ferrand, A. Decurninge, L. G. Ordóñez. "Dimensionality Reduction Experiments with Massive MIMO Wireless Channels", **IEEE Communication Theory Workshop (CTW), 2019**.
- **(c-17)** A. Decurninge, L. G. Ordóñez, P. Ferrand, H. Gaoning, L. Bojie, Z. Wei, M. Guillaud. "CSI-based Outdoor Localization for Massive MIMO: Experiments with a Learning Approach", **Int. Symp. Wireless Commun. (ISWCS), 2018**.
- **(c-16)** P. Ferrand, M. Duarte. "Multi-tap Digital Canceller for Full-Duplex Applications", **IEEE Sig. Proc. Advances in Wireless Commun. (SPAWC), 2017**.
- **(c-15)** G. C. Alexandropoulos, P. Ferrand, C. B. Papadias. "On the Robustness of Coordinated Beamforming to Uncoordinated Interference and CSI Uncertainty", **IEEE Wireless Commun. Networking Conf. (WCNC), 2017**.
- **(c-14)** P. Ferrand, A. Decurninge, M. Guillaud, L. G. Ordóñez. "Efficient Channel State Information Acquisition in Massive MIMO Systems using Non-Orthogonal Pilots", **Int. ITG Workshop Smart Ant. (WSA), 2017**.
- **(c-13)** P. Ferrand and S. Yang. "Blind Precoding in Line-of-Sight MIMO Channels", **IEEE Sig. Proc. Advances in Wireless Commun. (SPAWC), 2016**.

- **(c-12)** Y. Fadlallah, P. Ferrand, J.-M. Gorce. "Interference Alignment for Downlink Cellular Networks: Joint Scheduling and Precoding", **IEEE Sig. Proc. Advances in Wireless Commun. (SPAWC), 2016**.
- **(c-11)** J.-M. Gorce, P. Ferrand, L. S. Cardoso. "Energy efficiency - spectral efficiency optimization with distributed interference alignment strategies in 4G cellular networks and beyond". In **URSI Atlantic Radio Sci. Conf. (AT-RASC), 2015**.
- **(c-10)** J.-M. Gorce, D. Tsilimantos, P. Ferrand, H. V. Poor. "Energy-Capacity Trade-off Bounds in a Downlink Typical Cell". In **IEEE Personal, Indoor and Mobile Commun. Conf. (PIMRC), 2014**
- **(c-09)** L. Cardoso, A. Massouri, B. Guillon, P. Ferrand, F. Hutu, G. Villemaud, T. Risset and J.-M. Gorce. "CorteXlab: A Facility for Testing Cognitive Radio Networks in a Reproducible Environment". In **Int. Conf. Cognitive Radio Oriented Wireless Net. (CROWNCOM), 2014**.
- **(c-08)** M. Lauzier, P. Ferrand, H. Parvery, A. Fraboulet, and J.-M. Gorce. "Full mesh channel measurements on body area networks under walking scenarios". In **Eur. Conf. Antennas and Propagation (EUCAP), 2013**.
- **(c-07)** P. Ferrand, C. Goursaud, and J.-M. Gorce. "Common rate maximization in cooperative multiple access channels". In **IEEE Wireless Commun. Networking Conf. (WCNC), 2013**.
- **(c-06)** P. Ferrand, J.-M. Gorce, and C. Goursaud. "Représentation alternative des canaux à relais gaussiens à travers un nœud virtuel". In **24ème colloque Gretsi, 2013**.
- **(c-05)** P. Ferrand, J.-M. Gorce, and C. Goursaud. "Approximations asymptotiques du taux d'erreur paquet et allocation de puissance dans les canaux à relais sous évanouissements lents". In **24ème colloque Gretsi, 2013**.
- **(c-04)** P. Ferrand, J.-M. Gorce, and C. Goursaud. "Power allocation in relay channels under a global power constraint using virtual nodes". In **IEEE Personal, Indoor and Mobile Commun. Conf. (PIMRC), 2013**.
- **(c-03)** P. Ferrand, C. Goursaud, and J.-M. Gorce. "Energy-delay tradeoffs in a linear sequence of relay channels". In **IEEE Wireless Commun. Networking Conf. (WCNC), 2012**.
- **(c-02)** P. Ferrand, C. Goursaud, and J.-M. Gorce. "Cooperation scenarios in cooperative multiple access channels". In **COST IC1004 + iPLAN Joint Workshop on "Small Cell Cooperative Communications", 2012**.
- **(c-01)** P. Ferrand, C. Goursaud, and J.-M. Gorce." On the packet error rate of correlated shadowing links in body area networks". In **Eur. Conf. Antennas and Propagation (EUCAP), 2011**.

Technical Reports

- **(r-02)** P. Ferrand. "Efficient Computation and Covariance Analysis of Geometry-Based Stochastic Channel Models". **Rapport de recherche, sept. 2017**, en ligne : `https://arxiv.org/abs/1709.09891`.
- **(r-01)** P. Ferrand and J.-M. Gorce. "Downlink Cellular Interference Alignment". **Rapport de recherche Inria, n°8543, may 2014**, en ligne : `http://hal.inria.fr/hal-00996728`.

Ph.D. dissertation

Subject	**Cooperative communications in Body Area Networks (BANs)**
Advisors	Dr. Claire Goursaud and Pr. Jean-Marie Gorce
Defense date	2013-06-21
Jury members	Pr. Luis Correia, Pr. Michel Kieffer, Pr. Olivier Berder, Pr. Inbar Fijalkow and Pr. Didier Le Ruyet

Research related activities

Organization

- TPC member for IEEE *Wireless Communications and Networking Conference* (WCNC) in 2018
- TPC member for IEEE *Workshop on Energy Harvesting Wireless Communications* in 2018, in marge de la conférence IEEE ICC
- TPC member for IEEE *Wireless Communications and Networking Conference* (WCNC) in 2017
- Session chair for IEEE *International Symposium on Personal, Indoor and Mobile Radio Communications* (PIMRC) in 2013
- Communication and local organizer for *International Workshop on Propagation and Channel Modeling for Next-Generation Wireless Networks* (IWPCM) in 2011

Reviewer I am a regular reviewer for:

- IEEE Transactions on Communications
- IEEE Communication Letters
- IEEE Transactions on Wireless Communications
- IEEE Journal on Selected Areas in Communications
- IEEE Communications Magazine
- IEEE Wireless Communication Magazine
- IEEE Journal on Selected Areas in Communications
- IEEE Signal Processing Letters
- EURASIP Journal on Wireless Communications and Networking

I also reviewed for the aforementioned conferences, as well as IEEE *International conference on Communications* (ICC), IEEE *Global Communications Conference* (GLOBECOM) and IEEE *International Workshop on Signal Processing Advances in Wireless Communications* (SPAWC).

Teaching activities

Hours breakdown :

Yeat	Lectures	Labs	Classwork	Projects
2019-2020	22h	4h	20h	
2018-2019	8h	12h	6h	
2017-2018	8h	4h	6h	
2016-2017	4h		6h	
2015-2016	12h	5h	10h	
2013-2014	10h	8h	6h	
2012-2013	24h	196h		24h
2011-2012	6h	24h		24h
2010-2011	6h		24h	32h
2009-2010			24h	32h
Total	100h	253h	102h	112h

Main teaching activities

- Assistant Professor in the **Industrial Engineering** department of Insa Lyon in courses related to **"Computer networks"** and computer science in general (2009-2013).
- Assistant Professor in the **Communications** department of Insa Lyon, in courses related to **"Wireless communications"** and **"4th generation mobile networks"** (2012-2014)
- Assistant Professor in **ENSEA Cergy (France)** in courses related to **"Advanced Wireless Communications"** and **"Internet of Things"**
- Assistant Professor in **Paris-Est University (France)** teaching **"Statistics"** for engineering students.
- The lecture notes and slides I designed are available at `http://ferrand.cc/teaching.html`.