

Laurent CLAVIER

IMT Nord Europe
Rue Guglielmo Marconi
59650 Villeneuve d'Ascq
Born on the 5th of November 1969.

Professor (IMT Nord Europe) Signal processing and digital communication. IoT Expert

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Professional Experience

Since 1998 **Professor** at IMT Nord Europe, Villeneuve d'Ascq, **research** at CERI SN (IMT Nord Europe), IEMN (Institut d'Electronique, de Microélectronique et de Nanotechnologies ; CNRS, UMR 8520) and IRCICA (Institut de Recherche en Composants logiciel et matériel pour l'Information et la Communication Avancée, CNRS, USR 3380).

Research:

- Domains : PHYsical layer of wireless communication networks (cellular, local, *ad hoc*, sensor networks), modeling interference (impulsive noise, alpha-stable process), characterizing and statistical modeling of the channel (Ultra-Wide Band, millimeter wave), cooperative communications, multiple access techniques, CDMA, UWB, channel coding. This research activity is closely linked to the hardware architecture in IEMN and to the MAC and network layers with CRISAL (Laboratoire d'Informatique Fondamentale de Lille) and INRIA. Expert in IoT and autonomous connected objects.

Responsibilities, projects and International Activities:

- **Responsible of the axis ARTS** (Autonomous and Resilient Systems) in IMT Nord Europe (16 permanent positions).
- **Responsible of department** "Communication systems and microwave applications" in IEMN (IEMN counts around 500 members (including PhD, Post-docs and administration) and 5 departments) (2015-2019).
- Chair of the **COST action CA-20120, INTERACT** (November 2021 – October 2025).
- IMT-NE coordinator **PEPR-NF**, Programme et Équipement Prioritaire de Recherche (PEPR), Développement de technologies avancées de la 5G et réseaux du futur, dans le cadre de la Stratégie d'accélération sur la 5G et les réseaux du futur (2023-2029).
- Partner **ECOTRAIN** project, plan France 2030. 2022-2025.
- IMT-NE coordinator **Beyond 5G** project, stratégie d'accélération, souveraineté de la 5G et des réseaux de Télécommunication, Octobre 2021 – December 2024.
- Co-ordinator **National Research Agency (France government) Project U-Wake**, kick off Mars 2021.
- Partner ADEME PERFECTO project GOODFLOW, Septembre 2021 - Septembre 2023.
- Partner **National Research Agency (France government) Project WISTTITWIN**, Kick off Janvier 2021, SIOMRI APPRENTIS, Sep. 2021.
- Partner Regional project STIMULE VIP², Région Haut De France,
- Partner IMMUNET project, COST innovator Grant, Mai 2020 à Octobre 2021
- Partner **EmulRadio4Rail** Emulation of Radio access technologies for Railway communications, European Work program S2R-OC-IP2-03-2018 Research and Innovation action **2018-2020**.
- French representative and core group member of the **COST action CA-15104, IRACON** (March 2016 – March 2020). French representative of the **COST action IC-1004**, « Cooperative Radio Communications for Green Smart Environments » May 2011 – April 2015. Participation to the **COST action 273** ("Towards Broadband Multimedia Networks") and **COST action 2100** ("Pervasive Mobile & Ambient Wireless Communications"). Management committee meeting organization in Lille in October 2008. Organization of a training school on "Cooperating Objects and Wireless Sensor Networks" in Bologna, May 2010.
- **National Research Agency (France government) Project ARBURST**, "Achievable region of multi-users bursty wireless communications" 2016-2020, **Project PERSEPTEUR**, "3D Virtual Platform for Wireless Sensor Network Simulation" – 2015-2018, **Project WASABI**: "Wireless System And SystemC-AMS Basic Infrastructure" – 2008-2011.
- **Merlion project with A*STAR in Singapore** – 2015-2016. Ten days stay in June 2015.
- **Internal Grant for international cooperation with ISM Tokyo** (participants: London, UK, UCL, Dr. Gareth Peters; University of Lille, France, François Septier and Laurent Clavier; Switzerland, ETH

Zurich: Prof. Mario V. Wüthrich; Singapore, the Institute for Infocomm Research (I²R), A-STAR, Dr. Ido Nevat; Japan, ISM, Prof. Tomoko Matsui (2015). Three weeks stay in ISM in July 2015.

- Invited talk to the Franco-Indonesian Workshop: “Overseas Telecommunications, Connection for the future”, November 2014.
- Leader of 4 projects from the Institut TELECOM (“Preparation of future generation wideband indoor networks: 60 GHz channel: modelling and communication systems optimisation” – 2001 and 2002, Channel and physical layer model for sensor networks – 2007, Interference Management in Internet of Things - 2010).
- Participation to GdR (French research groups) Waves and Signal, ISIS, SoC-SIP. Organization of a meeting on wireless cooperative networks the 12th of June 2008 in TELECOM Paris.
- European Regional Development Fund “Next generation local area networks” (leader) and “Mobile Communicating Objects” including a demonstration platform) – 2000-2003; “Multimedia and multisupport short range Communications” – 2004-2007; Campus Ambient Intelligence (2007-2013)

Teaching:

- Creation of several 4 weeks courses on Communicating Objects and 5G for fifth year students (M2).
- Digital communications, channel coding, multiple access schemes, CDMA, radio channel, deterministic and random signals, time – frequency analysis, wavelets, hidden Markov chains, classification methods, Matlab from 1st to 5th engineering school year. Programs’ responsibility.
 - Lecture on cooperation in sensor networks at the COST 2100 *training school* (May 2010).
 - Invited in Alger (University of Sciences and Technology Houari Boumediene) for a lecture on UWB and cooperation in sensor networks (June 2010).

1994- **PhD**: Signal processing applied to electrocardiograms, in TELECOM Bretagne, Brest; director: J.M. Boucher.
1997 Defended the 18th of December 1997.

1992- **Enterprise project** in collaboration with Philips: «*Behaviour comparison of MOSFETS and their models on simulator ACCUSIM of MENTOR GRAPHICS*».
1993 Université de Manchester, Angleterre.

1992 **Placement** «*Use of microprocessor DSP 56001 in signal processing*»
IFREMER (Frenc Institute for Research and exploiting the sea), Brest, France.

Education

2009 **HDR**, *Signal processing and wireless communication*, University of Lille 1.

1997 **PhD**, University of Rennes I in signal processing (mention *très honorable*)

1994 **DEA STIR** (Signal, Telecommunications, Image Radar), specialty Telecommunications, University of Rennes I (mention *Assez Bien*)

1993 **Engineer** from ENSEEIHT (Ecole Nationale Supérieure d'Electrotechnique, d'Electronique, d'Informatique et d'Hydraulique de Toulouse), specialty electronics.
Last year in Manchester University, England.

Skills

- **Wireless standards**: cellular – 2G to 5G, IoT (IEEE 802.15, LP-WANs), WLANs (IEEE 802.11)
- **Digital communications**: information theory, channel coding, multiple access techniques (CDMA), UWB, radio channel, interference modeling, non linear receivers.
- **Physical layer**: cellular networks, WLAN, *ad hoc* networks, sensor networks.
- **Signal processing**: alpha-stable process, time-frequency, wavelets, Markov chains, speech coding.
- **Matlab**
- **Fluent in English**

PhD advisor

1. Mamadou Ngom “Interference models for IoT”, PhD since December 2021.
2. Mohammed Mallik “MAPs of Electro-Magnetic Fields”, PhD since November 2020.
3. Angesom Ataklity Tesfay “Versatile *in situ* platform for 5G physical layer evaluation”, PhD Defended October 2021.
4. Zheng Ce, “Impact of impulsive – dependent interference on radio communications”, PhD Defended December 2020.
5. Yasser Mestrah, "Systèmes Robustes de Communication" PhD Defended 16th of December 2019 (co-direction Guillaume Gellé, Université de Reims Champagne Ardennes).
6. Nicolas De Araujo Moreira, "On heterogeneous networks under non-Gaussian interferences: experimental and theoretical aspects", PhD Defended 11th July, 2019.
7. Umer Noreen, "3D Modelling of Communication Links For Sensor Networks in Intelligent Cities", PhD Defended 20 May 2018, (co-Direction Aheène Bounceur, Université de Bretagne Occidentale).

8. Mauro Lopes De Freitas, "Next Generation heterogeneous and Autonomous Networks", PhD Defended the 13th of June 2018 (co-supervisor: Malcolm Egan, CITI, INSA Lyon).
9. Victor Toldov, "Interference and adaptability for a complete autonomy of nodes in a sensor network", PhD Defended the 24th of January 2017, co-director Nathalie Mitton, INRIA, Lille.
10. Roman Igual-Pérez, "Measuring and modeling energy consumption for nodes in large and heterogeneous networks", PhD Defended the 27th of June 2016, co-supervisors Alexandre Boé (IEMN), Thomas Vantroys (CRISAL).
11. Xin yan, "Modeling impulsive interference and its dependence structure", PhD defended the 10th of December 2015.
12. Ilias Sirokopoulos, "Continuous-time Digital Signal Processing for Ultra-low Power Wireless Sensors Network Nodes", PhD defended the 14th of December 2015, co-director Antoine Frappé.
13. Mirabelle Handème, "RFID in confine middles ", PhD defended the 1st of October 2015, co-director Philippe Mariage.
14. Kouakou Kouassi, "Wave forme and interference in UWB", PhD Defended the 22th of November 2012, Co-directed by University of Lille 1 and University of Abidjan, Ivory Coast. Co-director : Pr. Doumbia Issa.
15. Gu Wei, "Turbo codes and cooperative communications in impulsive environment", PhD since Septembre 2009.
16. Abdelbasset El Massouri, "Radio channel and RF transceivers simulation in systemC-AMS applied to sensor networks", PhD defended 14th of January 2012, co-director : Pr. Andréas Kaiser.
17. Hassen Benmaad, "LDPC codes in impulsive environments", PhD defended the 1st of July 2011, University of Reims, Champagne-Ardenne. Co-director : Pr. Guillaume Gelle.
18. Jiejia Chen, "Multi-hop transmissions: impact of material characteristics and of multiple access interference", PhD defended the 17th of December 2010, University of Lille 1. Co-director : Pr. Nathalie Rolland.
19. Hamza ElGhannudi, "Multiple access interference and performance of an impulse radio ultra wide band system up converted in the 60 GHz band for ad hoc networks", PhD defended the 13th of December 2007, University of Lille 1. Co-director : Pr. Paul-Alain Rolland.
20. Rodrigue Okouyi, "Feasibility of a system based on DS-CDMA for future wireless local area networks in the 60 GHz band", PhD defended the 1st of February 2006, University of Lille 1. Co-director : Yves Delignon.

Other activities

- Reviewer for several journals and conferences (IEEE Trans. on Communications, IEEE Trans. on Wireless Communications, IEEE Trans. On Signal Processing, IEEE Trans. on Vehicular Technology, European Trans. on Communication, , GretsI, PIMRC2013, PIMRC2014, VTC, Globecom, Chinacom, ICC...).
- TPC Member PIMRC, JNCW 2011 (NEWCOM++ / COST 2100 Joint Workshop on Wireless Communications, 1 – 2 March 2011, Paris, France) and International Workshop on Propagation and Channel Models for Next Generation Wireless Systems, March 2-4, 2011, Lyon, France.
- Workshop Chairs for PIMRC 2015.
- I have been a jury member in more than 50 PhDs and HDRs.

Publications

HDR

- [1] L. Clavier. *Modeling radio channel and interference for ambient intelligence*. Mémoire de HDR, Université de Lille I, 27 Novembre 2009.

Defended in front of the following jury:

Pr. Luis M. Correia Université Technique de Lisbonne, Portugal, Reviewer.

Pr. Samir Saoudi TELECOM Bretagne, Institut TELECOM, Reviewer.

Pr. Bernard Uguen Université de Rennes 1, Reviewer.

Pr. Jean-Marie Gorce INSA Lyon, Member.

Pr. Mérouane Debbah SUPELEC Gif-Sur-Yvette, Member.

Pr. Philippe Vanheeghe École Centrale de Lille, President.

Pr. Paul Alain Rolland Université Lille 1 Sciences et Technologies, Director.

PhD

- [2] L. Clavier. *Analysis of the electrocardiograms in order to detect patients at risk of atrial fibrillation*. PhD thesis, University of Rennes I, December 1997.

Defended in front of the following jury:

Monsieur Jean-Jacques Blanc, professeur at the Faculté de Médecine de Brest (president).

Monsieur Hervé Rix, professeur à l'Université de Nice - Sophia Antipolis (reviewer).

Monsieur Paul Rubel, professeur à l'INSA de Lyon (reviewer).

Monsieur Jean-Marc Boucher, Habilité à diriger des recherches à TELECOM Bretagne (director).
Monsieur Guy Carrault, maître de conférences à l'Université de Rennes I (member).
Monsieur Lotfi Senhadj, maître de conférences à l'Université de Rennes I (member).

Patent

- [3] Patent N° 18305464.2, Methods and systems for processing an encoded signal received from a noisy channel, date of filing 13.04.18 (European patent)

Book chapters

- [4] Jan Sykora, Andreas Czylik, Laurent Clavier, Alister Burr, *Chapter 5 - Coding and processing for advanced wireless networks*, Editor(s): Claude Oestges, François Quitin, Inclusive Radio Communications for 5G and Beyond, Academic Press, 2021, Pages 121-140.
- [5] Chiara Buratti, Erik Ström, Luca Feltrin, Laurent Clavier, Gordana Gardašević, Thomas Blazek, Lazar Berbakov, Titus Constantin Balan, Luis Orozco-Barbosa, Carles Anton-Haro, Piotr Rajchowski, Haibin Zhang, *Chapter 7 - IoT protocols, architectures, and applications*, Editor(s): Claude Oestges, François Quitin, Inclusive Radio Communications for 5G and Beyond, Academic Press, 2021, Pages 187-220
- [6] A. A. Tesfay, E. P. Simon, I. Nevat and L. Clavier, "Power Domain NOMA Without SIC in Downlink CSS-Based LoRa Networks", Distributed Computer and Communication Networks: Control, Computation, Communications, 23rd International Conference, DCCN 2020, Moscow, Russia, September 14-18, 2020, Revised Selected Papers, Pages 3-13
- [7] Congduc Pham, AHCÈNE BOUNCEUR, Laurent Clavier, UMBER NOREEN, MUHAMMAD EHSAN, *LPWAN Technologies for IoT and M2M Applications Chapter 4 "Radio channel access challenges in LoRa low-power wide-area networks"*, Editor(s): Bharat S. Chaudhari, Marco Zennaro, Academic Press, 2020, 65-102.
- [8] N. Azaoui, L. Clavier, A. Guillin, G.W. Peters, *Spectral measures of α -stable distributions : an overview and natural applications in wireless communications*, in *Theoretical aspects of spatial-temporal modeling*, Peters G.W., Matsui T. (Eds), Springer Japan (25/12/2015) chapter 3, 63-94
- [9] L. Clavier, D. Vukobratovic, M. Wetz, W. Teich, A. Czylik, K. Kansanen, *Advanced coding, modulation and signal processing*, in *Pervasive mobile and ambient wireless communications*, Verdone R., Zanella A. (Eds), Springer London (2012) Part 2, 373-404
- [10] L. Clavier, *Multi-user systems and multi-user detection in Mobile Broadband Multimedia Networks, Techniques, Models and Tools for 4G*, Correia L.M. (Ed), Academic Press (2006) chapter 3.5.

Report

- [11] M. Bafleur, L. Clavier and J.M. Dilhac *Un aperçu des réseaux de capteurs sans fil au Japon : de la gestion de l'énergie à l'architecture des réseaux*. Publication disponible auprès de l'Agence pour la Diffusion de l'Information Technologique (ADIT), 2, rue Brûlée, 67000 Strasbourg (<http://www.adit.fr>), Juillet 2008

International journals

- [1] Lala Rajaoarisoa, Nacer Kouider M'Sirdi, Moamar Sayed-Mouchaweh, Laurent Clavier, "Decentralized fault-tolerant controller based on cooperative smart-wireless sensors in large-scale buildings," J. of Network and Computer Applications, Vol. 214, 2023
- [2] A. A. Tesfay, S. Kharbech, E. P. Simon and L. Clavier, "Signal Denoising and Detection for Uplink in LoRa Networks Based on Bayesian-Optimized Deep Neural Networks," in *IEEE Communications Letters*, vol. 27, no. 1, pp. 214-218, Jan. 2023, doi: 10.1109/LCOMM.2022.3217337.
- [3] Mallik, M.; Tesfay, A.A.; Allaert, B.; Kassi, R.; Egea-Lopez, E.; Molina-Garcia-Pardo, J.-M.; Wiart, J.; Gaillot, D.P.; Clavier, L. "Towards Outdoor Electromagnetic Field Exposure Mapping Generation Using Conditional GANs." *Sensors* 2022, 22, 9643. <https://doi.org/10.3390/s22249643>
- [4] R. Chevillon, G. Andrieux, L. Clavier, J.F. Diouris, "Stochastic Geometry-based Analysis of the Impact of Underlying Uncorrelated IoT Networks on LoRa Coverage", *IEEE Access*, 2022
- [5] C. Zheng, M. Egan, L. Clavier, G.W. Peters, J.M. Gorce, "On the Interference Arising From Random Spatial Fields of Interferers Utilizing Multiple Subcarriers", *EURASIP Journal on Wireless Communications and Networking*, 2022
- [6] L. Clavier, G.W. Peters, F. Septier, I. Nevat, "Impulsive Noise Modeling and Robust Receiver Design.", *EURASIP Journal on Wireless Communications and Networking* 2021 (1), 1-30
- [7] C. Zheng, M. Egan, L. Clavier, A. E. Kalør and P. Popovski, "Stochastic Resource Optimization of Random Access for Transmitters With Correlated Activation," in *IEEE Communications Letters*, vol. 25, no. 9, pp. 3055-3059, Sept. 2021
- [8] A. Bharti, R. Adeogun, X. Cai, W. Fan, F.-X. Briol, L. Clavier, T. Pedersen, "Joint Modeling of Received Power, Mean Delay, and Delay Spread for Wideband Radio Channels", in *IEEE Transactions on Antennas and Propagation*, vol. 69, no. 8, pp. 4871-4882, Aug. 2021, doi: 10.1109/TAP.2021.3060099.

- [9] L. Clavier, T. Pedersen, I. Larrad, M. Lauridsen and M. Egan, "Experimental Evidence for Heavy Tailed Interference in the IoT," in *IEEE Communications Letters*, vol. 25, no. 3, pp. 692-695, March 2021, doi: 10.1109/LCOMM.2020.3034430.
- [10] Sébastien Lalléchère; Lala Rajaoarisoa; Laurent Clavier; Raul Sanchez Galan; Blaise Ravelo. Bandpass NGD function design for 5G microwave signal delay synchronization application. *Comptes Rendus. Physique*, Tome 22 (2021) no. S1, pp. 53-71. doi : 10.5802/crphys.68. <https://comptes-rendus.academie-sciences.fr/physique/articles/10.5802/crphys.68/>
- [11] Ben Chaabane, S.; Belazi, A.; Kharbech, S.; Bouallegue, A.; Clavier, L. Improved Salp Swarm Optimization Algorithm: Application in Feature Weighting for Blind Modulation Identification. *Electronics* 2021, 10, 2002. <https://doi.org/10.3390/electronics10162002>
- [12] A. A. Tesfay, E. P. Simon, I. Nevat and L. Clavier, "Multiuser Detection for Downlink Communication in LoRa- Like Networks," in *IEEE Access*, vol. 8, pp. 199001-199015, 2020, doi: 10.1109/ACCESS.2020.3034973.
- [13] Y Mestrah, A Savard, A Goupil, G Gellé, L Clavier, "An Unsupervised LLR Estimation with unknown Noise Distribution", *EURASIP Journal on Wireless Communications and Networking* 2020 (1), 1-11
- [14] Ouendi S., Arico C., Blanchard F., Codron J.L., Wallart X., Taberna P.L., Roussel P., Clavier L., Simon P., Lethien C, "Synthesis of T-Nb2O5 thin-films deposited by atomic layer deposition for miniaturized electrochemical energy storage devices", *Energy Storage Mater.* 16 (2019) 581-588
- [15] M. Egan, L. Clavier, Z. Ce Zheng, M. de Freitas and J.-M. Gorce, "Dynamic interference for uplink SCMA in large-scale wireless networks without coordination", *EURASIP Journal on Wireless Communications and Networking*, Aug. 2018
- [16] De Freitas M., Egan M., Clavier L., Goupil A., Peters G.W., Azzaoui N., "Capacity bounds for additive symmetric α -stable noise channels", *IEEE Trans. Inf. Theory* 63, 8 (2017) 5115-5123.
- [17] Zhang P.F., Nevat I., Peters G., Clavier L., "Event detection in sensor networks with non-linear amplifiers via mixture series expansion", *IEEE Sens. J.* 16, 18 (2016) 6939-6946
- [18] Nevat I., Peters G.W., Avnit K., Septier F., Clavier L., "Location of things: geospatial tagging for IoT using time-of-arrival", *IEEE Trans. Signal Inf. Process. Netw.* 2, 2 (2016) 174-185
- [19] N. Jaoua, E. Duflos, P. Vanheeghe, L. Clavier, F. Septier, "Joint estimation of state and noise parameters in a linear dynamic system with impulsive measurement noise : application to OFDM systems", *Digit. Signal Process.*, 35 (2014) 21-36.
- [20] V. Dimanche, A. Goupil, L. Clavier, G. Gellé, "On detection method for soft iterative decoding in the presence of impulsive interference", *IEEE Commun. Lett.*, 18, 6 (2014) 945-948
- [21] P. Mariage, M.M. Handème Nguema, L. Clavier, "Study of the readability of passive UHF RFID tags placed inside a cargo van by a reader located outside", *J. Commun. Softw. Syst.* 10, 2 (2014) 76-82 (published june 2014)
- [22] H. BenMaad, A. Goupil, L. Clavier, G. Gellé, "Clipping demapper for LDPC decoding in impulsive channel", *IEEE Commun. Lett.*, 17, 5 (2013) 968-971
- [23] K. Kouassi, L. Clavier, I. Doumbia, P.A. Rolland, "Optimal PWR codes for TH-PPM UWB multiple-access interference mitigation", *IEEE Commun. Lett.*, 17, 1 (2013) 103-106
- [24] Wei Gu, L. Clavier "Decoding metric study for turbo codes in very impulsive environment", *IEEE Commun. Lett.*, 16, 2 (2012) 256-258.
- [25] Jiejia Chen, A. Massouri, L. Clavier, C. Loyez, N. Rolland, P.A. Rolland "Relay characteristic impact on energy consumption in heterogeneous sensor network", *AEU-Int. J. Electron. Commun.*, 66, 6 (2012) 495-50.
- [26] Jiejia Chen, L. Clavier, N. Rolland, and P.A. Rolland. "Alpha-stable multiple access interference modelling for amplify-and-forward multihop ad hoc networks" in *Electronics Letters*, Vol 46, n° 16, pp 1160 - 1162, Aug. 2010.
- [27] H. El Ghannudi, L. Clavier, N. Azzaoui, F. Septier, and P.A. Rolland. "Alpha-stable interference modeling and Cauchy receiver for an IR-UWB ad hoc network" in *IEEE Transactions on Communications*, Vol 58, n° 6, pp 1748-1757, Jun. 2010.
- [28] N. Azzaoui, and L. Clavier. "Statistical channel model based on alpha-stable random processes and application to the 60 GHz Ultra Wide Band channel" in *IEEE Transactions on Communications*, Vol 58, n° 5, pp 1457-1467, May 2010.
- [29] C. Lethien, C. Loyez, J.P. Vilcot, L. Clavier, M. Bocquet, P.A. Rolland. "Indoor coverage improvement of MB OFDM UWB signals with radio over POF system", in *Optics Communications*, 2009.
- [30] A. Boé, L. Clavier, R. Okouyi, N. Rolland and P.A. Rolland, "Sectorized antennas for CDMA based *ad hoc* networks at 60 GHz", *Proceedings of the European Microwave Association*, Vol. 3, pp 228–235 Sept. 2006.
- [31] N. Deparis, A. Bendjabballah, A. Boé, M. Fryziel, C. Loyez, L. Clavier, N. Rolland, P.A. Rolland, "Transposition of a baseband UWB signal at 60 GHz for high data rate indoor WLAN", *IEEE Microwave and Wireless Components Letters*, Volume 15, Issue 10, pp 609-611, Oct. 2005
- [32] M. Fryziel, C. Loyez, L. Clavier, N. Rolland, P.A. Rolland, "Path loss model of the 60 GHz indoor radio channel", *Microwave and optical technology letters*, Vol. 34, No. 3, pp 158 - 162 5 August 2002
- [33] L. Clavier, J.M. Boucher, R. Lepage, J.J. Blanc, J.C. Cornily, "Automatic P-wave analysis of patients prone to atrial fibrillation", *Medical and Biological Engineering and Computing*, Vol. 40, p 63-71, Jan 2002.

National journals

- [34] L. Clavier, J.M. Boucher, J.J. Blanc, K. Provost, "Classification automatique des patients à risque de fibrillation auriculaire", *ITBM Innovation et Technologie en Biologie et Médecine*, Vol 20, N°1, p 33-41, Jan 1999.

International conferences

- [35] G. Marthe, C. Goursaud, R. Cazé and L. Clavier, "On exploiting the synaptic interaction properties to obtain frequency-specific neurons," 2023 IEEE 16th Dallas Circuits and Systems Conference (DCAS), Denton, TX, USA, 2023, pp. 1-6, doi: 10.1109/DCAS57389.2023.10130264. (BEST PAPER AWARD)
- [36] G. Marthe, C. Goursaud and L. Clavier, "Wake-up radio receiver based on Spiking Neurons for detecting activation sequence," 2023 IEEE Wireless Communications and Networking Conference (WCNC), Glasgow, United Kingdom, 2023, pp. 1-6, doi: 10.1109/WCNC55385.2023.10118713.
- [37] Y. Mestrah, D. Anade, A. Savard, A. Goupil, M. Egan, P. Mary, J.M. Gorce, L. Clavier, "Unsupervised Log-Likelihood Ratio Estimation for Short Packets in Impulsive Noise", *IEEE Wireless Communications and Networking Conference (WCNC)*, 2022.
- [38] C. Zheng, M. Egan, L. Clavier, A. Kalør, P. Popovski, "Stochastic Resource Allocation for Outage Minimization in Random Access with Correlated Activation", *IEEE Wireless Communications and Networking Conference (WCNC)*, 2022
- [39] M. Mallik, S. Kharbech, T. Mazloun, S. Wang, J. Wiart, D.P. Gaillot, L. Clavier "EME-Net: A U-net-based Indoor EMF Exposure Map Reconstruction Method," 2022 16th European Conference on Antennas and Propagation (EuCAP), 2022, pp. 1-5, doi: 10.23919/EuCAP53622.2022.9769645.
- [40] A. A. Tesfay, E. P. Simon, S. Kharbech and L. Clavier, "Deep Learning-based receiver for Uplink in LoRa Networks with Sigfox Interference," 2022 18th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob), Thessaloniki, Greece, 2022, pp. 25-29, doi: 10.1109/WiMob55322.2022.9941543.
- [41] L. Clavier, T. Pedersen, I. Rodriguez, M. Egan, "Alpha-Stable Model for Interference in IoT Networks." *IEEE International Conference on Antenna Measurements and Applications*, Antibes Juan-Les-Pins, France, pp. 575-578, 15-17 Nov. 2021
- [42] A.A. Tesfay, E.P. Simon, S. Kharbech, L. Clavier, "Deep Learning-based Signal Detection for Uplink in LoRa-like Networks", *IEEE 32nd Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, pp. 617-621, Sep. 2021
- [43] M. Berbineau, A. Sabra, V. Deniau, C. Gransart, R. Torrego, A. Arriola, I. Val, J. Soler, Y. Yan, A. Vizzarri, F. Mazzenga, S. Kharbech, L. Clavier, R. Kassi, Redha and J.M. García-Loygorri, "Zero on site testing of railway wireless systems: the Emulradio4Rail platforms", *IEEE 93rd Vehicular Technology Conference (VTC2021-Spring)*, Apr. 2021, pp. 1-5
- [44] A. A. Tesfay, E. P. Simon, I. Nevat and L. Clavier, "Power Domain NOMA Without SIC in Downlink CSS-Based LoRa Networks", *23rd International Conference, DCCN 2020, Moscow, Russia*, September 14-18, 2020.
- [45] M. Egan, L. Clavier, "Multivariate α -Stable Models in OFDM-Based IoT Networks with Interference From a Poisson Spatial Field of Interferers", *23rd International Conference, DCCN 2020, Moscow, Russia*, September 14-18, 2020,
- [46] A. A. Tesfay, E. P. Simon, G. Ferré and L. Clavier, "Serial Interference Cancellation for Improving uplink in LoRa-like Networks," *2020 IEEE 31st Annual International Symposium on Personal, Indoor and Mobile Radio Communications*, London, United Kingdom, August 2020, pp. 1-6, doi: 10.1109/PIMRC48278.2020.9217060.
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