Nicolas Barbot

Assistant Professor

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Graduated from the University of Limoges in 2010, I started my career in the field of wireless communications where I obtained the PhD in 2013 at Xlim (Limoges) on channel coding at the physical and application layer. I continued with a post-doc at L2S (Gif/Yvette) on the design of cross-layer receivers under the supervision of Pr. Michel Kieffer. In 2014, I obtained an assistant professor position at LCIS in an RF oriented team. My research activities focus on RFID technology which was already present in the laboratory. Today, I initiate my own activities in the field of non-linear and/or time-variant systems. These systems allow to break the limitations of linear time-invariant systems (LTI) in terms of reading distance and coding capacity. These activities are part of the themes carried by the laboratory, and make it possible to use the knowledge acquired in the first part of my career.

My scientific interests cover chipless RFID technology (LTI systems), classical RFID technology (LTV systems), harmonic transponders (NLTI systems). The design of antennas and instrumentation exploiting these non-linear and/or non-time-invariant effects are also at the heart of my concerns.

Professional experience

2014–2021 **Assistant Professor**, *Grenoble INP/Esisar, Laboratoire de Conception et d'Intégration des Systèmes (LCIS)*.

2014–2014 **Post-PhD**, *Laboratoire des Signaux et Systèmes (L2S)*, Gif/Yvette, Cross-layer design for wireless communications.
Supervisor: Michel Kieffer

2010–2013 **PhD Thesis**, *Xlim CNRS UMR 7252*, Limoges, Channel coding for optical wireless channel.
Supervisor: Anne Julien-Vergonjanne, Co-supervisor: Stéphanie Sahuguède.

Education

2009–2010 **Master**, *Faculté des Sciences*, Limoges, Technologies Hyperfréquences, Électronique et Optique.

2007–2010 **Engineer's degree**, *École Nationale Supérieure d'Ingénieurs de Limoges*, Électronique et Télécommunications.

2005–2007 **DUT Mesures Physiques**, *IUT du Limousin*, Limoges.

Summary of publications and scientific production

24 **Journal Articles**, *(20 over 2017/18 – 2020/21)*.

29 **Conferences**, *(21 over 2017/18 – 2020/21)*.

5 **National Conferences**, *(3 over 2017/18 – 2020/21)*.

Teachings

Code	Course Name	Nb. Stu.	Grade	Type	ECTS	HETD
CE515	Processors Architecture	32	BAC+5	CM/TP	4	10 h
PX504	Inovation Projects	8	BAC+5	Projet	4	9 h
AC469	Signal Processing	20	BAC+4	TP	1.5	18 h
SC311	Wireless Communication	88	BAC+3	CM/TD	2.5	36 h
MA331	Information Theory and Coding	88	BAC+3	CM	3	18 h
PX302	3A Projects	50	BAC+3	TP	3	30 h
PX300	Modules d'Ouverture	35	BAC+3	Projet	2	0 h
PX212	Mini-projet	30	BAC+2	Projet	6	40 h

CE515 Processors Architecture

This course allows students to develop and optimize applications on ARMv7A family using the NEON extension. The labs are built around a Zynq 7000 SoC from Xilinx. The course consists of a single CM and 6 TP and is taught in English.

PX504 Inovation Projets

Innovation projects allow groups of 4 students to respond to a multidisciplinary issue by providing an innovative response. The subjects are proposed by the teachers. (Topics proposed in 2020: Transmission information by load modulation based on the use of classic GPIOs of a micro-controller, Design and implementation of a DC micro-grid network.)

AC469 Signal Processing

The course concerns apprentice students and allows to characterize the noise related to quantization in Delta-Sigma analog-to-digital converters.

SC311 Wireless Communications

This course describes how a message can be modulated and transmitted over a transmission channel. The analog and digital modulation techniques, and the architecture of the corresponding receivers are covered.

MA331 Information Theory and Coding

This course describes the steps for transmitting a message reliably over an unreliable channel. Source coding and channel coding techniques are approached from a theoretical and practical point of view.

PX302 3A Projet

These labs allow the students to learn and program STM32 microcontrollers. This course was set up in partnership with STMicroelectronics. Lab support is also available on the official ST website. This course is entirely based on labs.

PX300 Modules d'ouverture

This course is a bit special because it allows students to carry out various actions with middle school and high school students in the region. This course is takes place throughout the year and is not placed in the timetable.

PX212 Mini-Projet

These projects extend over a period of 3 full-time weeks for students. The objective is to design a robot allowing to realize various tasks (movement, obstacle avoidance, communications, decoding of messages sent by a beacon). The mini project ends with a competition between the different student robots.

Doctoral and Scientific Supervision

PhD Students

2020–2023 **Ashkan Azarfar**, Doppler-based chipless tag detection for gesture recognition applications.
Supervisor: Etienne Perret (50%), Co-supervisor: Nicolas Barbot (50%).
Thése débutée le 14/12/20.
Funding: ERC ScattererID.
Journals: 1, Conferences: 1 [2].

2019–2022 **Florian Requena**, Robust chipless RIFD tag design for sensor applications.
Supervisor: Etienne Perret (33%), Co-supervisor: Darine Kaddour (33%), Nicolas Barbot (33%).
Start: 01/10/19.
Funding: École Doctorale EEATS.
Journals: 1 [7], Conferences: 1 [3].

2019–2022 **Raymundo de Amorim Junior**, Millimeter chipless tags for secure applications.
Supervisor: Etienne Perret (33%), Co-supervisor: Romain Siragusa (33%), Nicolas Barbot (33%).
Start: 04/01/19.
Funding: ANR Australe.
Journals: 2 [5],[11], Conferences: 1 [4].

2017–2020 **Raphael Tavares de Alencar**, Contribution to the design and production of chipless RFID tags compatible with industrial manufacturing processes.
Supervisor: Etienne Perret (33%), Co-supervisor: Marco Garbati (33%), Nicolas Barbot (33%).
Start: 06/01/17, Defense: 12/10/20.
Funding: Cifre (MGI).
Journals: 1 [10], Conferences: 2 [9],[10].

2015–2019 **Mushir Ahmed**, Authentication of microchips using non-intrusive RF and THz approaches.
Supervisor: Etienne Perret (33%), Co-supervisor: Maxime Bernier (33%), Romain Siragusa (33%).
Start: 12/01/15, Defense 02/04/19.
Funding: Projet Idex.
Journals: 4 [12],[15],[17],[21], Conferences: 4 [8],[15],[19],[23].

2015–2019 **Ali Zeshan**, Chipless RFID tag authentication using non-intrusive RF approaches.
Supervisor: Etienne Perret (33%), Co-supervisor: Romain Siragusa (33%), Frederic Garet (33%).
Start: 10/01/15, Defense 03/14/19.
Funding: Projet Région.
Journals: 5 [7], [11], [15], [17], [21], Conferences: 2 [16],[22].

Post-PhD

2019–2022 **Olivier Rance**.
Etienne Perret (50%), Nicolas Barbot (50%).
Funding: ERC Scatterer ID.
Journals: 1 [8], Conferences: 1 [6].

Master students

2020 **Alexandre Oliviera**, Non reciprocal antennas.
Funding LCIS, PFE (6 mois)

2019 **Gregory Ahungwa**, Gesture recognition using machine learning algorithms.
Funding LCIS, PFE (6 mois)

2017 **Tran Thi Thanh Tam**, Localization based of the phase measurement of chipless tags.
Funding LCIS, PFE (6 mois)

Scientific Engagements

- Team leader of the ORSYS group of the LCIS laboratory (6 permanent members).
- Reviewer for IEEE Trans. Microw. Theory Techn, IEEE RFID J., IEEE Trans. Antennas Propag., IEEE Access et IEEE Sensors J.(15 reviews over 2017/18 – 2020/21).
- Participaton in the local committee of the Wireless Power Week 2022 conference.
- Member of the LCIS council.
- Annual organization (since 2015) of the Fête de la science stand in the Valence science village (3 days / year, 6,000 visitors).
- Organization of weekly meeting for PhD student of the team.
- Participation in meetings of the " Components and systems for telecoms " axis of the FMNT allowing the initiation of new collaborations between the researchers of the axis.

Administrative Engagements

- Responsible for the ESE course (validation of the internship subjects, validation of semesters abroad, participation in internship defenses, educational orientation).
- Responsible for "Cordées de la réusste " and " Actions lycées " (application for 2 grants (approx. 15000 €/year), and supervision of 40 students on various actions with around ten middle and high schools in the region).
- Member of the ESISAR council (College B, 5 elected members).