

# Mathieu Goutay

PH.D. STUDENT - NOKIA BELL LABS, PARIS SACLAY

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## Summary

Ph.D. student in machine learning applied to signal processing at Nokia Bell Labs, Paris Saclay, France. Graduated from INSA Lyon, France, with an MSc. in telecom engineering. Technology enthusiast who discovered signal processing and machine learning at university and enjoyed combining these two topics over the course of doctoral studies. Presently seeking to apply the acquired expertise and take up new challenges.

## Education

### Nokia Bell Labs

Paris Saclay, France

PH.D. THESIS IN MACHINE LEARNING APPLIED TO SIGNAL PROCESSING IN WIRELESS COMMUNICATION SYSTEMS

2019 - Now

- Preparation of a Ph.D thesis co-supervised by Dr. Jakob Hoydis and Dr. Jean-Marie Gorce, from Nokia Bell Labs, Paris Saclay, and Inria, Lyon.
- Publication of five research articles, including one in the highest-ranked journal of my category. Nine patents awarded or under examination.
- Writing of a library using Tensorflow and Python to enable end-to-end training of communication systems.
- Improving the digital predistortion of power amplifier using artificial neural networks (ANNs) with custom layers and activation functions.
- Enhancing multi-user MIMO receivers using convolutional neural networks (CNNs) and hypernetworks with weight sharing.
- Designing waveforms tailored for specific needs using recurrent neural networks, ANNs, CNNs, and ResNets.

### INSA Lyon

Villeurbanne, France

MSC. IN ENGINEERING (TELECOMMUNICATIONS) : OBTAINED WITH JURY'S CONGRATULATIONS

2013 - 2018

- Learning about communication systems, networks, and machine learning. Preparatory School with 95% of classes in English.
- Main courses: signal processing, information theory, computer science, machine learning, algebra, calculus, and probabilities.
- Heavily invested in the associative life: head of communication for the BAL INSA Lyon, member of the student office's board of directors...

### New Jersey Institute of Technologies

Newark, NJ, USA

ECHANGE STUDENT : GPA 4.0/4.0

Sept. 2016 - Dec. 2016

- Learning about Processors, Networks, Technical Writing, Security.

### Paul Sabatier High School

Carcassonne, France

BACCALAURÉAT (HIGH-SCHOOL DEGREE) IN MATHEMATIC : OBTAINED WITH JURY'S CONGRATULATIONS

2010 - 2013

## Work and Academic Experiences

### Nokia Bell Labs

Paris Saclay, France

AI RESEARCH INTERN

Feb. 2018 - Aug. 2018

- Using various machine learning techniques to enable the end-to-end learning of a communication system without a channel model.
- Publication of a research article including a theoretical analysis of the proposed solution and numerical evaluations.

### Alstom - Innovation Department

Villeurbanne, France

R&D INTERN

Mar. 2017 - Jun. 2017

- Using Bluetooth Low Energy and other technologies to help people with reduced mobility to take common transports. Patented solution.
- Realization of a working prototype able to localize disabled passengers and produce corresponding audio and visual actions.

### INSA Lyon

Villeurbanne, France

INNOVATION PROJECT

Sept. 2017 - Jan. 2018

- Large-scale room monitoring to reduce the energy consumption of shared buildings. Elected as the best project out of 16 competitors.

RESEARCH PROJECT

Sept. 2017 - Jan. 2018

- Extra project for students interested in research. Publication of an article on the impact of beamforming in machine-type communications.

## Teaching

### INSA Lyon

Villeurbanne

PART-TIME TEACHER (70h)

2020 - 2021

- Creation of tutorials and projects about deep learning, reinforcement learning, deep reinforcement learning, and Tensorflow: 50h.
- Creation, supervision and grading of a project on deep learning for the physical layer of communication systems: 20h.

## Publications

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### Learning OFDM Waveforms with PAPR and ACLR Constraints

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, Jakob Hoydis, and Jean-Marie Gorce

2021

Submitted to IEEE Transactions on Wireless Communications (journal)

### End-to-End Learning of OFDM Waveforms with PAPR and ACLR Constraints

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, Jakob Hoydis, and Jean-Marie Gorce

2021

2021 IEEE Global Communications Conference (GLOBECOM), Madrid, Spain

### Machine Learning-enhanced Receive Processing for MU-MIMO OFDM Systems

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, Jakob Hoydis, and Jean-Marie Gorce

2021

2021 IEEE 21st International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Lucca, Italy

### Machine Learning for MU-MIMO Receive Processing in OFDM Systems

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, Jakob Hoydis, and Jean-Marie Gorce

2020

IEEE Journal on Selected Areas in Communications (JSAC) - Machine Learning in Communications and Networks

### Deep HyperNetwork-Based MIMO Detection

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, and Jakob Hoydis

2020

2020 IEEE 21st International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), Atlanta, Georgia, USA

### Deep Reinforcement Learning Autoencoder with Noisy Feedback

MATHIEU GOUTAY, FAYÇAL AIT Aoudia, and Jakob Hoydis

2019

Workshop on Machine Learning for Communications WMLC 2019, WiOpt 2019, Avignon, France

### Massive Machine Type Communications Uplink Traffic: Impact of Beamforming at the Base Station

M. GOUTAY, L. S. CARDOSO AND C. GOURSAUD

2018

2018 25th International Conference on Telecommunications (ICT), St. Malo, 2018, pp. 493-497

## Patents

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**Ten patents submitted, including six patents under examination by patent offices and four already awarded :**

- A receiver for a communication system (WO2020EP52103)
- Apparatuses and methods for providing feedback (WO2021083521A1)
- Communication system having a configurable modulation order and an associated method and apparatus (US20200403723A1)
- Method for assisting the movement of a mobility-impaired person in a public transport means, associated computer program product and system (EP3495773A1)

## Foreign Languages

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**English :** Business fluent, 990/990 TOEIC (2018)

**Spanish :** Basic

## Hobbies

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- Head of communication for the first edition of a music festival gathering 1500 persons: the tendrestival. Website - Facebook - Instagram.
- Long-time photography passionate, particularly interested in portraits. Instagram : @mgoutay - Street photography project on issuu.
- Keeping up with the latest technology news.

## Honors & Awards

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2019	<b>First Place in the Machine Learning Challenge</b> , 6th IRACON Training School on Machine & Deep Learning Techniques for (Beyond) 5G Wireless Communication Systems	CTTC, Barcelona
2018	<b>Best Student</b> , Nokia France Student Awards	Paris Saclay, France

## Referees

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**Dr. Jean-Marie Gorce**  
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**Dr. Jakob Hoydis**  
jhoydis@nvidia.com