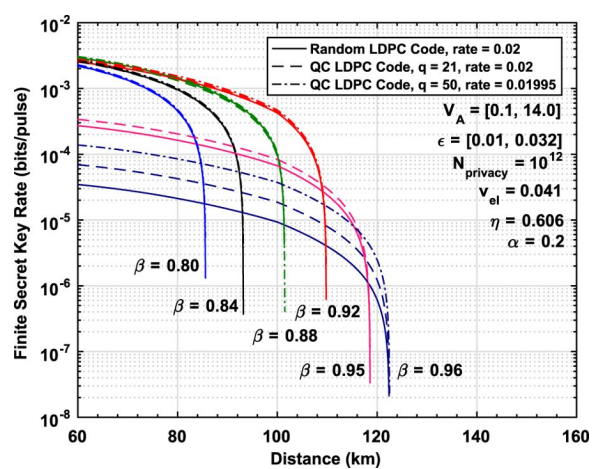


ETIS 2019



Rapport d'activité



Editorial of Mathias Quoy

2019 was a rich year in milestones for the ETIS laboratory, starting with its evaluation by HCERES in February. This evaluation devoted 5 years to research and made it possible to draw up the future lines of research for the next five-year contract. The excellent feedback from the evaluators is the reward for everyone's work and the daily involvement of all staff.

2019 was also the year of the CNRS's 80th anniversary, an event to which the laboratory contributed indirectly by being rewarded on the PRIME80 call through two forms of support: a doctoral contract and a PRIME project team, supporting research work with the IMS, LIRMM and IJL, on intelligent stimulation and bioimpedance. The theme of embedded for health continues to grow through 1 INEX funding and one ANR (BIOTIFS). The ASTRE team has also benefited from an ED EM2PSI grant for new power amplifier architectures for 5G. The information processing axis has also benefited from an INEX project and an INS2I PEPS (CoS). In addition, an ANR straddling the ASTRE and ICI teams was accepted (ANR QCSP). The laboratory has also awarded a doctoral contract from ED EM2PSI on this theme. In robotics and cognitive sciences, 2 DIM RFSI financings have been obtained. An INEX project has been accepted. A thesis funded by FACEBOOK started in early 2019. Finally, data mining in social networks has obtained 1 INEX funding. ETIS participates in several projects in data mining for cultural heritage (Labex PATRIMA and the "Data Analytics" chair set up with the QWANT company), in semantic web (CNRS PICS Italy). Moreover, data mining now extends to texts produced on twitter (platform #IDEO2017) in collaboration with the UCP's AGORA laboratory. ETIS has made a major contribution to the submission of projects for the IA call (3 chairs requested in July and 4 theses for 2020 and 2021).

Many other remarkable events took place in 2019 and are to be discovered in this report. These excellent results are the fruit of all of them. I would like to thank each and every one of you, and, since I am leaving the management at the end of the year, I would like to reiterate the pride I felt in having been able to lead this laboratory for 6 years, and thank you for your confidence.

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KPI 2019



Structure of the lab

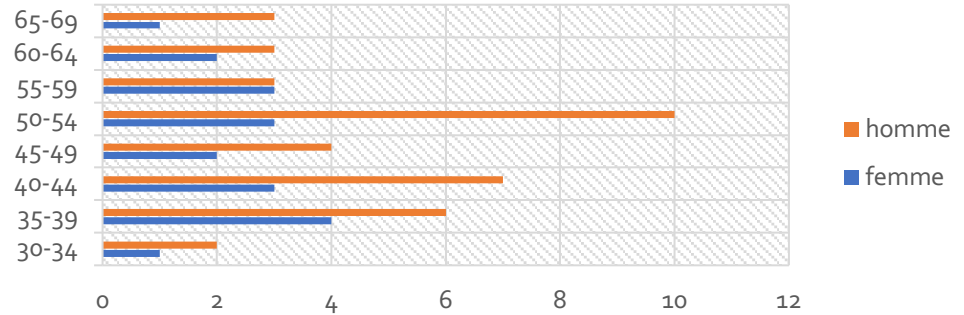
	Mathias Quoy – Director	Emmanuelle Bourdel - Deputy
	Administrative	Annick Bertinotti (ENSEA) Astrid Montelimar (CNRS) Sokhena Men (UCP) Michel Jordan (resp) Laurent Protois (resp)
	4 Teams	CELL – Aymeric Histace ICI – Claudio Weidman MIDI – Dan Vodislav Neurocyber – Philippe Gaussier



Human Forces

	131 members ○ 25 UCP ○ 25 ENSEA ○ 9 CNRS	59 Permanents ○ 11 Professors ○ 32 Assistant Professors ○ 2 CNRS researchers ○ 14 engineers and technicians
	2 IUF	16 associated members

Average age: 48.5 years



- 66% men
- 33% women

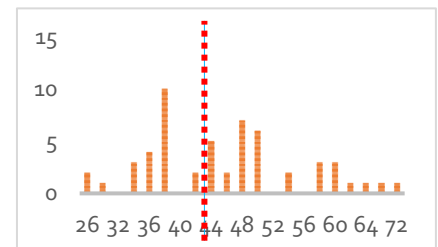


In	Out
• Hajer Baazaoui (MCF-HDR, MIDI) • 16 new PhD Students	• Hedi Tabia (Professor UEVE) • David Picard (Professor LIGM) • Koa Le Trung (Engineer Huawei) • Mehdi Terosiet (Engineer Carmat)

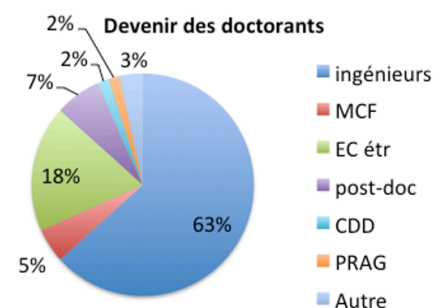
Thesis and post-doc



- 48 PhD students
- 14 Thesis defended
- Average length: 44 months
- XX post-docs



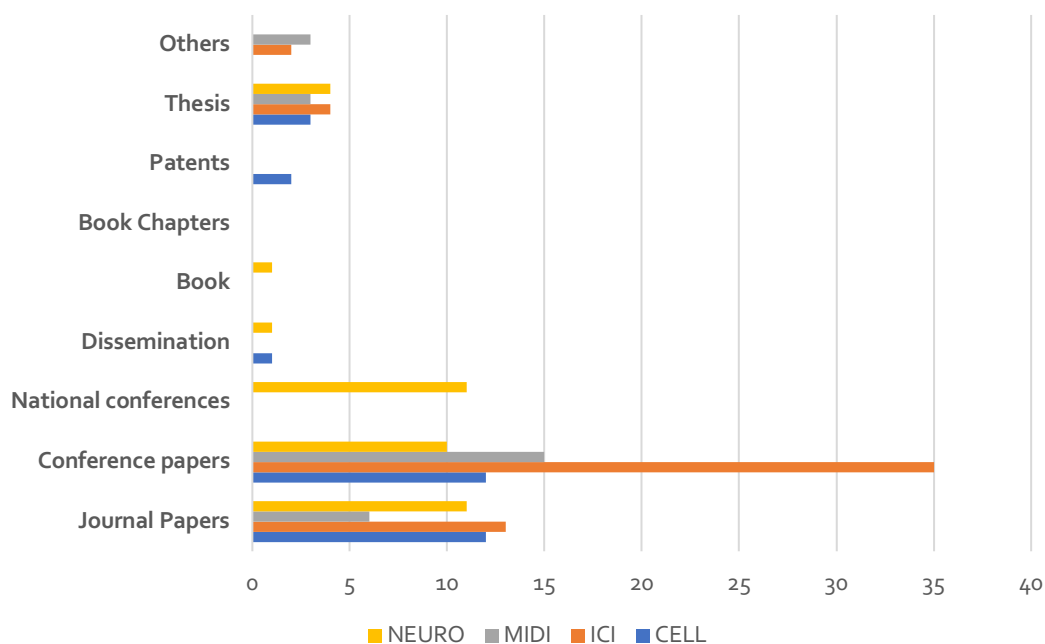
- 1 HDR (V. Belmega – mars 2019)



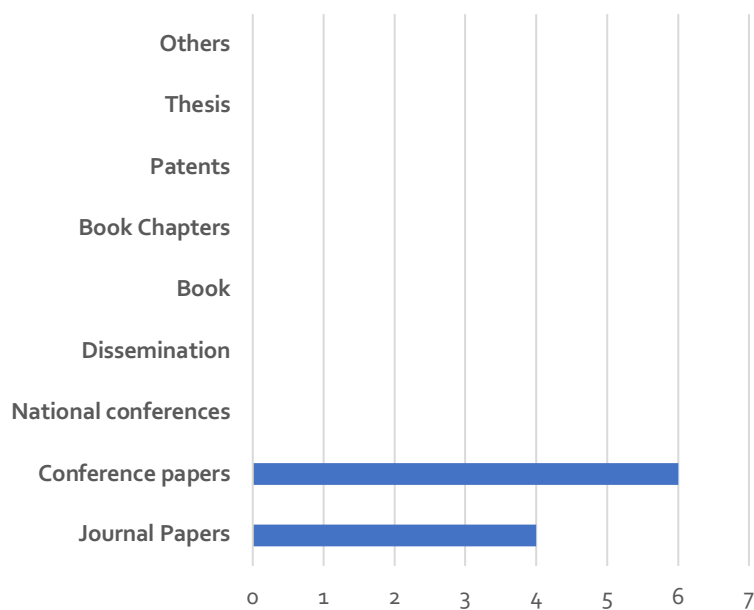
Publications

<i>Teams</i>	<i>Journal Papers</i>	<i>Conferences</i>	<i>National</i>	<i>Dissemination</i>	<i>Book</i>	<i>Chapter</i>	<i>Patent</i>	<i>Thesis</i>	<i>Others</i>
<i>CELL</i>	12	12		1			2	3	
<i>ICI</i>	13	35						4	2 HDR
<i>MIDI</i>	6	15						3	3 invited
<i>NEURO</i>	11	10	11	1	1			4	
<i>Total Team</i>	42	72	11	2	1	0	2	14	5
<i>Inter-team</i>	4	6	-	-	-	-	-	-	-
<i>ETIS</i>	40	69	11	2	1	0	2	14	5

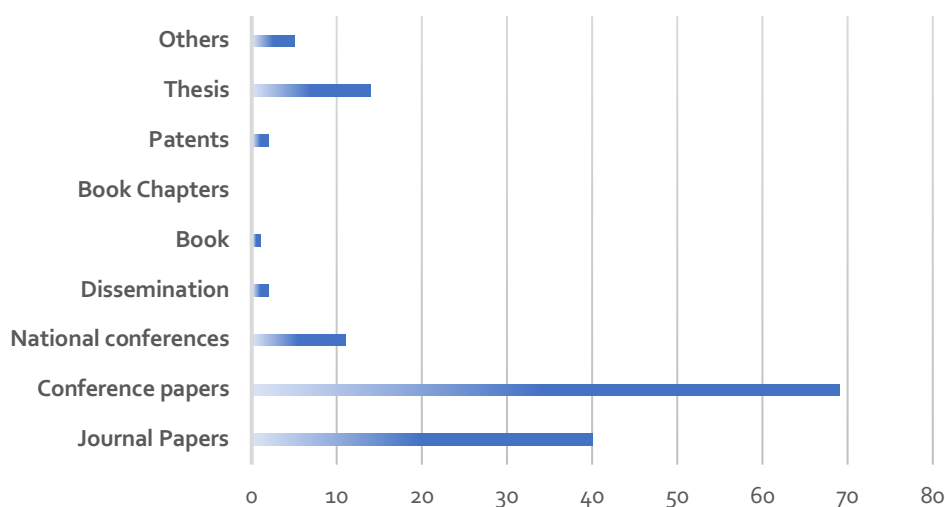
Publication



Publication Interteam



PUBLICATION IN 2019 - ETIS



Platforms and equipments



- 79 measurement and experimentation equipment
- 1 Humanoid platform
- 1 Data-H platform
- 5 platforms at ENSEA
- 3 platforms at St Martin
- EQUIPEX ROBOTEX
- EQUIPEX PATRIMEX
- Embedded systems for Health, ARVA 3D, IoT, Wizarde, RF
- MOCAP, Robot, Equipex

Ongoing contracts

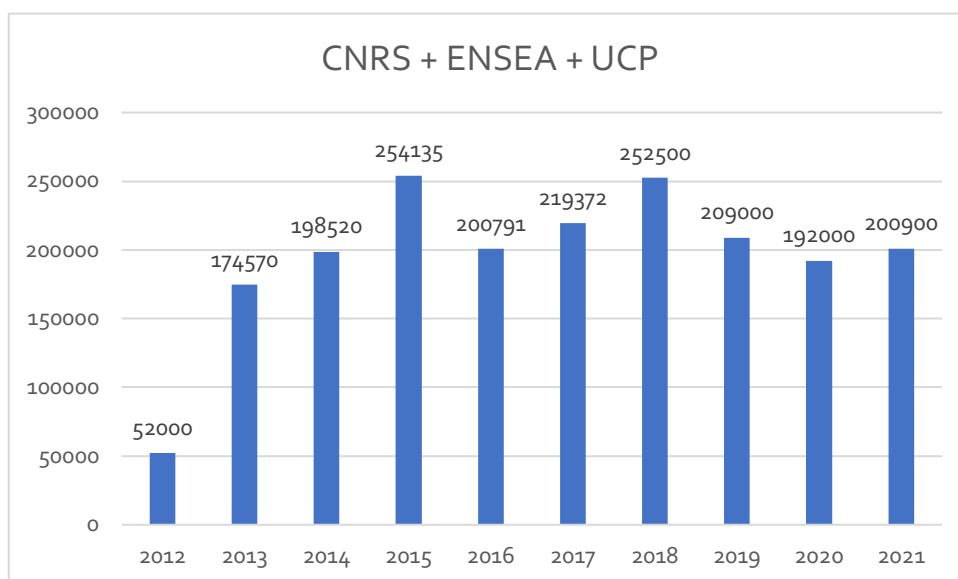
	2019		
	UCP	ENSEA	CNRS
Call for proposals	5	2	3
Public partners – ANR		1	1
Public partners – DIM RFSI -COMUE – Autres	5	1	2
Public partners – Europe			
Public partners – LABEX			
Public partners – ADEME		1	

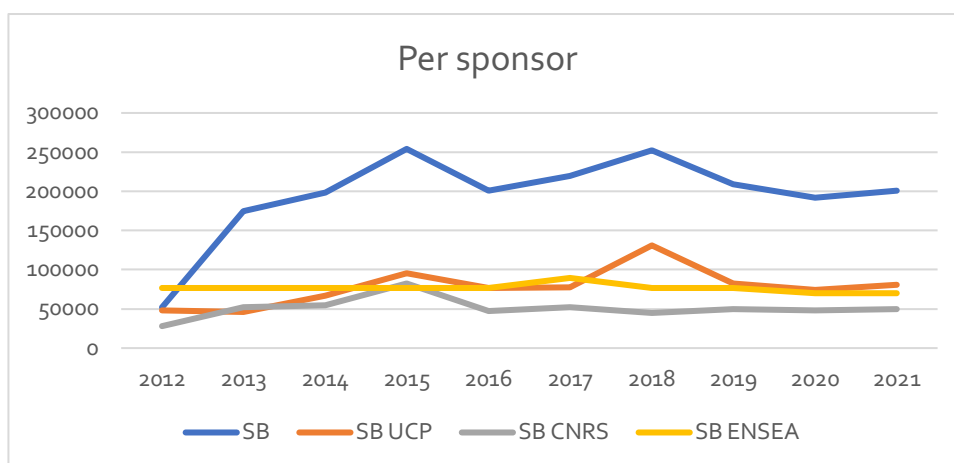
ETIS 2019

INEX	9	1	0
EUR			
INEX	9	1	
Hors AAP	13	5	0
Collaboration/thesis/NDA/MTA... (private sponsors)	8	2	
Collaboration/theses/NDA/MTA...- (public sponsor)	3	2	
Services (private customer)	1	1	
Services (public customer)	1		
Total	27	8	3
Total for the 3 sponsors of the lab	38		



Budget – Sponsors





Highlights

- Evaluation of the Lab by the HCERES
- Creation of the 1st Spin-off of ETIS: Augmented Endoscopy
- 4 new ANR projects with one CRCNS
- Chaire Robotique and Neurosciences – ANR PIA



Innovation in 2019



Augmented Endoscopy is a startup founded in July 2019 by Pr Xavier Dray and Dr Romain Leenhardt from the Digestive Endoscopy Centre at Saint-Antoine Hospital (APHP) in collaboration with Pr Aymeric Histace and Pr Olivier Romain from the ETIS laboratory (CNRS / Ecole Nationale Supérieure de l'Electronique et de ses Applications / University of Cergy Pontoise). Its CEO, Alain Angèle, has a long experience in the digestive endoscopy industry. The startup is supported in its development by Erganeo, a French investment company specialising in breakthrough innovations (Deep Tech) with a strong societal impact.

The startup Augmented Endoscopy develops artificial intelligence solutions and innovations for gastroenterologists and endoscopists. Its first realisation is a "Software as a Service" (SaaS) platform where an artificial intelligence solution called Axaro enables automated reading of endoscopic small intestine video capsules. Through this startup and these partnerships, the Centre d'Endoscopie Digestive is thus associated with the filing of several invention patents and the publication of numerous scientific articles in the field of artificial intelligence applied to digestive endoscopies.

ETIS in 2019

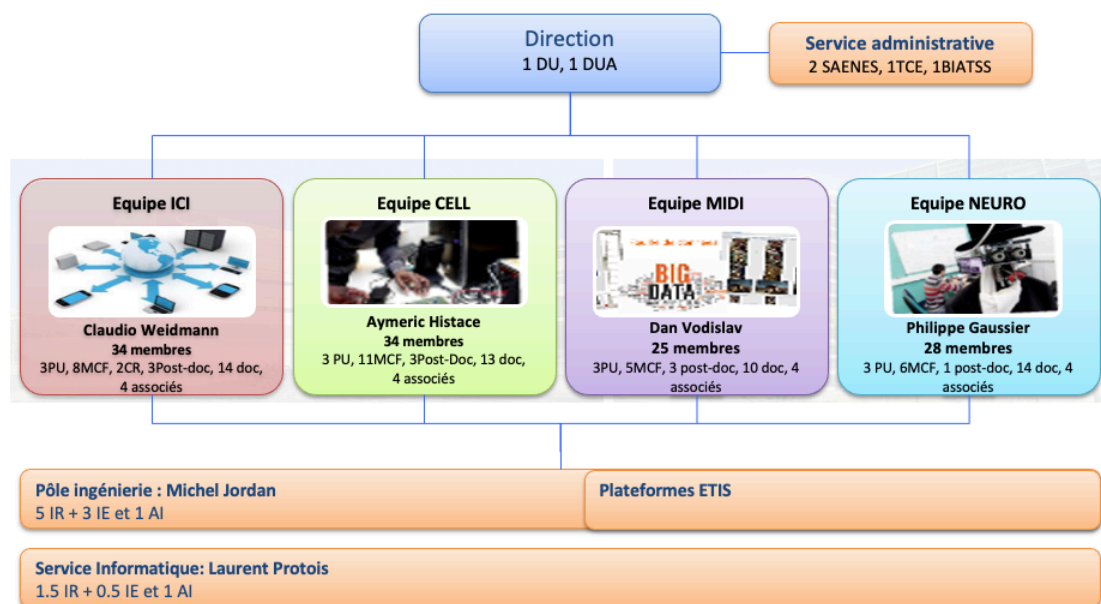
General presentation

The laboratory was created in 1980 at the Ecole Nationale Supérieure de l'Electronique et de ses Applications (ENSEA) as the Image Processing Team, then ETIS with the addition of the Signal component. In 1991, ETIS became a joint team of ENSEA and the University of Cergy-Pontoise (UCP). Since 2002, ETIS is a joint research unit (UMR 8051) under the supervision of ENSEA, UCP and CNRS. At the CNRS, ETIS is mainly attached to the National Institute of Information Sciences and their Interactions (INS2I), and secondarily to the National Institute of Engineering Sciences (INSIS). Following the arrival in 2006 of three lecturer-researchers in databases (from the former Laboratoire d'Informatique de Cergy-Pontoise), then in 2009 of seven lecturer-researchers in analogue electronics (from the former EA ECIME), ETIS changed its name to Equipes Traitement de l'Information et Systèmes (Information Processing and Systems Teams), while retaining its ETIS acronym. The laboratory was successively directed by Jean-Pierre Cocquerez (1989-1999), Didier Demigny (2000-2004), Inbar Fijalkow (2005-2012) and Mathias Quoy (2013-2019). The laboratory is located on the premises of ENSEA (1135 m²) and UCP (677 m² in Saint-Martin, and 90 m² in Neuville).

Scientific activities

The laboratory carries out both theoretical and experimental research with a view to enabling information processing systems to acquire autonomy capacities. Autonomy is understood here to include learning and adaptation to the environment (including the user), as well as decision-making and low energy consumption or computing power, for example. The systems designed at ETIS are therefore intended to perform intelligent processing for systems that are increasingly complex. The fields concerned are reconfigurable system-on-chip, data analysis, image indexing, developmental robotics, information theory and telecommunications.

Teams



Team CELL

General presentation

The CELL team is a multidisciplinary team in the field of intelligent embedded systems. It brings together teacher-researchers from the fields of electronics (microelectronics, analogue, digital and wave electronics), signal and image processing (computer vision in general) and computer science. The work carried out in the team concerns fundamental subjects related to embedded systems (reliability, energy, reconfigurability, processing under computing resource constraints, non-conventional sensors, communication protocol) embodied through application projects in the fields of health, safety, and communicating systems (IoT, autonomous vehicle).

This particularity leads the team to develop several projects in collaboration with the other teams of the laboratory (embedded ML with the MIDI team, Adéquation Algorithme Architecture for error correcting codes with the ICI team, event camera with the Neurocybernetics team) and in connection with experts in the targeted application domains. Thus, the team welcomes several associated researchers or external partners including a PU-PH from the APHP at 100% of its research time, a EC from the University of Glasgow in the field of UWB, and members of the Pôle judiciaire de la gendarmerie nationale (PJGN) located in Pontoise.

Highlights in 2019

Creation of the "Augmented Endoscopy" Start-up as part of the INEX Smart Videocolonoscopy and iPolyp project (SATT ERGANE0).

Synthesis of the research activity

- Presentation of the digital poster "Position Paper: Prototyping Autonomous Vehicles Applications with Heterogeneous Multi-FPGA Systems" (see bibliography) at the UCTE 2019 workshop in Glasgow, Italy ;
- Participation in the submission of a funding application for a tri-partite Italy-Italy-Japan call for projects (project led by Christophe Cérin on the French side). The response is expected at the end of August-beginning of September;
- Participation in an INEX AMBITION project, with MOVE (led by Nicolas Cuperlier). We were not accepted, but we submitted a slightly modified version for a springboard project of the ETIS laboratory, which was validated. We intend to re-submit (adapting) this project for an ANR call.
- Within the framework of Amine Khelif's thesis, in collaboration with IDEMIA and the PJGN, several publications [1,2,3] have been made on a man-in-the-middle attack emulator to analyse the communications between two devices of a telephone and to identify vulnerabilities in order to access sensitive data.
- As part of Habiba Lahdhiri's thesis, a publication was published in 2019 on a routing algorithm used within a network on a chip with an additional RF interconnect. This work followed a collaboration with the University of Catania in Italy. Salvatore Monteleone was also invited as a guest researcher, via the IEA's Fellows in Residence programme, for one year.
- The RADAR activities, following the PHC with China and the collaboration with Julien LE KERNEC have resulted in a publication in Signal Processing Magazine.
- Launch of the Security and Safety of Complex Systems with AltaRica project, Initiative d'excellence Université Paris Seine AAP 2019, in collaboration with APSYS, an Airbus subsidiary, and IRT Système X.

- Participation in setting up a European project "Personalized Medicine" in November 2019 jointly with the Autonomous University of Barcelona, the Karlsruhe University Cancer Research Centre and the University College of London on the theme of early colorectal cancer screening. The project was not accepted, but it has made it possible to maintain the partnership dynamic within the framework of the GIANA challenge.
- Response to the ANR's "Réseau Hospitalo-Universitaire" (RHU) call for projects on the prevention and treatment of haemorrhagic rectocolitis. Four APHP hospitals, 2 academic partners, 5 companies. Budget 8 million euros. Not retained, but has enabled links to be forged with future partners.
- Pierre Jacob's joint thesis work with the MIDI team resulted in a publication in the very selective IEEE ICCV 2019 conference.
- Publication in the journal Gastrointestinal Endoscopy of a reference paper on the use of Deep Learning for the automatic processing of images from small intestine videocapsules (already cited 50 times).
- Submission of a first structuring project with the University of Mauritius in the context of the automatic surveillance of haematophagous diptera by recognition and classification of interferential patterns (accepted in 2020). Collaboration with IRD Montpellier.
- Start of Dimitri Barrière's thesis on the design of a low noise amplifier for 5G.
- Launch of the "SmartGreenHouse" (IoT) platform in the form of a connected greenhouse installed in the ENSEA gardens.

KPI of CELL in 2019

Since March 2019, the team has been organised into three research areas: (i) the "Reconfigurable Trusted Architectures" (RTA) axis, the "Agile Circuit for Telecommunications" (ACT) axis and the "Smart Embedded Systems" (SES) axis. Each of them enables the creation of a core of expertise around a common theme and the organisation of interaction at the scientific strategy level of each of them within the team and with the other ETIS teams.

Members

- At the 31 December 2019, the team consisted of 36.5 members:
 - 15.5 permanents:
 - 4 Full Professors (1UCP, 2 ENSEA et 1 Central)
 - 11 Assistant Professor with 3 HDR
 - 1/2 CNRS Engineers
- 21 non-permanents:
 - 2 contractual members (CDD)
 - 2 engineers/Post-doc
 - 2 associate researchers
 - 1 PU-PH of the APHP-Saint Antoine Hospital
 - 1 CY Tech Teacher/Researcher (Ex EISTI) since March 2019.
 - 13 PhD students (all types of funding) 2 membres contractuels (CDD)

In - Out

The year 2019 saw the integration of the IR CNRS at the level of the engineering pole of the laboratory, and the arrival of a CY-Tech EC (ex-EISTI) as associate researcher of the laboratory in the field of embedded systems reliability.

The number of theses is stable with 3 defended Thesis compensated by the arrival of 3 new theses (1 on ministerial funding, 2 CIFRE).

PHD Defended

- Edwin DE ROUX FUENTES – Defended on 12/07/2019
 - "Detection and characterisation of fibrosis induced by active cardiac implants".
 - Olivier ROMAIN (50%) and Aymeric HISTACE (50%)
 - EM2PSI - SFERE funding (Panama)
 - <https://www.adum.fr/adm/phdInfo/cv.pl?matr=70775>
- Alejandro VON CHONG ECHEVERS - Supported on 16/07/2019
 - "New approach for the estimation of arterial blood oxygen saturation using a multispectral sensor".
 - Olivier ROMAIN (50%) and Aymeric HISTACE (50%)
 - EM2PSI - SFERE funding (Panama)
 - <https://www.adum.fr/adm/phdInfo/cv.pl?matr=69972>
- Jérôme LORAINE - Supported on 12/12/2019
 - "Improvement of the intrinsic performance of a power amplifier thanks to a linearisation method".
 - Myriam ARIAUDO (50%) and Cédric DUPERIER (50%)
 - EM2PSI - ED scholarship
 - <https://www.adum.fr/adm/phdInfo/cv.pl?matr=67399>

Publications

<i>Journal Papers</i>	<i>Conferences</i>	<i>National</i>	<i>Dissemination</i>	<i>Book</i>	<i>Chapter</i>	<i>Patent</i>	<i>Thesis</i>	<i>Others</i>
12	12		1			2	3	

New contracts – funding

<i>Name</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
SSA (Security and Safety Analysis)	INEX APP	Financement Contrat Doctoral	NGUYEN	1/10/2019	3 years	274 210 €	60 000€
QCSP	ANR 2019	Post-Doc	GHAFFARI	01/10/2019	4.5 years	787 608€	80 000 €
SmartStim	CNRS 80'	Travels	ROMAIN	01/10/2019	2 years	18 000€	4400 €
Safe ML for Autonomous Vehicle	CIFRE VALEO	Thesis	HISTACE	4/11/2019	3 years	379 800€	45 000€
BioTIF	ANR CRCNS 2019	Thesis	ROMAIN	20/03/2019	3 years	178 300€	178 300€

Plateforme Identification	Fondaction UCP	Equipment	LORANDEL	09/04/2019	1 year	3 500 €	3 500€
PHC	Campus France	Mobilité	ROMAN	31/12/2019	1 year	2 400 €	2 400€
VEDECOM	VEDECIM	Thèse S. Colomer	ROMAIN	01/09/2019	3 years	150 000€	45 000€
INEX SEEING	PIA	Thesis	KOLBL	01/02/2019	3 years	117 500€	117 500 €
INEX CARING	PIA	Post-doc	ROMAIN	01/07/2019	2 years	106 000€	106 000€
STAGE SPECTROMETRIE	CY Fondation	Internship	KOLBL	01/01/2019	1 year	5 600€	5 600€
VALEO	VALEO	Thesis CIFRE	HISTACE	4/11/2019	3 years	82 000€	45 000€

Ongoing contracts

<i>Name</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
INEX Smart video colonoscopy	ANR PIA	Post-doc	HISTACE	01/10/2017	2.5 years	150 000€	106 000€
INEX M2Scan	ANR PIA	Post-doc, internship	HISTACE	01/10/2018	2 years	36 592€	36 592€
IDEMIA	CYU	Thesis	ROMAIN	01/10/2017	36 months	60 000 €	52 500 €
Prix talent Satt	Satt IDF	Award	ZUCKERMAN N	31/01/2018	1 year	20 000 €	20 000 €
ALICE	CYU – M2M	Thesis	HISTACE	01/01/2017	36 months	60 000€	52 500€
NOC Cognitif	INEX	Thesis	LORANDEL	11/09/2017	36 months	112 500€	112 500€
I-Polyp	SATT ERGANEAO	Post-doc	ROMAIN	12/02/2016	36 months	138 000€	138 000€

INSECT	<i>DIM RFSI</i>	<i>Intership</i>	<i>HISTACE</i>	<i>01/02/2018</i>	<i>30 months</i>	<i>12 000€</i>	<i>12 000€</i>
Reliability	<i>St Microelectroni c</i>	<i>Thesis CIFRE</i>	<i>GHAFFARI</i>	<i>03/12/2018</i>	<i>36 months</i>	<i>52 300€</i>	<i>52 300€</i>

Scientific Dissemination

Event Organization

<i>GIANA Special Session</i>	<i>Special session</i>	<i>HISTACE</i>	<i>Co-Organisateur et Chairman</i>	<i>Février 2019</i>	<i>Pragues (RT), Conférence VISAPP</i>	<i>Jorge Bernal (UAB) Co-Chair</i>
<i>ViMaBi (Visual Computing and Machine Learning for Biomedical Applications)</i>	<i>Workshop (in conjunction with CAIP 2019) conference</i>	<i>HISTACE</i>	<i>PC Committee member</i>	<i>Septembre 2019</i>	<i>Turin (Italie), CAIP conference</i>	<i>Bogdan Matuszewski (UCLan, UK)</i>
<i>IEEE IMBIOC2019</i>	<i>Special session</i>	<i>ROMAIN</i>	<i>Technical Committee</i>	<i>Mai 2019</i>	<i>Naning, China</i>	<i>Fioranelli et Lekernek (UK, CHina)</i>
<i>Euromicro DSD ASHWAPA 2019</i>	<i>Special session</i>	<i>ROMAIN</i>	<i>PC Committee member</i>	<i>Aout 2019</i>	<i>Chalkidiki, Greece</i>	
<i>2019 IEEE 14th System of Systems Engineering Conference (SoSE)</i>		<i>NGUYEN</i>	<i>Technical Programme Committee</i>	<i>May 2019</i>	<i>Alaska, USA</i>	
<i>DFM19: 8th International Workshop on Data-Flow Models for Extreme-Scale Systems</i>	<i>Workshop (host: COMPSAC)</i>	<i>ZUCKERMAN</i>	<i>Chair</i>	<i>Juillet 2019</i>	<i>Milwaukee, IL, USA</i>	

New Platform

Launch of the SmartIoT platform in the form of a connected greenhouse installed at ENSEA. Partnership with the company @MyFood.

Research perspectives for 2020

The development of high-performance, intelligent, reliable and resource-efficient embedded systems is a set of issues, both upstream and applied, which will remain at the heart of the CELL team's activities over the coming year. Targeting application domains with a high societal impact will remain a priority (IoT, Health, Autonomous Vehicle) and

efforts leading to actions to enhance the value of more theoretical work will be maintained in order to provide resources (maturation, patents, etc.) for the team's activities.

Publications 2019

Journals

1. A. Rahman, M. Rashid, J. Le Kernec, B. Philippe, S. Barnes, F. Fioranelli, S. Yang, O. Romain, Q. Abbasi, G. Loukas and M. Imran, «A Secure Occupational Therapy Framework for Monitoring Cancer Patient's Quality of Life», *Sensors Journal*, MDPI, special issue on "Smart Sensors and Measurements Methods for Quality of Life and Ambient Assisted Living", Nov 2019, doi: 10.3390/s19235258
2. Yoan Espada, Nicolas Cuperlier, Guillaume Bresson, Olivier Romain. From Neurobotic Localization to Autonomous Vehicles, *Unmanned systems*, Word Scientific, 2019, {10.1142/S2301385019410048}
3. J. Le Kernec, F. Fioranelli, C. Ding, H. Zhao, L. Sun, H. Hong, J. Lorandel and O. Romain, "Radar Signal Processing for Sensing in Assisted Living", *IEEE Signal Processing Magazine*, Vol. 36, I. 4, July 2019. <https://doi.org/10.1109/MSP.2019.2903715>
4. J. Bernal, A. Histace, M. Masana, Q. Angermann, C. Sanchez-Montes, C. Rodriguez de Miguel, M. Hammami, A. Garcia-Rodriguez, H. Cordova, O. Romain, G. Fernandez-Esparrach, X. Dray and F. Javier Sanchez, "GTCreator: a flexible annotation tool for image-based datasets", *International Journal of Computer Assisted Radiology and Surgery*, <https://doi.org/10.1007/s11548-018-1864-x>, Vol. 14, I. 2, pp.191 - 201, February 2019.
5. Edwin de Roux, Mehdi Terosiet, Florian Kolbl, Michel Boissière, Aymeric Histace, Olivier Romain. OFDM-based Electrical Impedance Spectroscopy Technique for Pacemaker-Induced Fibrosis Detection Implemented in an ARM Microprocessor, *Microprocessors and Microsystems: Embedded Hardware Design (MICPRO)*, Elsevier, 2019, {10.1016/j.micpro.2019.07.005}
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8. Edwin de Roux, Amélie Degache, Mehdi Terosiet, Florian Kolbl, Michel Boissière *et al.* Orthogonal Multitone Electrical Impedance Spectroscopy - OMEIS - for the Study of Fibrosis Induced by Active Cardiac Implants, *Journal of Sensors*, Hindawi Publishing Corporation, 2019, 2019, 14 p
9. Anis Baklouti, Nga Nguyen, Faïda Mhenni, Jean-Yves Choley, Abdelfattah Mlika. Dynamic Fault Tree Generation for Safety-Critical Systems Within a Systems Engineering Approach, *IEEE Systems Journal*, IEEE, In press, pp.1-11. {10.1109/JSYST.2019.2930184}
10. Anis Baklouti, Nga Nguyen, Faïda Mhenni, Jean-Yves Choley, Abdelfattah Mlika. Improved Safety Analysis Integration in a Systems Engineering Approach, *Applied Sciences*, MDPI, 2019, 9 (6), pp.1246. {10.3390/app9061246}
11. Mohamad Hamieh, Sébastien Quintanel, Yves Louët, Myriam Ariaudo. A new interconnect method for radio frequency intra-chip communications using transistors-based distributed access, *Microwave and Optical Technology Letters*, Wiley, 2019, 61 (2), pp.297-302. {10.1002/mop.31590}
12. Romain Leenhardt, Pauline Vasseur, Cynthia Li, Gabriel Rahmi, Franck Cholet *et al.* A neural network algorithm for detection of GI angiectasia during small-bowel capsule endoscopy, *Gastrointestinal Endoscopy*, Elsevier, 2019, 89 (1), pp.189-194. {10.1016/j.gie.2018.06.036}

Dissemination

- Xavier Dray, Romain Leenhardt, Aymeric Histace, Aymeric Becq. Intelligence artificielle et endoscopie : le meilleur des mondes ? *Hépatogastro & Oncologie Digestive*, John Libbey Eurotext, 26 (3), pp.319-331. {10.1684/hpg.2019.1754}

Patents

- Aymeric Histace, Xavier Dray. Device and Method for Producing a Numerical Classifier of Images, so as to Determine the Viewing Quality of the Endoscopic Videocapsule Images of a Segment of the Digestive Tube, France, Patent n° : WO2019175248A1. 2019
- « Dispositif de caractérisation de l'actimétrie d'un sujet en temps réel », O. Romain *et al.*, demande de brevet européen déposé le 7 octobre 2019, reference 19306308.8.

Conferences

1. Gaetan Raynaud, Pierre Jacob, Camille Simon, Aymeric Histace. Active Contour Segmentation Based on Histograms and Dictionary Learning for Videocapsule Image Analysis, *VISAPP 2019, GIANA Special Session*, Feb 2019, Prague, Czech Republic
2. Mohamed Amine Khelif, Jordane Lorandel, Olivier Romain, Matthieu Regnery, Denis Baheux *et al.* Toward a Hardware Man-in-the-Middle Attack on PCIe Bus for Smart Data Replay, *2019 22nd Euromicro Conference on Digital System Design (DSD)*, Aug 2019, Kallithea, Greece. pp.230-237, {10.1109/DSD.2019.00042}
3. Mohamed Amine Khelif, Jordane Lorandel, Olivier Romain, Matthieu Regnery, Denis Baheux. A Versatile Emulator of MitM for the identification of vulnerabilities of IoT devices, a case of study, *The 3rd International Conference on Future Networks and Distributed Systems*, Jul 2019, Paris, France. pp.1-6, {10.1145/3341325.3342019}
4. Habiba Lahdhiri, Jordane Lorandel, Emmanuelle Bourdel. Threshold-based routing algorithm for RF-NoC OFDMA architecture, *ReCoSoC 2019*, Jul 2019, York, United Kingdom
5. Tarek Elouaret, Stéphane Zuckerman, Lounis Kessal, Tarek Elouaret, Nicolas Cuperlier *et al.* Position Paper: Prototyping Autonomous Vehicles Applications with Heterogeneous Multi-FpgaSystems, *2019 UK/ China Emerging Technologies (UCET)*, Aug 2019, Glasgow, United Kingdom. pp.1-2, {10.1109/UCET.2019.8881834}
6. Pierre Jacob, David Picard, Aymeric Histace, Edouard Klein. Efficient Codebook and Factorization for Second Order Representation Learning, *International Conference on Image Processing*, Sep 2019, Taipei, Taiwan
7. Valentine Wagnier-Dauchelle, Camille Simon-Chane, Aymeric Histace. Retinal Blood Vessels Segmentation: Improving State-of-the-Art Deep Methods *Visual Computing and Machine Learning for Biomedical Applications (co-located with CAIP 2019 conference)*, Sep 2019, Salerno, Italy. pp.5-16, {10.1007/978-3-030-29930-9_1}
8. Pierre Jacob, David Picard, Aymeric Histace, Edouard Klein. Metric Learning with HORDE: High-Order Regularizer for Deep Embeddings, *International Conference on Computer Vision*, Oct 2019, Seoul, South Korea
9. J. LeKernec, F. Fioranelli and O. Romain, «Human Activities Classification in a Complex Space using Raw Radar Data», *International Radar Conference*, Toulon, France, 23-27 Sept. 2019.
10. S. Thomet, S. De Paoli, F. Ghaffari, F. Abouzeid, O. Romain and P. Roche, «CLASS: on-chip Lightweight Accurate SEU/SET event claSSifier», *European Conference on Radiation and its Effects on Components and Systems, RADECS*, September 16-20th, Montpellier, France, 2019.
11. D. Haider, J. Lekernek, O. Romain, M. U. Farooq, S. Shah and Z. Qadus, «Monitoring Body Motions Related to Huntington Disease by Exploiting the 5G», *The fourth IEEE International Conference on UK-China Emerging Technologies*, August 21-22, Glasgow, UK, 2019.
12. S. Yang, J. LeKernec, F. Fioranelli, C. Ding, H. Zhao, L. Sun, H. Hong, J. Lorandel O. Romain, «Radar Sensing in Assisted Living: An Overview», *IEEE MTT-S 2019 International Microwave Biomedical Conference (IMBioC2019)*, Nanjing, China, 6-8 May, 2019.

Team ICI

General presentation

The ICI group's research focus is on wireless communications, information theory, signal processing and imaging. The research topics covered by the ICI group lie primarily on the following domains:

- Wireless communications, B5G and 6G, including:
 - machine learning for communications, resource allocation, low energy / latency, localization, mmWave, IoT, waveform design;
- Security for wireless communications and B5G, including:
 - physical layer security, covertness, physical unclonable functions / biometric authentication, lattice based cryptography, privacy, intrusion detection in software defined networks;
- Coding and information theory:
 - graph codes (e.g., LDPC), polar codes and lattices, interplay between information theory and game theory;
- Networking and caching, including:
 - layer 2 scheduling, energy efficient protocols, enhanced mobile broadband (eMBB) and ultra-reliable low latency communications (URLLC) coexistence;
- Imaging and modelization.

Thanks to the international outreach of senior ICI members, the group managed to attract new members with strong background in information theory as well as wireless communications, e.g., the recent recruitment of Dr. Sara Berri.

In terms of niche expertise, the ICI team now has one of the most comprehensive teams in wireless / physical layer security in France, with experts covering topics such as covertness, secrecy coding, hybrid crypto-PLS systems for B5G, localization as an authentication factor, etc.

Highlights in 2019

The ICI group increased substantially its international visibility as showcased by the fact that it hosted internationally renowned experts in wireless communications and information theory including H.V. Poor (Princeton University) and Subhash Lakshminarayana (Warwick University). Furthermore, it was the host of the CRCT of M. Pischella (MCF CNAM) while team members were invited for short research stays and seminars to leading research institutes including the Barkhausen Institute (Dresden DE) and the ICS FORTH (Heraklion, Greece).

Synthesis of the research activity in 2019

The ICI group produced 12 International Refereed Journals and 43 Refereed International and National Conference Papers, the detailed list can be in page 22. Most the team's research output was in top IEEE Journals, e.g., the IEEE Transactions on Wireless Communications, the IEEE Transactions on Signal processing, IEEE Transactions on Information Theory, IEEE Access, IEEE Wireless Communications Letters, IEEE Communication Letters, and IEEE

Conferences including GLOBECOM, ICC, ISIT, ITW, PIMRC, WCNC, 5GWF, VTC, etc. Other notable activities of the ICI group in 2019 are summarized as below:

- Strengthening of international collaborations, e.g., TU Dresden gteam of Gerhard Fettweis), Princeton (h.V. Poor), Warwick University (S. Lakshminarayana) etc.
- A wide range of activities in terms of research funding proposals, e.g., to the ANR (project QCSP), to the INEX (project eNiGMA), to DIM RFSI (project SAFEST), to PHC (Maimonide), to the CNRS (project CoS), etc.
- 1 successful HDR defended (V. Belmega)
- Four PhD theses defended successfully (details below)
- Hosting of H.V. Poor, S. Lakshminarayana, M. Pischella.
- Participation of group members to IEEE Committees, e.g., the ETI in Machine Learning (M. Chafii), the IEEE Teaching Awards Committee (A. Chorti), Standardization Groups (A. Chorti), etc.
- Organization of special sessions and workshops in top IEEE International Conferences such the ICASSP (I. Fijalkow), GLOBECOM (M. Chafii), Training School in machine learning (M. Chafii)
- Outreach activities for women equality in engineering (I. Fijalkow).
- A. Chorti and I. Andriyanova were awarded the PEDR.

KPI of ICI in 2019

Members

As of 1st September 2020, the ICI Group has:

- 14 permanent members:
 - 3 Full Professors
 - 5 Assistant Professors
 - 2 Full CNRS Researchers – CR
- 19 non-permanent members:
 - 2 associates of EISTI
 - 17 PhD Students

Publications

<i>Journal</i>	<i>Conferences</i>	<i>National</i>	<i>Dissemination</i>	<i>Book</i>	<i>Chapter</i>	<i>Patent</i>	<i>Thesis</i>	<i>Others</i>
13	35						4	

PHD Defended

- ALOUACHE Lylia – Defended the 10/11/2019
 - SDN-based, Multi-Criteria and Secure Routing Protocols in Collaborative IoV.
 - CHELOUAT Rachid and ALIOUT Makhlof
- CHANDESRIS Ludovic – Defended the 23/01/2019
 - Contribution to the construction and the decoding of polar codes
 - FIJALKOW Inbar and SAVIN Valentin

- EL HAMDY Dhekra – Defended the 11/04/2019
 - Generalized Radon Transform and application in pattern recognition
 - NGUYEN-VERGER Mai and BSAIES Khaled
- MARCASTEL Alexandre – Defended the 21/02/2019
 - Online power allocation in a dynamic and unpredictable iot network
 - BELMEGA Elena Veronica (50%), PANAUTIS Mertikopoulos (20%) and FIJALKOW Inbar (30%)

HDR Defended

- E. V. Belmega, "Contributions to energy-efficient wireless communications exploiting games, online optimization and learning (Contributions aux communications sans fil efficaces en énergie exploitant la théorie des jeux, l'optimisation en ligne et l'apprentissage)", HDR Thesis, Université de Cergy-Pontoise, Mar. 29th 2019.

New contracts

<i>Name</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
QCSP	ANR	Post-Doc	LUZZI	01/10/2019	4 years	787 608€	80 k€ (Cf CELL)
Security in Distributed Inference	PHC Maimonide	Travels	WANG	01/10/2019	2 years	130,000 €	64 000€
SAFEST	DIM RFSI	Post-Doc	CHORTI	19/03/2019	2.5 years	27 500€	27 500€
eNiGMA	INEX	Post-Doc	CHORTI	pending	2 years	287 137€	112 00€
AI PROCOPE	INRIA	Training School	CHAFII	23 au 25/09/2019	2 months	4850€	4850€
AI PROCOPE	INRIA	Travels France Allemagne	CHAFII	01/07/2019	4 months	2 000€	2 000€
CPHD	DIM RFSI et IEA	Workshop Travels	ANDRIYANO VA	01/06/2019	6 months	2 500€	2 500€
SRV	ENSEA	Invited professor Luis Briceno Univ. TFSM, Chile	Le TREUST	2019	14 per diem	1 680€	1 680€

ETIS 2019

CoS	CNRS	Research project	Le TREUST	11/03/2019	31/12/2019	8 000€	8 000 €
COSA	INEX	Doctorant Roni Bou Rouphael	Le TREUST	01/10/2019	3 years	403 724 €	117 500 €
Research Stays for University Academics and Scientists	DAAD	mobility France Allemagne	CHAFII	02/05/2019	1 month	2 450 €	2 450 €

Ongoing contracts

Name	Sponsor	Type	PI	Start	Length	Budget	Budget (ETIS)
ELIOT	ANR + FAPESP	Thesis Post doc	BELMEGA	01/11/2018	4.5 years	390 420€	390 420€
ECOBIOH₂	ADEME	Thesis	FIJALKOW	17/05/2018	4.5 years	580 149€	457 708€
INEX Lattice hash functions for secret key generation	ANR/PIA	Thesis	LUZZI	01/10/2017	3 years and 10 months	112 500€	112 500€
ECOMICENE	DigiCosme – INRIA	Thesis	WEIDMANN	01/11/2017	46 months	145 000€	0€
CHAIRE ASIA	INEX AAP CHAIRE	Thesis	CHAFII	01/09/2018	4 years	216 000€	216 000€
TARPAU	Labex MMEDII DIM Mathinnov	Thesis	NGUYEN	01/10/2018	30/09/2021	48 600€	48 600€

Scientific Dissemination

Event Organization

ICASSP 2019	<i>special session "Signal Processing for IoT" at ICASSP 2019</i>	<i>FIJALKOW</i>	<i>Session Special chair</i>	<i>12 – 17 may</i>	<i>Brighton</i>
Globecom 2019	<i>Workshop Machine learning for Wireless Communications at IEEE Globecom</i>	<i>CHAFII</i>	<i>Co-Chair</i>	<i>9 – 13 december</i>	<i>Hawaii</i>
Workshop	<i>Workshop "Information Design and Splitting Games"</i>	<i>Le TREUST</i>	<i>Co-Organizer</i>	<i>17-19 June</i>	<i>Paris</i>
Training School	<i>Training School on Machine Learning for Communication</i> https://sites.google.com/view/mlc-training-school/home	<i>CHAFII</i>	<i>Organization committee</i>	<i>23-25 September</i>	<i>Paris</i>
Workshop	<i>"Sciences XX Elles", workshop organized by the CNRS</i>	<i>FIJALKOW</i>	<i>Organization committee</i>	<i>April</i>	<i>Paris</i>

Invited Professors

- Mylène Pischella (MCF, CEDRIC CNAM), Sep. – Dec. 2019.
- Vince Poor, Princeton University, Sep. 2019.
- Subhash Lakshminarayana, Warwick University, Sep. 2019.
- Luis Briceno Univ. TFSM, Chile,

Guest Editor

Mael Le Treust, Guest Editor for the Special Issue "Information Theory for Control, Games, and Decision Problems" in Entropy MDPI with Tobias Oechtering and Serdar Yüksel, deadline 31 october 2019.

Prizes and Distinctions

- I. Andriyanova received the Prix de Femmes et Sciences de l'Université Paris Seine 2019
- M. Chafii won the 1st prize of the Machine Learning Challenge at the 6th Training School on Machine & Deep Learning Techniques for (Beyond) 5G Wireless Communications Systems, April 2019 Barcelona, Spain
- M. Le Treust became an Elected member of the CoNRS – Secretary of the Scientific Council of Institut (CSI) INS2I, CNRS, since January 2019.
- A. Chorti became a Member of the IEEE P1948 Standardization Workgroup on P1940 Standard Profiles for ISO 8583 Authentication Services
- A. Chorti member of the IEEE Teaching Awards Committee

Research perspectives for 2020

The ICI group's research focus for 2020 will be on wireless communications, information theory, signal processing and imaging, as in 2019. The new research topics that are expected to be covered by the ICI group will likely be in the following topics:

- Wireless communications, B5G and 6G: Deep learning for communications, resource allocation, low energy / latency, localization, mmWave, IoT, waveform design, interference management, context aware communications;
- Security for wireless communications and B5G, including: Cross-layer security including physical layer security, state masking, authentication, lattice based cryptography, intrusion and anomaly detection, privacy in vehicular networks;
- Coding and information theory: code design, polar codes and lattices, interplay between information theory and game theory;
- Networking and caching, including: Ultra-reliable low latency communications (URLLC), vehicular networks;
- Imaging and modelization.

Publications 2019

Journals

1. R. Bomfin, M. Chafii, and G. Fettweis. "A Novel Iterative Receiver Design for CP-free Transmission under Frequency-Selective Channels". IEEE Communications Letters, 2019
2. Le Treust, M. and Tomala, T., Persuasion with limited communication capacity, Journal of Economic Theory, Vol. 184, Page 104940, Nov. 2019
3. L. Wang, "On Gaussian Covert Communication in Continuous Time," EURASIP JWCN, Dec. 2019
4. S. Salehkalaibar, M. Wigger, and L. Wang, "Hypothesis Testing Over the Two-Hop Relay Network," IEEE Trans. Information Theory, Jul. 2019
5. A Marcastel, EV Belmega, P Mertikopoulos, I Fijalkow, "Online Power Optimization in Feedback-Limited, Dynamic and Unpredictable IoT Networks", IEEE Transactions on Signal Processing 67 (11), 2987-3000, 2019
6. G. Rezgui, E. V. Belmega, and A. Chorti, "Mitigating jamming attacks using energy harvesting", IEEE Wireless Commun. Lett., vol. 8, no. 1, pp. 297-300, Feb. 2019
7. W. Yu, A. Chorti, L. Musavian, V.H. Poor, Q. Ni, "Effective Secrecy Capacity for a Downlink NOMA Network", IEEE Trans. Wireless Commun., vol. 18, no 12, pp: 5,673-5690, Dec. 2019.
8. G.A. Nunez Segura, C. B. Margi, A. Chorti, "Understanding the Performance of Software Defined Wireless Sensor Networks Under Denial of Service Attack", Open Journal of Internet of things (OJIOT), Vol.5, no 1, pp:59-68 Aug. 2019 (published in the OJIOT as a special issue).
9. S. Skaperas, L. Mamatas, A. Chorti, "Real-Time Video Content Popularity Detection Based on Mean Change Point Analysis", IEEE Access, vol.7 pp: 142,246-142,260, Jul. 2019.
10. Cécilia Tarpau, Javier Cebeiro, Marcela A. Morvidone and Mai K. Nguyen, « A new concept of Compton scattering tomography and the development of the corresponding circular Radon transform », IEEE Transactions on Radiation and Plasma Medical Sciences (IEEE-TRPMS), accepted for publication, September 26th, 2019
11. Cécilia Tarpau and Mai K. Nguyen, « Compton scattering imaging system with two scanning configurations », Journal of Electronic Imaging (JEL), vol. 29, no. 1, January, 2020.
12. T. T. Truong and M. K. Nguyen, «Compton scatter tomography in annular domains », Inverse Problems, 35 (2019) 054005 (18pp), 2019.

13. AM Abdelhady, ..., I Andriyanova, et al., "2019 Index IEEE Transactions on Wireless Communications Vol. 18 » IEEE Trans. Wireless Commun. 2019

Conferences

1. L Desportes, P Andry, I Fijalkow, J David, "Short-Term Temperature Forecasting on a Several Hours Horizon", International Conference on Artificial Neural Networks, 525-536, 2019
2. A Marcastel, I Fijalkow, L Swindlehurst, "Energy efficient downlink massive MIMO: Is 1-bit quantization a solution?", ISWCS, 2019 (invited)
3. A Marcastel, E Belmega, P Mertikopoulos, I Fijalkow, "Gradient-free Online Resource Allocation Algorithms for Dynamic Wireless Networks", IEEE SPAWC, 2019
4. L. Li, S. M. Moser, L. Wang, and M. Wigger "On the Capacity of Block Fading Optical Wireless Channels," 2019 IEEE Global Communications Conference, Waikoloa, HI, USA, 9–13 Dec. 2019.
5. D. Kibloff, S. M. Perlaza, and L. Wang, "Embedding Covert Information on a Given Broadcast Code," 2019 IEEE International Symposium on Information Theory, Paris, France, 7–12 Jul. 2019.
6. R. Bomfin, M. Chafii, and G. Fettweis. "Performance assessment of orthogonal chirp division multiplexing in MIMO Space Time Coding" In 2019 IEEE 2nd 5G World Forum (5GWF), pages 220_225.
7. S. Ehsanfar, M. Chafii, and G. Fettweis. "Time-Variant Pilot-and CP Aided Channel Estimation for GFDM". 2019 IEEE International Conference on Communications (ICC), pages 1-6. 4
8. M. Danneberg, Z. Li, P. Kühne, A. Nimr, S. Ehsanfar, M. Chafii, and G. Fettweis. "Real-Time Waveform Prototyping". 2019 IEEE 20th International Workshop on Signal Processing Advances in Wireless Communications, (SPAWC) (Invited)
1. R. Bomfin, M. Chafii, and G. Fettweis. "A Novel Modulation for IoT : PSK-LoRa". IEEE VTC-spring (Kuala Lumpur, Malaysia, Mai 2019).
2. A. Fadel, A. Nimr, H. Chiang, M. Chafii, and B. Cousin. "Cross-Layer Multi-User Selection in 5G Heterogeneous Networks Based on Hybrid Beamforming Optimization for Millimeter-Wave" In 2019 IEEE 30th Annual International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC).
3. R. Bomfin, M. Chafii, and G. Fettweis. "Low-Complexity Iterative Receiver for Orthogonal Chirp Division Multiplexing". IEEE WCNC, Marrakesh, Morocco, April, 2019
4. A. Nimr, M. Chafii, and G. Fettweis. "Precoded-OFDM within GFDM Framework". IEEE VTC- spring, Kuala Lumpur, Malaysia, Mai, 2019
5. A. Nimr, M. Chafii, and G. Fettweis. "Low-Complexity Transceiver for GFDM systems with Partially Allocated Subcarriers". IEEE WCNC, Marrakesh, Morocco, April, 2019
6. J. Mancovasquez, M. Chafii, and B. Faouzi. "Tailoring Index-Modulation for uplink IoT and M2M Networks". IEEE WCNC, Marrakesh, Morocco, April, 2019
7. A. Martinez, M. Matthé, M. Chafii, and G. Fettweis. "Blind Carrier Frequency Offset Estimation in Generalized Frequency Division Multiplexing" In IEEE ICNC, Honolulu, Hawaii, United States, February, 2019
8. A. Nimr, M. Chafii, and G. Fettweis. "Practical GFDM-based Linear Receivers". IEEE SCC, Rostock, Germany, February, 2019
9. N. Bousmaha, M. Maachaoui, and R. Chelouah, "Trust Mechanism Using Clustering Approach in Vehicular Network", ICWNES 2019, International Conference on Wireless Networks and Embedded Systems, 26-28 July 2019 Roma
10. P. Loubiere, Astrid Jourdan, Patrick Siarry and Rachid Chelouah, "How sensitivity analysis can help AI optimization algorithms", Ninth International Conference on Sensitivity Analysis of Model Output, SAMO'2019, October 28th-30th Barcelona, Spain
11. L. Alouache, M. Maachaoui, M. Aliouat and R. Chelouah, "Securing Southbound Interface of HSDN-GRA Vehicular Routing Protocol using a Distributed Trust", 4th IEEE International Conference on Fog and Mobile Edge Computing (FMEC) 2019, June 10-13, Rome, Italy

12. Oechtering, T. and Le Treust, M., Coordination Coding with Causal Decoder for Vector-valued Witsenhausen Counterexample Setups, IEEE Information Theory Worskhop (ITW), Visby, Aug. 2019.
13. Le Treust, M. and Bloch, M., Jeu d'estimation de l'état de canal et coordination, Actes de la Conférence du Groupement de Recherche en Traitement du Signal et des Images (GRETSI), Lille, France, 2019
14. Le Treust, M. and Tomala, T. Strategic communication and persuasion, GT En- tropie, mots, stat, Département de Mathématique de l'université de Caen, Nov. 2019 (invited)
15. Le Treust, M. and Tomala, T. Strategic communication and persuasion, Workshop on Information and Decision, Satellite of IEEE ISIT conference, IHP Paris, 10th July 2019. (invited)
16. Le Treust, M. and Tomala, T. Strategic communication and persuasion, Workshop on Information Design and Splitting Games, MSE Paris, 17-19 June 2019 (invited)
17. Michel Chapron, Stereovision from the 2 cameras of the new HTC Vive Pro Headset, VRIC 2019, Laval Virtual, March 2019
18. Vincent P. Martin, Sylvain Reynal, Dogac Basaran, Hélène C. Crayencour. Belief Propagation algorithm for Automatic Chord Estimation. 16th Sound & Music Computing Conference, May 2019, Malaga, Spain. Pp.537-544
19. Sylvain Reynal, Comprendre la post-modernité au travers des interactions Art et (Techno)sciences, Séminaire DAHLIA, Université de Nantes, 28 juin 2019
20. Mitev, A. Chorti, M.J. Reed "Subcarrier Scheduling for Joint Data Transfer and Key Generation Schemes in Multicarrier Systems", in Proc. IEEE GLOBECOM 2019, Big Island, HI.
21. G. A. Nunez Segura, C. B. Margi, A. Chorti, "Understanding the Performance of Software Defined Wireless Sensor Networks Under Denial of Service Attack", in Proc. Int. Workshop on Very Large IoT (VLIoT) 2019, 30th Aug. 2019, Los Angeles, US.
22. R. Nasfi, A. Chorti, "Performance Analysis of the Uplink of a Two User NOMA Network under QoS Delay Constraints", in Proc. IEEE Int. Conf. on Ubiquitous and Future Networks (ICUFN) 2018, 2-5 July 2019, Zagreb, Croatia.
23. M. Mitev, A. Chorti, M.J. Reed "Optimal Resource Allocation in Joint Secret Key Generation and Data Transfer Schemes", in Proc. IEEE Int. Conf. Wireless Communications and Mobile Computing(IWCMC) 2019, 24-28 June 2019, Tangiers, Morocco.
24. M. Mitev, A. Chorti, E.V. Belmega, and M.J. Reed, "Man-in-the-Middle and Denial of Service Attacks in Wireless Secret Key Generation", IEEE GLOBECOM 2019, Waikoloa, HI, USA, Dec. 2019
25. S. Lakshminarayana, E.V. Belmega, and H. V. Poor, "Moving-Target Defense for Detecting Coordinated Cyber-Physical Attacks in Power Grids", IEEE SmartGridCom 2019, Beijing, China, Oct. 2019
26. K. Antonakopoulos, P. Mertikopoulos, and E.V. Belmega, "An adaptive Mirror-Prox Method for Variational Inequalities with singular operators", NeurIPS, 33rd Conf. on Neural Information Processing Systems, Vancouver, Canada, Dec. 2019
27. I. Chafaa, E. V. Belmega, and M. Debbah, "Adversarial Multi-armed Bandit for mmWave Beam Alignment with One-bit Feedback", ACM ValueTools 2019, Palma de Mallorca, Spain, Mar. 2019.
28. A. Savard, E. V. Belmega, "Optimal Power Allocation in a Relay-aided Cognitive Network", ACM ValueTools 2019, Palma de Mallorca, Spain, Mar. 2019.
29. A. Savard, and E. V. Belmega, « Allocation de puissance pour les réseaux radio cognitifs à relais », GRETSI, Lille, France, Sep. 2019.
30. Cécilia Tarpau, Javier Cebeiro, Mai K. Nguyen, Geneviève Rollet and Laurent Dumas, « A 3D imaging system based on scattered ionizing radiation », International Conference of SPIE Photonics Europe, April 7-10, 2020, Proc. SPIE 11351, Unconventional Optical Imaging II
31. Cécilia Tarpau, Javier Cebeiro and Mai K. Nguyen "A new bi-imaging NDT system for simultaneous recovery of attenuation and electronic density maps", 11th Symposium on NDT IN AEROSPACE, Paris-Saclay, November 13-15, 2019

32. Javier Cebeiro, Cécilia Tarpau, Marcela A. Morvidone, Diana Rubio, and Mai K. Nguyen, « A new Transmission Compton Scattering Tomography », XVIII Workshop on Information Processing and Control (RPIC) (ISBN 978-987-544-754-7), Bahia Blanca, Argentina, September 18-20, 2019
33. Cécilia Tarpau and Mai K. Nguyen, « Scattering imaging system with dual configuration », 14th International Conference on Quality Control by Artificial Vision (QCAV), Mulhouse, France, May 15-17, 2019, vol. 11172. International Society for Optics and Photonics, 2019
34. Javier Cebeiro, Marcela A. Morvidone, Cécilia Tarpau and Mai K. Nguyen, « On the invertibility of a new toric Radon transform with applications in Compton scatter tomography », VII Congress on industrial, computational and applied Mathematics (MACI), Comodoro Rivadavia, Argentina, May 8-10, 2019
35. Tarik Benaddi, Arti D Yardi, Charly Poulliat, Iryna Andriyanova, "Estimating the Maximum a Posteriori Threshold for Serially Concatenated Turbo Codes", IEEE ISIT 2019

Team MIDI

General presentation

The MIDI team (Multimedia Indexing and Data Integration) was created in 2006 with the fusion of two previously existing teams, one working on databases and one working on image processing. The team consists of about a dozen of permanent faculty members (teachers-researchers) and includes the research activity of 3 Engineers (2 IR and 1 IE), members of the Pole Ingénierie in the new organization of ETIS. The team balances competences in different fields, since 4 of its teachers-researchers are in section 61, the other ones in section 27. The team is also distributed between ENSEA (4 permanent teachers-researchers), and University of Cergy Pontoise, site St. Martin. With the integration of the EISTI engineering school within CY Cergy Paris Université, effective in 2020, two associated members from EISTI have integrated the team and a new member was recruited by EISTI in 2019 in the MIDI team. Also, a few members of the team are participating to the IDHN research federation, composed of members of ETIS and of several social and human sciences laboratories of CY Cergy Paris Université. The goal of IDHN is to exploit diverse data corpuses (text, social media, multimedia) for various applications in social and human sciences.

The team traditionally works around 2 main axes of research:

- Axis 1 on research in indexing and searching of multimedia data
- Axis 2 on research in big data management and data analytics

The team members put equal efforts in advancing both axes of research and at the same time in bringing those axes closer together; the latter is particularly important in the fast-evolving world of data analytics, for the analysis of multimodal data (namely data that contains textual, numerical, multimedia, etc.) and of information at the same time and for the same subject. Additionally, the team has developed competences in the area of machine learning for multimedia classification and now it is in the process of expanding these competences in the area of machine learning for constrained devices and in the area of combining machine learning with traditional databases in order to automatically adjust, optimize and predict database functioning in various aspects (e.g. caching, indexing, etc.). A specific topic the team starts to invest in is the explainability of various machine learning algorithms used in data analytics, in order to tackle issues such as transparency and fairness of decision making based on this kind of algorithms. Additionally, the team has invested in other areas of data processing like processing of data coming from social media by providing top-k interesting results per user and extracting and managing social networks, processing of spatio-temporal / mobility data and reducing big data sets by providing summaries. We have also been interested in issues around data privacy and are focusing more on the implications of data integration to the privacy of the user information.

In order to support the work of the team members in the long term, the team has invested in the creation of the following platforms:

- Platform RETIN, which is implementing in one compact way the work of the team around multimedia description and analysis, multimedia classification and indexing and machine learning for multimedia search;
- Platform MIDI cloud, a new platform in the process of becoming operational that allows the team members to push to parallel and distributed architectures parts of their research around top-k queries, graph summarization and data privacy processing.
- Platform ARAV3D, which is supporting research around acquisition of 3D models and virtual and augmented reality experiments. It is used for experimentation in the areas of 3D modeling, facial recognition, etc.

Highlight in 2019

- The SoCoRe! Project, obtained at the ANR Flash call for Open Science, that will allow to continue the efforts, started with previous projects of the FSP, to structure data management, sharing and querying in the French cultural heritage community.

Synthesis of the research activity in 2019

The activity of the MIDI team continued along the existing projects in both axes. In the axis around big data management and data analytics, the work on RDF data summarization (PhD of Mussab Zneika, defended this year [T1]) produced important results, with high visibility publications in VLDB Journal [J1] and Semantic Web journal [J3], and a tutorial at the EDBT top conference [C2]. The work on data privacy (PhD of Emmanouil Katsomailos) advanced with results in privacy preserving for continuous data publishing [J2], while that on trajectory modelling in indoor spaces (PhD of Alexandros Kontarinis) presented a model proposal in [C4]. The work on opinion mining in social networks, in collaboration with the Neuro team (C. Lavandier), in the context of the ANIMA European project, was presented in [C7].

In the axis around indexing and searching multimedia data, the work on human action recognition in image and video data (PhD of Diogo Luvizon, defended this year [T2]) was presented in [J4]. The work on learning image representations through metric learning (PhD of Pierre Jacob), in collaboration with the CELL team (A. Histace) and PJGN, produced recognized results presented at the top-level conference ICCV [C1], but also in [C3] and [C6]. The work on reassembling images through deep learning approaches, with application to archeologic object reconstruction (PhD of Marie-Morgane Paumard) was presented in [C8]. An extension to deep learning of previous work in the team around distributed learning for image representations with gossip exchanges was presented in [J5]. To notice also, in the same axis, the work on dynamic texture classification presented in [C5].

The activity in the context of the IDHN federation also continued with collaborations around the analysis of Twitter data, in order to characterize the political language [J6] or the gastronomy heritage [C11] [C12].

To notice also the results presented by the new associated members from CYU-EISTI, in the field of multilayer network analysis (M. Malek, [C9] [I1]) and visualization (S. Bornhofen, [C10] [I2] [I3]).

Several successful applications to various research project calls are to be noticed in 2019. The successful invitation for 10 months of Prof. Vassilis Christophides (Univ. of Crete) in the Fellows in Residence program of the Institute of Advanced Studies of CYU, will support the effort of developing a new research direction in the team, around explainability and transparency of machine learning algorithms for data analytics. The SoCoRe! Project, obtained at the ANR Flash call on Open Science, allows to continue the effort initiated with the PARCOURS projects (<http://projet-parcours.eu/>) of the FSP, to structure the management, sharing and querying of data produced by the community of cultural heritage sciences working in the field of conservation / restoration. The DforDetection project, in collaboration with PJGN, obtained at the Paris Seine Initiative call, will continue the work on deep learning for image representations, with a focus on fake image detection. The MOSCOW project establishes a new collaboration with ISC-PIF in the field of social media text analysis for fake news detection. Finally, the BDBE project, in collaboration with ESSEC, obtained in 2018 at the Paris Seine Initiative call, started effectively in 2019 with the recruitment of a postdoc (Jafar Mansouri) and continues the work in the team around opinion mining in social network data.

Noticeable is also the activity of scientific animation, with the participation at the organization of a winter school for the EGC conference (D. Kotzinos, C. Marinica) and the co-chairing of the MARAMI conference (M. Malek).

KPI of MIDI in 2019

Members

- 11 permanent members (10 members end of 2019)
 - 3 PU: D. Kotzinos (CYU), D. Vodislav (CYU), P.H. Gosselin (ENSEA, leaved in 2019)
 - 1 PU Emeritus : D. Laurent (CYU)



- 2 MCF HDR: D. Picard (ENSEA, leaved in 2019), H. Tabia (ENSEA, leaved in 2019)
- 5 MCF: T. Jen (CYU), T.T. Dang Ngoc (CYU), C. Marinica (CYU), A. Tzompanaki (CYU), S. Vu (ENSEA)
- 2 MCF on contract: H. Baazoui (CYU-EISTI, CDI arrived in 2019), W. Swaileh (CYU, CDD arrived in 2019)
- 21 non-permanent members
 - 3 associated researchers: M. Malek (CYU-EISTI), S. Bornhofen (CYU-EISTI), N. Priniotakis (CYU)
 - 3 engineers from Pole Ingénierie: M. Jordan (CY, IGR), B. Borzic (CNRS, IGR), N. Cholewka (CNRS, IGE)
 - 10 PhD students
 - 1 postdoctoral student
 - 4 members in contract: 2 ATER, 1 IGE, 1 apprentice CNRS

Publications

<i>Journal Papers</i>	<i>Conferences</i>	<i>National</i>	<i>Dissemination</i>	<i>Book</i>	<i>Chapter</i>	<i>Patent</i>	<i>Thesis</i>	<i>Others</i>
6	15						3	3 invited

PhD Defended

- ZNEIKA Mussab – Defended the 20/09/2019
 - Querying semantic web/linked data graphs using summarization
 - KOTZINOS Dimitris (70%) and VODISLAV Christian Dan (30%)
- CARBONERA LUVIZON Diogo – Defended the 08/04/2019
 - Machine Learning for Human Action Recognition and Pose Estimation based on 3D Information
 - PICARD David (50%) and TABIA Hedi (50%)
- PHAN Thi Hai Hong – Defended the 10/09/2019
 - Human Action Recognition in Videos with Shallow and Deep Learning
 - QUOY Mathias (30%) and VU son (70%)

Contracts

<i>Name</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
<i>FIR – Fellow In Residence</i>	INEX	Mobility	KOTZINOS VODISLAV	1/10/2019	10 months	Budget IEA	0€
<i>DforDetection</i>	INEX	Post-Doc	PICARD	1/10/2019	2 years	112 500€	112 500€

SoCoRe !	ANR Flash Science Ouverte	Post-Doc	VODISLAV	01/10/2019	2 years	96 000€	96 000€
MOSCCOW	CNRS 80 PRIME	PhD	BORZIC	01/10/2019	3 years	Managed by ISC	0€
BDBE	INEX	Post-Doc	KOTZINOS	01/09/2019	2 years	112 000 €	112 000 €
PICS	AAP	Internship	KOTZINOS	19/03/2019	9 months	12 000€	4 000€
AUSY	CIFRE	Thesis	TABIA	9/05/2019	3 years	481 678€	45 000€
OCTOPEEK	CIFRE	Thesis	TABIA	01/02/2019	3 years	99 640€	45 000€
BIG AI	INEX	Thesis	KOTZINOS	Pending 01/02/2020	1 year	327 225€	117 500€

Ongoing Contracts

Name	Sponsor	Type	PI	Start	Length	Budget	Budget (ETIS)
Trajectoire	FSP	Thesis	VODISLAV	01/10/2016	3 years	109 200€	109 200€
BDA		Workshop	VODISLAV	20/09/2018	9 months	3000€	2000€
TOPK	QWANT	Post-doc	VODISLAV – BORZIC	07/07/2017	2 years	100 000€	53 000€

Scientific Dissemination

Event Organization

5 th Winter School é-EGC	School	MARICINA KOTZINOS	Scientific and Organization committee	Jan 2019	Metz
MARAMI 2019	Conference Modèles et l'analyse des réseaux: approches mathématiques et informatiques	MALEK	Co-general Chair	Nov 2019	Dijon

Highlights dissemination

- Publication of a paper in the VLDB Journal (A* CORE ranking) S. Cebiric, F. Goasdoué, H. Kondylakis, D. Kotzinos, I. Manolescu, G. Troullinou, M. Zneika: Summarizing semantic graphs: a survey. VLDB Journal. 28(3): 295-327 (2019). Paper accepted at the ICCV conference (A* CORE ranking)
- P. Jacob, D. Picard, A. Histace, E. Klein. Metric Learning with HORDE: High-Order Regularizer for Deep Embeddings. International Conference on Computer Vision, Oct 2019, Seoul, South Korea
- Tutorial at the EDBT/ICDT conference (A CORE ranking), top conference with high visibility in the community
- H. Kondylakis, D. Kotzinos, I. Manolescu. RDF graph summarization: principles, techniques and applications (tutorial). EDBT/ICDT 2019 - 22nd International Conference on Extending Database Technology - Joint Conference, Mar 2019, Lisbonne, Portugal
- Fellows in residence invitation for 10 months for Vassilis Christophides (University of Crete), that enforces the development of a new research direction in the team, around explainability and transparency of machine learning algorithms for data analytics.
- The SoCoRe! Project, obtained at the ANR Flash call for Open Science, that will allow to continue the efforts, started with previous projects of the FSP, to structure data management, sharing and querying in the French cultural heritage community.

Highlight papers

- S. Cebiric, F. Goasdoué, H. Kondylakis, D. Kotzinos, I. Manolescu, G. Troullinou, M. Zneika: *Summarizing semantic graphs: a survey*. VLDB Journal. 28(3): 295-327 (2019) - <https://hal.archives-ouvertes.fr/ETIS-MIDI/hal-01925496v1>
- P. Jacob, D. Picard, A. Histace, E. Klein. *Metric Learning with HORDE: High-Order Regularizer for Deep Embeddings*. International Conference on Computer Vision, Oct 2019, Seoul, South Korea - <https://arxiv.org/pdf/1908.02735.pdf>

Research perspectives for 2020

The MIDI team will experience a significant evolution in 2020, with the departure of 3 members in the axis of indexing and searching multimedia data (1 PU and 2 MCF HDR). The team strategy is to continue to evolve toward a more integrated team, without separate research axes. The scientific framework for this convergence between the former axes is that of machine learning and artificial intelligence methods for massive data analytics, encompassing various types of data (structured, semi-structured, text, image, video) and also considering their combination in new multimodal approaches. The recruitment of the two positions open in the team in 2020 (1 PU and 1 MCF ENSEA) will follow this strategy.

The new research direction in the team, on fairness and explainability of machine learning algorithms for data analytics, enforced through the collaboration with Vassilis Christophides around entity resolution problems, will be developed with new research projects, e.g. on recommendation systems. Besides this new research direction, the team will continue the work in the existing projects, on learning image representations, on social network and text mining, on graph data summarization, on spatiotemporal data analytics and data privacy. In the context of the IDHN federation, a new project around video segmentation and indexing, combining multimodality techniques, is under development.

The team prepares new research projects through applications to the local calls of CY Initiative (former Paris Seine Initiative) in the Ambition, Emergence and PhD Eutopia programs. The traditional collaborations with partners in the domain of cultural heritage will be continued through new projects for the next FSP call, including the specific calls for the reconstruction of the Notre Dame cathedral, through the preparation of the continuation of the EquipEx Patrimex program and through a project of enhancing the MIDI cloud platform as an equipment used in cultural heritage projects, prepared for the DIM MAP.

Publications 2019

Journals

1. S. Cebiric, F. Goasdoué, H. Kondylakis, D. Kotzinos, I. Manolescu, G. Troullinou, M. Zneika: Summarizing semantic graphs: a survey. *VLDB Journal*. 28(3): 295-327 (2019)
2. Katsomallos, M., Tzompanaki, K., Kotzinos, D. Privacy, Space and Time: a Survey on Privacy-Preserving Continuous Data Publishing, *Journal of Spatial Information Science*, 19: 57-103 (2019)
3. M. Zneika, D. Vodislav, D. Kotzinos: Quality metrics for RDF graph summarization. *Semantic Web* 10(3): 555-584 (2019)
4. D. Luvizon, H. Tabia, D. Picard: Human pose regression by combining indirect part detection and contextual information. *Computers and Graphics* 85: 15-22 (2019)
5. M. Blot, D. Picard, N. Thome, M. Cord: Distributed optimization for deep learning with gossip exchange. *Neurocomputing* 330: 287-296 (2019)
6. J. Longhi, C. Marinica, Z. Després. Political language patterns' dissemination between a political leader and his campaign community: a CMC corpora analysis. *European Journal of Applied Linguistics*. 7(2), <https://doi.org/10.1515/eujal-2019-0009>. De Gruyter, 2019

Conference papers

- [C1] P. Jacob, D. Picard, A. Histace, E. Klein. *Metric Learning with HORDE: High-Order Regularizer for Deep Embeddings*. International Conference on Computer Vision, Oct 2019, Seoul, South Korea
- [C2] H. Kondylakis, D. Kotzinos, I. Manolescu. *RDF graph summarization: principles, techniques and applications (tutorial)*. EDBT/ICDT 2019 - 22nd International Conference on Extending Database Technology - Joint Conference, Mar 2019, Lisbonne, Portugal
- [C3] P. Jacob, D. Picard, A. Histace, E. Klein. *Efficient Codebook and Factorization for Second Order Representation Learning*. International Conference on Image Processing, Sep 2019, Taipei, Taiwan
- [C4] A. Kontarinis, K. Zeitouni, C. Marinica, D. Vodislav, D. Kotzinos. *Towards a Semantic Indoor Trajectory Model*. 2nd International Workshop on "Big Mobility Data Analytics" (BMDA) with EDBT 2019, Mar 2019, Lisbon, Portugal
- [C5] Thanh Tuan Nguyen, Thanh Phuong Nguyen, Frédéric Bouchara, Ngoc-Son Vu. *Volumes of Blurred-Invariant Gaussians for Dynamic Texture Classification*. Computer Analysis of Images and Patterns (CAIP), Sep 2019, Salerno, Italy
- [C6] G. Raynaud, P. Jacob, C. Simon Chane, A. Histace. *Active Contour Segmentation Based on Histograms and Dictionary Learning for Videocapsule Image Analysis*. VISAPP 2019, GIANA Special Session, Feb 2019, Prague, Czech Republic
- [C7] I. Meddeb, C. Lavandier, D. Kotzinos: *Using Twitter Streams for Opinion Mining: A Case Study on Airport Noise*. ISIP 2019: 145-160
- [C8] M.-M. Paumard, D. Picard, H. Tabia. *L'apprentissage profond pour le réassemblage d'images patrimoniales*. GRETSI 2019, Aug 2019, Lille, France
- [C9] M. Malek, S. Zorzan, M. Ghoniem. *A Methodology for Multilayer Networks Analysis in the Context of Open and Private Data*, Modèles & Analyse des Réseaux: Approches Mathématiques & Informatiques, Nov 2019, Dijon, France
- [C10] Bornhofen, S., Düring, M. *Exploring dynamic multilayer graphs for digital humanities*. Modèles & Analyse des Réseaux: Approches Mathématiques & Informatiques, Nov 2019, Dijon, France
- [C11] J. Longhi, Z. Després, C. Marinica, M. Vincent, F. Diaz-Marin. *The gastronomic meal of the French through the tweets of Michelin star-rated chefs: characterization of the cultural heritage, and extraction of techniques and professional gestures*. 7th conference CMC and Social Media Corpora for the Humanities, Sep 2019, Cergy-Pontoise, France

- [C12] J. Longhi, Z. Després, C. Marinica, M. Vincent, F. Diaz-Marin. *Le repas gastronomique des Français comme patrimoine culturel immatériel de l'humanité : caractérisation et transmission à travers les tweets des chefs 2 et 3 étoiles au Guide Michelin*. Atelier DAHLIA DigitAl Humanities and cuLtural herItAge: data and knowledge management and analysis, Jan 2019, Metz, France

Proceedings

- [P1] Anas Alaoui M'Darhri, Vincent Baillet, Bastien Bourineau, Alessio Calantropio, Gabriella Carpentiero, et al. (including M. Jordan). *Share - Publish - Store - Preserve. Methodologies, Tools and Challenges for 3D Use in Social Sciences and Humanities*. PARTHENOS, Feb 2019, Marseille, France. 2019.
- [P2] Julien Longhi, Claudia Marinica. *Proceedings of the 7th Conference on CMC and Social Media Corpora for the Humanities (cmccorpora19)*. 2019
- [P3] Dimitris Kotzinos, Dominique Laurent, Nicolas Spyrtos, Yuzuru Tanaka, Rin-ichiro Taniguchi: *Information Search, Integration, and Personalization - 12th International Workshop, ISIP 2018*, Fukuoka, Japan, May 14-15, 2018, Revised Selected Papers. Communications in Computer and Information Science 1040, Springer 2019, ISBN 978-3-030-30283-2

Invitations

- [I1] Maria Malek. Dagstuhl seminar 19061: Visual Analytics of Multilayer Networks across Disciplines, February 2019
- [I2] Stefan Bornhofen, *Graph Visual Analytics for Digital Humanities*, 6. Jahrestagung des Verbands Digital Humanities im deutschsprachigen Raum », DhD 2019, Mainz, Germany.
- [I3] Stefan Bornhofen, *Interactive Visualization of Dynamic Multilayer Graphs for Digital Humanities corpora*, 2nd DigiHUBB Days, Transylvania Digital Humanities Centre, Babeş-Bolyai University, Cluj-Napoca, Romania.

PhD Thesis

- [T1] Mussab Zneika. Querying semantic web/linked data graphs using summarization. Université de Cergy Pontoise, 2019.
- [T2] Diogo Luvizon. Machine Learning for Human Action Recognition and Pose Estimation based on 3D Information. 2019

Team NEUROCYBERNETIC

General presentation

The Neurocybernetics team is part of an enactive approach to cognitive sciences. We seek to model a number of cognitive processes ranging from isolated neurons to social interactions. We are interested in understanding what properties can emerge from the different dynamics involved: dynamics of local circuits, dynamics between brain structures, dynamics with the physical but also social environment.

In this framework, robots become a simulation tool for the emerging properties of neural networks. Robotic experiments thus make it possible to show the coherence of the developed models (challenges of integration both at the modelling level and at the technological mastery level with applications for engineering sciences) but especially the limitations of the models used (proof by failure allowing in certain cases to demonstrate the importance of changing paradigm or to show the importance of previously neglected structures).

Highlights in 2019

We have organised a large monthly thematic seminar on Human Sound Perception throughout the year, organised by C. Lavandier, A. Pitti and S. Boucenna

An INEX AMBITION project was drafted, with MOVE carried by Nicolas Cuperlier. This project was not accepted, but it was resubmitted for a springboard project by the ETIS laboratory, which was validated. This ambitious project is being prepared for an ANR call.

Synthesis of the research activity in 2019

This year showed a strong research activity with 24 journal articles and international conference papers, 12 funded projects and several thematic workshops and seminars that were organised, as well as several invited oral presentations. This contributed to the strong influence of our team.

KPI of Neurocybernetic in 2019

In 2019, the team is organised into three research areas: (i) the Perception axis, the Navigation axis and the Interaction axis. Each of these makes it possible to create a core of expertise around a common theme and to organise the interaction at the scientific strategy level of each of them within the team and with the other ETIS teams.

Members

As of 31 decembre 2019, the NEURO Group has:

- 10.5 permanent members:
 - 3 Full Professors
 - 7 Assistant Professors with 2 HDR
 - 1.5 CNRS Engineers.
- 13 non-permanent members:

- 1 associated member
- 12 PhD students

Ongoing PhD

1. **DEDIEU Romain** (70% of the scientific supervision) "Evaluation of acoustic comfort in buildings: study of the link between acoustic performance and sound perception", Thesis from the University of Cergy Pontoise directed by C. LAVANDIER, Sylvain BERGER 30% is in charge of the follow-up of the CIFRE convention with the company Saint Gobain Recherche), Thesis started in January 2017, defence on 11 May 2020 postponed to 10 June following the Covid-19 2020. Funding: CIFRE Convention, Next situation : Post-Doc on the European ANIMA project, as soon as the thesis is defended.
2. **GONTIER Félix** (30% scientific supervision by C. LAVANDIER in co-direction with Jean-François PETIOT 40% and co-supervision with Mathieu LAGRANGE 30%) "Analysis and synthesis of environmental sounds by deep convolutional approaches", Thesis of the Ecole Centrale de Nantes started in September 2017, Funding: Doctoral contract on ANR CENSE agreement [CAP13].
3. **REGRAGUI Mehdi Sidi** (50% scientific supervision by C. LAVANDIER in co-direction with Arnaud CAN at 50%) "Modelling and perceptive characterisation of rare events in urban environmental acoustics", Thesis of the doctoral school SPI (ED 602) started in October 2018, Funding: Doctoral contract of the University of Maine on agreement with ENS Cachan
4. **ELEY Nolan** (50% scientific supervision by C. LAVANDIER in co-direction with Brian KATZ 50%) "Virtual Experience in Archaeological Acoustics: Multimodal study of the influence of halls on the playing techniques of musicians on wind instruments in the 17th and 18th centuries in Versailles", Thesis of the University of Cergy Pontoise started in November 2019, Funding: Doctoral contract of the University of Cergy Pontoise on agreement with the foundation of heritage sciences ANR-10-LABX-0094-01.
5. **ABDELWAHED Mehdi** (50% O. Romain and 50% A. Pitti), " Adaptive impedance spectroscopy for feature extraction and exploitation of artificial skin: application to mobile robotics of autonomous vehicle type ". VEDECOM funding.
6. **MOUALLA Aliaa**, Expected date of defence: 17/02/2020, Title of the thesis: ""A robot in a museum: Cognitive learning and aesthetic driving"". "Thesis Director: Philippe Gaussier and Denis Vidal.
7. **COLOMER Sylvain**, Title of the thesis: "Integrated neurorobotic approaches for the localisation and navigation of an autonomous vehicle" Thesis director: Olivier Romain, Nicolas Cuperlier and Guillaume Bresson (Vedecom).
8. **ESPADA Yoan** (Olivier Romain, Nicolas Cuperlier and Guillaume Bresson). Title of the thesis: "Bio-inspired location for driving delegation" Thesis supervisor: Olivier Romain
9. **REYNAUD Jérôme** 2016 (part-time), " Insertion of robots in the world of work ", Thesis Director Mathias Quoy.
10. **ANNABI Louis**, "Spiking neural architecture based on predictive coding for memory sequences" with A. Pitti and M. Quoy.
11. **ABROSSIMOFF Julien**, with P. Gaussier and A. Pitti, " Neurocomputational models of a working memory by predictive coding ".
12. **HOANG Kevin** with P. Gaussier and A. Pitti, " Exploration and active recognition of visual scenes: Impact of the use of an event camera ".

PhD Defended

- GUEDJOU Hakim – Soutenue le 21/10/2019
 - Learning for detection and adaptation to social traits in social robotics
 - With Mohamed Chetouani (Sorbonne université, laboratoire ISIR)
- BEAUSSE Nils – Soutenue le 19/12/2019

- Visual-motor learning, involvement in sensorimotor development and the emergence of social interactions
- GAUSSIER Philippe (30%) and MOSTAFAOUI Ghiles (70%)
- ANSERMIN Eva – Soutenu le 30/09/2019
 - Unintentional rhythmic training: study and modelling of a sensorimotor control for human/robot coordination
 - GAUSSIER Philippe (30%) and MOSTAFAOUI Ghiles (70%)
- PHAN Thi Hai Hong – Defended the 10/09/2019
 - Human Action Recognition in Videos with Shallow and Deep Learning
 - QUOY Mathias (30%) and VU son (70%)

Publications

<i>Journal Papers</i>	<i>Conferences</i>	<i>National</i>	<i>Dissemination</i>	<i>Book</i>	<i>Chapter</i>	<i>Patent</i>	<i>Thesis</i>	<i>Others</i>
11	10	11	1	1			4	

New contracts

<i>Name</i>	<i>Manager</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
ROBOCOL	CNRS	ROBOCOL		GAUSSIER	26/03/2019	1 year	5 000,00 €	5 000,00 €
CIGALE	UCP	DGAC	RTE CORAC	LAVANDIER	1/10/2019	3 year	796 000€	15 000€
Chaire Neurosciences	UCP	INEX	Chaire	QUOY	1/10/2019	4 years	380 000€	380k
Facebook	UCP	Facebook	Thesis	QUOY	01/11/2019	3 years	147 000€	147k
SRV	ENSEA	ENSEA	Travels	BOUCENNA	01/10/2019	1 years	2 500€	2.5k
INEX SCIENCES COGNITIVES	PIA	INEX	Workshop	GAUSSIER	16/06/2019	1 years	55 000€	55 000€

Contracts on going

<i>Name</i>	<i>Manager</i>	<i>Sponsor</i>	<i>Type</i>	<i>PI</i>	<i>Start</i>	<i>Length</i>	<i>Budget</i>	<i>Budget (ETIS)</i>
Facebook	UCP	Facebook	Thesis	QUOY	01/09/2018	3 years	147 000 €	147 000 €

MRTE Lieux de culte	UCP	IDF PATRIMA	Subvention avec condition	LAVANDIER	01/01/2017	3 years	2 915 €	2 000 €
CENSE	UCP	ANR	Subvention avec condition	LAVANDIER	01/10/2016	5 years	75 000 €	69 444 €
ARTEM	UCP	INEA Union Européenne	Contrat Européen	LAVANDIER	01/12/2017	4 years	4 000 €	4 000 €
ARTEM overheads	UCP	INEA Union Européenne	Contrat européen	LAVANDIER	01/12/2017	4 years	21 000 €	18 000 €
ANIMA	UCP	INEA Union Européenne	Contrat Européen	LAVANDIER	19/09/2017	4 years	174 000 €	174 000 €
ANIMA overheads	UCP	INEA Union Européenne	Contrat Européen	LAVANDIER	19/09/2017	4 years	122 000 €	86 680 €
SPACE CODE	UCP	Inex	Doctorant	GAUSSIER	01/10/2018	36 months	188 436 €	117 500 €
Cifre St Gobain	CNRS	ST Gobain	Thesis	LAVANDIER	21/06/2017	3 years	45 000 €	45 000 €
Cifre THALES	CNRS	THALES	Thesis	GAUSSIER	28/03/2018	3 years	45 000 €	45 000 €
DIM RFSI	CNRS	Université Paris XIII PARIS NORD VI	Payment	BOUCENNA	07/12/2018	11 months	10 000€	10 000 €
DIM RFSI	CNRS	Université Paris XIII PARIS NORD VI	Payment	PITTI – BLANCHARD	07/12/2018	1 year	11 500,00 €	11 500,00 €

Scientific Dissemination

Invited conference

Urban Sound Symposium	Conférence invitée	LAVANDIER	Avril 2019	Gent Université	Attractive routes	https://urban-sound-symposium.org/speaker
ISRE Symposium	Talk	BOUCENNA	Juillet 2019	Amsterdam	Emotional interaction as a way to regulate robot behavior	

Event Organization

Colloque national	Journée thématique	PITTI, LAVANDIER, BOUCENNA	Animateur	Mensuel	Cergy	https://www-etis.ensea.fr/fr/actualite/seminaire-thematique-etude-de-la-perception-sonore-humaine.html
NeuroDevRob	Workshop international	PITTI	Chairman	4 and 5 december 2019	Cergy	
SAB2020	The 16th International Conference on the Simulation of Adaptive Behavior	GAUSSIER, BOUCENNA, CUPERLIER	Local chair			
TechDays	Journée Véhicules Autonomes et Robotique Mobile Terrestre GT9-2RM/GT2	CUPERLIER	Organizer	10 september 2019	Compiègne	Une approche neurorobotique de la navigation
TechDays		CUPERLIER	Organizer	25 juin 2019	Cergy	Une approche neurorobotique pour la navigation
Séminaire	Séminaire laboratoire PARAGRAPHE	CUPERLIER	Participant	18 avril 2019	Cergy	Cognition spatiale et navigation : une approche neurorobotique

Others KPI

Chaire INEX Robotique et Neurosciences.

Research perspectives for 2020

A transformation is under way in the team with a new manager (A. Pitti), a new MCF position (Laura Cohen) and an INEX Professor of Robotics and Neurosciences (Lola Canamero). This new organisation of the team should reinforce its different assets with renewed research themes and a new impetus. The team's strategy aims at redefining and renewing the positioning of the research themes around cognitive, affective and social robotics, health, with the neurorobotics and neuronal modelling axes as strong points. A policy aiming at more efficiency upstream in the submission of projects has been initiated, interaction and decision making in consultation, and support for doctoral students for the success of their theses. Work towards greater visibility of the work must continue and internationalisation of collaborations must be pursued. Internationally, lobbying work is underway, which has resulted in a thesis with IPAL/NTU Singapore and another with Pompeu Fabra. Two other projects are underway with AI and Robotics laboratories of the Eutopia consortium with the VUB University on social robotics and bio-robotics and another project with the Technical University of Munich. At the national level, collaborations with strong national actors must be intensified with the ISIR, Nanterre and others must be created to join large robotics projects such as TIRREX to which we are not associated.

Internally, a federation of research between several researchers is being promoted around new robotic platforms chosen jointly (Kephera swarm, the humanoid robot Reachy and navigation robot Instar, basic support and DIM RFSI/Collège de France) around the themes of multimodal physical and social interaction, language and sound perception, to develop a multimodal platform Berenson 2. Work on physical interaction and object gripping should be renewed with this new platform.

The theme of computational neuroscience around the hippocampus remains a preponderant research which must be intensified with perspectives in fundamental research (CNRS Aix-Marseilles/Collège de France) and collaboration with industrialists for autonomous vehicles, drones must be intensified (Vedecom, Thalès, and the actor iXBlue).

Bio-inspired robotics sees new prospects for collaborations with Ghiles Mostafaoui and the ISIR laboratory and together with Alexandre Pitti and VUB and the Brubotics laboratory for the co-creation of a new platform for a compelling robotic arm and engine control. A withdrawal of the team on hydraulic robotics was made due to the lack of arm. Finally, a collaboration with Harbin China University on flexible robotics has received 1 year's funding for the arrival of a Chinese doctoral student, which should further develop this original axis.

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