RESEARCH CENTER

FIELD

Activity Report 2019

Section Highlights of the Team

Edition: 2020-03-21

ABS Project-Team (section vide)

ACUMES Project-Team (section vide)

AGORA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Walid Bechkit holds the PEDR (2017-2021).
- Khaled Boussetta holds the PEDR (2018-2022).
- Hervé Rivano holds the PEDR (2017-2021).
- Razvan Stanica holds the PEDR (2016-2020).
- Razvan Stanica obtained his HDR from the University Lyon 1 / INSA Lyon, in November 2019.

5.1.1. Awards

- Ahmed Boubrima is runner-up (*accessit*) for the Gilles Kahn thesis prize 2019.

AIRSEA Project-Team (section vide)

ALICE Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Dmitry Sokolov has won the "best expertise" nomination for TechnoText 2019, the challenge for the best russian language IT-related text of 2019. The award was given for the article on understandable raytracing [0].

[0] https://github.com/ssloy/tinyraytracer/wiki

ALMANACH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The main highlight for ALMAnaCH in 2019 is the publication of CamemBERT, a French neural language model trained on the French section of OSCAR, our very large multilingual web-based raw corpus. The publication of this first Transformer-based language model for French, which allowed us to improve the state of the art in several classical NLP tasks, met a large success both in the academic and industrial worlds. It is the topic of an article in the major French daily newspaper Le Monde and of a broadcast on the national radio France Culture.

ALPINES Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- HPDDM software is now available through PETSc PCHPDDM routine, for details see the routine. Both Geneo and its multilevel extension presented in [32] are available.
- ERC Synergy EMC2 project kick off meeting took place in September 2019, at Sorbonne University.

ANGE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Human ressources

Martin Parisot left the team in september 2019 to join the team Cardamom (Inria-Bordeaux). Apoline El Baz joined the team on an ADT position to developp Fresh Kiss 3D. Julien Guieu is the new assistant of the team (May). Mathieu Rigal and Chourouk El Hassanieh started a PhD. (September).

5.1.2. Travel policy

The team started to limit flies for professional activities. A deeper reflexion on the environmental impact of scientific activities has been initiated in the team. C. Guichard and Y. Penel are members of the CLDD of Inria Paris.

5.1.3. Awards and new grants

- J. Sainte-Marie was promoted Adjoint au Directeur Scientifique, in charge of the topic "Sciences de la planète, de l'environnement et de l'énergie". (July)
- M. Parisot was invited for a long term stay at Aachen University (Sept.-Nov.)
- The ANR project ALLOWAP supported by J. Salomon (with L. Halpern, F. Kwok and B. Delourme) was accepted for a start in Jan. 2020.
- M. Parisot and E. Audusse organized the CEMRACS project "Land Slide Tsunami" at CIRM (July-Aug.).
- Y. Penel organized the CEMRACS project "SGN-Num" at CIRM (July-Aug.).
- E. Audusse and Y. Penel organized the CEMRACS project "SW-Cor".

ANTIQUE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Caterina Urban joined the group as a CR in February 2019, and is opening new research directions towards static analysis for data-science software. She was invited to talk about her work in this area at SAS 2019 (Static Analysis Symposium) [13].

ARAMIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- F. De Vico Fallani was awarded an ERC Consolidator Grant.
- N. Burgos was awarded a Chair at the Paris Artificial Intelligence Research Institute (PRAIRIE).
- O. Colliot was awarded a Chair at the Paris Artificial Intelligence Research Institute (PRAIRIE).
- S. Durrleman was awarded a Chair at the Paris Artificial Intelligence Research Institute (PRAIRIE).
- S. Epelbaum holds a "Poste d'accueil" Inria since november 2019.

5.1.1. Awards

- N. Burgos received the Cor Baayen Young Researcher Award from ERCIM.
- V. Debavelaere was awarded a best paper award at the MICCAI conference in Shenzhen .

BEST PAPERS AWARDS :
[32]
V. DEBAVELAERE, A. BÔNE, S. DURRLEMAN, S. ALLASSONNIÈRE.*Clustering of longitudinal shape data sets using mixture of separate or branching trajectories*, in "Medical Image Computing and Computer Assisted Intervention – MICCAI", Shenzhen, China, Medical Image Computing and Computer Assisted Intervention – MICCAI 2019, October 2019, p. 66-74, https://hal.archives-ouvertes.fr/hal-02103355

ARIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Florent Bréhard, jointly with Mioara Joldes and Jean-Bernard Lasserre (CNRS LAAS) received the Distinguished paper award at ISSAC 2019 for *On Moment Problems with Holonomic Functions*.

Alice Pellet-Mary was an awardee of the L'Oréal-Unesco scholarship for Women and Science.

BEST PAPERS AWARDS :

[16]

F. BRÉHARD, M. JOLDES, J.-B. LASSERRE.*On Moment Problems with Holonomic Functions*, in "ISSAC 2019 - 44th International Symposium on Symbolic and Algebraic Computation", Pékin, China, July 2019, p. 66-73, https://hal.archives-ouvertes.fr/hal-02006645

AROMATH Project-Team (section vide)

ATHENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maureen Clerc left the group and took up her new position as new Director and Head of the Inria Sophia Antipolis - Méditerranée research centre on 8 November 2019.

5.1.1. Awards

The European Association for Signal Processing (EURASIP) elevated on Sept. 2019 Rachid DERICHE to EURASIP FELLOW, the Association's most prestigious honour in recognition of outstanding achievements in the broad field of Signal Processing and in particular in Computational Brain Imaging.

November 22nd 2019, Université Côte d'Azur officially launched its new Institute of artificial intelligence *3IA Côte d'Azur*. Rachid Deriche and Maureen Clerc are among the 27 awarded 3IA chairs.

Auctus Team

5. Highlights of the Year

5.1. Highlights of the Year

- Jean-Marc Salotti has been elected Member of the International Academy of Astronautics
- The startup Touch Sensity [0] has been created by Ganna Pugach.

[0] http://touchsensity.com/

AVALON Project-Team (section vide)

AVIZ Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Aviz researchers contributed 36 publications this year. Amongst these 3 papers were presented at IEEE VIS, the largest international Visualization and Visual Analytics conference.
- Aviz researchers remained active in the research community. We organized one Dagstuhl seminar and one Shonan seminar, served in 8 different organizing committee roles, on 19 program committees, and on 5 different journal editorial board. We reviewed for 25 different conference venues and for 12 different journals. We also gave 26 invited talks and served on two different steering committees and a best PhD award committee and served on 10 different juries (for both PhD and Master students).
- Aviz researchers started two four-year ANR grants as principle investigators.

5.1.1. Awards

- Tobias Isenberg was named the Associate Editor of the Year for Elsevier Computers & Graphic.
- Pierre Dragicevic and his co-authors received a best paper award at ACM CHI .
- Natkamon Tovanich and his co-authors received the Honorable Mention poster award at EuroVis 2019 .

BEST PAPERS AWARDS :

[34]

P. DRAGICEVIC, Y. JANSEN, A. SARMA, M. KAY, F. CHEVALIER.*Increasing the Transparency of Research Papers with Explorable Multiverse Analyses*, in "CHI 2019 - The ACM CHI Conference on Human Factors in Computing Systems", Glasgow, United Kingdom, May 2019 [*DOI :* 10.1145/3290605.3300295], https://hal.inria.fr/hal-01976951

[51]

N. TOVANICH, N. HEULOT, J.-D. FEKETE, P. ISENBERG.*A Systematic Review of Online Bitcoin Visualizations*, 2019, Posters of the European Conference on Visualization (EuroVis), The poster received the Honorable Mention award at EuroVis 2019 [*DOI :* 10.2312/EURP.20191148], https://hal.archives-ouvertes.fr/hal-02155171

BEAGLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Last year our highlights were focused on remarkable publications. This year the main events are on organizations and grants applications.

- We have been in charge of organizing the Scientific Days of Inria in July 2019 https://project.inria.fr/journeesscientifiques2019/
- We were awarded two exploratory actions by Inria in 2019, one on high performance computing, the other in agro-ecology
- We were auditioned for an ERC synergy grant call (very last step in the many steps for the grant obtention)
- We organized MMEE https://mmee2019lyon.sciencesconf.org/ in Lyon

BIGS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BIGS participated to the organization the JdS 2019 (Journées de Statistique 2019) http://www.jds2019.sfds.asso.fr/ in Nancy.

B. Scherrer and his co-authors received the Outstanding paper award for AAAI-2019“ from the AAAI (Association for the Advancement of Artificial Intelligence.
BEST PAPERS AWARDS :
[9]
Y. EFRONI, G. DALAL, B. SCHERRER, S. MANNOR.*How to Combine Tree-Search Methods in Reinforcement Learning*, in "AAAI 19 - Thirty-Third AAAI Conference on Artificial Intelligence", Honolulu, Hawai, United States, January 2019, https://arxiv.org/abs/1809.01843 - AAAI 2019, https://hal.inria.fr/hal-02273713

BIOCORE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Highlights

- The patented approach to produce microalgae under a biofilm form was further optimized with gradient based approaches [71] and strategies to still enhance productivities were identified and tested experimentally [26].
- The introduction of resistant plants for the protection against pathogens often leads to the appearance of virulent pathogenic strains that are capable of infecting these resistant plants. We developed a model for the pyramiding of these qualitative resistances with genetically controlled infection bottlenecks, and showed the efficiency of this technique when the fitness cost of Resistance Breaking pathogen variants in susceptible plants is intermediate [36].
- In the context of ANR project ICycle, following the PhD thesis of Sofia Almeida and in collaboration with F. Delaunay's lab (Institut Biologie Valrose, CNRS), a calibrated and validated model of the mammalian circadian clock was published in [13]. The interactions between the circadian clock and the cell cycle were then investigated [44]. The coupled models replicate the oscillators' period-lock response and recover clock to cell cycle period ratios such as 1:1 or 3:2, as observed in F. Delaunay's lab.

5.1.2. Awards

- Lucie Chambon and J.-L. Gouzé won a Best Paper award at the DYCOPS conference in Brazil (April 2019), on original control strategies for the genetic toggle switch.

BEST PAPERS AWARDS :
[46]
L. CHAMBON, J.-L. GOUZÉ.*A new qualitative control strategy for the genetic Toggle Switch*, in "DYCOPS 2019 - 12th IFAC Symposium on Dynamics and Control of Process Systems, including Biosystems", Florianopolis, Brazil, B. CHACHUAT, O. BERNARD, J. E. NORMEY-RICO (editors), IFAC-PapersOnLine, Ifac, 2019, vol. 52, n^{o} 1, p. 532-537 [*DOI :* 10.1016/J.IFACOL.2019.06.117], https://hal.inria.fr/hal-02319873

BIOVISION Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

In November 2019, the Biovision project team recruited Dr. Aurelie Calabrèse as a “Starting Research Position” for a 3-year period. A. Calabrèse is a psychophysicist specialized in visual neuroscience with a strong clinical expertise. She has done extensive work on enhancing further the methods to detect and measure reading deficit in low-vision populations. She has extensive practice in experimenting with visually impaired individuals and will be a great asset to bridge the gap between development and validation of assistive technology solutions.

BONUS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

+ The paper [30] was nominated for the *Best Student Workshop Paper Award* at the 28th ACM (Companion) Genetic and Evolutionary Computation Conference (GECCO 2019).
+ *USA Patent* with Beckman & Coulter on the optimization of large medical laboratories (Prof. E-G. Talbi, S. Faramarzi Oghani, M. Bué), 2019.
+ The paper [29] has received the *Best Student Paper Award* at the 10th International Conference on Evolutionary Multi-Criterion Optimization (EMO 2019).
  BEST PAPERS AWARDS :
  [29]
  Y. MARCA, H. AGUIRRE, S. Z. MARTINEZ, A. LIEFOOGHE, B. DERBEL, S. VEREL, K. TANAKA.*Approximating Pareto Set Topology by Cubic Interpolation on Bi-objective Problems*, in "EMO 2019 - International Conference on Evolutionary Multi-Criterion Optimization", East Lansing, Michigan, United States, February 2019, p. 386-398 [*DOI :* 10.1007/978-3-030-12598-1_31], https://hal.archives-ouvertes.fr/hal-02064548

CAGE Project-Team (section vide)

CAGIRE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. R. Manceau, new Cagire team leader

After having taken over the responsibility of the team since its creation, Pascal Bruel, 59, has decided this year to hand over the reins! After consultation, Inria's management has appointed Remi Manceau as the new head of the Cagire team as of 18 November 2019.

CAIRN Project-Team (section vide)

CAMBIUM Project-Team (section vide)

CAMIN Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Student Paper price: X. Lu, D. Guiraud, S. Renaux, T. Similowski, C. Azevedo-Coste, "Monitoring phrenic nerve stimulation-induced breathing via tracheal sounds", the 58th International Spinal Cord Society Annual Scientific Meeting (ISCoS), Nice, France, 2019

Student Paper competition Finalist: L. Fonseca, A. Bo, D. Guiraud, B. Navarro, A. Gelis and C. Azevedo-Coste, "Investigating Upper Limb Movement Classification on Users with Tetraplegia as a Possible Neuroprosthesis Interface," 2018 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), Honolulu, USA, 2018, pp. 5053-5056.

CAMUS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

One of the main challenges of parallelization is the selection of the appropriate granularity to balance between the ideal degree of parallelism and the mitigation of the runtime system's overhead. We have worked on the granularity control for parallel applications focusing on two different paradigms. In the first one, which is the tasks with spawn/sync mechanism, we combined the use of asymptotic complexity functions provided by the programmer, with runtime measurements to predict the execution time of tasks with reasonable accuracy. This estimation can then be used to select the proper task granularity, while making sure to put enough work inside each task. In the second one, which is related to the tasks with dependencies paradigm, we have improved an existing algorithm to cluster a graph of tasks to obtain a meta-graph with larger tasks. This approach was used in an application in collaboration with the TONUS team, and we have demonstrated that it allows for a significant speedup.

CAPSID Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Malika Smaïl-Tabbone was invited with Bastien Rance to coordinate the selection of the best contributions from 2018 literature on Bioinformatics and Translational Informatics for the 2019 IMIA YearBook of Medical Informatics [20].

Bishnu Sarker (PhD student) obtained a DrEAM fellowship from Lorraine Université d'Excellence for a 3-month internship at the MILA (Machine Learning Laboratory of the University of Montreal and University of Quebec) in Montreal.

CARAMBA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- On December 2nd, 2019, the factorization of RSA-240 and the computation of a 240-digit discrete logarithm were announced.
- In August 2019, Pierrick Gaudry found a vulnerability in the encryption scheme of the Internet voting system of Moscow.
- Pierrick Gaudry and Cécile Pierrot were invited speakers at the ECC 2019 conference (Bochum, Germany).

5.1.1. Awards

- Simon Abelard received the PhD prize of Université de Lorraine from the doctoral school IAEM (computer science, automatic) [25].

CARDAMOM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- In September 2019 Martin Parisot, previously CR in the ANGE team, has joined CARDAMOM;
- In September 2019 Nicolas Barral, previously post-doc in the Computational Geoscience and Energy division of the Department of Earth Science and Engineering at Imperial College London, has joined CARDAMOM
- H. Beaugendre has contributed to the organization of Inria's Autumn school, November 4-8 2019, Inria Bordeaux Sud-Ouest.
  School's objective: The school will aim at simulating a physical problem, from its modeling to its implementation in a high performance computing (HPC) framework. The school will offer both plenary courses and hands-on sessions. The physical problem considered will be the harmonic wave propagation.
  The first day will be dedicated to the modeling of the problem and its discretization using a Discontinuous Galerkin scheme. The following two days will be dedicated to linear algebra for solving large sparse systems. Background on direct, iterative and hybrid methods for sparse linear systems will be discussed. Hands-on on related parallel solvers will then be proposed. Will follow a session dedicated to advanced parallel schemes using task-based paradigms, including a hands-on with the starpu runtime system. The ultimate hands-on session will be devoted to the use of parallel profiling tools. The school will be closed with plenary talks illustrating the usage of such a workflow in an industrial context.
  38 participants, mostly PhD students and Post-docs.
  This school received support form cea, Inria, prace and sysnum.

5.1.1. Awards

In November 2019 M. Ricchiuto has been granted the honorary appointment of Adjunct Professor at the Civil and Environmental Engineering department of Duke University in North Carolina (USA).

CARMEN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Mark Potse has been recruited on a permanent position researcher at Bordeaux University.

The team has been involved in the organization of the 10th international conference on Functional Imaging and Modeling of the Heart (FIMH), that was held at Bordeaux in July 2019.

The Direction Generale de l'offre de soins (DGOS) has accepted to found the clinical project of phase III Parkeo2 In this project 11 hospitals in France will use the software OptimDBS for the planification of deep cerebral surgery. The project will start in October 2020 and will last three years.

CASCADE Project-Team

5. Highlights of the Year

5.1. Awards

- The paper “The Gap-Problems: A New Class of Problems for the Security of Cryptographic Schemes”, by Tatsuaki Okamoto and David Pointcheval from PKC 2001, has received the Test-of-Time award at PKC 2019
- Raphaël Bost received the “2019 PhD Thesis Award” from the GDR Sécurité Informatique
- Mélissa Rossi received the L’Oréal-UNESCO For Women in Science Rising Talent Award Scholarship 2019.

CASH Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

In January 2019, the paper “Static Analysis Of Binary Code With Memory Indirections Using Polyhedra” resulting from a collaboration with colleagues from Lille University, has received a best paper award of the VMCAI 2019 conference.

The paper “Godot: All the Benefits of Implicit and Explicit Futures” received the distinguished artefact at ECOOP’19.

BEST PAPERS AWARDS :

[5]

C. BALLABRIGA, J. FORGET, L. GONNORD, G. LIPARI, J. RUIZ.*Static Analysis Of Binary Code With Memory Indirections Using Polyhedra*, in "VMCAI’19 - International Conference on Verification, Model Checking, and Abstract Interpretation", Cascais, Portugal, LNCS, Springer, January 2019, vol. 11388, p. 114-135 [*DOI :* 10.1007/978-3-030-11245-5_6], https://hal.archives-ouvertes.fr/hal-01939659

[8]

A. CHARIF, G. BUSNOT, R. MAMEESH, T. SASSOLAS, N. VENTROUX.*Fast Virtual Prototyping for Embedded Computing Systems Design and Exploration*, in "RAPIDO2019 - 11th Workshop on Rapid Simulation and Performance Evaluation: Methods and Tools", Valence, Spain, January 2019, p. 1-8 [*DOI :* 10.1145/3300189.3300192], https://hal.archives-ouvertes.fr/hal-02023805

CASTOR Project-Team (section vide)

CEDAR Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Through 2019 competitive **hiring**, the team has doubled its number of senior members: Oana Bălălău has been hired on an Inria Starting Researcher Position (SRP), and she joined in november; Angelos Anadiotis has been hired as a Gaspard Monge Assistant Professor at Ecole Polytechnique within the team.
- I. Manolescu and M. Buron have demonstrated the **ConnectionLens** system to the Defense Minister Florence Parly, as part of DataIA's showing for her visit at Inria, in April 2019 [0]. The national Inria director Bruno Sportisse, the military director of Ecole polytechnique François Bouchet, and the Fields medalist Cédric Villani were also present.
- As a member of the scientific committee of the **GFAIH** (Global Forum on AI for Humanity), I. Manolescu had the opportunity to meet, in a dinner at the Elysée Palace, and exchange with the French President Emmanuel Macron, the Economy and Industry Minister Bruno Le Maire, the Research Minister Frédérique Vidal, and the Digital Affairs Minister Cedric O [0].

5.1.1. Awards

- The demonstration "Spade: A Modular Framework for Analytical Exploration of RDF Graphs"[15] has obtained the **Best Demonstration Award** at the BDA conference 2019, where it has also been informally presented [0].

[0] https://team.inria.fr/cedar/connectionlens/
[0] https://twitter.com/ioanamanol/status/1189478849651904513
[0] https://twitter.com/cedarinrialix/status/1185203276142256128

CELESTE Project-Team (section vide)

CELTIQUE Project-Team (section vide)

CHORALE Team (section vide)

CHROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Success for European H2020 ICT Robotics project application 'BugWright2' (9M€), led by C. Pradalier (CNRS, GeorgiaTech Metz). O. Simonin leads the multi-robot systems Work-Package (funding for Chroma & Agora teams 600K€). Domain : Autonomous Robotic Inspection and Maintenance on Ship Hulls and Storage Tanks.
- Success for several ANR project applications in the field of Artificial Intelligence :
  - ANR JCJC 'PLASMA' led by J. Dibangoye (250K€)
  - ANR 'DELICIO' led by C. Wolf (510 K€), Chroma is partner.
  - AI Chair led by C. Wolf (520 K€), Chroma is partner (O. Simonin, J. Dibangoye).
- Success for several project applications in the field of Autonomous Vehicles : 2 multi-annual R&D projects with Toyota Motor Europe, a PSPC project ES3CAP leaded by Kalray (3 years), and an EU ECSEL project CPS4EU (3 years).
- Our team LyonTech obtained the 3rd place at the Robocup@Home Pepper league in the 2019 RoboCup competition organized in Sydney (July).
- O. Simonin co-chaired with F. Charpillet (Inria Nancy) the JNRR'2019 bi-annual conference, gathering the French Robotic community (GDR Robotique) ($\sim$ 200 pers.).
- New book by A. Martinelli : "Observability: A new theory based on the group of invariance". To be edited by SIAM on year 2020.
- Exploitation Licenses of CMCDOT have respectively been sold to Toyota and to a French company in the field autonomous vehicles (confidential), with an engineer support for the related transfer of technology.

5.1.1. Awards

BEST PAPERS AWARDS :
[43]
J. SARAYDARYAN, R. LEBER, F. JUMEL.*People management framework using a 2D camera for human-robot social interactions*, in "RoboCup 2019 - 23rd Annual RoboCup International Symposium", Sydney, Australia, Robocup 2019: Robot World Cup XXIII, July 2019, p. 1-13, https://hal.archives-ouvertes.fr/hal-02318916

CIDRE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

This year we highlight two key events in the team's life:

- We have organized the SILM semester on the Security of Software/Hardware Interfaces. The goal of this semester is to promote the scientific, teaching and industrial transfer activities on the security of software/hardware interfaces. This semester is supported by DGA.
- We have concluded the transfer of a license to use GroddDroid our Android malware analysis framework.

COAST Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

In collaboration with Valerie Shalin (Department of Psychology, Wright State University), we proposed a novel validation methodology for automatic trust assessment of users based on their collaboration behavior. Our validation methodology relies on experimental game theory, namely trust game. In the large scale collaboration context of our team research, results of our experimental design [7] suggest that trust score could enhance or even replace traditional identity mechanisms.

COATI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Julien Bensmail: “Jeunes Talents France-Chine” funding for one travel to China in 2019;
- Christelle Caillouet: UCA Excellence award;
- Emilio Cruciani: recipient of a 2019 Testing and Verification research award;
- François Dross: recipient of an accessit to the PhD prize Graphes "Charles Delorme" 2019 for his PhD entitled *Vertex partition of sparse graphs* [87];
- William Lochet: recipient of the PhD prize Graphes "Charles Delorme" 2019 for his PhD entitled *Substructures in digraphs* [92];
- Emanuele Natale: awarded the "Best Italian Young Researcher in Theoretical Computer Science" by the Italian Chapter of the EATCS.

5.1.2. Promotions

- Patricia Riveill: promoted to Administrative Engineer.

BEST PAPERS AWARDS :
[47]
C. CAILLOUET, T. RAZAFINDRALAMBO, D. ZORBAS.*Optimal placement of drones for fast sensor energy replenishment using wireless power transfer*, in "WD 2019 - Wireless Days 2019", Manchester, United Kingdom, April 2019, Best Paper Award, https://hal.inria.fr/hal-02043123

COFFEE Project-Team (section vide)

COMETE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Catuscia Palamidessi has received an European Research Council (ERC) grant for the project HYPATIA.

COML Team (section vide)

COMMANDS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We have now a strong involvement in the study of mean-field games (MFG) and their application to distributed energy production problems. In the paper [3] we study MFG equilibria with coupling of the agents through a price function (see more in the 'New Results' section). In the framework of the PhD of Pierre Lavigne we currently study discrete-time models with risk-averse agents. Both directions take advantange of the recent recruitment of Laurent Pfeiffer as "chargé de recherche", and of a starting collaboration with Jameson Graber (Baylor University, Texas).

COMMEDIA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Major results have been obtained on the simulation of fluid-structure interaction [1] and of cardiac hemodynamics [8].

CONVECS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Frédéric Lang, together with Franco Mazzanti from CNR-ISTI/FMT (Pisa, Italy), won all the gold medals for the "Parallel CTL" and "Parallel LTL" tracks of the RERS'2019 (*Rigorous Evaluation of Reactive Systems*) challenge [0]. The goal of these two tracks was to verify 180 properties expressed in the branching-time temporal logic CTL and 180 properties expressed in the linear-time temporal logic LTL. These properties had to be evaluated on various complex systems, having up to 70 concurrent processes and 234 synchronization actions. To attack such difficult problems, Lang and Mazzanti decided to join forces, and managed to evaluate all the 360 properties correctly, by designing new verification algorithms and exploiting the compositional verification techniques of CADP.

[0] http://rers-challenge.org/2019

CORSE Project-Team (section vide)

CQFD Project-Team (section vide)

CTRL-A Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Ctrl-A team co-organised, in cooperation with the Gipsa-lab laboratory, the 40th International Summer School in Grenoble, with a special topic on Control of Computing Systems, on 9-13th of September 2019.

Invited speakers were international specialists of the field, from USA, Europe and France. Full information and programme are available : http://www.gipsa-lab.fr/summerschool/auto2019

DANTE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Dante is member of the following new projects accepted in 2019, for funding by ANR:

- **DataRedux** Big data reduction for predictive computational modelling. Consortium: Dante (ENS de Lyon), Centre Physique Théorique Marseille (CNRS), Pierre Louis Institute of Epidemiology and Public Health (INSERM).
- **Darling** Distributed adaptation and learning over graphs. Consortium: Observatoire Côte d'Azur (U. Nice), Dante & LP (ENS de Lyon), L2S (Centrale Supelec).
- **CCS 2021** Márton Karsai and IXXI obtained the right to organise Conference on Complex Systems in Lyon in 2021.

5.1.1. Awards

- Article [10] has been highlighted as the cover page article of the journal MDPI.

BEST PAPERS AWARDS :
[25]
R. FONTUGNE, E. BAUTISTA, C. PETRIE, Y. NOMURA, P. ABRY, P. GONÇALVES, K. FUKUDA, E. ABEN.*BGP Zombies: an Analysis of Beacons Stuck Routes*, in "PAM 2019 - 20th Passive and Active Measurements Conference", Puerto Varas, Chile, Springer, March 2019, p. 197-209, Best paper award. [*DOI :* 10.1007/978-3-030-15986-3_13], https://hal.inria.fr/hal-01970596

DATAMOVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Pierre Neyron received the Médaille de Cristal CNRS 2019 (http://www.cnrs.fr/fr/personne/pierre-neyron)
- Denis Trystram leading the Edge Intelligence chair of the new Institute of Artificial Intelligence of Univ. Grenoble Alpes (MIA@Grenoble-Alpes).
- Best Paper Awards at CCGrid 2019
- Outstanding Paper Award at HPCS 2019

BEST PAPERS AWARDS :

[12]

D. CARASTAN-SANTOS, R. Y. DE CAMARGO, D. TRYSTRAM, S. ZRIGUI.*One can only gain by replacing EASY Backfilling: A simple scheduling policies case study*, in "CCGrid 2019 - International Symposium in Cluster, Cloud, and Grid Computing", Larnaca, Cyprus, IEEE, May 2019, p. 1-10 [*DOI :* 10.1109/CCGRID.2019.00010], https://hal.archives-ouvertes.fr/hal-02237895

[15]

F. ZANON BOITO, R. NOU, L. LIMA PILLA, J. LUCA BEZ, J.-F. MÉHAUT, T. CORTES, P. O. NAVAUX.*On server-side file access pattern matching*, in "HPCS 2019 - 17th International Conference on High Performance Computing & Simulation", Dublin, Ireland, IEEE, 2019, p. 1-8, outstanding paper award, https://hal.inria.fr/hal-02079899

DATASHAPE Project-Team (section vide)

DATASPHERE Team (section vide)

DEDUCTEAM Project-Team (section vide)

DEFI Project-Team (section vide)

DEFROST Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Fondamental results

Three PhD students have defended excellent thesis in 2019:

- **Eulalie Coevoet**: Optimization-Based Inverse Model of Soft Robots With Contact Handling
- **Zhongkai Zhang**: Vision-based Calibration, Position Control and Force Sensing for Soft Robots
- **Maxime Thieffry**: Dynamic control of soft robots

In each of these thesis we presented fundamental results on the team's roadmap. Eulalie Coevoet presented the first algorithms that allow inversing the robot model in contact situations. It can be used for planning, manipulation and locomotion. Zhongkai Zhang's results allow the use of the robot as a generalized force sensor thanks to vision. We use that for feedback control for both position and force. Maxime Thieffry developped the first method for dynamic control based on model order reduction. The method is very generic and significantly improves the precision of soft robots.

5.1.2. Awards for software development

DEFROST actively contributed to the open source community by developing plugins for the SOFA framework. The team participated in the SofaWeek2019, during which the SOFA consortium organized the "Open-Source SOFA awards". One prize was offered to the candidate who developed the best open source plugin for SOFA. Another prize was offered to the best open source plugin according to the public (conference attendants). **Both prizes were won by the DEFROST team**, for the Model Order Reduction plugin and the SofaPython3 plugin respectively: link.

5.1.3. Organization of workshops and tutorials

This year, special effort was expended on the promotion of our tools through the organization of workshops and tutorials. A full tutorial day about our tools was organized at the IEEE International Conference on Soft Robotics (RobotSoft019). We then organized the first Journée de Robotique Souple in Lille with 70 participants from 9 countries. The team also participated in the organization of the (2nd Workshop on Proximity Perception in Robotics) at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019).

5.1.4. ANR project ROBOCOP

The project ROBOCOP (ROBOtization of COchlear ImPlant) was funded by the ANR (Agence nationale de la recherche) for the development of cochlear implants for the future that are activated by electroactive polymers. The project is in collaboration with the IEMN, the LPPI, Inserm and Oticon Medical. This project will allow us to fund a PhD Student and a postdoctoral fellow for 2 years.

DELYS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

In 2019, DELYS obtained a best paper award at ICDCN 2019 (distributed computing track) .

Alejandro Tomsic, former PhD student of the Delys group, was awarded the Prize for Best French PhD in Systems and Networking 2019 for his thesis titled “Exploring the design space of highly-available distributed transactions” . The prize is awarded yearly by ASF (the French chapter of ACM Sigops) and by RSD (the French research network in Networked and Distributed Systems). The award ceremony and presentation of Alejandro’s work took place at the COMPAS 2019 conference in Anglet, France.

The US patent, titled “Distributing computing system implementing a non-speculative hardware transactional memory and a method for using same for distributed computing,” was awarded to inventors Julien Peeters, Nicolas Ventroux, Tanguy Sassolas and Marc Shapiro in April 2019, with number US 10 416 925 B2 [4].
BEST PAPERS AWARDS :
[28]
E. MAUFFRET, D. JEANNEAU, L. ARANTES, P. SENS.*The Weakest Failure Detector to Solve the Mutual Exclusion Problem in an Unknown Dynamic Environment*, in "20th International Conference on Distributed Computing and Networking (ICDCN 2019)", Bangalore, India, January 2019, Extended version: https://hal.archives-ouvertes.fr/hal-01661127v3, https://hal.archives-ouvertes.fr/hal-01929224

[7]
A. Z. TOMSIC.*Exploring the design space of highly-available distributed transactions*, Université Pierre et Marie Curie, Paris, France, April 2018

DIANA Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Ekinops

We have started a collaboration with EKINOPS on the topic of Multi-access Edge Computing. The activity started with a CIFRE thesis. The PhD student Mamoutou Diarra started his PhD on this topic on November 2019.

4.1.2. ACM CoNEXT 2019 Artefact Evaluation Committee

As a continuation of our long lasting efforts in encouraging reproducibility [17], Damien Saucez and Mohamed Naoufal Mahfoudi from our project-team have co-chaired the ACM CoNEXT 2019 Artefact Evaluation Committee. In 2019, 11 papers out of the 32 accepted at the conference have requested for being evaluated, resulting in 10 artefacts being awarding with a badge. Interestingly, we are witnessing an important improvement in the quality of the artefacts proposed by the SIGCOMM community.

DIONYSOS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Bruno Tuffin was among the five finalists for the Best Contributed Theoretical Paper Award at the Winter Simulation Conference 2019 for his paper "Randomized Quasi-Monte Carlo for Quantile Estimation" co-authored with Z. Kaplan, Y. Li, M. Nakayama (New Jersey Institute of Technology, USA).

5.1.2. Conference

Yassine Hadjadj-Aoul was General co-chair of the 6th International Conference on Information and Communication Technologies for Disaster Management (ICT-DM), Paris, France. The conference took place on December 18-20 2019. Its proceedings will appear in the IEEE xPlore Digital Library.

DISCO Project-Team (section vide)

DIVERSE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

This year, we would like to highlight the following results:

- In terms of publications among the many articles published this year, articles [37], [28] and [25] have been published at the highest level but above all they represent perfectly the type of research conducted within the team: open research based on studies of major open-source software and in connection with the developer communities.
- We received the "Data Showcase Award" (Figure 2) at the MSR'19 conference (Mining Software Repositories 2019) for the dataset described in the following paper [55] and publicly available on Zenodo (https://zenodo.org/record/1489120).
- Since this year two former PhD students of the team now have a full time researcher position at CNRS: Pierre Laperdrix and Thomas Degueule.
- Four new PhDs and one new HDR have been successfully defended this year.
- A new CNRS junior researcher, Djamel Eddine Khelladi, has joined the team in February 2019. Since his arrival, he submitted a Marie Skłodowska-Curie Action (MSCA) Individual Fellowships (IF), as well as an ANR JCJC in phase 1. Both projects, respectively, CoEvoCCT and MC-Evo^2 are on the topics of software evolution and co-evolution. His research amplifies a new axis around software evolution and maintenance. First results led to the publication at 42nd International Conference on Software Engineering, ICSE, 2020, Seoul, South Korea, an A* top conference in the field of software engineering.

4.1.1. Awards

Most Influential Paper (MIP) award at SLE 2019 https://ins2i.cnrs.fr/fr/cnrsinfo/des-scientifiques-primes-pour-leurs-travaux-sur-les-feature-models

BEST PAPERS AWARDS :

[55]

A. BENELALLAM, N. HARRAND, C. SOTO-VALERO, B. BAUDRY, O. BARAIS.*The Maven Dependency Graph: a Temporal Graph-based Representation of Maven Central*, in "MSR 2019 - 16th International Conference on Mining Software Repositories", Montreal, Canada, ACM, May 2019, p. 344-348 [*DOI :* 10.1109/MSR.2019.00060], https://hal.archives-ouvertes.fr/hal-02080243

Figure 2. Data Showcase Award, MSR'19

DRACULA Project-Team (section vide)

DYLISS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The AuReMe software for metabolic network reconstruction has been selected for the Service Delivery Plan of the French Institute of Bioinformatics (IFB).

5.1.1. Awards

Lucas Bourneuf is the World champion of man vs. machine challenge of the Angry Birds AI competition (during IJCAI) where humans can challenge the four best AI agents. Note that Lucas was the human, not the AI and that there is no direct connection with his PhD project. World champion nonetheless!

Nicolas Guillaudeux (with Grégoire Siekaniec from the GenScale team) won the public's prize at the short scientific film festival "Sciences en cour[t]s" for their movie about Nicolas's PhD thesis.

DYOGENE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

ERC NEMO

ERC NEMO, led by F. Baccelli, started in January 2019; see 9.3.1.1 .

Inria International Chair

Sean Meyn obtained Inria International Chair for the period 2019–2023 and joined Dyogene.

Markov Lecture

L. Massoulié gave the Markov Lecture at the Annual Meeting of the INFORMS society, in October in Seattle https://connect.informs.org/aps/participate46/markov.

EASE Project-Team (section vide)

ECUADOR Project-Team (section vide)

ELAN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Creation of Graphyz, a new graphics-physics workshop

- F. Bertails-Descoubes, together with B. Audoly (École Polytechnique), has founded, chaired and organized the first graphics-physics workshop, Graphyz, held at Inria Montbonnot on October 24-25 2019. An outstanding scientific program, gathering 15 international experts from both Computer Graphics and Physics, originally combined talks from both communities around various topics ranging from viscous thread coiling to snow avalanches. The workshop was entirely funded by the ERC GEM. Being a high success, it will be organized again in 2021, in Paris.

5.1.2. Keynote at Eurographics 2019

- Florence Bertails-Descoubes was a Keynote speaker at Eurographics 2019 held in May 2019 in Genova, Italy.

5.1.3. Awards

BEST PAPERS AWARDS :
[7]
R. CHARRONDIÈRE, F. BERTAILS-DESCOUBES, S. NEUKIRCH, V. ROMERO.*Modélisation numérique de rubans en éléments de haut degré*, in "JF.IG.RV 2019 - Journées Françaises d'Informatique Graphique et de Réalité Virtuelle", Marseille, France, November 2019, p. 1-7, https://hal.archives-ouvertes.fr/hal-02384170

EMPENN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. New NIRS system at the Neurinfo platform

An MRI and EEG-compatible functional near-infrared spectroscopy (fNIRS) system was installed at the Neurinfo platform in September 2019.

5.1.2. Sciences en Cour[t]s

This event is a festival of short films, which offers doctoral students the opportunity to make short films about their thesis work. Raphael Truffet, Antoine Legouhy and Xavier Rolland won the high school award in science en Cour[t]s event https://www.youtube.com/watch?v=IKgqv-iCwak.

5.1.3. Second neuroscience hackathon in Rennes

We organized the second edition of hackathon in the Empenn team, November 14-15 as part of the international event Brainhack Global 2019.

EPIONE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Nicholas Ayache, Hervé Delingette, Marco Lorenzi, Xavier Pennec, and Maxime Sermesant were awarded a chair at the institute *3IA Côte d'Azur* focused on artificial intelligence.
- Hervé Delingette was elected a Fellow of MICCAI society at MICCAI 2019 : http://www.miccai.org/about-miccai/miccai-fellows/
- Julian Krebs received the Best Presenter Award at the workshop STACOM for his presentation of the paper
- Marco Lorenzi was awarded a Contrat jeune chercheur by the National Research Agency (ANR) for his Fed-BioMed project.
- Sara Garbarino was awarded the IPMI 2019 Erbsmann Award for her paper entitled "Modeling and inference of spatio-temporal protein dynamics across brain networks".
- Nicholas Ayache was awarded the Grand Prize of the City of Nice by the Mayor of Nice, at the Villa Masséna, on May 24, 2019.
- Maxime Sermesant received the Innovator of the Year Award by CentraleSupelec on January 21st, 2019.
- Yann Thanwerdas was nominated among the 5 running papers for the best paper award at the Geometric Sciences of Information conference GSI' 2019 at ENAC in Toulouse.

4.1.2. Dissemination

- Publication of the book *Riemannian Geometric Statistics in Medical Image Analysis* [53] edited by Xavier Pennec, Stefan Sommer and Tom Fletcher, 3rd volume of "The Elsevier and MICCAI Society book series". The book contains 5 introductory chapters on the methodological foundations by Xavier Pennec, Tom Fletcher, Stefan Sommer, Stephen Marsland and Marco Lorenzi, and 11 contributed chapters on applications, including a chapter by Nina Miolane, Loic Devillier and Xavier Pennec.
- Publication of the book *Voir l'invisible - Tome 2, Comprendre, Agir* by the Collectif Amir with Maxime Sermesant as one of the scientific contributors. The second version of the book informs the public reader of the latest innovations in science and technology from different fields.
- Organization of the scientific program of the conference "The Academie des sciences in Nice and Sophia Antipolis" by N. Ayache in June 20-21, 2019.

BEST PAPERS AWARDS :

[40]

J. KREBS, T. MANSI, N. AYACHE, H. DELINGETTE.*Probabilistic Motion Modeling from Medical Image Sequences: Application to Cardiac Cine-MRI*, in "STACOM 2019 - 10th Workshop on Statistical Atlases and Computational Modelling of the Heart", Shenzhen, China, October 2019, https://arxiv.org/abs/1907.13524 - Probabilistic Motion Model, Motion Tracking, Temporal Super-Resolution, Diffeomorphic Registration, Temporal Variational Autoencoder, https://hal.inria.fr/hal-02239318

[48]

S. GARBARINO, M. LORENZI.*Modeling and Inference of Spatio-Temporal Protein Dynamics Across Brain Networks*, in "IPMI 2019 - 26th International Conference on Information Processing in Medical Imaging", Hong-Kong, China, LNCS, Springer, 2019, vol. 11492, p. 57-69, https://hal.inria.fr/hal-02165021

ERABLE Project-Team (section vide)

EVA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Startup Falco wins the Innovation Competition at the Paris Nautic Show (200.000 visitors), December 2019
- Startup Falco wins the Favorite Startup Pitch battle at MassChallenge, Boston, November 2019
- Startup Falco wins the Amplify Pitch battle, October 2019
- Startup Falco awardee of the prestigous Netva "Deeptech North America" program, June 2019
- Startup Falco awardee of the prestigous WILCO/WILCOMET accelerator program
- Amar Abane and **Paul Muhlethaler** receive the best student paper award at PEMWN 2019 for the paper "Modeling and Improving Named Data Networking over IEEE 802.15.4"
- Abdallah Sobehy, under the supervision of **Paul Muhlethaler** and Eric Renault from EVA, secured the first place in the Indoors Positioning Competition held during the IEEE's Communication Theory Workshop 2019, Selfoss, Iceland. The objective was to localize a transmitter using Channel State Information (CSI) received at a Massive MIMO antenna which is one of the main drivers of the 5G. The contesters were provided with training data to develop algorithms that predict the transmitter's position from CSI. On the competition day, the teams were given 2000 CSI readings to predict the corresponding positions using the developed algorithms. The evaluation criterion is the Mean Square Error (MSE) of the predicted positions. The proposed method relies on CSI preprocessing and Deep Learning (Multi-Layer Perceptron Neural Network). With an MSE of 2.3 cm, the proposed solution clinched the first place among 8 teams from top universities around the world such as: University of Toronto (Canada), Ruhr University Bochum (Germany). Heriot-Watt University (England), University of Padova (Italy), IMdea networks institute (Spain), Aalborg University (Denmark), and Yuan Ze University (Taiwan).
- Abdellah Sobehy receives the "Le premier prix du jury" during the fifth edition of' "la journée doctorants de Samovar"

5.1.2. Transfer

- Internet Engineering Steering Group (IESG) approval of draft-ietf-6tisch-minimal-security to be published as RFC
- Malisa Vucinic named co-chair of the IETF LAKE standardization working group
- Thomas Watteyne co-chairs IETF working group 6TiSCH
- Thomas Watteyne co-chairs IETF design team of fragment forwarding
- Thomas Watteyne part of the IETF IoT directorate
- Startup Falco had a booth at the Paris Nautic Show (Dec 2019, 200.000 visitors)
- Startup Falco had a booth at the Cap d'Agde Nautic Show (Oct-Nov 2019, 50.000 visitors)
- Startup Falco selected to join the Parisian Incubator Agoranov, April 2019

EX-SITU Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Wanyu Liu: First prize, Télécom ParisTech thesis award, “Information theory as a unified tool for understanding and designing human-computer interaction”
- Stacy Hsueh, Sarah Fdili Alaoui, and Wendy Mackay: Honorable Mention Award at ACM CSCW 2019 for “Deconstructing Creativity: Non-Linear Processes and Fluid Roles in Contemporary Music and Dance.” [21]
- Alexander Eiselmayer, Chat Wacharamanotham, Michel Beaudouin-Lafon, and Wendy Mackay: Best Paper award at ACM CHI 2019 for “Touchstone2: An Interactive Environment for Exploring Trade-offs in HCI Experiment Design” [19]

FACTAS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Robotic tuning: a nice outcome of our long lasting experience in the field of computer assisted tuning for microwave devices

A contract was signed with the French small and midsize business (SMB) Inoveos for the realization of a robotic prototype for the mass tuning of microwave devices. In addition to Inria, this project includes the university of Limoges Xlim and the engineering center Cisteme https://cisteme.net. Our team will be responsible of the driving software of the robot based on our long lasting experience in circuit extraction methods and in connection with our tools Presto-HF and Dedale-HF. Among the technical and scientific challenges for us on this project we can list:

- Improvement of the computational efficiency of our circuit methods in order to be compatible with real-time measurements techniques of filter. Typically a circuital extraction needs to be performed in less than 1 second when dealing with a filter of order 10.
- Handling the ambiguity resulting from the use of multiple solutions coupling topologies yielding several equivalent circuits for a single DUT (device under tuning).

FLOWERS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Clément Moulin-Frier was recruited as CRCN permanent research scientist.
- PY Oudeyer was invited to give plenary keynote talks at several international AI conferences, including ICLR 2019 in New Orleans (https://www.youtube.com/watch?v=7bJ0fnvPLaA) and ACM International Conference on Virtual Agents (ACM IVA 2019), Paris.
- The team published papers in several major machine learning conferences, including ICML [33], Neurips [32], CoRL [38] and IJCNN [36], [37], and one in a major educational technology conference, CHI 2019 [29].
- PY Oudeyer was awarded an individual "Chaire IA" in the context of the national plan on artificial intelligence.
- The Poppy Station association, initiated by the team from the Poppy Education project, and co-directed by Didier Roy, was created and gathers several major national and international educational associations. It aims at scaling up and disseminating the educational robotics kits designed by the Flowers team, and now used in many educational and artistic projects, see https://www.poppy-station.org.
- The work of the PhD of Sébastien Forestier (sup. by PY Oudeyer) on curiosity-driven learning of tool use in robots and children, was integrated as a video interview in the new permanent exhibition on robots at Cité des Sciences et de l'Industrie, Paris, see http://www.cite-sciences.fr/fr/au-programme/expos-permanentes/expos-permanentes-dexplora/robots/lexposition/.

5.1.1. Awards

- Y Oudeyer was awarded the Atos Joseph Fourier prize for his work on curiosity-driven machine learning.

FLUMINANCE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Best paper award 2019 Romain Schuster "Visualisation et mesure du flux d'aspiration d'une Sorbonne", ContaminExpert 2019. Paris, FR
BEST PAPERS AWARDS :
[43]
R. SCHUSTER, D. HEITZ, E. MÉMIN.*Visualisation et mesure du flux d'aspiration d'une Sorbonne*, in "ContaminExpert 2019", Paris, France, March 2019, p. 1-8, https://hal.archives-ouvertes.fr/hal-02330348

FOCUS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Ugo Dal Lago has been awarded an ERC CoG for his project “Differential Program Semantics” (DIAPASoN), which started on March 1st, 2019.
- Francesco Gavazzo has received the award for “Best Italian PhD Thesis in Theoretical Computer Science”, by the Italian Chapter of EATCS (European Association for Theoretical Computer Science)
- Raphaëlle Crubillé has been awarded the “prix de thèse Gilles Kahn 2019 (Societé Informatique de France and Académie des Sciences)

FUN Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Paper [17] has been awarded best paper of the 34th ACM/SIGAPP Symposium On Applied Computing (SAC 2019).
BEST PAPERS AWARDS :
[17]
A. BLANCHARD, N. KOSMATOV, F. LOULERGUE.*Logic against Ghosts: Comparison of Two Proof Approaches for a List Module*, in "SAC 2019 - The 34th ACM/SIGAPP Symposium On Applied Computing", Limassol, Cyprus, April 2019 [*DOI :* 10.1145/3297280.3297495], https://hal.inria.fr/hal-02100515

GALLINETTE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Permanents members

Gaëtan Gilbert, currently PhD student in the Gallinette team, will be promoted expert engineer for the Coq consortium, staying in the Gallinette team.

Matthieu Sozeau, Inria Junior Researcher and leader of the Coq development team, is joining the Gallinette team end of 2019-beginning of 2020.

Nicolas Tabareau is now director of research (DR2) at Inria since October 2019.

4.1.2. Awards

Marie Kerjean has been awarded a L'Oréal - Unesco Foundation grant.

L'Oréal - Unesco Grants for Women in Science are awarded to talented young female researchers.

GAMBLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We are happy to report that some of our past work appeared this year in highly visible journals. Our proof that deciding *shellability* of simplicial complexes, a problem that was open for 40 years, was published in the Journal of the ACM [15], and our survey on *combinatorial geometry and topology and their applications* was published in the Bulletin of the AMS [13].

GAMMA Project-Team (section vide)

GANG Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Amos Korman won the 2020 prize of innovations in distributed computing.

Pierre Fraigniaud and his co-authors obtained the best paper award at SSS 2019:
BEST PAPERS AWARDS :
[19]
A. CASTAÑEDA, P. FRAIGNIAUD, A. PAZ, S. RAJSBAUM, M. ROY, C. TRAVERS.*Synchronous t-Resilient Consensus in Arbitrary Graphs*, in "SSS 2019 - 21st International Symposium on Stabilization, Safety, and Security of Distributed Systems", Pisa, Italy, October 2019 [*DOI :* 10.1007/978-3-030-34992-9_5], https://hal.inria.fr/hal-02433524

GENSCALE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The Gilles Kahn *accessits* **prize was awarded to Camille Marchet** for her PhD thesis: *From reads to transcripts: de novo methods for the analysis of transcriptome second and third generation sequencing* [8]. This thesis was prepared in the GenScale team under the supervision of P. Peterlongo.

The Gilles Kahn prize is awarded each year by the SIF, the French Society of Computer Science, for an excellent PhD thesis in the field of computer science.

The thesis of Camille dealt with the processing of transcriptome sequencing data. More precisely, the question was how to take advantage of the characteristics of the data produced by third generation sequencing technologies, as they produce large sequences covering the total length of RNA molecules. The core work of this thesis consisted in the methodological development and implementation of new algorithms allowing the clustering of third generation sequences by gene, then their correction and finally the detection of the different isoforms of each gene.

GEOSTAT Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Inria's exploratory action "TRACME" led by N. Brodu, starting October 2019.

GRACE Project-Team (section vide)

GRAPHDECO Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The SIGGRAPH paper "Multi-view relighting using a geometry-aware network" by J. Philip et al. [19] was presented at the Adobe Max event in November 2019 in San Fransisco. The project was part of the 11 projects selected out of 200 to be presented at Adobe MAX under the name project #LightRightSneak (Link to the video of the event).

G. Drettakis presented at the French Academy of Sciences days at Sophia-Antipolis in June: video on the Academy of Sciences site.

4.1.1. Awards

Jean-Dominique Favreau (co-supervised with the TITANE team) received the best Ph.D. thesis award 2019 (assessit prize) from IGRV.

GRAPHIK Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- One of our papers ([15]) has been recognized as a **highlight of the year 2020** of the INRA department CEPIA.
- The SudoQual engine, which was developed in the context of the Qualinca research project (2012-2016), has been reused by ABES (the French National Agency for Academic Libraries) to build Paprika, a professional tool for documentalists, released this year (https://paprika.idref.fr/). SudoQual/Paprika is devoted to data curation in the context of bibliographic databases.

HEPHAISTOS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Science

- strong advances on the analysis of cable-driven parallel robots (section 6.1.1)
- first results the daily activities monitoring in a day hospital (section 6.2)

4.1.2. Experimentation

- Two months experimentation of a very large cable-driven parallel robot for an artistic exhibition (section 6.1.2)
- Completion of the second version of our immersive environment for rehabilitation (section 5.3.2.1)

HIEPACS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- HIEPACS was extremely pleased to welcome two new permanent Inria members, namely O. Beaumont and L. Eyraud-Dubois, whose scientific expertises clearly strengthen the impact of the team on the HPC research.
- We are very delighted to report that seven new PhD students have joined the team this year on research topics covering the full range of those adressed by the team. These PhD students, with gender parity, come from different places in France (Bordeaux, Strasbourg) as well as other places worldwide (China, Italy and Russia). This cultural and scientific variety will surely lead to a nice and fruitful blend and will contribute to the stimulating research atmosphere within the team.
- In June 2019, we organized the 14th Scheduling for Large Scale Systems Workshop, in the campus of Victoire in Bordeaux. 48 participants from all over the world registered to the workshop and gave 36 presentations over 3 days, covering topics like Numerical Algorithms, Resilience, Performance Evaluation, Job and DAG Scheduling.
- Inria's Autumn school, November 4-8 2019, Inria Bordeaux Sud-Ouest co-organized by E. Agullo (HIEPACS), H. Beaugendre (CARDAMON) and J. Diaz (MAGIQUE3D)

  The school aimed at simulating a physical problem, from its modeling to its implementation in a high performance computing (HPC) framework. The school offered both plenary courses and hands-on sessions that involved many members of the three teams. The physical problem considered was the harmonic wave propagation.

  The first day was dedicated to the modeling of the problem and its discretization using a Discontinuous Galerkin scheme. The following two days were dedicated to linear algebra for solving large sparse systems. Background on direct, iterative and hybrid methods for sparse linear systems were discussed. Hands-on on related parallel solvers were then be proposed. Has followed a session dedicated to advanced parallel schemes using task-based paradigms, including a hands-on with the starpu runtime system. The ultimate hands-on session was devoted to the use of parallel profiling tools. The school was closed with plenary talks illustrating the usage of such a workflow in an industrial context.

  The hands-on session were conducted on the Federative Platform for Research in Computer Science and Mathematics (PlaFRIM) machine in a guix-hpc reproducible environment

  The school was attended by about 40 participants mostly PhDs and postdocs from Inria teams.

HYBRID Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Mélanie Cogné (Medical Doctor, PhD, CHU Rennes) has joined the Hybrid team as a new External Collaborator.
- Hybrid team has been strongly involved in the organization of the IEEE Virtual Reality Conference 2019 (IEEE VR), with F. Argelaguet (Program Chair) and A. Lécuyer (Panels Chair) and Jean-Marie Normand (Program Committee).
- The Immersia VR platform has celebrated its 20 years of existence at Inria Rennes/IRISA center, within the “20ans d’Immersia” event (November 2019).
- Hybrid team has organized a “VR Hackathon” at the Inria Rennes/IRISA Center, gathering around 20 participants (May 2019).

5.1.1. Awards

- IEEE VGTC Virtual Reality Technical Achievement Award 2019 was obtained by Anatole Lécuyer.
- IEEE VR Best 3DUI Contest Demo Award 2019: was obtained by Team Hybrid (Hugo Brument, Rebecca Fribourg, Gerard Gallagher, Thomas Howard, Flavien Lecuyer, Tiffany Luong, Victor Mercado, Etienne Peillard, Xavier de Tinguy, and Maud Marchal), for the demo entitled “Pyramid Escape: Design of Novel Passive Haptics Interactions for an Immersive and Modular Scenario” [11].

BEST PAPERS AWARDS :

[31]
E. PEILLARD, T. THEBAUD, J.-M. NORMAND, F. ARGELAGUET SANZ, G. MOREAU, A. LÉCUYER.*Virtual Objects Look Farther on the Sides: The Anisotropy of Distance Perception in Virtual Reality*, in "VR 2019 - 26th IEEE Conference on Virtual Reality and 3D User Interfaces", Osaka, Japan, IEEE, March 2019, p. 227-236 [*DOI :* 10.1109/VR.2019.8797826], https://hal.archives-ouvertes.fr/hal-02084069

[18]
R. GAUGNE, T. NICOLAS, Q. PETIT, M. OTSUKI, V. GOURANTON.*Evaluation of a Mixed Reality based Method for Archaeological Excavation Support*, in "ICAT-EGVE 2019 - International Conference on Artificial Reality and Telexistence - Eurographics Symposium on Virtual Environments", Tokyo, Japan, September 2019, p. 1-8, https://hal.inria.fr/hal-02272910

[23]
J. LACOCHE, T. DUVAL, B. ARNALDI, E. MAISEL, J. ROYAN.*Machine Learning Based Interaction Technique Selection For 3D User Interfaces*, in "EuroVR 2019 - 16th EuroVR International Conference", Tallinn, Estonia, Springer, October 2019, p. 33-51 [*DOI :* 10.1007/978-3-030-31908-3_3], https://hal.archives-ouvertes.fr/hal-02292434

HYCOMES Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The Hycomes team has reached in 2019 an important milestone in the team's research objectives: the design and implementation of an implicit structural analysis algorithm supporting multimode DAE systems. This method is based on an encoding of the varying structure of a multimode DAE as Boolean functions, represented with Binary Decision Diagrams (BDD). This enables a complete strucutral analysis of a multimode DAE system, without enumerating its modes.

I4S Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Our former PhD student Nicolas Le Touz received the Abertis Prize France for his thesis “Design and study of positive energy transport infrastructure: from thermomechanical modelling to the optimisation of such energy systems“, defended in November 2018. The Abertis Prize is awarded for research in transport infrastructure management.
- Nassif Berrabah, industrial PhD student of the I4S Team in collaboration with EDF, has defended his thesis on “Inverse problems for diagnosis of electric cables from reflectometry measurements” in November 2017. The research work of his thesis received the award of Scientific Prize from EDF R&D.

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

A publication on the use of mixed-effects models for the analysis of the inheritance and variability of gene expression parameters along lineage trees was published in a special issue of *Bioinformatics* and presented at the major bioinformatics conference ISMB/ECCB 2020. A publication in *BMC Bioinformatics* accompanied the release of the new version of the web application WELLINVERTER for the analysis of fluorescent reporter gene data. IBIS member Michel Page launched his start-up ProLeads (https://proleads.fr/), a specialized business search engine.

ILDA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Honorable mention for ActiveInk: (Th)Inking with Data at CHI 2019 .
- Best paper and best doctoral student paper awards for Influence of Color and Size of Particles on their Perceived Speed in Node-Link Diagrams at INTERACT 2019 .

BEST PAPERS AWARDS :

[22]
H. ROMAT, N. RICHE, K. HINCKLEY, B. LEE, C. APPERT, E. PIETRIGA, C. COLLINS.*ActiveInk: (Th)Inking with Data*, in "CHI 2019 - The ACM CHI Conference on Human Factors in Computing Systems", Glasgow, United Kingdom, CHI 2019 - Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems, ACM, 2019 [*DOI :* 10.1145/3290605.3300272], https://hal.archives-ouvertes.fr/hal-02020272

[20]
H. ROMAT, D. LEBOUT, E. PIETRIGA, C. APPERT.*Influence of Color and Size of Particles on Their Perceived Speed in Node-Link Diagrams*, in "INTERACT 2019 - 17th IFIP TC 13 International Conference on Human-Computer Interaction", Paphos, Cyprus, Springer, August 2019, p. 619-637 [*DOI :* 10.1007/978-3-030-29384-0_37], https://hal.inria.fr/hal-02274134

IMAGINE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maxime Garcia, Amélie Fondevilla and Geoffrey Guingo defended their PhD theses.

We published two papers [16], [20] at ACM Transaction on Graphics (Proceedings of SIGGRAPH) which is the most prestigious and selective conference in computer graphics.

5.1.1. Awards

Mélina Skouras was elected Eurographics Junior Fellow in May 2019.
Stefanie Hahmann was elected SMA Fellow (Solid Modeling Association) in June 2019.

INDES Project-Team (section vide)

INOCS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Martine Labbé received the EURO Gold Medal in June 2019. This is the highest distinction in Operations Research in Europe.

Kairos Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- New Collaboration with Renault Software Labs - CIFRE starting in April 2019
- ANR Project on the verification of smart contracts on the use of multi-modalities transportations in the smart city - AAPG 2019 PRCE

5.1.1. Awards

Frederic Mallet is Laureate of the program 'Jeune Talent France Chine 2019' from French Embassy in China.

KERDATA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Contributions to the ETP4HPC agenda

The KerData team contributed to the new ETP4HPC Strategic Agenda (to appear). It will serve as a reference for the future EU funding strategy for HPC. Gabriel Antoniu served as a co-leader of the Programming Environment working group. He also served as a co-leader of 2 transversal (*"cross-working group"*) research clusters: *"HPC and the Digital Continuum"* and *"Data Everywhere"*. Alexandru Costan served as a member of these groups.

5.1.2. Paper co-authored with the LACODAM team published in a major AI conference

In 2019, Pedro Silva initiated a multi-disciplinary collaboration with the LACODAM Inria team and the team of Manish Parashar at Rutgers University. It addresses Machine Learning in the context of Edge stream processing. The target application is early earthquake detection from motion sensors distributed on the ground.

This collaboration resulted in a co-authored paper titled *Distributed Multi-Sensor Machine Learning Approach to Earthquake Early Warning* [21]. It will be presented at the 34th AAAI Conference on Artificial Intelligence (AAAI-20), a top conference for Machine Learning (CORE Rank: A*). It is the first paper published by the team in a major AI venue.

5.1.3. Awards

Pierre Matri, earned a PhD in May 2018 co-advised by Maria Pérez (Universidad Politécnica de Madrid, UPM), Alexandru Costan (INSA Rennes) and Gabriel Antoniu (Inria). This PhD was defended at UPM and it received the Outstanding PhD Award (*Premio Extraordinario*) of UPM.

KOPERNIC Team

5. Highlights of the Year

5.1. Highlights of the Year

The Kopernic research results on statistical estimation of execution time bounds has been transferred to a start-up, led by Adriana Gogonel, postdoctoral student in Kopernic team. The start-up, Statinf, has been a Carnot 2019 and Wilco 2019 laureate and it has integrated the Agoranov Deeptech incubator since September 2019.

The Kopernic leader, Liliana Cucu-Grosjean has been the IEEE RTSS2019 Track co-chair as well as the DATE2020 Real-time Systems Track co-chair.

LACODAM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Elisa Fromont was awarded a Junior Member position at the Institut Universitaire de France (IUF). This is a prestigious position given for 5 years (2019-2024), the selection process is especially competitive.
- Tassadit Bouadi (MCF Univ Rennes 1) joined the team in July 2019. Her research topics are skyline queries and preference mining. Her work will especially contribute to the design of approaches having results easier to grasp by human users.

LARSEN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Arrival of a Talos robot in our team (Fig. 1). This is a full-scale humanoid (1.7 m / 100kg / 32 degrees of freedom) that can be fully torque-controlled. The robot is made by PAL Robotics, a Spanish company and is funded by the CPER “Cyber-Entreprise”.
- Arrival of Pauline Maurice as a CRCN (CNRS).

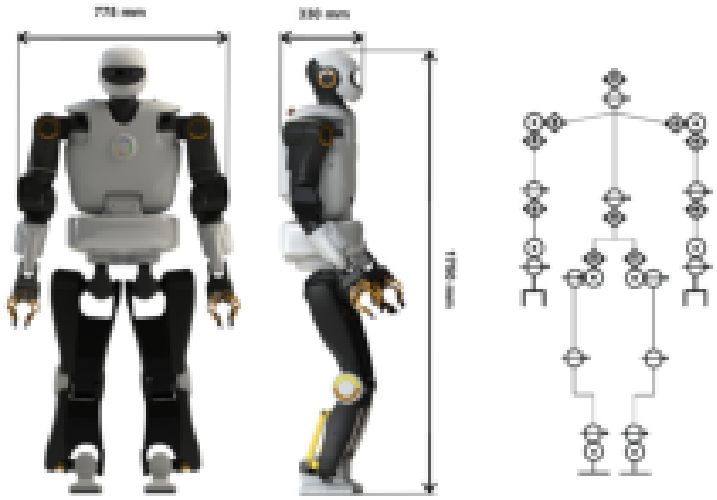

Figure 1. The Talos robot.

5.1.1. Awards

- International Society for Artificial Life (ISAL) award for the Outstanding Publication of the Decade 2004-2014: Clune J, Mouret JB, Lipson H. The evolutionary origins of modularity. Proceedings of the Royal Society b: Biological sciences. 2013 Mar 22;280(1755):20122863.

BEST PAPERS AWARDS :

[16]

N. GAUVILLE, F. CHARPILLET.*Exploration et couverture par stigmergie d’un environnement inconnu avec une flotte de robots autonomes réactifs*, in "JFSMA 2019 - 27emes Journées Francophones sur les Systèmes Multi-Agents", Toulouse, France, Cépaduès 2019, ISBN 9782364937192, July 2019, https://hal.inria.fr/hal-02195812

LEMON Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- Antoine Rousseau and Cécile Choley have participated to the Climate Change Conference (COP25) in Madrid.
- Year 2019 has been a year with lots of changes for the team with 4 new members and 1 departure:
  - Since October 2019, Fátima Palacios Rodríguez is hired as associate professor at the *Departement Economía Financiera Actuarial y Estadística de Facultad de Ciencias Económicas y Empresariales de Universidad Complutense de Madrid*
  - 4 new members joined the team in 2019: Pascal Finaud-Guyot (associate professor at the Montpellier University, Laboratory HydroSciences Montpellier) has a permanent member and Cécile Choley (PhD, funding: ANR Project DEUFI), Vita Ayoub (PhD, funding: Luxembourg National Research Fund) and Yassine Bel-Ghaddar (PhD, funding: Bourse CIFRE ANRT).

LFANT Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Guilhem Castagnos defended his professorial degree (“habilitation à diriger des recherches”) on the topic of *Cryptography based on quadratic fields: cryptanalyses, primitives and protocols*[11].

4.1.1. Awards

Fredrik Johansson won the best paper award at the conference ARITH26 — 26th IEEE Symposium on Computer Arithmetic in Kyoto for his contribution on dot products and matrix multiplication in arbitrary precision .

BEST PAPERS AWARDS :

[21]

F. JOHANSSON.*Faster arbitrary-precision dot product and matrix multiplication*, in "26th IEEE Symposium on Computer Arithmetic (ARITH26)", Kyoto, Japan, June 2019, https://arxiv.org/abs/1901.04289 , https://hal.inria.fr/hal-01980399

LIFEWARE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Figure 1. La Recherche magazine award 2019 ceremony.

- **Creation of a new team at Inria Paris**

  At the end of 2019, the Lifeware team gave birth to a new Inria team, called InBio and affiliated to the Inria Paris research centre. So far, InBio was a Pasteur research unit that was hosting a fraction of the members of the Lifeware team on the campus of Institut Pasteur. So in 2020, InBio becomes a new Common Project-Team between Inria Paris and Pasteur Institute. This demonstrates that Inria is actively supporting research in the computational systems biology field.
- **Launching of Inria Exploratory Action GRAM on chemical programming of artificial vesicles**

  Chemical reaction networks are a computation paradigm used by natural cells to process information, take decisions and control their vital processes. The synthesis of artificial vesicles without DNA nor RNA but containing precise quantities of enzymes allows us today to implement high-level functions in proto-cells with numerous potential applications in health and the environment. Based on previous work of the Lifeware project-team on chemical analog computation theory and programming, of the CNRS-Alcediag Sys2diag laboratory on the synthesis of biosensors in artificial vesicles, and on the expertise of the Roscoff Biological Station on membrane transporters, we explore an original approach to analog chemical circuit design applied to the programming of high-level functions in chemical analog computers.

5.1.1. Awards

- **Award Ceremony - La Recherche magazine 2019 - Information Sciences**

  The ceremony for awards La Recherche magazine 2019 at University Paris-Dauphine was a great occasion to present our article “Strong Turing Completeness of Continuous Chemical Reaction Networks and Compilation of Mixed Analog-Digital Programs” by F. Fages, G. Le Guludec, O. Bournez and A. Pouly, Best Paper award at CMSB 2017, recipient of La Recherche magazine 2019 Award - Information Sciences.

LINKMEDIA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Highlights of the year

- Our activities in relation with fake news were extensively highlighted in 2019. Ewa Kijak and Vincent Claveau gave a few interviews in newspapers, in a nationwide radio broadcast as well as in several TV shows.
- A chaire position in Artificial Intelligence for Defense has been granted to Teddy Furon. This chaire is supported by the national Defense Innovation Agency. The chaire will last 4 years, starting early 2020.
- Laurent Amsaleg (General Chair), Guillaume Gravier (Program Committee Chair), Yannis Avrithis (Workshops Chair) as well as almost all students of LINKMEDIA (as volunteers) were involved in running the 27th ACM Multimedia conference in Nice. This edition, very successful, was attended by close to 800 people.

5.1.2. Awards

Oriane Siméoni received the best presentation award from the International Computer Vision Summer School (ICVSS) 2019 [0].

[0] https://iplab.dmi.unict.it/icvss2019/

LINKS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Data Integration and Schema Validation

The ShEx language for defining RDF schemas was proposed and developed earlier by the Links team in cooperation with the W3C. S. Staworko et al. now studied the containment problem for ShEx schemas for RDF documents. They showed at *PODS* [10] – the best database theory conference – that the problem is decidable, but co-NEXP-hard. This is a joint work with P. Wieczorek from the University of Wroclaw, Poland.

5.1.2. Aggregates

Florent Capelli et al. showed at *STACS* [7] – a top conferences in theoretical computer science – a new knowledge compilation procedure for quantified Boolean formulas allowing to decide the satisfiability quantified Boolean formulas with bounded tree width in polynomial time. This can be applied in particular to first-order database queries with quantifiers. This is joined work with S. Mengel from the CNRS in Lens.

LOKI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Géry Casiez and Mathieu Nancel received a very selective Google Faculty Research Award for their project "Real-time Latency Measure and Compensation".

Mathieu Nancel contributed to the writing of the new NF Z71-300 French keyboard standard, and spoke at the official launch event in April 2019 at the National Assembly.

5.1.1. Personnel

Edward Lank joined Loki in October as part of the Inria International Chair program and will spend more than 50% of his time with us until 2023.

5.1.2. Awards

Best paper award from the ACM EICS conference to the paper "Polyphony: Programming Interfaces and Interactions with the Entity-Component-System Model", from T. Raffaillac & S. Huot .

Best paper award from the Francophone Conference on Human-Computer Interaction (IHM) to the paper "Reducing Error Aversion to Support Novice-to-Expert Transitions with FastTap", from A. Goguey, S. Malacria, A. Cockburn & C. Gutwin .

BEST PAPERS AWARDS :

[22]

T. RAFFAILLAC, S. HUOT.*Polyphony: Programming Interfaces and Interactions with the Entity-Component-System Model*, in "EICS 2019 - 11th ACM SIGCHI Symposium on Engineering Interactive Computing Systems", Valencia, Spain, June 2019, vol. 3 [*DOI :* 10.1145/3331150], https://hal.inria.fr/hal-02147180

[25]

A. GOGUEY, S. MALACRIA, A. COCKBURN, C. GUTWIN.*Reducing Error Aversion to Support Novice-to-Expert Transitions with FastTap*, in "Actes de la 31e conférence francophone sur l'Interaction Homme-Machine (IHM 2019)", Grenoble, France, ACM, 2019, p. 1:1-10 [*DOI :* 10.1145/3366550.3372247], https://hal.archives-ouvertes.fr/hal-02381584

M3DISIM Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The team obtained 3 ANR fundings this year: LungManyScale, ODISSE and SIMR.

MAGIQUE-3D Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Inria's Autumn school, November 4-8 2019, Inria Bordeaux Sud-Ouest co-organized by E. Agullo (HIEPACS), H. Beaugendre (CARDAMOM) and J. Diaz The school aimed at simulating a physical problem, from its modeling to its implementation in a high performance computing (HPC) framework. The school offered both plenary courses and hands-on sessions that involved many members of the three teams. The physical problem considered was the harmonic wave propagation.

The first day was dedicated to the modeling of the problem and its discretization using a Discontinuous Galerkin scheme. The following two days were dedicated to linear algebra for solving large sparse systems. Background on direct, iterative and hybrid methods for sparse linear systems were discussed. Hands-on on related parallel solvers were then be proposed. Has followed a session dedicated to advanced parallel schemes using task-based paradigms, including a hands-on with the starpu runtime system. The ultimate hands-on session was devoted to the use of parallel profiling tools. The school was closed with plenary talks illustrating the usage of such a workflow in an industrial context.

The hands-on session were conducted on the Federative Platform for Research in Computer Science and Mathematics (PlaFRIM) machine in a guix-hpc reproducible environment

The school was attended by about 40 participants mostly PhDs and postdocs from Inria teams.

MAGNET Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Metric-Learn software has been included in the scikit-learn-contrib packages. It records more than 900 stars and 190 forks on GitHub. It is also used by 51 projects.
- AURÉLIEN BELLET has applied for a ERC Starting Grant on privacy-preserving decentralized machine learning.
- MATHIEU DEHOUCK has successfully defended his PhD dissertation on *Multi-Lingual Dependency Parsing: Word Representation and Joint Training for Syntactic Analysis*, and he is doing a post-doc at University of A Coruña (Spain) funded by ERC grant FASTPARSE.
- MARIANA VARGAS VIEYRA's work on probabilistic end-to-end graph-based semi-supervised learning was accepted as one of the 8 contributed talks (among 92 accepted submissions) as the NeurIPS'19 workshop on Graph Representation Learning [0].

[0] https://grlearning.github.io/papers/

MAGRIT Team

5. Highlights of the Year

5.1. Highlights of the Year

Two patents have been filed during this year: [28] relates to computational photomechanics and [27] relates to localization from objects.

MAMBA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Marie Doumic gave a plenary talk at the AIP Conference (Applied Inverse Problems) in Grenoble, July 8-12th (around 600 participants).
- Diane Peurichard and Nastassia Pouradier Duteil won a Mittag-Leffler and EWS-EMS Call to organize a summer school at the Mittag-Leffler institute in July 2020.
- the STIC AmSud cooperative project NEMBICA, between France, Chile, Paraguay and Colombia, headed by Pierre-Alexandre Bliman, has been accepted (2020-2021).

MANAO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Public exhibitions

Textile(s) 3D, exhibition at the Musée Ethnographique de Bordeaux (MEB), until May 29th, 2020: measurement and reproduction of textiles.

The program has targeted the faithful reproduction of the appearance of fragile textiles. To this end, an optical appearance measurement setup has been developped and installed in the basement of the museum. Several textiles have been measured, including ancient asian textiles from the MEB collection; the originals along with their digital reproduction have been shown to the visitors of the museum.

5.1.2. Demonstration

SID Display Week I-Zone, San José Convention Center, May 14-16, 2019: Prototype of an autostereoscopic transparent display

We have showcased a 5-view, full-color, autostereoscopic transparent display prototype that we have developed [8], [13]. Its solution is much like a window that is able to superimpose autostereoscopic 3D data over the real world without the need of any wearables. There are many potential applications in augmented reality and head-up display fields; for example, in automotive, advertisement, and educational areas.

MARACAS Team

5. Highlights of the Year

5.1. Highlights of the Year

Over the last year, the MARACAS team has made a number of significant contributions in the form of journal publications and international conference proceedings, invited lectures in international conferences and schools, as well as contributions in the form of organization of international conferences and editorial roles in international IEEE journals. These include 9 high quality journal publications and over 10 international conference proceedings, spanning many areas of communication and information theory as well as signal processing. In particular, these results contribute to the ongoing development of 5G wireless communication systems and also to emerging areas of communications in the form of the smart grid and molecular communications.

5.1.1. Awards

- Samir Perlaza: Visiting Research Collaborator (Honorific Position), Term 2019 - 2020, at the Department of Electrical Engineering, Princeton University. Annual Renew under evaluation of a Departmental Committee.
- Samir Perlaza: Fellowship of The Finnish Society of Sciences and Letters for visiting the School of Energy Systems at Lappeenranta University of Technology, Finland. April, 2019.
- Bayram Akdeniz: 2nd place in the Molecular MIMO Competition at the IEEE Communication Theory Workshop.
- Cyrille Morin: 1st place in the Machine learning challenge at the 6th Training School on Machine and Deep Learning Techniques for (Beyond) 5G Wireless Communication Systems.

MATHERIALS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Grants

- Eric Cancès, Laura Grigori (ALPINES, Inria Paris), Yvon Maday (Sorbonne Université), and Jean-Philip Piquemal (Sorbonne Université) are the PIs of the ERC Synergy project EMC2 (Extreme-scale Mathematically-based Computational Chemistry) launched in September 2019 (grant agreement No 810367).
- Virginie Ehrlacher is the PI of the ANR JCJC COMODO (CrOss-diffusion systems on MOving DOmains) project, to start in January 2020.

4.1.2. Awards

- C. Le Bris was a plenary speaker at ICIAM 2019, July 2019, Valencia, Spain.
- T. Lelièvre has received a Visiting professorship from the Leverhulme Trust, for his sabbatical leave at Imperial College London (Sep 2019-Jul 2020).

MATHNEURO Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Ariane Delrocq received on 29th November 2019, a price from Ecole Polytechnique Paris for her research internship co-supervised by E. Deval and R. Veltz.

MATHRISK Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Aurélien Alfonsi : Award for the Best Young Researcher in Finance and Insurance, Europlace Institute of Finance and SCOR Corporate Foundation.

5.1.2. Publications

B. Øksendal and A. Sulem. *Applied Stochastic Control of Jump Diffusions*. 3rd edition (436 pages) 2019, Universitext, Springer Verlag, Berlin, Heidelberg, New York [23].

MAVERICK Project-Team (section vide)

MCTAO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Laetita Giraldi has been awarded the price "My Innovation is" by SATT Sud & Corse for her research project on the control of swimming microbots.

MEMPHIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. 3D Numerical Model of a Zebra Fish Larva

The full reconstruction of a 3D larval zebrafish (5 days post fertilization) was realized using a serial-section electron microscopy data set combined with the technique of level-set and optimal transportation for shape interpolation. From an experimental video of zebrafish escape swimming, the kinematics of the swimming is extracted removing both translational and rotating displacements. Based on this video-extracted body deformation, 3D zebrafish snapshots of the body surface were generated deforming the 3D model according to the midline motion. The escape response of the zebrafish larva has been simulated using the NaSCar solver. The numerical simulation of the hydrodynamic zebrafish-locomotion provides a full range of the energetic performance performed by the larva during an escape response that are used by the MRGM biology lab in Bordeaux for toxicology evaluations. See figures 6 and 7 .

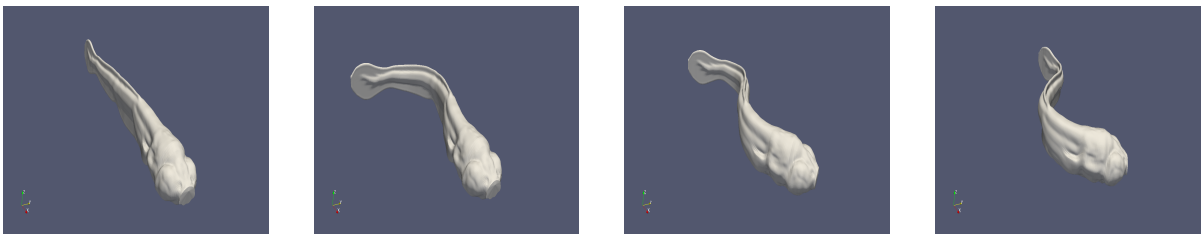

Figure 6. Snaphshots from left to right: reconstruction from electron microscopy and experimental video provided by MRGM Bordeaux of a zebra fish larva swimming movement.

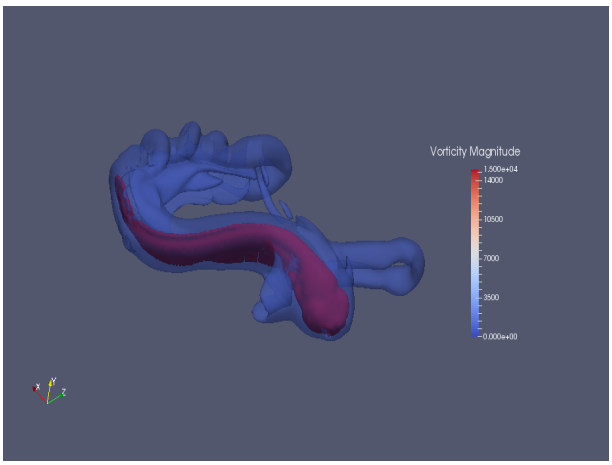

Figure 7. Numerical simulation of the swimming displacement of a zebra fish larva.

MEPHYSTO Team

4. Highlights of the Year

4.1. Highlights of the Year

The team has almost completed the process of creation of a new project-team named Paradyse (for PARticles And DYnamical SystEms), between Inria and the Laboratoire Paul Painlevé of the Université de Lille in 2019.

In 2019, the Mephysto team has been granted an Action de Développement Technologique (ADT) by Inria. This allowed the team to hire Alexandre Roget as an engineer for 2 years. The goal of this ADT is to develop software using mathematical techniques developed in the team, to be used by theoretical and experimental physics communities.

In 2019, the team also had individual successes that can be highlighted. Amongst others, M. Simon submitted an ERC Starting Grant project which was ranked A, and S. De Bièvre became Associate Editor of the Journal of Mathematical Physics.

MEXICO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- The article *Manifestability Verification of Discrete Event Systems* by Lina Ye, Philippe Dague, and Lulu He received the *Best Paper Award* of the *30th International Workshop on Principles of Diagnosis DX'19*, Klagenfurt/Austria, November 2019.
- The article *Sequential Reprogramming of Boolean Networks Made Practical* by Hugues Mandon, Cui Su, Stefan Haar, Jun Pang, and Loïc Paulevé received the *Best Paper Award* of the conference on *Computational Models in Systems Biology*(CMSB 2019), Trieste/Italy, September 18-20, 2019.

BEST PAPERS AWARDS :

[24]

L. YE, P. DAGUE, L. HE.*Manifestability Verification of Discrete Event Systems*, in "DX'19 - 30th International Workshop on Principles of Diagnosis", Klagenfurt, Austria, November 2019, vol. 19, p. 1-9, Best Paper Award (https://dx-workshop.org/2019/awards/), https://hal.archives-ouvertes.fr/hal-02425146

[22]

H. MANDON, C. SU, S. HAAR, J. PANG, L. PAULEVÉ.*Sequential Reprogramming of Boolean Networks Made Practical*, in "CMSB 2019 - 17th International Conference on Computational Methods in Systems Biology", Trieste, France, Lecture Notes in Computer Science, Springer, 2019, vol. 11773, p. 3–19, Best paper award [*DOI :* 10.1007/978-3-030-31304-3_1], https://hal.archives-ouvertes.fr/hal-02178917

MFX Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

This year we advanced on all of our main research axes [11], [12], [13], [14], [15], [17]. We would like to highlight two of these results. First, we cast a new view on the Gabor noise – a now well established procedural texturing technique – by reformulating it to enable new controls and properties [17]. This opens interesting possibilities for microstructure synthesis, a direction we are now pursuing. Second, we introduced a novel algorithm for curved 3D printing [11], a long term ongoing effort within the team. This algorithm is the first – to our knowledge – to optimize for curved layers throughout a part, under constraints allowing fabrication on standard 3D printers using thermoplastic filament. This paves the way to more general techniques for 6-DOF 3D printing.

Our software efforts have also intensified, with a clear increase in the use and popularity of our software IceSL (see *software*). We also announced an exciting collaboration with *AddUp*, a leading French company in the field of metal 3D printing.

MIMESIS Team

5. Highlights of the Year

5.1. Highlights of the Year

- Our paper entitled "Physics-based Deep Neural Network for Augmented Reality during Liver Surgery" was selected for oral presentation at the MICCAI conference in Shenzhen China and presented to more than 2,000 attendees [22]. In this work we demonstrated that it is possible to combine a neural network with physics-based simulation to reproduce the deformation of a complex organ.
- SOFA, our open source simulation software, continues to grow and attract scientists and companies. New results were presented during the SOFA week in November at Station F in Paris. Three start-ups created by former SOFA engineers or researchers, were among the attendees.

MIMETIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Members of the MimeTIC team / M2S laboratory carried out a PIA3 EUR (Ecole Universitaire de Recherche) project (DIGISPORT project) for the University of Rennes, which brings together the universities and Grandes Ecoles of the Rennes site. This project, with a total budget of €86 million, is funded by the Ministry of Higher Education, Research and Innovation to the tune of €5.9 million. The objective of DIGISPORT is to create a unique graduate school of international excellence in interdisciplinary training and research in digital sport sciences. This project aims to offer students in initial and continuing training an opportunity to build a study strategy suited to their professional goals and to the labor market. The digital revolution in sports and exercise is indeed already underway, at the confluence of the fast-growing markets of sport (€80 billion worldwide) and digital technology and connected objects (€207 billion worldwide). It leads to the emergence of new professions at the interface of these domains requiring skills in sports science, digital, electronics, and human and social sciences. Currently, education system is not designed to train this type of multi-skilled and agile students able to integrate an evolving labor market. DIGISPORT aims to link and structure training courses and research to promote a transversal approach uniting teaching and research staff around the new discipline of digital sport science and to address the new skills generated by the entry of sport into the digital age. The EUR will provide a coordinated training offer, from masters to doctoral level, that is resolutely interdisciplinary and strongly linked to research and innovation.
Based on previous scientific results in dynamic motion analysis, MimeTIC has developed an efficient software platform to carry-out biomechanical analysis based on motion capture data. "Customizable Toolbox for Musculoskeletal simulation" (CusToM) was delivered as an open source software available on a repository (https://github.com/anmuller/CusToM) and documented in [22]. CusToM is a MATLAB toolbox aiming at performing inverse dynamics-based musculoskeletal analyzes. This type of analysis is essential to access mechanical quantities of human motion in different fields such as clinic, ergonomics and sports. CusToM exhibits several features. It can generate a personalized musculoskeletal model, and can solve from motion capture data inverse kinematics, external forces estimation, inverse dynamics and muscle forces estimation problems with a high level of customization for research purposes. It is also designed for non-expert users interested in motion analysis. CusToM is an OpenSource Software available with no restriction.

The Immersia VR platform has celebrated its 20 years of existence at Inria Rennes/IRISA center, within the “20ans d’Immersia” event (November 2019).

MIMOVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Wall Street Journal published an article, “The Truth About Faster Internet: It’s Not Worth It” (on the front page of the printed version of the paper on August 21, 2019) based on the results of the models we have developed to infer video quality from encrypted network traffic and the Network Microscope system.

MINGUS Project-Team (section vide)

MISTIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

New appointments:

- Florence Forbes has been appointed as a member of the advisory committee of the Helmholtz AI Cooperation Unit https://helmholtz.ai/.

Data Challenges

- Pixyl winner of the Société Francaise de Radiologie Data Challenge 2019

  Pixyl, a Grenoble-based start-up originating in the team and Inserm, accompanied by a team of neuroradiologists and academics, distinguished itself in the AI challenge held during the 2019 edition of the Journées Francophone de Radiologie, which took place from 11 to 14 October in Paris. The Challenge was about prediction of multiple sclerosis patient disability from a single MRI image

5.1.1. Awards

- Meryem Bousebata received the second best presentation award at the "10th conference of the international society for Integrated Disaster Risk Management (IDRiM)" organized by CNRS-University of Nice and AFPCN and held from 16 to 18 October 2019 in Nice.
- Mariia Vladimirova received the best poster award for her work [45] at the "12th Conference on Bayesian Nonparametrics", Oxford University, UK, June 24-28, 2019.

BEST PAPERS AWARDS :
[52]
M. BOUSEBATA, G. ENJOLRAS, S. GIRARD.*Bayesian estimation of natural extreme risk measures. Application to agricultural insurance*, in "IDRiM 2019 - 10th conference of the international society for Integrated Disaster Risk Management", Nice, France, October 2019, https://hal.archives-ouvertes.fr/hal-02276292

MNEMOSYNE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We recently considered a new domain of application for our models, educational science. In a very stimulating perspective, we wonder how our cognitive models of cerebral architectures can be used to study children performing problem solving. Our first steps in this domain concern the etablishment of relations with a laboratory in educational science, designing a software platform (*cf.* § 6.4). and being associated to ongoing projects, one project with the French ANR regarding cocreativity and problem solving evaluation during a computational thinking initiation activity and one in the Erasmus+ CAI « Communauté d'Apprentissage de l'Informatique » 19PE0004 project, in link with the Erasmus+ Let'Steam project.

MOCQUA Team

5. Highlights of the Year

5.1. Highlights of the Year

The ZX-calculus is a powerful diagrammatic language which can be used to reason on quantum computing. The ZX-calculus is also an essential tool for the development of the quantum computer allowing for instance optimisation of quantum programs. Indeed the ZX-calculus is equipped with an equational theory which allows one to transform and optimize quantum programs. A few years ago, we have proved the first completeness result of the ZX-calculus [41] [28], guaranteeing that two equivalent evolutions can be transformed one into the other thanks to the equational theory. Its completeness gives to the ZX-calculus a competitive advantage compared to the other models of quantum computation, like the quantum circuits, for which no complete equational theory is known.

In [31], Renaud Vilmart introduced a new, simple, and meaningful equational theory for the ZX-calculus, based on the famous Euler angle decomposition. Renaud participated to the various previous results of the team on this subject during his PhD thesis in the Mocqua team, and culminated with this sole author paper published at LICS for which he obtained the best student paper award.

5.1.1. Awards

Best student paper award at LICS'19 for Renaud Vilmart. [31].

MODAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Benjamin Guedj gave (with John Shawe-Taylor) a plenary tutorial of 2 hours for opening the ICML 2019 (Longbeach, California, USA – June 2019).
- Official creation in July 2019 of a startup DiagRAMS using MODAL's technology (MixtComp software) for predictive maintenance.
- Benjamin Guedj has received two best reviewer awards (top 5% of reviewers) for ICML 2019 and NeurIPS 2019, the flagship conferences in machine learning. Pascal Germain received the best reviewer award (top 5% of reviewers) for NeurIPS 2019.

5.1.1. More relevant results in 2019.

While Section 7 contains a complete list of results for 2019, the important results which were published in peer-reviewed international conferences/journals are described in Sections 7.2 , 7.3 , 7.13 , 7.16 , 7.17 , 7.18 , 7.19 , 7.21 , 7.22 , 7.27 , 7.28 , 7.32 , 7.37 , 7.43 and 7.47 .

MOEX Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- We published our work on relational concept analysis applied to link key extraction in *Discrete applied mathematics* [5].
- Jérôme Euzenat was invited to deliver a keynote talk at the International semantic web conference (ISWC), in Aukland (NZ). The title of the talk was a call to brains: *For knowledge!*
- The teams leads the *Knowledge communication and evolution* chair of the Multidisciplinary Institute of Artificial Intelligence awarded in Grenoble.

MOKAPLAN Project-Team (section vide)

MONC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- 2 abstracts accepted as oral communications at the PAGE meeting (main international conference in population modeling) (C. Nicolò and S. Benzekry)

5.1.1. Awards

- Floriane Gildel is French Young Talent 2019 - L'Oréal-UNESCO for Women in Science.

MORPHEME Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Luca Calatroni get a CNRS position as scientist and joined the team in october 2019.

MORPHEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST PAPERS AWARDS :
[15]
R. KLOKOV, J. VERBEEK, E. BOYER.*Probabilistic Reconstruction Networks for 3D Shape Inference from a Single Image*, in "BMVC 2019 - British Machine Vision Conference", Cardiff, United Kingdom, September 2019, p. 1-15, https://arxiv.org/abs/1908.07475 - Awarded with Best Science Paper Honourable Mention Award at BMVC'19., https://hal.inria.fr/hal-02268466

MOSAIC Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- MOSAIC has been promoted to Inria project-team in July 2019.
- In collaboration with CNRS (LIRMM and CRBM units in Montpellier), the team published a new web browser-based computational tool, Morphonet, to interactively explore complex 3D+time biological structures in silico, [8].

MULTISPEECH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We developed the first deep learning-based multichannel speech enhancement algorithm that jointly reduces acoustic echo, reverberation, and background noise [57].

E. Vincent gave a keynote at the Voice Tech Paris 2019 trade fair [18].

A. Deleforge organized the IEEE Signal Processing Cup 2019 on "Search & Rescue with Drone-Embedded Sound Source Localization", to which 20 teams of undergraduate students from 18 universities in 11 countries participated, for a total of 132 participants [5]. The final took place on May the 13th at the international conference ICASSP in Brighton. The associated DREGON dataset, which was made publicly available afterwards, has received over 1,000 file downloads as of December 2019.

5.1.1. Awards

L. Perotin obtained the Best Poster Award of the 2019 IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA) .
BEST PAPERS AWARDS :
[43]
L. PEROTIN, A. DÉFOSSEZ, E. VINCENT, R. SERIZEL, A. GUÉRIN.*Regression versus classification for neural network based audio source localization*, in "WASPAA 2019 - IEEE Workshop on Applications of Signal Processing to Audio and Acoustics", New Paltz, United States, IEEE, October 2019, https://hal.inria.fr/hal-02125985

Myriads Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- SimGrid was named as one of ten "French scientific successes in year 2018" in the French government report "Vers une loi de programmation pluriannuelle de la Recherche" [0]
- The FogGuru European project has started a real-life experimentation in València (Spain) of Fog computing technologies applied to smart water supply management, in collaboration with Emivasa, the public-private company in charge of water supply.
- The RI/RE project (funded by the CNRS Momentum call) has started in 2019. This project will strengthen our exploration of Smart Grids relations with computing systems.

[0] "Vers une loi de programmation pluriannuelle de la Recherche." French government's press release, Feb 2019, page 6. https://cache.media.enseignementsup-recherche.gouv.fr/file/Recherche/91/7/dp-loi_programmation_1069917.pdf

NACHOS Project-Team (section vide)

NANO-D Team

4. Highlights of the Year

4.1. Highlights of the Year

- The work on first-principle simulation has been completed. The aim was to use the restrained dynamical model ARPS previously developed by the team to speed-up dynamical simulations using a first-principle interaction model. We have chosen Orbital-Free Density Functional Theory (OF-DFT), a fast scheme of DFT, as interaction model. We have developed a new OF-DFT code adapted to restrained particle simulations and have compared the accuracy and speed of our method to the state of the art OF-DFT code, PROFESS. The results were published in the Journal of Computational Chemistry [11] and the code is available in SAMSON. The thesis at the origin of this research has been defended in October.
- The proof-of-concept orientation-dependent potential for small molecules was developed and tested.
- With the advance of experimental procedures, obtaining sparse experimental data of proteins in solution (chemical crosslinking and small-angle scattering) is becoming a fast and routine practice. These can greatly enhance the accuracy of protein structure modeling. We participated in reviewing the current state of the art in modeling protein structures with the assistance of experimentally determined chemical crosslinks and small-angle scattering profiles within the framework of the 13th meeting of Critical Assessment of Structure Prediction approaches [2], [4].

NECS Team

5. Highlights of the Year

5.1. Highlights of the Year

- C. Canudas-de-Wit was the General Chair of IEEE Conference on Decision and Control 2019 (CDC) in Nice (11-13 Dec. 2019).
- H. Fourati was elected as member of CNU61 (Conseil national des universités, Génie informatique, Automatique et Traitement du Signal), 2020-2023.
- H. Fourati has co-edited the book “Cooperative Localization and Navigation: Theory, Research and Practice”, by Taylor and Francis Group LLC.

NEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Maximilien Dreveton, PhD student in NEO, has co-authored a book: *Leçons pour l'agrégation de mathématiques* [61].

The members of NEO have edited three collections: [64], [65], [66]. One collection is a result of the very successful EU Project CONGAS: Multilevel Strategic Interaction Game Models for Complex Networks.

Sara Alouf has been elected member of the Board of Directors of the ACM SIGMETRICS.

A workshop in the honor of Eitan Altman, at the occasion of his 60th birthday, took place at the University of Avignon on June, 3rd, 2019. Recordings of the presentations are available, see https://www.canal-u.tv/producteurs/universite_d_avignon_et_des_pays_de_vaucluse/colloque/wiopt_2019.

NEUROSYS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Laurent Bougrain is the coordinator of the 4-years ANR project Grasp-IT on the design and the evaluation of a tangible and haptic brain-computer interface for upper limb rehabilitation after stroke including 4 research teams, 3 centers or hospital departments for physical medicine and rehabilitation and one manifacturer of 3D printers (see Sec. 8.2.1).

NUMED Project-Team (section vide)

OPIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Our M.Sc. program in Data Sciences and Business Analytics (with ESSEC Business School) was ranked 3rd worldwide in the QS World University Rankings.
- E. Chouzenoux was laureate of the ERC Starting Grant MAJORIS (starting date: 01-01-2020).
- M.C. Corbineau received the best poster award at “Journée de rencontre entre entreprises, doctorants et jeunes docteurs” (J-RED) in 2019.

ORPAILLEUR Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

This year we would like to mention two publications as highlights of the year.

- The conference paper [10] got the best paper award at the International Conference on Formal Concept Analysis 2019 in Frankfurt, June 2019 (https://icfca2019.frankfurt-university.de/).
- Classical properties of functions such as associativity, although algebraically easy to read, are hard to meaningfully interpret. In [18], Miguel Couceiro and colleagues showed that associative and quasi-trivial operations that are non-decreasing are characterized in terms of total and weak orderings through the so-called single-peakedness property introduced in social choice theory by Duncan Black. This enabled visual interpretations of the above mentioned algebraic properties, and the enumeration of such operations led to several, previously unknown, integer sequences in Sloane's On-Line Encyclopedia of Integer Sequences (http://www.oeis.org), e.g., `A292932`, `A292933`, and `A292934`.

BEST PAPERS AWARDS :

[42]

J. REYNAUD, Y. TOUSSAINT, A. NAPOLI.*Using Redescriptions and Formal Concept Analysis for Mining Definitions Linked Data*, in "ICFCA 2019 - 15th International Conference on Formal Concept Analysis", Francfort, Germany, June 2019, https://hal.inria.fr/hal-02170760

OURAGAN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Two new projects have started this year

- the MACAO associated team in collaboration with the University of Wollongong (Australia) - see 9.3.1
- a collaboration with Safran Tech - see 8.1

PACAP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Benjamin Rouxel, Stefanos Skalistis, Steven Derrien and Isabelle Puaut received an Outstanding paper award for their paper entitled “Hiding Communication Delays in Contention-Free Execution for SPM-based Multi-Core Architectures” at the Euromicro conference on real time systems .

BEST PAPERS AWARDS :

[28]

B. ROUXEL, S. SKALISTIS, S. DERRIEN, I. PUAUT.*Hiding Communication Delays in Contention-Free Execution for SPM-Based Multi-Core Architectures*, in "ECRTS 2019 - 31st Euromicro Conference on Real-Time Systems", Stuttgart, Germany, July 2019, p. 1-24 [*DOI :* 10.4230/LIPICS.ECRTS.2019.25], https://hal.archives-ouvertes.fr/hal-02190271

PANAMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The **Premier Prix de Thèse de la Fondation Rennes 1** in the area of *Mathématiques, Sciences et Technologies de l'Information et de la Communication*, was awarded to **Himalaya Jain** for his Ph.D. [73] titled "Learning compact representations for large scale image search", conducted under the joint supervision of R. Gribonval and Patrick Perez, Technicolor R & I, Rennes.
- The **Prix Jeune Chercheur** from the *Journée Science et Musique 2019 (Rennes)* was awarded to **Corentin Louboutin** for a contribution titled "Modélisation multi-échelle et multi-dimensionnelle de la structure musicale", in relation to his PhD thesis [13].

PARIETAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- November 2019: Académie des sciences / Dassault System / Inria prize awarded to the developers of scikit-learn: Loic Estève, Alexandre Gramfort, Olivier Grisel, Bertrand Thirion and Gael Varoquaux.
- December 2019: Alexandre Gramfort, Bertrand Thirion and Gael Varoquaux are each awarded a *Chaire IA* following a national call.
- December 2019: Carole Lazarus, former PhD student supervised by Philippe Ciuciu got the Prix de la Chancellerie des Universités de Paris 2019 - Section Sciences.

PARKAS Project-Team (section vide)

PARSIFAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The journal Mathematical Structures in Computer Science published “A special issue on structural proof theory, automated reasoning and computation in celebration of Dale Miller’s 60th birthday” – volume 29, Special issue 8, September 2019.
- Accattoli was invited speaker at the international conference FSCD 2019.

PERCEPTION Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. IEEE Senior Member.

Xavier Alameda-Pineda has become an IEEE Senior Member on February 1st, 2019. The grade of Senior Member requires experience reflecting professional maturity as an engineer, scientist, educator, technical executive, or originator in IEEE-designated fields for a total of 10 years and have demonstrated 5 years of significant performance.

4.1.2. H2020 Project SPRING

(1 Januray 2020 – 31 December 2023) is a research and innovation action (RIA) with eight partners: Inria Grenoble (coordinator), Università degli Studi di Trento, Czech Technical University Prague, Heriot-Watt University Edinburgh, Bar-Ilan University Tel Aviv, ERM Automatismes Industriels Carpentras, PAL Robotics Barcelona, and Hôpital Broca Paris.. The main objective of SPRING (Socially Pertinent Robots in Gerontological Healthcare) is the development of socially assistive robots with the capacity of performing multimodal multiple-person interaction and open-domain dialogue. In more detail:

- The scientific objective of SPRING is to develop a novel paradigm and novel concept of socially-aware robots, and to conceive innovative methods and algorithms for computer vision, audio processing, sensor-based control, and spoken dialog systems based on modern statistical- and deep-learning to ground the required social robot skills.
- The technological objective of SPRING is to create and launch a brand new generation of robots that are flexible enough to adapt to the needs of the users, and not the other way around.
- The experimental objective of SPRING is twofold: to validate the technology based on HRI experiments in a gerontology hospital, and to assess its acceptability by patients and medical staff.

Website: https://spring-h2020.eu/

4.1.3. ANR JCJC Project ML3RI

(1 March 2020 – 28 February 2024) has been awarded to Xavier Alameda-Pineda. Multi-person robot interaction in the wild (i.e. unconstrained and using only the robot's resources) is nowadays unachievable because of the lack of suitable machine perception and decision-taking models. *Multi-Modal Multi-person Low-Level Learning models for Robot Interaction* (ML3RI) has the ambition to develop the capacity to understand and react to low-level behavioral cues, which is crucial for autonomous robot communication. The main scientific impact of ML3RI is to develop new learning methods and algorithms, thus opening the door to study multi-party conversations with robots. In addition, the project supports open and reproducible research.

4.1.4. MIAI Chair.

The Multidisciplinary Institue in Artificial Intelligence (MIAI) is one of the four AI French institutes launched in 2019 by the French government. MIAI is structured around several chairs, each chair gathering 3-6 researchers as well as postdocs and PhD students. Team members Radu Horaud and Xavier Alameda-Pineda are co-chairs of the *Audio-visual machine perception and interaction for companion robots* chair. The development of methods and algorithms for enabling socially-aware robot behavior with the specific goal of interacting with humans is the core topic. The emphasis is put on unsupervised and weakly supervised learning with audio and visual data, based on Bayesian methods, deep learning and reinforcement learning. It is planned to develop challenging proof-of-concept implementations and demonstrators.

PERVASIVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

James Crowley was named to the Chair on Intelligent Collaborative Systems.

PESTO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Itsaka Rakotonirina was awarded a Google PhD fellowship in Security and Privacy.

Steve Kremer was granted an ANR Chair of research and teaching in artificial intelligence: ASAP – Tools for automated, symbolic analysis of real-world cryptographic protocols.

PETRUS Project-Team (section vide)

PI.R2 Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

A one-day scientific meeting in honour of Pierre-Louis Curien's retirement was held at Université Paris Diderot on se 6, 2019 (organisers Antonio Bucciarelli, Bérénice Delcroix-Oger and Thomas Ehrhard) (https://www.irif.fr/plcmeeting).

The paper [35] presents the results of a large collaborative work led by Matthieu Sozeau on the metatheory and implementation of Coq's type theory in Coq itself.

Yves Guiraud defended his habilitation thesis on the 18th of June 2019, entitled "Rewriting methods in higher algebra". Yann Régis-Gianas defended his habilitation thesis on the 22nd of November 2019 entitled "About some metamorphoses of computer programs".

Yves Guiraud was granted an Action Exploratoire, Réécriture Algébrique, to start in January 2020. Emilio Gallego Arias joined the team in November 2019 on a Starting Research Position.

PLEIADE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Genomic determinants:

The study [7] appearing in *BMC Genomics* resolves a longstanding enigma in winemaking. While the *fact* of resistant strains of wine yeasts has been known for many years, the actual mechanism underlying the phenomena have only now been elucidated by a combined genetic and bioinformatic analysis.

5.1.2. INRAE-Inria PhD:

PLEIADE was succesful in applying for a PhD in 2019 INRA-Inria call for PhD. The submitted topic is: "Statistical Learning for OTU identification and Biodiversty characterizaton." This PhD is a collaboration between PLEIADE (INRAE-Inria, supervision), HiePACS (Inria) and MIAT Toulouse (INRAE).

POEMS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- The POEMS EPI has been officially renewed by Inria on the 1st November 2019.
- Two permanent members of the team, S. Chaillat and S. Fliss, have successfully defended their habilitation theses.
- SACHEMS project led by CEA (where POEMS is involved) has been retained in the call of Ile-de-France Region SESAME 2019. Its purpose is to federate the research in the region in the field of SHM (Structural Health Monitoring), which consists of developing intelligent sensors aimed at detecting and characterizing directly defects in a structure (crack, corrosion, etc.). The SACHEMS project is part of a strategy for pooling equipment with the objective of creating an innovation platform for SHM methods.

POLARIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- N. Gast received an ANR JCJC grant.
- The team was highly involved in the 3IA institute MIAI @ Grenoble Alpes: P. Loiseau is co-holder of the chair "Explainable and Responsible AI" of which N. Gast and B. Pradelski are members; and P. Mertikopoulos is a member of the chair "Optimization & Learning".
- Arnaud Legrand participated in the writing of a book [39] on Reproducible Research, which aims at helping students and engineers and researchers to find efficient and accessible ways leading them to improve their reproducible research practices.

5.1.1. Awards

- The paper "Privacy Risks with Facebook's PII-based Targeting: Auditing a Data Broker's Advertising Interface" by P. Loiseau and co-authors (IEEE S&P '18) was runner up for the 2019 Caspar Bowden Award for Outstanding Research in Privacy Enhancing Technologies.
- The paper "Investigating ad transparency mechanisms in social media: A case study of Facebook's explanations" by P. Loiseau and co-authors (NDSS '18) was runner up for the 2019 CNIL-Inria Award for Privacy Protection.

POLSYS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

CryptoNext Security, a spinoff of the PolSys team, was founded in June 2019 and has already been selected in the Future 40 group by STATION F of the most promising young startups.

POTIOC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The HOBIT system has been exported to a foreign institution (University of Jena) for the first time. The licensing of the technology is in progress for a worldwide distribution.

5.1.1. Awards

- Honorable mention award at ACM ISS 2019
- Best paper award at ACM UIST 2019
- Best presentation award at Neuroadaptive Technologies 2019 (NAT'19): "Modular biofeedback: build your own tangible experience" by Joan Sol Roo and Jeremy Frey

BEST PAPERS AWARDS :

[23]

P. GIRAUDEAU, A. OLRY, J. SOL ROO, S. FLECK, D. BERTOLO, R. VIVIAN, M. HACHET.*CARDS: A Mixed-Reality System for Collaborative Learning at School*, in "ACM ISS'19 - ACM International Conference on Interactive Surfaces and Spaces", Deajon, South Korea, November 2019 [*DOI :* 10.1145/3343055.3359721], https://hal.inria.fr/hal-02313463

[25]

A. KHAN, J. SOL ROO, T. KRAUS, J. STEIMLE.*Soft Inkjet Circuits: Rapid Multi Material Fabrication of Soft Circuits Using a Commodity Inkjet Printer*, in "UIST'19 - 32nd ACM Symposium on User interface software and technology", New Orleans, United States, October 2019, https://hal.archives-ouvertes.fr/hal-02279960

PRIVATICS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

PRIVATICS members have written several position documents for policy makers: a report on facial recognition, algorithmic decision-making, pseudonymisation and a white book on cybersecurity.

PROSECCO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- We published 12 papers at top-tier conferences and journals such as S&P (1), POPL (2), Euro S&P (2), ICFP (3), CSF (1), ESOP (1)
- Our cryptographic library HACL* was incorporated within the Linux kernel, Microsoft WinQuic, mbedTLS, and Concordium, in addition to the prior deployments in Mozilla Firefox and Tezos Blockchain
- Catalin Hritcu served as Program Chair of the 9th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP)

5.1.1. Awards

- EU Horizon Impact Award 2019 for Karthikeyan Bhargavan for his research on TLS 1.3.
- Distinguished Paper Award at CSF'19 for "Journey Beyond Full Abstraction"
- Distinguished Paper Award at POPL'19 for "Gradual Parametricity, Revisited"

BEST PAPERS AWARDS :

[17]

C. ABATE, R. BLANCO, D. GARG, C. HRIŢCU, M. PATRIGNANI, J. THIBAULT.*Journey Beyond Full Abstraction: Exploring Robust Property Preservation for Secure Compilation*, in "CSF 2019 - 32nd IEEE Computer Security Foundations Symposium", Hoboken, United States, IEEE, June 2019, p. 256-271, https://arxiv.org/abs/1807.04603 [*DOI :* 10.1109/CSF.2019.00025], https://hal.archives-ouvertes.fr/hal-02398915

[16]

M. TORO, E. LABRADA, É. TANTER.*Gradual Parametricity, Revisited*, in "Proceedings of the ACM on Programming Languages", 2019, vol. 3, n^{o} POPL, https://arxiv.org/abs/1807.04596 [*DOI :* 10.1145/3290330], https://hal.archives-ouvertes.fr/hal-01960553

QUANTIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Zaki Leghtas has obtained an ERC starting grant in pannel PE3 entitled ECLIPSE (Exotic superconducting CIrcuits to probe and protect quantum States of light and mattEr).
- Our team (Zaki Leghtas and Mazyar Mirrahimi) has obtained a european QUANTERA grant entitled QuCOS (Quantum Computation with Schrödinger cat states).
- Philippe Campagne-Ibarcq was hired as a CRCN Inria in the QUANTIC team.
- Zaki Leghtas was an invited speaker of American Physical Society March Meeting in Boston, USA.
- Pierre Rouchon was a semi-plenary speaker at the IFAC Mechatronics and NOLCOS conference, September 4-6, Vienna, Austria.
- Successful PhD defense of Gerardo Cardona, under the direction of P. Rouchon and A. Sarlette.
- Successful PhD defense of Lucas Verney, under the direction of M. Mirrahimi and Z. Leghtas.
- Successful PhD defense of Zhifei Zhang, under the direction of A. Sarlette at Ghent University.

RAINBOW Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- J. Pettré is the unit PI of the new H2020 ICT project “PRESENT” started on Sep 2019

4.1.1. Awards

- P. Robuffo Giordano received the Prix Michel Monpetit – Inria from the Académie des sciences
- B. Penin (former PhD student), P. Robuffo Giordano and F. Chaumette received at ICRA 2019 the IEEE RA-L 2018 Best Paper Award for the paper “Vision-Based Reactive Planning for Aggressive Target Tracking while Avoiding Collisions and Occlusions”
- M. Babel received the Innovation Award from the Société Française de Médecine physique et de Réadaptation (SOFMER) for the power wheelchair simulator in virtual reality described in Sect. 6.4.6

RANDOPT Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cheikh Touré received the 2nd prize for the student best paper award at the conference EMO 2019 for the paper “On Bi-Objective convex-quadratic problems” by Cheikh Touré, Anne Auger, Dimo Brockhoff, Nikolaus Hansen
- Nikolaus Hansen received the ENUM best paper award at the ACM-GECCO 2019 conference (see https://gecco-2019.sigevo.org/index.html/Best+Paper+Awards) for the paper “A global Surrogate Assisted CMA-ES”

BEST PAPERS AWARDS :

[6]
C. TOURÉ, A. AUGER, D. BROCKHOFF, N. HANSEN.*On Bi-Objective convex-quadratic problems*, in "10th International Conference on Evolutionary Multi-Criterion Optimization", East Lansing, Michigan, United States, March 2019, https://arxiv.org/abs/1812.00289 , https://hal.inria.fr/hal-01942159

[5]
N. HANSEN.*A Global Surrogate Assisted CMA-ES*, in "GECCO 2019 - The Genetic and Evolutionary Computation Conference", Prague, Czech Republic, ACM, 2019, p. 664-672 [*DOI :* 10.1145/3321707.3321842], https://hal.inria.fr/hal-02143961

RAPSODI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

In 2019, RAPSODI members have been the laureates of several calls for projects.

- T. Rey has been awarded an ERC Generator grant (116 545 euros) from I-SITE Université Lille - Nord Europe for his project MANAKINEQO (R-ERCGEN-19-007-REY). Upon the next two years, T. Rey aims at investigating mathematical properties, as well as developing efficient numerical schemes, for multiscale collisional kinetic equations of the Boltzmann type. A 20-months post-doc will be funded using this grant, as well as an international conference. Following this ERC Generator grant, T. Rey will apply for an ERC Consolidator grant.
- S. Lemaire is the PI of the ADT project ParaSkel++, which is one of the funded Actions of Technological Development of the Inria Lille - Nord Europe 2019 campaign. The aim of the project is to develop an optimized C++ platform for the arbitrary-order numerical approximation of PDEs by skeletal methods on general 2D/3D meshes, with a particular emphasis on the implementation of HPC facilities. L. Beaude has been hired as a development engineer for this project. She will start in February 2020.
- C. Cancès, C. Chainais-Hillairet and B. Merlet are involved in the H2020 project EURAD (EUropean Joint Programme on RADioactive Waste Management). The aim of their project inside EURAD is to establish an energetic formulation of the Diffusion Poisson Coupled Model leading to new large-time robust numerical methods for the simulation of the corrosion processes in an underground repository. C. Cancès is the leader of the task "Numerical methods for high-performance computing of coupled processes" within the EURAD project.

One can also mention the obtention by T. Rey of a Young Researcher PEPS grant from CNRS's INSMI (3 500 euros, from March to November 2019). The granted project aimed at investigating high-order (in time and velocity) numerical methods for approximating the solutions to the granular gases equation.

REALOPT Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The team has recruited Aurélien Froger as assistant professor.

Ruslan Sadykov has defended his habilitation (HDR) [2].

A paper [8] was accepted in conference IPCO, which is the most prestigious conference in the field.

REO Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

ERC consolidator grant MoDeLLiver (I Vignon-Clementel).

RESIST Team

5. Highlights of the Year

5.1. Highlights of the Year

The impact of the RESIST team in network and service management community has been highly recognized and awarded this year in recognition of their exceptional contributions and leadership in this research area.

- R. Badonnel has been elected as the chair of the IFIP (International Federation for Information Processing) WG6.6 (Working Group 6.6).
- J. François has been appointed as co-chair of NMRG (Network Management Research Group) of IRTF (Internet Research Task Force).
- T. Cholez gets involved in the new H2020 European project Concordia (section 9.3.1.4).

5.1.1. Awards

- O. Festor has received the *Dan Stokesberry award*.
- J. François has received the *IEEE Young Professional in Network and Service Management award.*

RITS Project-Team (section vide)

RMOD Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Steven Costiou was hired as CR.
- We released Pharo 7. More information at http://pharo.org.
- The paper *Rotten Green Tests* has been accepted at ICSE.
  https://hal.inria.fr/hal-02002346

5.1.1. Awards

- Best paper award: *SATToSE 2019 Migrating GWT to angular 6 using MDE*.
  https://hal.inria.fr/hal-02304301
- 2nd place best paper award IWST 2019: *Illicium: a modular transpilation toolchain from Pharo to C*.
  https://hal.archives-ouvertes.fr/hal-02297860
- 3rd place best paper award IWST 2019: *GildaVM: a Non-Blocking I/O Architecture for the Cog VM*.
  https://hal.archives-ouvertes.fr/view/index/docid/2379275

ROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Jean-Yves L'Excellent co-created the MUMPS technologies start-up and left the team to work full time for MUMPS technologies.
- Grégoire Pichon joined the team as an Associate Professor of University Claude Bernard, Lyon 1.
- Anne Benoit was elected chair of the IEEE Technical Committee on Parallel Processing.
- Anne Benoit received on February 2019 the award for Editorial Excellence as Associate Editor of the IEEE Transactions on Parallel and Distributed Systems during 2018.
- Yves Robert received the 2020 IEEE-CS Charles Babbage Award *for contributions to parallel algorithms and scheduling techniques.* This award covers all aspects of parallel computing including computational aspects, novel applications, parallel algorithms, theory of parallel computation, parallel computing technologies, among others. Further information about the award, including a list of past recipients, may be found at https://www.computer.org/web/awards/charles-babbage. The award consists of a $1,000 honorarium, certificate, and the invitation to present a paper and/or presentation at the annual IEEE-CS International Parallel and Distributed Processing Symposium (IPDPS).

5.1.1. Awards

BEST PAPERS AWARDS :
[16]
F. DUFOSSÉ, K. KAYA, I. PANAGIOTAS, B. UÇAR.*Effective heuristics for matchings in hypergraphs*, in "SEA2 2019 - International Symposium on Experimental Algorithms - Special Event", Kalamata, Greece, Springer, 2019, p. 248-264 [*DOI :* 10.1007/978-3-030-34029-2_17], https://hal.inria.fr/hal-02417475

SECRET Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- **Keynote at FSE 2019:** María Naya Plasencia bas been an invited keynote speaker at FSE 2019 in Paris.
- **NIST competition on post-quantum cryptography:** The members of the project-team have submitted 5 candidates to the NIST competition on post-quantum cryptography. After a first selection, three of our candidates have been moved to the second round of the competition, which includes a total of 26 candidates.
- **NIST competition on lightweight cryptography:** The members of the project-team are involved in the design of 3 authenticated encryption schemes submitted to the NIST lightweight competition. These three ciphers are among the 32 candidates which have been move to the second round of the competition.

5.1.1. Awards

- María Naya Plasencia was awarded the Inria - Académie des Sciences prize for young researchers https://www.academie-sciences.fr/fr/Laureats/prix-inria-academie-des-sciences-2019-vincent-hayward-equipe-scikit-learn-et-maria-naya-plasencia.html
- Anne Canteaut has been made doctor honoris causa of the University of Bergen (Norway), October 2019 https://www.uib.no/en/news/129910/ten-new-honorary-doctorates

BEST PAPERS AWARDS :

[31]
L. PERRIN.*Partitions in the S-Box of Streebog and Kuznyechik*, in "IACR Transactions on Symmetric Cryptology", March 2019, vol. 2019, n^{o} 1, p. 302-329 [*DOI :* 10.13154/TOSC.V2019.I1.302-329], https://hal.inria.fr/hal-02396814

[49]
T. DEBRIS-ALAZARD, N. SENDRIER, J.-P. TILLICH.*Wave: A New Family of Trapdoor One-Way Preimage Sampleable Functions Based on Codes*, in "ASIACRYPT 2019 - 25th International Conference on the Theory and Application of Cryptology and Information Security", Kobe, Japan, LNCS, Springer, November 2019, vol. 11921, p. 21-51 [*DOI :* 10.1007/978-3-030-34578-5_2], https://hal.inria.fr/hal-02424057

SEMAGRAMME Project-Team (section vide)

SEQUEL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Organization of the 1st Reinforcement Learning Summer Scool: 2 weeks of lectures, keynotes, and practical sessions fully dedicated to bandits and reinforcement learning. We received about 300 applications from all around the world and selected 110 participants.
- Julien Seznec and Michal Valko have obtained an oral at AI&Stats (2,5% acceptance rate) [32].
- This is the ultimate SEQUEL highlight: after 12 years, following Inria's policy, SEQUEL comes to an end. We have designed a new team-project which will be named SCOOL.

5.1.1. Awards

BEST PAPERS AWARDS :
[16]
M. ASADI, M. S. TALEBI, H. BOUREL, O.-A. MAILLARD.*Model-Based Reinforcement Learning Exploiting State-Action Equivalence*, in "ACML 2019, Proceedings of Machine Learning Research", Nagoya, Japan, 2019, vol. 101, p. 204 - 219, https://hal.archives-ouvertes.fr/hal-02378887

SERENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Many new results of the ERC GATIPOR project in the ERC GATIPOR Gallery.

SERPICO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The SERPICO team organized the 7th International Conference on “Quantitative BioImaging” (QBI, https://www.quantitativebioimaging.com/qbi2019/) in January 2019 (350 attendees) in Rennes. The Quantitative BioImaging conference encourages scientific communication between researchers with interest in quantitative imaging in biological and biomedical sciences. A particular emphasis is to promote interdisciplinary interactions between physicists, computer scientists, chemists, mathematicians, and biologists.
- Emmanuel Moebel and Sandeep Manandhar defended their PhD theses in 2019.
- The DeepFinder algorithm was ranked first at the international SHREC’19 Challenge: "classification in cryo-electron tomograms" (Eurographics Workshop on 3D Object Retrieval – SHREC - 3D Shape Retrieval Contest (2019), Genova, Italy).

SIERRA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Damien Scieur, Prix de thèse PSL-ADELI
- Francis Bach, Prix Jean-Jacques Moreau

SIMSMART Project-Team (section vide)

SIROCCO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- C. Guillemot has received the 2019 EURASIP Technical Achievement Award.

SISTM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Team structure

The SISTM team was re-structured into three research axes (formerly two) in 2019:

- Axis “High Dimensional Statistical Learning” (coordinator Boris Hejblum)
- Axis “Mechanistic Learning” (coordinator Mélanie Prague)
- Axis “Translational Vaccinology” (coordinator Laura Richert)

  The third research axis on "Translational vaccinology" was created in order to formalize research activities already performed previously in a less structure way. This axis is dedicated to applied research questions in early stage clinical vaccine trials, with two objectives:

  – to elucidate the potential effects and mechanisms of action of vaccines and immunotherapies in integrative statistical analyses of the induced responses at various levels of the immune system

  – to better inform future trial designs and statistical analysis methods by means of modelling and methodological developments.

The three axes collaborate closely with each other.

In fact, the third axis gives the motivating examples leading to the methodological work done in the two other axes. The first axis deals with the raw high-dimensional data generated in clinical epidemiology or biological studies and aims at reducing the dimension of the problem or better annotate the data available (e.g. automatic gating of cytometry data). The second axis aims at building mechanistic model to understand and predict the biological phenomenons by using the available information. The idea then is that the results of this modelling part feed the third axis to define the next strategies to be evaluated in clinical studies and the design of these studies.

5.1.2. Team composition

The SISTM team core has changed in December 2019: Daniel Commenges, DRE Inserm, HDR (emeritus from September 2014) has retired from research activities. Daniel Commenges founded the “Biostatistic” team of Bordeaux within an Inserm unit in the 1990s. The research team was officially labelled by Inserm in the early 2000s and was lead by Daniel Commenges until 2013. The team split in 2014 into two teams: the Inserm “Biostatistic” team (led by Hélène Jacqmin-Gadda), and the “SISTM” team (led by Rodolphe Thiébaut) that joined the Inria BSO center.

5.1.3. Funded projects

- Launch of the Graduate’s School Digital Public Health (PI: R Thiébaut) including the Master of Public Health Data Sciences that started with its first cohort of 9 international students in Sep 2019.
- Positive response for funding of the H2020 IP-Cure-B project (Immune profiling to guide host-directed interventions to cure hepatitis B infections, project coordinator: Pr. F. Zoulim, Inserm U1052 CRCL), in which the work package “Data Science” is led by the SISTM team. The project will be launched in January 2020.
- Kick-off of the EDTCP-2 funded project PREVAC-UP (partnership for research on Ebola vaccinations – extended follow-up and clinical research capacity build-up, project coordinator: Pr Y. Yazdanpanah, Inserm), in which the work package “Systems vaccinology” is led by the SISTM team.

- A new collaboration has started with the pharmaceutical company Ipsen on the integration of "omics" data into in-silico modelling of early-stage clinical trials in cancer. This project will be conducted with a "*CIFRE*" (*Conventions Industrielles de Formation par la REcherche*) PhD contract starting in January 2020.
- *Action de Développement technologique* VASI: Visualization and Analytics Solution for Immunologists.
- The Ebovac2 IMI project on Ebola vaccine development has been extended to 11/2020 (no cost extension).
- Associate Team DYNAMHIC: Dynamical Modeling of HIV Cure in Collaboration With Harvard Program for evolutionary dynamics.

5.1.4. Advancements in projects

- A translational phase I clinical trial of an experimental placental malaria vaccine, conducted by an interdisciplinary consortium including members of the SISTM team (Primalvac trial), has reached its publication, with a manuscript accepted for publication in the Lancet Infectious Diseases
- Two HIV clinical vaccine trials have reached their final stage with all resultats available, including integrative data analyses of the immune responses, and the corresponding manuscripts are in preparation (ANRS VRI01 trial and ANRS 149 Light trial).
- The two phase II Ebola vaccine trials conducted by the IMI-2 EBOVAC2 consortium that is coordinated by Rodolphe Thiébaut are terminated. Results have been presented at international conferences and the manuscripts with the primary results are either submitted (EBL2001 study, submitted to the Lancet) or in preparation (EBL2002 study). Systems vaccinology analyses of the data from these trials are ongoing in the SISTM team.
- Robin Genuer co-authored a book with Jean-Michel Poggi on random forests entitled *Les forêts aléatoires avec R* in *Presses Universitaires de Rennes*, Rennes, France.

5.1.5. Awards

- Award for Doctoral Supervision and Research Activity (PEDR) attributed by the University of Bordeaux to Marta Avalos and Robin Genuer

SOCRATE Project-Team (section vide)

SPADES Project-Team (section vide)

SPECFUN Project-Team (section vide)

SPHINX Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Four members of the team are involved in the scientific project ODISSE funded by the ANR (october 2019-october 2023). The goal of this project, which gathers researchers from communities of automatic control and applied mathematics, is to investigate inverse problems using observer techniques.

SPIRALS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

In 2019, Christophe Gourdin and Philippe Merle have created the XScalibur company. XScalibur is a startup company that sells an innovative software solution to design, deploy and monitor software systems in a multi-cloud environment. The company is the result of a transfert activity initiated by Philippe Merle and Christophe Gourdin around the OCCIware Studio software tool suite. This model-driven based solution for cloud management is the result of several years of research [26], [15] and has especially been developed in the context of the OCCIware collaborative project from 2014 to 2017. XScalibur has been selected in March 2019 by the Alliancy magazine in the top-13 of startup companies in the domain of cloud computing to "follow closely"[0].

In 2019, Laurence Duchien has been general chair of the 13th edition of the European Conference on Software Architecture (ECSA) [49], [48] and program co-chair of the 23rd edition of the International Systems and Software Product Line Conference (SPLC) [47], [46]. These two events have been co-located in Paris from 9 to 13 September 2019. The fact that a member of the Spirals project-team was proposed by the software architecture research community to serve in these two major events is a testimony of the recognition and of the visibility of our research activities in this domain.

5.1.1. Awards

Walter Rudametkin and Pierre Laperdrix were awarded in January 2019 the *Prix Inria CNIL protection de la vie privée*. The award was announced during the 12th edition of the International Computers, Privacy and Data Protection (CPDP) conference, and rewards research undertaken with a view to creating a trustworthy digital society. The award was granted thanks to the work of Walter Rudametkin, Pierre Laperdrix, and Benoit Baudry [63] on browser fingerprinting.

Thomas Durieux was awarded in June 2019 a honorable mention (*accessit*) at *Prix de thèse GDR GPL* for his PhD work on software automated repair that was defended in September 2018 [55]. GDR GPL (*Génie de la Programmation et du Logiciel*) is the group that gathers the French research community on software engineering and programming languages. This is the third time that a PhD student from the Spirals project-team wins either this prize or an honorable mention (Clément Quinton won the prize in 2014, and Maria Gomez won a honorable mention in 2017).

Lakhdar Meftah and Romain Rouvoy won a Best Paper award at the 19th International Conference on Distributed Applications and Interoperable Systems (DAIS 2019) [37]. This award distinguishes their work on improving user privacy in crowdsourced mobile datasets. They propose a decentralized approach, named Fougere, to convey data samples from user devices to third-party servers. By introducing an a priori data anonymization process, they show that Fougere defeats state-of-the-art location-based privacy attacks with little impact on the quality of crowd-sourced datasets. This work takes place in the context of the Inria Project Lab BetterNet and involves Isabelle Chrisment, who is heading the BetterNet IPL, and who is co-supervising with Romain Rouvoy the PhD thesis of Lakhdar Meftah [13] that was defended in December 2019.

Philippe Merle won a Best Demo Paper award at the 5th IEEE International Conference on Network Softwarization (NetSoft 2019) [39]. This award distinguishes his work on the formal verification of virtualized network and cloud environments. Philippe Merle and his co-authors demonstrate a lightweight toolchain for validating descriptors of network functions compliant with the latest ETSI NFV standards, visualizing these descriptors in the form of various diagrams (i.e. network-oriented, function-oriented, and UML2-based), analyzing these descriptors formally with Alloy Analyzer, and deploying these virtualized network functions

[0] https://www.alliancy.fr/a-laffiche/cloud/2019/03/13/13-start-up-du-cloud-a-suivre-de-pres

on OpenStack. This work takes place in the context of a funded project that ended in 2019 with the Orange telecom operator and that involved, in addition to Philippe Merle, Jean-Bernard Stefani from the Inria Grenoble - Rhône-Alpes research center.

Laurence Duchien was awarded the rank of Chevalière de l'Ordre National du Mérite (JO du 29 mai 2019).
BEST PAPERS AWARDS :
[37]
L. MEFTAH, R. ROUVOY, I. CHRISMENT.*FOUGERE: User-Centric Location Privacy in Mobile Crowdsourcing Apps*, in "19th IFIP International Conference on Distributed Applications and Interoperable Systems (DAIS)", Kongens Lyngby, Denmark, J. PEREIRA, L. RICCI (editors), Distributed Applications and Interoperable Systems, Springer International Publishing, 2019, vol. LNCS-11534, p. 116-132 [*DOI :* 10.1007/978-3-030-22496-7_8], https://hal.inria.fr/hal-02121311

[39]
P. MERLE, A. NDEYE SYLLA, M. OUZZIF, F. KLAMM, K. GUILLOUARD.*A Lightweight Toolchain to Validate, Visualize, Analyze, and Deploy ETSI NFV Topologies*, in "NetSoft 2019 - The 5th IEEE International Conference on Network Softwarization", Paris, France, June 2019 [*DOI :* 10.1109/NETSOFT.2019.8806632], https://hal.archives-ouvertes.fr/hal-02124164

STACK Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Regarding scientific results, the team has produced a number of outstanding results on the management of resources and data in large-scale infrastructures, notably on how speeding up VM and Docker boot time by reducing the I/O operations [16], on how to place container images across edge servers in such a way that an image can be retrieved from any edge server fast and in a predictable time [14], and how the placement challenge of data and computations accross multiple sites can be addressed by using Constraint Programming techniques in a general manner [22].

We also deliver two other important contributions. In the first one, we propose an efficient graph partitioning method named Geo-Cut, which takes both the cost and performance objectives into consideration for large graph processing in geo-distributed DCs [8]. In the second one, we propose a model and a first implementation of a simulator to compare the energy footprint of different cloud architectures (single sites vs fully decentrlaized) [3].

On the software side, the team has pursued its efforts on the development of the EnosLib library and the resulting artifacts to help researchers perform experiment campaigns: https://discovery.gitlabpages.inria.fr/enoslib/theyuseit.html. We would like also to point it out the development of the field of dynamic reconfiguration of distributed software systems, in particular through the Concerto and Mad softwares: http://helene-coullon.fr/verdi/page/software/

On the platform side, the deployment of the SeDuCe testbed that allows researchers to investigate energy concerns in data-centers thanks to a numerous of energy sensors deployed across the dedicated facility is now fully operational: https://seduce.fr. Moreover, the team is still strongly involved in the different actions that aim to setup the SILECS platform.

5.1.1. Awards

In 2019, the team has received two individual award:

- **Outstanding Leadership Award** Shadi Ibrahim received an outstanding leadership award as program chair of the SmartData-2019 (http://cse.stfx.ca/~cybermatics/2019/smartdata/).
- **Best Tech Pitch** Hélène Coullon received the best tech pitch award at the IMT 5G event from a jury composed of both academic experts in 5G and experts from the Qualcomm company. Moreover, a grant has been awarded by France Brevet to Hélène Coullon to push further her efforts on Fog and Edge computing.

We would like also to highlight two other elements that underline the visibility and recognition of the team nationally and internationally. First, Thomas Ledoux became head of the teaching chair "ArchOps : architecture, déploiement et administration des infrastructures IT agiles" supported by Bodet Software. The ArchOps chair aims to develop skills in the design of distributed software architectures for engineering students at IMT Atlantique. Second, Shadi Ibrahim and Hélène Coullon, two members of the team, act as program track chairs of 20th IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid 2020), a major conference in the area of distributed systems.

STAMP Project-Team (section vide)

Stars Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. People detection

People detection is a very challenging topic, where many top-level research groups are competing and have already proposed impressive approaches (e.g. Faster-RCNN, SSD, YOLO). Yet, we were able to design a novel algorithm able to better balance the speed and accuracy trade-off on the most challenging pedestrian detection benchmarks (e.g. Caltech and Citypersons).

4.1.2. Person Re-Identification

Person Re-Identification is a very challenging task, where current Computer Vision algorithms manage to obtain better results than humans. By proposing a simple and elegant technique, based on Spatial-Channel Partitions, we have obtained the best performance compared to the State-of-the-art approaches on the most popular benchmark datasets (e.g. Market-1501, CUHK03 and MARS).

4.1.3. Action recognition

This year, we have proposed several action recognition approaches able to outperform the State-of-the-art algorithms and get nearly maximal performance on most of ADL benchmark video datasets (e.g. Northwestern-UCLA Multiview Action 3D, NTUTU-RGB and DAHLIA). We have also released a novel ADL benchmark video dataset, which is more challenging, as it has been collected within real-world settings.

4.1.4. Awards

Antitza Dantcheva and Abhijit Das recceived a Best Poster Award at the 14th IEEE International Conference on Automatic Face and Gesture Recognition (FG 2019) in Lille, France (the flagship face analysis conference) for the paper: “Robust remote heart rate estimation from face utilizing spatial-temporal attention” [28].

STEEP Project-Team (section vide)

STORM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- 1st year for the CoHPC team in collaboration with the Lawrence Berkeley National Lab. (9.4.1.1). A PhD student of the team obtained a joint postdoc with InriaSiliconValley at this lab to initiate the collaboration.

SUMO Project-Team

5. Highlights of the Year

5.1. Changes in 2019

SUMO was evaluated in spring 2019, and we took this opportunity to make several changes. First, we adapted the research axes of the team in our scientific foundations to reflect a slight topic drift over the last four years, which is also a consequence of modifications in the team composition. In particular, we now put emphasis on one emergent topic, namely population models. Last but not least, Éric Fabre stepped down as project-team leader and Nathalie Bertrand replaces him since April 2019.

TADAAM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Guillaume PALLEZ was an invited speaker at the Royal Society https://royalsociety.org/science-events-and-lectures/2019/04/high-performance-computing/
- Brice GOGLIN is co-chair of the Architecture & Networks area of the SuperComputing 2020 conference.
- François PELLEGRINI has been re-appointed a member of the French *Commission Nationale de l'Informatique et des Libertés* (French data protection authority) by the President of the French Senate.

5.1.1. Awards

- Guillaume PALLEZ was one of the recipient of the IEEE Computer Society TCHPC Early Career Researchers Award for Excellence in High Performance Computing
- François PELLEGRINI was bestowed *Chevalier dans l'Ordre des Palmes Académiques* (Order of Academic Palms), promotion of July 2019.

TAMIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Kick-off of the ANR JCJC AHMA project

The ANR JCJC project lead by Annelie Heuser was kicked-off, and a PostDoc (Matthieu Mastio) and PhD (Duy Phuc Pham) have been hired. The team already created a first platform for automated hardware malware analysis. See below and in the following.

4.1.2. New results in the TeamPlay H2020 project, coordinator

The project is coordinated by Olivier Zendra. The TeamPlay H2020 project had a successful mid-term review in October 2019, where the reviewers stressed the quality of the overall work. We TAMIS also achieved new results on security modelling in this TeamPlay project in 2019 (see in the following).

4.1.3. New software and platforms

In 2019, we continued the development of several software and platforms (hardware and software), and build up four new ones:

- E-PAC, an Evolving Packer Classifier,
- The SABR (Semantic-driven Analysis of BinaRies) platform
- Orqal, an efficient schedueler for docker images.
- A Side-channel deep learning evaluation platform,
- The AHMA (IoT malware classification through side-channel information) platform and tools.

TAU Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Best Paper Award in Machine Learning at ECML-PKDD 2019 in Wurzburg to Guillaume Doquet and Michèle Sebag for their paper *Agnostic feature selection* . See Guillaume's PhD [13] for more details.
- Nacim Belkhir, Winner ACM-GECCO 2019 **BBComp single-objective**, **BBComp two-objective** and **three-objective** tracks. The winning program is a slighly modified version of the one Nacim wrote during his PhD in TAU in 2017 [71], co-supervised by Marc Schoenauer, Johann Dréo and Pierre Savéant (Thalès TRT).

5.1.2. Visibility

- Marc Schoenauer, expert seconding Guillaume Klossa, special advisor to European Vice-President Ansip, for the report *Toward European Media Sovereignty* giving strategic advice on the opportunities and challenges related to the use artificial intelligence, with a focus on the media sector.

BEST PAPERS AWARDS :

[32]
G. F. DOQUET, M. SEBAG.*Agnostic feature selection*, in "ECML PKDD 2019 - European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases", Würzburg, Germany, September 2019, https://hal.archives-ouvertes.fr/hal-02436824

TEA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Loïc Besnard was promoted to the rank of Senior Engineer Exceptional Class by CNRS, acknowledging his remarkable career of research engineer as principal developer of Signal and Polychrony, as project manager and integrator with project teams EPATR (Signal), ESPRESSO (Polychrony), TEA (ADFG) and PACAP (Heptane).

THOTH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cordelia Schmid received the Royal Society Milner Award, 2019.
- Julien Mairal received the test-of-time award at the International Conference on Machine Learning (ICML), 2019.
- The paper [21] authored by Roman Klokov, Jakob Verbeek, Edmond Boyer [Inria Morpheo] won the "Best Science Paper Award Honourable Mention" at BMVC 2019.
- Jakob Verbeek was awarded as an outstanding reviewer at ICLR 2019.
- Adria Ruiz Ovejero was awarded as an outstanding reviewer at ICCV 2019.

5.1.2. Dissemination

- The team co-organized PAISS 2019, an international AI summer school in Paris. This is the second edition of the school that was first organized in Grenoble in 2018. The 2019 edition brought together over 200 participants. We also provided scholarships to 21 students to encourage diversity among the attendees.

TITANE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Pierre Alliez was program co-chair of the EUROGRAPHICS 2019 conference and of the Symposium on Solid and Physical Modeling (SPM). From February 2019 Yuliya Tarabalka is on leave to the Luxcarta company for two years.

5.1.1. Awards

Cédric Portaneri and Pierre Alliez obtained a best paper award at the ACM Conference on Multimedia Systems for a contribution to the progressive compression of textured meshes, in collaboration with the Draco team from Google. Jean-Philippe Bauchet obtained an award for the best presentation at a national workshop (GMTG 2019). Jean-Dominique Favreau received the best PhD thesis award 2019 (assessit prize) from IG-RV. Onur Tasar was part of the winning team of the tomtom AI summer school challenge organized in the Netherlands.

TOCCATA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Martin Clochard has been awarded the GDR GPL 2018 prize (http://gdr-gpl.cnrs.fr/node/361) for his thesis entitled "Methods and tools for specification and proof of difficult properties of sequential programs" carried out at LRI, under the scientific supervision of Claude Marché and Andrei Paskevich. [57] [43]

  Martin Clochard is currently a postdoc at ETH Zurich.

- Jean-Christophe Filliâtre receives the 2019 CAV Award, jointly with Rustan Leino (Amazon Web Services), for the design and development of reusable intermediate verification languages which significantly simplified and accelerated the building of automated deductive verifiers. Jean-Christophe is the initial designer of the Why environment for automated deductive verification, and a leading developer of its successor Why3.

  The CAV award is given anually at the CAV conference for fundamental contributions to the field of Computer-Aided Verification. http://cavconference.org/cav-award

- Claude Marché received the FIEEC CARNOT 2019 prize for applied research for his collaboration with AdaCore. The award recognizes his collaboration with AdaCore, a computer assisted proof verification company, for applications in the development of critical software for safety and security in the aeronautics, space, air traffic control and rail transportation industries, autonomous vehicles, finance or medical devices. https://www.instituts-carnot.eu/fr/actualite/prix-fieec-carnot-de-la-recherche-appliquee-trois-chercheurs-recompenses-pour-leurs-partenariats-retd-avec-les-pme

TONUS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Low Mach relaxation scheme
We designed a new relaxation scheme [16]-[18] for the Euler/shallow water equations in the low Mach regime. The scheme admits an uniform convergence and a close to uniform cost compare to the Mach number. Additionally the implicit part (the most complicated classically) is reduced at the maximum. This method is a good candidate for the MHD in Tokamak and the extension of the method for this problem is an ongoing work.

TOSCA Team (section vide)

TRIBE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Together with his co-authors, Aline Carneiro Viana was awarded: (1) the **best poster award** at the main conference on the scientific analysis of mobile phone datasets (NetMob) in Oxford, UK, Jul. 2019, for the poster on **Complete Trajectory Reconstruction from Sparse Mobile Phone Data** (collaboration with G. Chen, M. Fiore, and C. Sarraute); (2) the **top-six best paper award** at the 27th International Conference on Advances in Geographic Information Systems 2019 (ACM SIGSPATIAL), in Chicago, USA, Nov. 2019, for the paper on **Deciphering Predictability Limits in Human Mobility**.

4.1.2. RIOT Summit 2019

We successfully organized in September 2019 the fourth RIOT Summit, in Helsinki. The RIOT Summit 2019 gathered ∼100 enthusiastic industrial participants, makers and academics involved in RIOT. Highlights included a keynote from IoT expert and former IETF general chair Jari Arkko (Ericsson Research), and a new car-sharing product using RIOT announced by Continental (and now deployed on thousands of vehicles). Aside of big companies and academics, a number of SMEs and startups from various places in Europe gave talks on aspects of IoT communication, use cases IoT hardware, IoT open source community aspects and concepts for future IoT software and networks, as well as hands-on sessions and tutorials. See: http://summit.riot-os.org.

4.1.3. Associated team - EMBRACE

2019 was the third and last year of the EMBRACE Associated team. The EMBRACE (lEveraging huMan Behavior for Resource AlloCation and services orchestration modEls) team was composed by members of the INFINE and by three Brazilian teams from three different Brazilian Universities. The EMBRACE project addressed the topic of designing efficient solutions for 5G networks taking into account human behavior, uncertainty, and heterogeneity of networking resources. A proposal requesting the extension of the project was submitted in Nov. 2019.

More information is available here: https://team.inria.fr/embrace/.

4.1.4. IETF Hackathons

Concerning Internet Standardization, we contributed to all three IETF Hackathons in 2019. In particular, Oumaima Attia and Cedric Adjih were some major contributors (with many others including Vincent Roca, EPI Privatics) in the NWCRG Hackathon which allowed to release in first prototype of SWIF-codec, a sliding-window forward-error correction codec, see: **https://github.com/irtf-nwcrg/swif-codec**. Cedric Adjih is also a major contributor to the LPWAN Hackathon on the SCHC protocol (IPv6 compression for IoT networks), which resulted this year in code at **https://github.com/openschc/openschc**, a working prototype of the protocol.

TRIPOP Project-Team (section vide)

TROPICAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Notable article

The results of the article [45], providing an unexpected counter example to the "continuous analogue of the Hirsch conjecture", showing that log-barrier interior point methods are not strongly polynomial, have been discussed by Jesus De Loera in his survey of recent advances on Linear Programming, "Algebraic and Topological Tools in Linear Optimization", Notices de l'AMS (volume 66, number 7, 2019, especially pp. 1028-1032.

5.1.2. Awards

Maxime Grangereau (PhD student) has been laureate of the programme "Siebel Scholar 2020", https://twitter.com/polytechnique/status/1177111371835695104

TYREX Project-Team (section vide)

VALDA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Leonid Libkin, formerly Professor at the University of Edinburgh, was recruited as a senior member of the group in 2019, first (from September to November 2019), with a *Chaire d'Excellence* from FSMP (Fédération des Sciences Mathématiques de Paris), and then as a Professor at ENS.

5.1.1. Awards

Mikaël Monet received the 2019 PhD award of the French database community (BDA) for his PhD prepared within Valda and defended in 2018.

VALSE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- This year Valse published 6 papers in Automatica and 4 in IEEE Transaction on Automatic Control (the top journals in the domain of control theory).
- A. Polyakov wrote a book Generalized Homogeneity in Systems and Control.

VERIDIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Christoph Weidenbach received the Skolem test-of-time award of CADE, the international conference on automated deduction, for his paper *Towards an Automated Analysis of Security Protocols* [72].

Martin Bromberger, Mathias Fleury, Simon Schwarz and Christoph Weidenbach received the best student paper award at CADE 27 for their paper *SPASS-SATT: A CDCL(LA) Solver* .

BEST PAPERS AWARDS :

[31]

M. BROMBERGER, M. FLEURY, S. SCHWARZ, C. WEIDENBACH.*SPASS-SATT: A CDCL(LA) Solver*, in "27th International Conference on Automated Deduction (CADE-27)", Natal, Brazil, P. FONTAINE (editor), Lecture Notes in Computer Science, 2019, vol. 11716, p. 111-122 [*DOI :* 10.1007/978-3-030-29436-6_7], https://hal.inria.fr/hal-02405524

WHISPER Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Whisper team published one paper at USENIX ATC, one at ASPLOS, one at EuroSys, one at RTSS, and one at PLDI which are five of the major conferences in the scope of our team:

- Effective Static Analysis of Concurrency Use-After-FreeBugs in Linux Device Drivers. USENIX 2019. [13]
- DCNS: Automated Detection of Conservative Non-SleepDefects in the Linux Kernel. ASPLOS 2019. [14]
- When eXtended Para-Virtualization (XPV) meets NUMA. EuroSys 2019. [15]
- Improving Prediction Accuracy of Memory Interferences for Multicore Platforms, RTSS 2019 [18]
- Usuba: high-throughput and constant-time ciphers, by construction. PLDI 2019. [23]

Julia Lawall was co-PC chair of the ASE 2019 research paper track.

WIDE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Florestan De Moor is the recipient of the “Prix National Jeunes André Blanc-Lapierre 2019” from the SEE society (Société de l’électricité, de l’électronique et des technologies de l’information et de la communication), for his work during his master thesis .

During the SRDS 2019 conference which took place in Lyon, France, from October 1st to 4th, Michel Raynal received an Outstanding Career Award for his contributions to distributed systems and algorithms.

BEST PAPERS AWARDS :

[42]

F. DE MOOR.*A Biclustering Approach to Recommender Systems*, University of Rennes 1, June 2019, p. 1-46, https://hal.inria.fr/hal-02369708

WILLOW Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Four Prairie chairs awarded to I. Laptev, J.-P. Laumond, J. Ponce and J. Sivic by the international selection committee.
- Best Paper Award at FG (Automatic Face and Gesture Recognition - http://fg2019.org/awards/) 2019. (M. Tapaswi)
- Best paper finalist at CVPR 2019 for the work of Z. Li, J. Sedlar, J. Carpentier, I. Laptev, N. Mansard and J. Sivic Estimating 3D Motion and Forces of Person-Object Interactions From Monocular Video, IEEE Conference on Computer Vision and Pattern Recognition (CVPR) (2019) [0]
- Best student paper awarded to H Cisneros, J Sivic, T Mikolov, Evolving Structures in Complex Systems at IEEE Symposium Series on Computational Intelligence (2019)

5.1.2. Visibility

- In 2019 we have recruited two excellent researchers with robotics background: Justin Carpentier and Jean-Paul Laumond, who will strengthen the team and will help developing a new research axis on learning embodied representations.
- J. Ponce co-organized the PRAIRIE AI Summer School, Paris, 2019.
- J. Ponce has been a key person in creating the PRAIRIE Institute for AI research in Paris, innagurated in October 2019.

BEST PAPERS AWARDS :
[11]
H. CISNEROS, J. SIVIC, T. MIKOLOV.*Evolving Structures in Complex Systems*, in "SSCI 2019 - IEEE Symposium Series on Computational Intelligence", Xiamen, China, December 2019, https://arxiv.org/abs/1911.01086 - IEEE Symposium Series on Computational Intelligence 2019 (IEEE SSCI 2019), https://hal.inria.fr/hal-02448134

[0]More details at: https://www.ciirc.cvut.cz/vysledek-ciirc-cvut-se-dostal-do-uzsiho-vyberu-nejlepsich-clanku-prestizni-konference-cvpr-v-pocitacovem-videni/ and the list of all shortlisted papers is available at http://cvpr2019.thecvf.com/files/CVPR%202019%20-%20Welcome%20Slides%20Final.pdf

WIMMICS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

28th International Joint Conference on Artificial Intelligence (IJCAI-2019) Runner-up (second place) for the Application Impact Award for the paper "DISPUTool – A tool for the Argumentative Analysis of Political Debates", for Shohreh Haddadan, Serena Villata and Elena Cabrio [22].

Best Poster Runners-Up at the 34th ACM/SIGAPP Symposium On Applied Computing (SAC 2019), for the paper: Pinar Arslan, Michele Corazza, Elena Cabrio, Serena Villata, *Overwhelmed by negative emotions?: maybe you are being cyber-bullied!* [7].

Hai Huang and Fabien Gandon received the Université Côte d'Azur Research Award.

Fabien Gandon, Andrea Tettamanzi and Serena Villata were nominated Fellow of the 3IA Côte d'Azur.

5.1.1. Awards

BEST PAPERS AWARDS :
[24]
H. HUANG, F. GANDON.*Learning URI Selection Criteria to Improve the Crawling of Linked Open Data*, in "ESWC2019 - 16th Extended Semantic Web Conference", Portoroz, Slovenia, June 2019, https://hal.inria.fr/hal-02073854

[33]
S. REN, S. LETZ, Y. ORLAREY, R. MICHON, D. FOBER, M. BUFFA, E. AMMARI, J. LEBRUN.*FAUST online IDE: dynamically compile and publish FAUST code as WebAudio Plugins*, in "WAC 2019 - 5th Web Audio Conference", Trindheim, Norway, December 2019, https://hal.inria.fr/hal-02366725

XPOP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Version 2.0 of the SPIX software was available in June 2019.

5.1.1. Awards

Geneviève Robin was awarded: “Prix L’Oréal-UNESCO Pour les Femmes et la Science (Jeunes Talents France 2019)”

ZENITH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Antoine Liutkus and Fabian Stoter won the second place at the Global Pytorch Summer Hackaton 2019 organized by FaceBook with the open-unmix software.
- Antoine Liutkus obtained the *Outstanding Reviewer Award* from IEEE.
- Vitor Silva obtained the *best PhD thesis award* from SBBD.

5.1.2. Software

The Pl@ntNet mobile application reached its ten million downloads.