Activity Report 2017

Section Highlights of the Team

ALGORITHMICS, PROGRAMMING, SOFTWARE AND ARCHITECTURE

APPLIED MATHEMATICS, COMPUTATION AND SIMULATION

NETWORKS, SYSTEMS AND SERVICES, DISTRIBUTED COMPUTING

PERCEPTION, COGNITION AND INTERACTION

ANTIQUE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The team obtained several strong results published in excellent international conferences, with high theoretical and applied impact (see detailed results). Among the theoretical results we underline those presented in conferences like Principles of programming languages POPL 2017, with the proposal of a novel and groundbreaking way to improve the precision and scalability of analyses performed with disjunctive abstract domains, using silhouette abstraction.

5.1.1. Awards

Patrick Cousot received the IEEE John Von Neumann Medal.

5. Highlights of the Year

5.1. Highlights of the Year

Our team has hosted for the first time in France the 38th Real-Time Systems Symposium (RTSS'17) which is the flag conference of our research domain. All the members of team jointly participated to the big effort of ensuring an excellent edition.

ARIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

H2020 project Prometheus (on privacy-preserving quantum-resistant cryptographic primitives, coordinated by Benoît Libert and hosted by ENS de Lyon). 4-year project (accepted in August 2017) starting from January 2018.

Publication of the book [48] "Algorithmes Efficaces en Calcul Formel."

J.-M. Muller was elected Fellow member of the IEEE in Jan. 2017.

AROMATH Project-Team (section vide)

CAIRN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Members of CAIRN published six papers accepted at IEEE/ACM Design Automation and Test in Europe for 2017, one of the major events in design automation.

[30] was among the few papers nominated for best paper at IEEE FPL.

<p style="color:red; text-align:center;">**CAMUS Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

A team composed of four CAMUS members (Cédric Bastoul, Vincent Loechner, Harenome Ranaivoarivony-Razanajato and Maxime Schmitt) participated to the Google Hash Code contest. They were ranked 9 during the qualification round, over more than 26000 participants from Europe, Middle-East and Africa, and qualified for the final. They were 34th at the final hosted in the Google Paris office.

CARAMBA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The CARAMBA team organized the "Journées Codage et Cryptographie 2017", whose objective is to regroup the French speaking community working on error-correcting codes and on cryptography. It is affiliated with the "Groupe de travail C2" of the GDR-IM.

CARTE Team

5. Highlights of the Year

5.1. Highlights of the Year

We worked on the computable aspects of an elementary problem in real analysis: extending a continuous function on a larger domain. More precisely, if a real-valued function f is defined on an interval $[0, a)$ (with $0 < a < 1$) and is computable there, under which conditions can it be extended to a computable function on $[0, 1]$? Our results show how the answer depends on a and on the way f converges at a. This provides new characterizations of already existing classes of real numbers previously defined in computability theory. Our work was presented at LICS 2017 [19].

CASCADE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Conferences

- We organised the Eurocrypt '17 annual conference in Paris, from April 30 to May 4.

5.1.2. Awards

- Damien Vergnaud was nominated for a 5 year appointment as Junior Member of the Institut Universitaire de France
- Romain Gay received a Google PhD Fellowship.

CELTIQUE Project-Team (section vide)

CIDRE Project-Team

5. Highlights of the Year

5.1. Highlights

This year, the CIDRE team would like to emphasize the following publications that appeared in major academic venues:

- Formal verification of an information flow monitor, presented at SEFM'17 [11]. See below (5.1.1) for a more complete description of this work.

- Automated quantitative information flow analysis for imperative deterministic programs, presented at POPL'17 [8].

- Reconstruction of connectivity graph for cloud infrastructures, presented at NCA'2017 [17]

- Co-processor-based Behavior Monitoring: Application to the Detection of Attacks Against the SMM, presented at ACSAC'17 [10]

5.1.1. *Awards*

Laurent Georget, Mathieu Jaume (LIP6), Guillaume Piolle, Frédéric Tronel and Valérie Viet Triem Tong received the best paper award at the SEFM'17 conference , which is a well established conference focused on the link between software development and formal methods. This publication is based on the work realized by Laurent Georget during his PhD. It focuses on the automated verification of the correctness of an information flow monitor that operates at the kernel level (Linux kernel). This information flow monitor relies on the Linux Security Module (LSM hereafter) framework. This framework has been designed for mandatory access control. This work tries to answer the question of its correctness when used for information flow monitoring. The verification is operated by a GCC plugin during the compilation phase of a full Linux kernel. Based on an ad-hoc static analysis, it can determine if the LSM hooks are correctly placed with respect to a property of complete mediation of systems calls. Each system call that is known to generate an information flow during its execution (34 system calls on a grand total of 340) is analyzed to determine if the LSM framework through the hooks it provides can intercept each execution that potentially generates an information flow. We have demonstrated that for 4 system calls, the hooks are not well placed, and discovered that 4 systems calls are simply lacking LSM hooks. A patch has been produced to improve this situation.

BEST PAPERS AWARDS :

[11] **15th International Conference on Software Engineering and Formal Methods (SEFM 2017)**. L. GEORGET, M. JAUME, G. PIOLLE, F. TRONEL, V. VIET TRIEM TONG.

COMETE Project-Team (section vide)

CONVECS Project-Team (section vide)

CORSE Project-Team (section vide)

DATASHAPE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Chairs

Jean-Daniel Boissonnat was elected a professor at the Collège de France, on the Chair Informatics and Computational Sciences for the academic year 2016-2017.

DATASPHERE Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Kavé Salamatian has been awarded in 2018 a President's International Fellowship of the Chinese Academy of Sciences.

DEDUCTEAM Project-Team (section vide)

GALLIUM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

In 2017, Jacques-Henri Jourdan received the "prix du GDR GPL" (http://gdr-gpl.cnrs.fr/node/284) for his dissertation, entitled "Verasco: a Formally Verified C Static Analyzer". Jacques-Henri was a Ph.D. student in the Gallium team, advised by Xavier Leroy.

GAMBLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The project-team VEGAS terminated at the end of 2016. Our main highlight is actually the creation of the new project-team GAMBLE (Geometric Algorithms and Models Beyond the Linear and Euclidean realm) on July 1st.

Another highlight of this year is that after two failures, both ANR projects we are coordinating finally won at the ANR lottery with two projects that will start in 2018: ASPAG (ANR-17-CE40-0017) and SoS (ANR-17-CE40-0033).

<p style="text-align:center; color:red; font-weight:bold; font-size:large;">GRACE Project-Team</p>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Presentation at Inria@SiliconValley

D. Augot made a presentation at a one day workshop "Blockchain Technology for Cybersecurity and Social Impact" at Berkeley's CITRIS https://project.inria.fr/siliconvalley/bis2017-day1-conference-blockchain

4.1.2. Workshop on Coding theory and Cryptography (WCC)

D. Augot was co-chair of the Program Commitee of WCC 2017 (St Petersburg, Russia).

4.1.3. NIST Call for post quantum cryptography

In the context of NIST's call for post quantum cryptography:

https://csrc.nist.gov/Projects/Post-Quantum-Cryptography

members of the team participated to two sumbissions:

- A. Couvreur and E. Barelli participated to the submission of **BIG QUAKE** proposal [19]:

  https://bigquake.inria.fr/

- L. De Feo participated to the submission of **SIKE** proposal:

  https://rwc.iacr.org/2018//Slides/Longa.pdf

HYCOMES Project-Team (section vide)

KAIROS Team (section vide)

<p align="center" style="color:red">LFANT Project-Team</p>

4. Highlights of the Year

4.1. Highlights of the Year

Aurel Page has been recruited as a Inria CR in the team.

Damien Robert organised a one-week workshop with the members of the associated team FAST with several African countries.

The book [17] by Henri Cohen on *Modular Forms: A Classical Approach* has been published.

4.1.1. Awards

The paper [] describing Arb in the IEEE Transactions on Computers was selected as the best paper of this journal's Special Issue on Computer Arithmetic.

BEST PAPERS AWARDS :

[] **IEEE Transactions on Computers**. F. JOHANSSON.

MARELLE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Our effort to setup a consortium around the Coq system has made significant progress this year as illustrated by two noticeable events: the first engineer was hired by InriaSoft for this consortium (Maxime Dénès) and the first funding was collected from academic partners (the first is Princeton University).

MEXICO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

See the 'New results' section.

PACAP Project-Team (section vide)

PARKAS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Francesco Zappa Nardelli received the *Most Influential ICFP Paper Award* for 2007 paper "Ott: Effective Tool Support for the Working Semanticist" (http://www.sigplan.org/Awards/ICFP/).

PARSIFAL Project-Team (section vide)

PESTO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The paper [3] is listed in ACM Computing Reviews' 21st Annual Best of Computing list of notable books and articles [0] for 2016.

The voting system Belenios, developed in the Pesto and Caramba teams, has served as a basis of the development of two industrial systems (Docapost and Orange).

A 4-year ANR project on *Protocol Analysis — Combining Existing Tools* (TECAP) has been accepted. It will start in 2018 with Vincent Cheval as project leader.

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[0]http://www.computingreviews.com

<p style="text-align:center">**PI.R2 Project-Team**</p>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Amina Doumane was awarded the The Kleene Award for Best Student Paper at the LICS 2017 conference, for her work on "Constructive Completeness for the Linear-Time mu-Calculus". She also received in January 2018 the prize of the Journal La Recherche for the same paper.

Amina Doumane was awarded the Gilles Kahn 2017 prize for her PhD thesis entitled "On the infinitary proof theory of logics with fixed points" supervised by Alexis Saurin, David Baelde and Pierre-Louis Curien.

Ludovic Patey was awarded the Prix Thiessé de Rosemont / Demassieux 2017 for his PhD thesis "Les mathématiques à rebours de théorèmes de type Ramsey", supervised by Laurent Bienvenu and Hugo Herbelin.
BEST PAPERS AWARDS :
[37] **Conference on Logic in Computer Science 2017**. A. DOUMANE.
[] **On the infinitary proof theory of logics with fixed points**.

POLSYS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Dongming Wang has been elected as a Member of the Academia Europaea.

Elias Tsigaridas was awarded an ANR "Jeune Chercheur Grant". The title of the project is GALOP (Games through the lens of ALgebra and OPptimization)

<p style="text-align:center">**PRIVATICS Project-Team**</p>

4. Highlights of the Year

4.1. An Privacy Risk Analysis of the TES system

The decree of 28 October 2016 authorising the creation of a centralised file of "secure electronic documents" (TES) has raised a certain number of questions and concerns. The main aim put forward by the French government is the fight against identity fraud. However, the text of the decree also authorises certain accesses to the database by officers of the national police, national Gendarmerie and intelligence. Many voices have been raised to highlight the risks that such a centralised file could represent with regard to individual freedom, and particularly the invasion of citizens' privacy. The strengthening of the means to fight fraud (and, more generally, criminality) and the requirement to protect privacy are not necessarily in contradiction. However, in order to be able to reach a decision on the advantages and disadvantages of a management system for electronic documents, it seemed necessary to: (1) Clearly define the desired functionalities and the advantages that can be expected from them, in particular with respect to the current situation and other solutions. (2) Describe the technical solution chosen in a sufficiently precise way to enable its analysis. (3) Rigorously analyse the risks of an invasion of privacy with regard to the expected benefits.

As a contribution to this debate, we have analyzed several architectures and alternative solutions which are described in an Inria Analysis Note [15]. This note received a lot of attention, and was partially covered by several high-audience media.

4.2. A Novel Authentication Scheme based on Implicit Memory

Selecting and remembering secure passwords puts a high cognitive burden on the user, which has adverse effects on usability and security. Authentication schemes based on implicit memory can relieve the user of the burden of actively remembering a secure password. In [8], we propose a new authentication scheme (MooneyAuth) that relies on implicitly remembering the content of previously seen Mooney images. These images are thresholded two-tone images derived from images containing single objects. Our scheme has two phases: In the enrollment phase, a user is presented with Mooney images, their corresponding original images, and labels. This creates an implicit link between the Mooney image and the object in the user's memory that serves as the authentication secret. In the authentication phase, the user has to label a set of Mooney images, a task that gets performed with substantially fewer mistakes if the images have been seen in the enrollment phase. We applied an information-theoretical approach to compute the eligibility of the user, based on which images were labeled correctly. This new dynamic scoring is substantially better than previously proposed static scoring by considering the surprisal of the observed events. We built a prototype and performed three experiments with 230 and 70 participants over the course of 264 and 21 days, respectively. We show that MooneyAuth outperforms current implicit memory-based schemes, and demonstrates a promising new approach for fallback authentication procedures on the Web. This work was published at ISOC NDSS'17, one of top conferences in security and privacy.

<p style="text-align:center;color:red;font-weight:bold;">PROSECCO Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

- We published 20 papers at top-tier conferences such as POPL (2), IEEE S&P (2), ACM CCS (1), IEEE CSF (1), ICFP (1), PETS (1), and IEEE Euro S&P (2).
- Bruno Blanchet published a paper on the applied pi calculus in the prestigious Journal of the ACM.
- The HACL* verified cryptographic library developed in our group was integrated into Mozilla Firefox 57 and is being actively used by hundreds of millions of users around the world.
- We organized the second edition of the IEEE Euro S&P Conference in Paris, which was attended by over 200 security researchers from around the world.

5.1.1. *Awards*

- Karthikeyan Bhargavan, Bruno Blanchet, and Nadim Kobeissi won a Distinguished Paper award at IEEE S&P 2017 .
- Catalin Hritcu was awarded a new DARPA SSITH grant called HOPE with DRAPER Labs.
- Antoine Delignat-Lavaud received an "accessit" for the prix de thèse GDR GPL 2016.

BEST PAPERS AWARDS :

[24] **38th IEEE Symposium on Security and Privacy**. K. BHARGAVAN, B. BLANCHET, N. KOBEISSI.

<h1 style="text-align:center; color:red;">SECRET Project-Team</h1>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. NIST post-quantum cryptography standardisation

The end of this year was the deadline to submit proposals to the NIST competition [0], whose purpose is to standardize quantum-safe public-key primitives. This call concerns all three major cryptographic primitives, namely public-key cryptosytems, key-exchange protocols and digital signature schemes. The most promising techniques today for addressing this issue are code-based cryptography, lattice-based cryptography, mutivariate cryptography, and hash-based cryptography.

We have contributed to three proposals to the NIST call. In two of them, "BIKE" [67] and "Big Quake" [69], our action is central and we also have a marginal participation in another, "Classic McEliece". Those projects are of great importance for us because they are a means to demonstrate our long lasting expertise in code-based cryptography. They are the product of numerous research works, including several PhD theses, on the design, the implementation, and the cryptanalysis of code-based cryptographic primitives. There are 69 projects in that call, which will be evaluated by the NIST and the academic cryptographic community in the next three to five years and whose outcome will certainly influence cryptographic applications for one or several decades.

5.1.2. Quantum symmetric cryptanalysis and collision search

The resistance of symmetric primitives to quantum computers is a topic that has received recently a lot of attention from our community. The ERC starting grant QUASYModo on this subject, awarded to M. Naya-Plasencia, has started in September 2017. We have continued the work started last year obtaining new results, as cryptanalysis of concrete proposals [44], or analysis on attacks considering modular additions (preliminary described in [14]). In particular, we have proposed in [47] a new quantum algorithm for finding collisions. This new algorithm, based on BHT, exploits distinguished points as well as an improved optimization of the parameters, and allows to find for the first time, collisions on n bits with a better time complexity than $2^{n/2}$. Its time and query complexity are of about $2^{2n/5}$, needing $2^{n/5}$ classical memory and a polynomial amount of quantum memory. As collision search is a tool widely used in symmetric cryptanalysis, this algorithm, that also can be applied to multiple preimage search, considerably improves the best known previous attacks when having a relatively small quantum computer available.

5.1.3. Émergences grant on quantum money

André Chailloux was awarded an Émergences grant from the city of Paris for a project on quantum money. This project aims at providing a comprehensive theoretical and experimental study of unforgeable quantum money, one of the most powerful protocols in quantum information science, and historically the first. A quantum money scheme enables a secure transaction between a client, a vendor and a bank via the use of a credit card or banknotes, with maximal security guarantees, unreachable with classical technologies. This application is central in the context of the emerging quantum network infrastructures guaranteeing the long-term security of data and communications against all-powerful adversaries.

Quantum money has been largely considered difficult to bring to the experimental realm, but a demonstration became more accessible recently, thanks to the conception of new practical schemes. The goal of our project will be to perform a theoretical analysis of such schemes, both in the discrete and continuous-variable frameworks, to adapt them to realistic conditions, and to implement them using state-of-the-art photonic quantum technologies. The project, centered around Inria, is interdisciplinary at its core, bringing together young partners with world leading expertise in all aspects of the proposed work, including theoretical and experimental quantum cryptography.

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[0]https://csrc.nist.gov/projects/post-quantum-cryptography/post-quantum-cryptography-standardization

SPADES Project-Team (section vide)

SPECFUN Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Pierre Lairez was awarded the SIAM/AAG (SIAM Activity Group on Algebraic Geometry) Early Career Prize.

SUMO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. *New partnership*

Several members of the team are involved in the joint research team "Softwarization of Everything", part of the joint research lab of Nokia Bell Labs France and Inria. This activity will finance two PhDs in the team, related to the management and control of software-defined networks.

5.1.2. *Awards*

- Engel Lefaucheux received the best young-researcher-paper award ("Prix Jeune Chercheur") at MSR 2017 for his paper titled *Diagnostic et contrôle de la dégradation des systèmes probabilistes* .

- Nicolas Markey was awarded an *Allocation d'Installation Scientifique* (at senior-researcher level) from Rennes Métropole.

BEST PAPERS AWARDS :

[42] **MSR 2017 - Modélisation des Systèmes Réactifs**. N. BERTRAND, S. HADDAD, E. LEFAUCHEUX.

TAMIS Team

5. Highlights of the Year

5.1. Highlights of the Year

"Chaire Analyse de Menaces" (Threat Analysis)

Participants: Axel Legay, Fabrizio Biondi

Creation of the "Chaire Analyse de Menaces" (Threat Analysis), that has been assigned to Fabrizio Biondi.

Thales Air Operations partnership

Participants: Axel Legay, Louis-Marie Traonouez

Creation of a partnership with Thales Air Operations for machine learning algorithms to detect anomalies in ground-to-air communications.

TEA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Inria created a new International Chair and appointed American computer engineer Rajesh Gupta to the part-time position. Gupta is a professor and former chair of the Computer Science and Engineering (CSE) department in the Jacobs School of Engineering at the University of California San Diego. Rajesh Gupta will hold the International Chair for a period of five years. Starting this summer, he will engage with researchers in Inria's research center in Rennes. The position enables him to spend as much as a year spread out over the five years of his appointment.

TOCCATA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

S. Conchon has co-organized POPL'2017 (January, Paris, http://conf.researchr.org/home/POPL-2017).

C. Marché has co-organized the first joint Frama-C/SPARK day (May, Paris, http://frama-c.com/FCSD17.html), in the context of the Open Source Innovation Spring (http://www.open-source-innovation-spring.org/).

S. Boldo and G. Melquiond have published a book: Computer Arithmetic and Formal Proofs, Verifying Floating-point Algorithms with the Coq System [32].

5.1.1. Awards

M. Pereira and R. Rieu-Helft received the "Best student team" award, and J.-C. Filliâtre the "Best overall team" award, at the *VerifyThis@ETAPS2017 verification competition*.

VERIDIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Jasmin Blanchette, Mathias Fleury, and Christoph Weidenbach were invited to submit a short version of their IJCAR 2016 paper "A Verified SAT Solver Framework with Learn, Forget, Restart, and Incrementality" (which had received the Best Paper Award) to the Sister Conference Best Paper Track of IJCAI 2017 [25]. The paper was also invited to a special issue of *Logical Methods in Computer Science*.

The paper "A Formal Proof of the Expressiveness of Deep Learning" [22] by Jasmin Blanchette et al., presented at ITP 2017, has been invited to a special issue of the *Journal of Automated Reasoning*.

The paper "Decidability of the Monadic Shallow Linear First-Order Fragment with Straight Dismatching Constraints" [39] by Andreas Teucke and Christoph Weidenbach presented at CADE 26 has been invited to a special issue of the *Journal of Automated Reasoning*.

Two systems developed in the context of the SMArT project were submitted to the SMT competition SMT-COMP 2017. Redlog won the non-linear real arithmetic (NRA) category, and veriT+Redlog performed nicely on the quantifier-free non-linear real arithmetic (QF_NRA) category.

ACUMES Project-Team (section vide)

APICS Project-Team (section vide)

ASPI Team (section vide)

BIPOP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Gilles Daviet has been awarded the 2017 PhD award of the national GdR IG-RV, http://www.af-rv.fr/blog/2017/07/10/resultats-du-prix-de-these-du-gdr-ig-rv-2017/, for his PhD thesis entitled 'Modèles et algorithmes pour la simulation du contact frottant dans les matériaux complexes, application aux milieux fibreux et granulaires'.

<p align="center" style="color:red">CAGIRE Project-Team</p>

5. Highlights of the Year

5.1. ANR MONACO_2025

The MONACO_2025 proposal has been selected by ANR. In addition to Cagire, the consortium of this project, coordinated by [RM], consists in an academic partner, the institute PPrime of Poitiers, and two industrial partners, PSA and EDF. It is focused on the the development of a CFD methodology for transient, buoyancy-affected turbulent flows, that are crucial for the two industrial partners. This project built up on the long-term collaboration with EDF, and the more recent collaboration with PSA through a master internship and the CIFRE PhD thesis of Saad Jameel.

5.2. First implementation of a turbulence model in AeroSol

In the long-term strategy of the CAGIRE team, the development of agile simulation, a first step towards auto-adaptive RANS/LES methods was made this summer during the internship of Axelle Perraud. This step consisted in the implementation in AeroSol of a first near-wall resolving turbulence model. Before focusing on innovative RANS and hybrid RANS/LES methods developed in CAGIRE, it was chosen to implement the standard, well-established k-ω RANS model, in order to make possible a straightforward validation in comparison with other CFD codes.

CARDAMOM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- CARDAMOM has passed with success its first evaluation in March 2017
- The associated team HAMSTER between CARDAMOM and the Department of Civil engineering of Duke University has been created in January 2017
- The associated team COMMUNES between CARDAMOM and the CWI in the Netherlands has been created in January 2017
- The open-source consortium around the Mmg platform has been created, and Mmg will now be part of the projects managed by Inria Soft

COMMANDS Project-Team

5. Highlights of the Year

5.1. Suboptimal feedback control of PDEs

In [13], J. Garcke (SCAI-Fraunhofer I.) and A. Kröner were able to solve finite time horizon suboptimal feedback control problems for partial differential equations is proposed by solving dynamic programming equations on adaptive sparse grids. The approach is illustrated for the wave equation and an extension to equations of Schrödinger type is discussed. A semi-discrete optimal control problem is introduced and the feedback control is derived from the corresponding value function. A semi-Lagrangian scheme is combined with spatially adaptive sparse grids. An adaptive grid refinement procedure is explored. We present several numerical examples studying the effect the parameters characterizing the sparse grid have on the accuracy of the value function and the optimal trajectory. Problems with dimensions up to eight were solved.

<p align="center" style="color:red">CQFD Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Pierre Del Moral is a Simons foundation CRM Professor, Montréal Math. Research Center 2017

Google scholar classic paper in Probability and Statistics (ten most-cited articles published ten years earlier): Del Moral, P., Doucet A., Jasra A.. *Sequential Monte Carlo Samplers* Journal of the Royal Statistical Society, Series B, vol. 68, no. 3, pp. 411-436 (2006).

DEFI Project-Team (section vide)

DISCO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Silviu-Iulian Niculescu is a 2018 IEEE Control Systems Society Fellow for research on the effects of delays in system dynamics.

DOLPHIN Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Patent with Beckman & Coulter on Intelligent handling of materials: joint selection and configuration optimization of machines (Prof. E-G. Talbi, S. Faramarzi-oghani, M. Bué)

- Best student paper award at conference SEAL'2017

BEST PAPERS AWARDS :

[27] **11th International Conference on Simulated Evolution and Learning (SEAL 2017)**. J. SHI, Q. ZHANG, B. DERBEL, A. LIEFOOGHE, S. VEREL.

ECUADOR Project-Team (section vide)

GAMMA3 Project-Team (section vide)

GECO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

GECO has ended in June 2017, after being evaluated earlier in the year. A new team, including all former members of GECO, has started in July 2017 in the Inria Paris center. Its name is CAGE, for *Control And GEometry*.

GEOSTAT Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Innovation LAB GEOSTAT-I2S based on 3 year contract with I2S company on non convex optimization methods for image processing.

5.1.1. Awards

A. Tamim, PhD Student in Geostat, wins the gold medal of Hubert Curien PhD prize 2017. A. Tamim's PhD title: "Segmentation et classification des images satellitaires : application à la détection des zones d'upwelling côtier marocain et mise en place d'un logiciel de suivi spatiotemporel". See https://www.inria.fr/centre/bordeaux/actualites/prix-de-these-pour-ayoub-tamim.

I4S Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Structual Health Monitoring system developed by Vincent Le Cam and SDEL-CC for lightning detection and localization on electrical lines, has received the VINCI Innovation Award for Western France 2017. https://team.inria.fr/i4s/vinci-2017-innovation-award/

5.1.1. Awards

BEST PAPERS AWARDS :

[29] **SPIE - Thermosense: Thermal Infrared Applications XXXIX**. J. DUMOULIN, A. CRINIÈRE.

[30] **IOMAC - 7th International Operational Modal Analysis Conference**. M. DÖHLER, P. ANDERSEN, L. MEVEL.

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Personnel

- Markus Sinnl joined us in October as Inria researcher.

5.1.2. Awards

- A joint team between Ecole des Mines de St Etienne and INOCS involving N. Absi, D. Cattaruzza, D. Feillet, M. Ogier, F. Semet won the scientific prize of the EURO/ROADEF Challenge 2016 devoted to an Inventory Routing Problem proposed by Air Liquid.

5.1.3. Publications & dissemination

- Martine Labbé was the EURO Plenary Speaker at the Conference of the International Federation of Operational Research Societies (IFORS) in Québec, Canada, July 2017 [42].

IPSO Project-Team (section vide)

MATHERIALS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

E. Cancès was awarded the 2017 Dargelos Prize from the Alumni of Ecole Polytechnique.

MATHRISK Project-Team (section vide)

MCTAO Project-Team (section vide)

<p align="center" style="color:red">MEMPHIS Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Memphis team of Inria and VALOREM are both involved in the european project AeroGust (Aeroelastic gust modelling). One of the task aims to investigate the behaviour of wind turbine blades submitted to gust using incompressible flow model and Octree grids. An other task is to carry on an experimental work on a wind turbine. Interests will be first to have real data and use it to better understand the effects of wind and more precisely of gusts, on wind blades. A second interest is to use experimental data to calibrate our numerical schemes in the high-fidelity CFD code.

The measurement of the wind was considered as the most important data to be obtained from the very start of the project. Indeed, this data will be used as a key input for the numerical simulations. This is needed to represent the wind as it arrives at the wind turbine. Then, wind turbine data collection aims to observe the aero-elastic behaviour of wind blades. So, the measurement of blade deformations will allow to check the structural beam model of the blade and to observe its structural behaviour. To observe the aerodynamic load on the wind blade, the measurement of pressure of air on the blade is of significant interest.

A meteorological mast has so been installed in March 2017 in Brittany (France) to measure wind on-site. In figure 5 can be seen a photograph of the whole mast after its installation. Figure 6 contains a picture focused on the sensors of the met mast which are wind vanes for the direction and anemometers for the velocity.

Figure 5. Photo of the met mast after its installation

For the instrumentation of the wind blade, the setup consists of 4 optical fibres along the blade. Each fibre has 4 sensors (pressure or strain gauges) and also temperature sensors at different lengths in order to calibrate the other sensors with respect to temperature. 10 strain gauges and 6 pressure sensors have so been installed on a wind blade located near the meteorological mast (in a way that in the main wind direction, the met mast and the wind turbine are aligned). In figure 7 , the 2 lines of sensors going along the pressure side and the leading edge of the wind blade can be seen.

Figure 6. Photo of the sensors on the met mast

Figure 7. Photo of the pressure side of the wind blade after instrumentation

Work is now in progress with the experimental data in order to identify different gust conditions in the field and to analyse the effects on the blade deformations. One of the outcomes will be then to compute simulations with our high-fidelity numerical tool developed with VALOREM. This comparison will allow us to calibrate the numerical schemes thanks to real test data.

MEPHYSTO Project-Team (section vide)

MISTIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Veronica Munoz Ramirez supervised by F. Forbes, J. Arbel (MISTIS) and M. Dojat (Grenoble Institute of neuroscience) was granted a PhD grant from the Idex NeuroCoG project. The PhD project is part of a work package, dedicated to Parkinson's Disease (PD), which aims at identifying multidimensional cognitive and neurophysiological biomarkers for early diagnosis, outcome prediction and novel neurorehabilitation methods for de novo PD patients.

- In the context of another Idex project named Grenoble Data Institute, two 2-years multi-disciplinary projects were granted in November 2017 to Mistis in collaboration respectively with Team Necs from Inria and Gipsa-lab (DATASAFE project: understanding Data Accidents for TrAffic SAFEty) and with IPAG and Univ. Paris Sud Orsay (Regression techniques for Massive Mars hyperspectral image analysis from physical model inversion).

MODAL Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. NIPS 2017 workshop

Benjamin Guedj, Pascal Germain (both at Modal) and Francis Bach (SIERRA, Inria Paris) co-organize a NIPS 2017 workshop, called "(Almost) 50 shades of Bayesian learning: PAC-Bayesian trends and insights". A large audience is expected, and the workshop has a series of prestigious international speakers. See the website.

5.1.2. Recruitment of a new researcher

Pascal Germain has been recruited has CR2 in the team, three years after the recruitment of Benjamin Guedj the first CR recruited in the team.

MOKAPLAN Project-Team (section vide)

NACHOS Project-Team (section vide)

NANO-D Project-Team (section vide)

NECS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- M. L. Delle Monache received the prize "France -Berkeley Fund Award" for young researcher awarded by the College de France for her works in collaboration with United States

- P. Frasca published the book "Introduction to averaging dynamics over networks", with F. Fagnani.

- P. Frasca has been selected as a member of the "Comité de Direction du GdR MACS ", term 2019-2023.

- The team organized the international ERC Scale-free Back workshop on "Modelling reduction tools for large-scale complex networks", Grenoble, September 2017

<p style="text-align:center; color:red;">**NON-A Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Maxime Feingesicht won The Creativity Prize of the FR CNRS TTM.
- Gabriele Perozzi won the Best Student Paper Award of the conference EUCASS 2017.
- The IPL COSY has been launched!
- Hafiz Ahmed won a CNRS PhD award by GDR MACS.

BEST PAPERS AWARDS :

[68] **7th European Conference for Aeronautics and Space Science**. G. PEROZZI, D. EFIMOV, J.-M. BIANNIC, L. PLANCKAERT, P. COTON.

POEMS Project-Team

5. Highlights of the Year

5.1. Waves diffracted by Patrick Joly

On the occasion of Patrick Joly's 60th birthday, a conference with about hundred attendees has been organized by Sonia Fliss, Xavier Claeys, Bérangère Delourme and Julien Diaz, from August 28th to August 30th 2017, to acknowledge and celebrate his decisive scientific contributions in the mathematical and numerical analysis of wave propagation.

Below is the list of invited Speakers

- Grégoire Allaire (CMAP, Ecole Polytechnique)
- Jean-David Benamou (Inria Paris)
- Anne-Sophie Bonnet-BenDhia (ENSTA/CNRS/Inria POems)
- Yann Brenier (Centre de Mathématiques Laurent Schwarz)
- Antoine Chaigne (MDW Vienna, Autriche)
- Simon Chandler-Wilde (Univ. Reading, UK)
- Lucas Chesnel (Inria Defi / CMAP Ecole Polytechnique)
- Bernardo Cockburn (Univ. Minnesota, USA)
- Francis Collino (freelance)
- Alexander Comech (Vienna University, Autriche)
- Martin Costabel (IRMAR, Univ. Rennes)
- Bruno Despres (LJLL UPMC)
- Bjorn Engquist (Univ. Texas Austin, USA)
- Martin Gander (Univ. Genève Suisse)
- Marcus Grote (Univ. Bâle Suisse)
- Houssem Haddar (Inria Defi / CMAP Ecole Polytechnique)
- Laurence Halpern (LAGA Univ. Paris 13)
- Thomas Hagstrom (Southern Methodist University Dallas, USA)
- Jan Hesthaven (EPF Lauzanne Suisse)
- Ralf Hiptmair (ETH Zurich Suisse)
- Andreas Kirsch (Karlsruhe Institute of Technology Allemagne)
- Claude Le Bris (CERMICS ENPC)
- Jérome Le Rousseau (LAGA Univ. Paris 13)
- Pierre Louis Lions (College de France)
- Peter Monk (Univ. Delaware)
- Serge Nicaise (Univ. Valenciennes)
- Konstantin Pankrashkin (Univ. Paris 11 Orsay)
- George Papanicolaou (Stanford University USA)
- Jerónimo Rodriguez (Univ. Saint Jacques de Compostelle)
- Chrysoula Tsogka (University of Crete Grèce)
- Ricardo Weder (University of Mexico Mexique)

A short presentation of former PhD students of Patrick Joly has also given an overview of his recent activities:

- Antoine Bensalah (ENSTA/CNRS/Inria Poems)

- Maxence Cassier (University of Utah)

- Juliette Chabassier (Inria Bordeaux, EPI Magique 3D)

- Julien Coatleven (IFP)

- Sebastien Imperiale (Inria Saclay, EPI M3DISIM)

- Elizaveta Vasilevskaya (High School teacher)

5.2. A day for Marc Lenoir

A day entitled *Un Lenoir... ça Marc... donc ça se fête* was organized at ENSTA on June, 23th, and gathered about 60 people. This day was intended to make a festive tribute to Marc Lenoir for his role in what has become the Applied Mathematics Laboratory of ENSTA (including POEMS). Two scientific talks have been given by longtime friends of Marc: Michel Crouzeix (University of Rennes) and Jacques Rappaz (Ecole Polytechnique Fédérale de Lausanne, Switzerland). The other talks, which emphasized the scientific and human qualities of Marc, were given by four former students: Nicolas Salles, Eric Lunéville and Christophe Hazard (all from POEMS) and Nabil Gmati (LAMSIN, Tunis).

QUANTIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Rémi Azouit (supervisor: Pierre Rouchon; co-supervisor: Alain Sarlette) has successfully defended his PhD thesis on October 27th and is now moving as a postdoc to Sherbrooke University. This thesis provides a systematic approach towards model reduction through adiabatic elimination for open quantum systems.

- Joachim Cohen (supervisor: Mazyar Mirrahimi) has successfully defended his PhD thesis on February 2nd. This thesis provides a roadmap for future experiments on autonomous hardware efficient quantum error correction with superconducting circuits.

5.1.1. Awards

- Mazyar Mirrahimi has received the "Inria-Academie des Sciences young researcher award 2017".

- Pierre Rouchon has received the "Grand Prix IMT-Academie ses Sciences 2017".

RANDOPT Team

5. Highlights of the Year

5.1. Highlights of the Year

- A Auger has been (re)-elected member of the ACM-SIGEVO executive board.

RAPSODI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. *Organization of the FVCA8 conference*

The team RAPSODI was deeply involved in the organization of the eighth edition of the conference *Finite Volumes for Complex Application* (FVCA8). The conference was held in Lille on June 2017. The conference was a great success. It gathered about 150 specialists —mostly academics and research engineers from the industry— of the finite volume methods and of their application to real world problems. Claire Chainais-Hillairet headed the organization committee, Clément Cancès was in charge of the publication of the proceedings, Caterina Calgaro and Emmanuel Creusé organized the social events, and all the members of the team were in charge of the reception of the participants.

5.1.2. *From a team to a project team*

The research team RAPSODI was created on August 2015, but its evolution to the project team level was effective on Nov. 1, 2017. This evolution was based on the positive evaluation by several internationally recognized experts of an extended version of our research program.

REALOPT Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Olivier Beaumont was the Track Chair of the Algorithm Track of Super Computing 2017 (November, Denver, USA); "The International Conference for High Performance Computing, Networking, Storage and Analysis" https://sc17.supercomputing.org. SuperComputing is the major international conference on High Performance Computing.

We have contributed to the JULIA mathematical programming ecosystem by providing tools to decompose a mixed integer programming model into blocks. This makes it very convenient to model Benders or Dantzig-Wolfe decomposition using JUMP and to compare different decomposition for a given problem formulation.

Our generic software platform BaPCod is now giving rise to specific branches for classes of applications. The first such release concerns the classic benchmark Vehicle Routing Problem variants that arise in logistics. The methods that are build in the platform emerge from our collaboration with our Brazilian partners of the SAMBA associated team. For their anterior work, our partners have received the 2017 best paper award from the prestigious journal "Mathematical Programming Computation". With the new version that is built under BaPCod, we have managed to solve to optimality many more open instances of classic and very competitive Vehicle Routing Problem with Time Windows [37]. This study has been an opportunity to improve significantly the performance on the generic Branch-Cut-and-Price platform and to highlight the interests of such generic methodologies.

SELECT Project-Team (section vide)

<h1 style="text-align:center; color:red">SEQUEL Project-Team</h1>

5. Highlights of the Year

5.1. Highlights of the Year

- under the supervision of O. Pietquin and J. Mary, F. Strub and collaborators (among which University of Montreal) have introduced the **Guesswhat?!** game to study visually grounded dialogues interleaving vision and natural language. A dataset of 150k human-human dialogues has been collected and is freely available on the Internet. Supervised learning baselines and state-of-the-art reinforcement learning algoritms have been implemented and are available as open-source code. This work resulted in publications in prestigious conferences: as a spotlight at CVPR 2017, an oral at IJCAI 2017, and an other spotlight at NIPS 2017 [51], [29], [30]. Spotlight presentations concern less than 3.5% of submisisons to NIPS, and 5% of submissions to CVPR.

    See https://www.guesswhat.ai

- under the supervision of M. Valko and A. Lazaric, D. Calandriello and collaborators have provided the first breaking quadratic barrier for nonparametric learning. An open source implementation is available on the Internet. The work has been published in prestigious conferences: AI & STATS, ICML and NIPS [26], [28], [27].

SIERRA Project-Team (section vide)

SPHINX Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Sphinx was evaluated in March 2017.
- A new ANR project (QUACO) has been accepted; its coordinator is Thomas Chambrion.

5. Highlights of the Year

5.1. Organisation and Distinctions

- Isabelle Guyon, General Chair, **NIPS 2017** in Los Angleles (8000+ attendees). She also co-organized several workshops (two *See.4C* workshops, *Connecting the dots* at LAL, *AutoML* a ICML, BayLearn, and CiML at NIPS).

- Flora Jay co-organized **JDSE17**, the second edition of the Junior Conference on Data Science and Engineering, Paris-Saclay (September 2017).

- Yann Ollivier coordinated several events in France (workshop, public conferences, initiatives with school teachers, ...) related to **Shannon100**, the celebration of the Claude Shannon's hundredth birthday, a world-wide event. In particular he created a public exhibit that took place from December 2016 to April 2017 in the Musee des Arts et Metiers in Paris, with extremely positive feedback.

- Marc Schoenauer, expert with Cédric Villani for his national mission on the French AI strategy.

- Michèle Sebag, elected at the *Académie Française des Technologies*; ephemeral nominated member of the *Conseil National du Numérique* (Dec. 2017); member of TransAlgo; head of the DataIA Research programme.

- Paola Tubaro organized **RECSNA17**, an international conference on Recent Ethical Challenges in Social Network Analysis with support from Maison des Sciences de l'Homme Paris-Saclay and Institute for Advanced Studies, in partnership with British Sociological Association, Association Française de Sociologie and European Network on Digital Labor.

5.2. Awards and Prizes

- **AS-AC-CMA-ES Winner**, single objective track at **BBComp**, the Black Box Competition for continuous optimization at ACM-GECCO 2017 (July, Berlin). Nacim Belkhir, Johann Dréo, Pierre Savéant and Marc Schoenauer.

- **ASAP** V2 and V3 [23] ranked **first and second** at the **Open Algorithm Selection Challenge 2017** (see the official results – slide 22). François Gonard, Marc Schoenauer, and Michèle Sebag.

BEST PAPERS AWARDS :

[28] **GSI 2017 - 3rd conference on Geometric Science of Information**. Y. OLLIVIER, G. MARCEAU-CARON.

TOSCA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST PAPERS AWARDS :

[] **A simple spiking neuron model based on stochastic STDP**.

TROPICAL Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Performance evaluation of the 17-18-112 call center in Paris

Vianney Bœuf completed his PhD, done in collaboration with Brigade des Sapeurs Pompiers de Paris, on the performance evaluation of the new organization of the Paris emergency call center developed by Préfecture de Police. See Section 7.5.2 .

5.1.2. Maximal upper bounds in Löwner order

A classical theorem of Kadison (1951) shows that the set of real quadratic forms, equipped with the pointwise order, is an antilattice, meaning that two quadratic forms have a least upper bound (or dually, a greatest lower bound) if and only if they are comparable. In [23], Nikolas Stott gave a quantitative version of Kadison theorem, characterizing the set of minimal upper bound as the quotient an indefinite orthogonal group. Applications of these ideas to hybrid systems verification appeared in [16], [30].

5.1.3. Formal proofs in linear programming

Xavier Allamigeon and Ricardo Katz have formalized in the proof assistant Coq several basic results in the theory of convex polyhedra and linear optimization. These include Farkas Lemma, the duality theorem of linear programming, separation from convex hulls, Minkowski Theorem, etc. See [27] and Section 7.3.1 .

ABS Project-Team (section vide)

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

M. Nodet and J. Erhel won the first prize of the second Imaginary Mathematics for Planet Earth competition with their web module entitled "Simulating the melting of ice caps" [26].

E. Arnaud was granted by a CRCT (Congé pour recherches ou conversions thématiques) by the CNU in 2016/2017.

AMIBIO Team (section vide)

<p style="text-align: center; color: red;">**ANGE Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Human resources

A major event in the year was the merging with CLIME which induces the incorporation of several new researchers (1 Researcher, 1 engineer, 2 PhD). CLIME research is naturally complementary to ANGE works insofar as it provides high level tools to improve modelling and numerical results.

Another fact is J. Salomon's arrival as a Senior Researcher.

5.1.2. Scientific activities

There has been major achievements within the team in the framework of dispersive models. An increased research activity is carried out with spanish collaborators (Univ. Sevilla, Córdoba and Málaga) supported by several project call fundings. This lead to a main publication [30]. In the aftermath of N. Aïssiouene's PhD thesis, a new PhD has been hired to go further in the design of robust and efficient numerical algorithms.

As detailed in Section 10.1.1.1 , members of the team were involved in the organisation of a substantial number of scientific events, either in the framework of national initiatives (mainly funded by CNRS) or due to the expertise in the field. Members are is particularly involved in the mathematical community.

5.1.3. Awards

L. Boittin and F. Wahl were granted a SIAM Student Travel Award to attend SIAM GS 2017. F. Wahl also received a Young Researcher Scholarship to attend the 2017 SMAI conference.

ARAMIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Anne Bertrand spent a year half-time within the ARAMIS team, thanks to an Inria-APHP interface contract (i.e., "poste d'accueil"), from november 2016 to november 2017. At the end of this contract, she was appointed as an Assistant Professor of Radiology at Sorbonne University, on september 2017, allowing her to continue working 40% of her time within the ARAMIS team.

- Fabrizio De Vico Fallani was named associate editor of the journal Brain Topography

- Stanley Durrleman was nominated coordinator of the ICM Center of Neuroinformatics, and scientific manager of the ICM iCONICS core-facility on bioinformatics.

- The team has been awarded the projects SEMAPHORE, ATTACK and PredictICD under the "Big Brain Theory" program (ICM)

5.1.1. Awards

- Jeremy Guillon was awarded the best lighting presentation at the international conference on complex networks

ASCLEPIOS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

- Nina Miolane won the second prize of the competition "My thesis in 180 seconds" at the regional level, among 20 PhD students.

- Xavier Pennec was elected Fellow of the MICCAI scientific Society for "pioneering theoretical contributions grounding the field of computational anatomy, shape statistics and medical image computing".

- Sophie Giffard-Roisin won the best electrophysiology paper award at the Functional Imaging and Modelling of the Heart 2017 conference.

- Matthieu Lê receives the SGBM Research Award for his PhD Thesis.

- Nicholas Ayache was named Chevalier de l'Ordre des Palmes Académiques (Order of Academic Palms), promotion of July 2017.

- Nicholas Ayache was elected member of the Académie Nationale de chirurgie (National Academy of Surgery).

BEST PAPERS AWARDS :

[37] **Functional imaging and modelling of the heart 2017**. S. GIFFARD-ROISIN, H. DELINGETTE, T. JACKSON, L. FOVARGUE, J. LEE, A. RINALDI, N. AYACHE, R. RAZAVI, M. SERMESANT.

<p style="text-align:center; color:red; font-weight:bold">ATHENA Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- D. Wassermann has been awarded an ERC Starting Grant from the European Research Council. NEUROLANG is a 5-years project about *Accelerating Neuroscience Research by Unifying Knowledge Representation and Analysis Through a Domain Specific Language.*. Since October, Demian Wassermann moved to Inria Saclay where he joined the PARIETAL project-team.
- B. Belaoucha has received the Best Student Paper Award at PRNI'17 and Medal of excellence from UCA for the paper [28].

BEST PAPERS AWARDS :

[28] **PRNI 2017 - 7th International Workshop on Pattern Recognition in NeuroImaging**. B. BELAOUCHA, T. PAPADOPOULO.

BEAGLE Project-Team

4. Highlights of the Year

4.1. ECAL Conference

In September 2017 Beagle organized the 14th European Conference on Artificial Life in Lyon (https://project.inria.fr/ecal2017/). ECAL is a biannual scientific meeting supported by the International Society for Artificial Life (ISAL). Carole Knibbe was scientific chair of the conference and Guillaume Beslon was local chair. We welcomed 200 researchers from various disciplines (computer science, biology, physics, humanities...) for 5 days of conferences (including 7 keynotes) in the domain of modelling and simulation of life. The scientific program was completed by an amazing social program (vineyard visits, old city visit, wine&cheese, banquet dinner, sport activities...). The proceedings of the conference have been published by MIT Press (http://cognet.mit.edu/journal/ecal2017).

4.1.1. Awards

Guillaume Beslon was awarded the 3rd price at the international innovation academy of the International conference on prevention and infection control. Geneva, Juin 2017. Project presented: ISEE-Resistance, using in silico experimental evolution to sensitize providers on antibiotic resistance [13].

BIGS Project-Team (section vide)

<p style="text-align:center;color:red;font-weight:bold;">BIOCORE Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

- Determining ways of preventing the appearance of virulent pathogenic strains that are capable of infecting resistant plants is crucial to the durability of a resistant trait as a crop protection method. Genetic drift could be used in such a way by eliminating initially rare resistant breaking pathogens, but it is necessary to quantify this drift in the considered/developed plant strains to know if it can be of any help. In this work, we developed a method to disentangle the relative role of genetic drift and selection during within-host pathogen evolution, by the development and identification of the parameters of a Wright-Fisher model, based on time-series of the frequencies of the various pathogen variants [31].

- We have proposed a metabolic model [15] of the diauxic growth of microalgae on different substrates. The model, with 172 metabolic reactions is derived using the Drum approach [2]. This model was successfully validated for a broad variety of cases where algae grow under heterotrophic, autotrophic or mixotrophic conditions, and the transient accumulation of metabolites.

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The article "Bio-inspired computer vision: towards a synergistic approach of artificial and biological vision" (published in Computer Vision and Image Understanding in 2016 [10]) was selected as part of the 21st Annual Best of Computing.

<p style="text-align: center; color: red;">**BONSAI Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

- Bonsai and close partners organized the French conference in bioinformatics, JOBIM, in Lille. More than 350 people attended to the conference.

- In the two last years, more than 2,000 samples of patients suffering leukaemia were analyzed with the Vidjil software developed in Bonsai with our partners. The VidjilNet consortium will be launched on January 1st 2018 within the Inria Foundation.

5.1.1. Awards

Pierre Pericard received the Best Oral Presentation Award from the SFBI for its talk on MATAM at the French bioinformatics conference JOBIM.

BEST PAPERS AWARDS :

[29] **JOBIM 2017 - Journées Ouvertes en Biologie, Informatique et Mathématiques**. P. PERICARD, Y. DUFRESNE, S. BLANQUART, H. TOUZET.

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

A part of CAMIN team is in the process of creating a spin-off: Neurinnov which has been awarded with the i-Lab 2017 prize by the French Minister of Research and Innovation, that encourage the most innovative and promising startups in France.

CAPSID Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Following a collaboration with Emmanuel Levy at the Weizmann Institute, a manuscript on annotating protein quaternary structures using our Kpax software has been published in Nature Methods [16].

CARMEN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. *Awards*

Michał Kania received a Gary and Bill Sanders poster award for his contribution "Prediction of the Exit Site of Ventricular Tachycardia Based on Different ECG Lead Systems" to the Computing in Cardiology meeting in Rennes, September 2017 .

5.1.2. *Inria domain evaluation*

In October the Carmen team participated in the evaluation of the Inria domain Life sciences, theme *Modeling and Control for Life Sciences*, during a 3-day seminar in Paris. The report was very positive about our work in general. The jury, composed of high-profile international scientists, noted especially the development of a bilayer model of the atria [56], [50] [15], the modified monodomain model which can reproduce much of the much more expensive bidomain model [49], and our contributions to electrocardiographic imaging [24], [17], [23], [27].

BEST PAPERS AWARDS :

[25] **Computing in Cardiology**. M. KANIA, Y. COUDIÈRE, H. COCHET, M. HAÏSSAGUERRE, P. JAÏS, M. POTSE.

<div align="center">

CASTOR Project-Team

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5. Highlights of the Year

5.1. Highlights

- Invited presentation at EPS Conference on Plasma Physics, 26 - 30 June 2017 Liu, F., Huijsmans, G.T., Alberto, L., Garofalo, A.M., Solomon, W.M., Nkonga, B., Hoelzl, M., Pamela, S., Becoulet, M., Orain, F. Non-linear MHD simulations of QH-mode and Type I ELMy H-mode DIII-D plasmas and implications for ITER high Q scenarios

- B. Nkonga, Elected member of the managing board, as treasurer, of the European Community on Computational Methods in Applied Sciences (ECCOMAS).

5.1.1. Awards

Jacques Blum has obtained the "Grand Prix de la ville de Nice" for 2017.

COFFEE Project-Team (section vide)

DRACULA Project-Team (section vide)

DYLISS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The team received a best paper award at the conference ICFCA and a best student paper award at the conference LPNMR .

BEST PAPERS AWARDS :

[24] **International Conference on Formal Concept Analysis 2017**. L. BOURNEUF, J. NICOLAS.

[26] **14th International Conference on Logic Programming and Nonmonotonic Reasoning - LPNMR 2017**. C. FRIOUX, T. SCHAUB, S. SCHELLHORN, A. SIEGEL, P. WANKO.

ERABLE Project-Team (section vide)

<p style="text-align:center;color:red;font-weight:bold;">FLUMINANCE Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

First prize of the second Mathematics of Planet Earth international competition. Module "Simulating the melting of ice caps", authors M. Nodet and J. Erhel.

BEST PAPERS AWARDS :

[] **Simulating the melting of ice caps**.

<p align="center" style="color:red">GALEN Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The work on dense registration of faces [22] was selected as demo at the IEEE Conference on Computer Vision and Pattern Recognition.

The work [26] received the best poster award at the BASP workshop 2017.

5.1.2. Others

Emilie Chouzenoux received an ANR JCJC grant, for her project MajIC:Majorization-Minimization algorithms for Image Computing.

Evangelia Zacharaki has defended her 'Habilitation à Diriger des Recherches' [3].

Emilie Chouzenoux has defended her 'Habilitation à Diriger des Recherches' [1].

5. Highlights of the Year

5.1. CAMI

GenScale participated to the international CAMI challenge. CAMI stands for Critical Assessment of Metagenome Interpretation. It is a community-led initiative designed to tackle the problem of recovering the complex information encoded in metagenomes by aiming for an independent, comprehensive and bias-free evaluation of methods. We contributed in the "Assembly" section with the Minia pipeline. Results of this competition, presented in the "Nature Methods" journal [20], highlight the good behaviour of our tool compared to other competitors.

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Three new projects coordinated by IBIS started this year: the IPL COSY, the ADT CoSoft, and the ANR project Maximic (Section 8.2). A paper based on the PhD thesis of Manon Morin was published in *mBio* this year [20]. The techniques used for the analysis of flux data were presented at ISMB/ECCB 2017 and published in a special issue of *Bioinformatics* [17]. Hidde de Jong organized a workshop on growth control in microorganisms, as a side event of the yearly meeting of the special interest group in systems and synthetic biology GDR BioSynSys, in La Grande Motte.

LEMON Team (section vide)

<h2 style="color:red; text-align:center">LIFEWARE Project-Team</h2>

5. Highlights of the Year

5.1. Highlights of the Year

- **Virtual Reality for Bacteria**

  Individual bacteria have been interfaced with a computer to build hybrid bio-digital circuits. Study published in Nature Communications [1].

- **Dynamical stabilization: real-time control allows maintaining cells in unstable configurations.**

  Using real-time control or periodic forcing one can drive cells towards a region of instability and dynamically maintain them there. Study published in Nature Communications [2].

- **Strong Turing Completeness of Continuous CRNs** solving a long standing open problem in CRN theory [8].

5.1.1. Awards

BEST PAPERS AWARDS :

[8] **CMSB 2017 - 15th International Conference on Computational Methods in Systems Biology**. F. FAGES, G. LE GULUDEC, O. BOURNEZ, A. POULY.

<p align="center">**M3DISIM Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

- Promotion of Jean-Marc Allain as a professor at Polytechnique.
- Patent submitted and accepted on heart and vessels modelling with data interaction ([40]).
- Submission of a IHU proposal, of 3 ERC proposals, 1 associated team proposal with UT Southwestern Medical Center Dallas
- Contract of collaboration with UT Southwestern Medical Center Dallas (Profs. G. Greil and T. Hussain)

MAGIQUE-3D Project-Team (section vide)

<div align="center">

MAMBA Project-Team

</div>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Benoît Perthame has been elected member of the Académie des Sciences, in the section "Physique, mécanique, informatique".

4.1.2. Personnel

Marie Doumic has prolonged for one more year her sabbatical at WPI (Vienna, Austria, 2016-2018).

Diane Peurichard has been hired as Chargée de Recherche classe normale in Mamba, beginning in October 2017.

MATHNEURO Team (section vide)

<p style="text-align:center;color:red;">**MIMESIS Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

Prix de thèse 2016 en Génie Biologique et Médical attributed to Rosalie Plantefève for her thesis *Augmented Reality and Numerical Simulation for Resection of Hepatic Tumor*. The award is attributed by three scientific bodies: IEEE EMBS, Société Française de Génie Biologique et Médical, and Alliance pour le Génie Biologique et Médical. In this context, R. Plantefève was invited to submite a paper to the Journal on Innovation and Research in BioMedical Engineering and the manuscript was accepted for publication [17].

Runner up for the best poster award at the IEEE International Symposium on Mixed and Augmented Reality 2017 with the poster *Deformed Reality: Proof of concept and Preliminary Results* [32]. The poster introduced a new paradigm to interactively manipulate objects in a scene in a deformable manner. Using the core principle of augmented reality to estimate a rigid pose over time, the method enables the user to deform the targeted object while it is being rendered with its natural texture, giving the sense of a real-time object editing in the user environment. The results show that the method is capable of opening new ways of not only augmenting the scene but also to interact with it in real by imposing possibly non-linear transformations to selected entities.

The **physics-based image and video editing tool *Calipso* was resumed in *Two-minutes papers* on YouTube.** At the end of 2017, the video has more that 35k views. Calipso is an interactive method for editing images and videos in a physically-coherent manner. The main idea is to perform physics-based manipulations by running a full physics simulation on proxy geometries given by non-rigidly aligned CAD models. Running these simulations allows us to apply new, unseen forces to move or deform selected objects, change physical parameters such as mass or elasticity, or even add entire new objects that interact with the rest of the underlying scene.
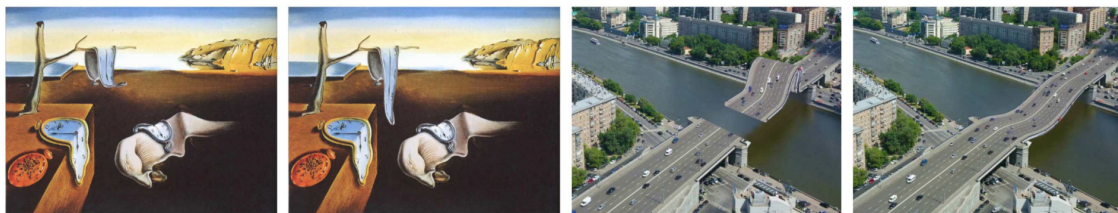
Figure 5. Illustration of Calipso deformed reality on two static images.

<div align="center">

MNEMOSYNE Project-Team

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5. Highlights of the Year

5.1. Highlights of the Year

We published this year an important article [4] gathering 45 co-authors about the ReScience initiative which makes an important contribution that traditional scientific journals cannot offer. It provides a venue for publishing replication work, which traditional journals exclude for lack of novelty. Considering the ever increasing importance of computational methods in all scientific disciplines, we believe that our approach to replication is of interest to a broad audience of researchers.

MONC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The team published in medical journals with strong impact factors like Cancer Research (*Mathematical modeling of tumor-tumor distant interactions supports a systemic anti-proliferative control of tumor growth* by S. Benzekry, *et al* for instance).

A new promising collaboration has started with the group of Yuval Shaked (double ERC laureate) at the Technion Israel Institute of Technology and first joint publication *Dose- and time-dependence of the host-mediated response to paclitaxel therapy: a mathematical modeling approach* by Benguigui *et al* will appear in Oncotarget, 2017.

Sébastien Benzekry received of the title of Assistant Associate Professor in the Department of Medical Biosciences of Iowa State University, reinforcing a starting collaboration with Jonathan Mochel about PK/PD modeling for comparative oncology.

Two former members of the team (Thierry Colin and Vivien Pianet) were hired by Sophia Genetics (http://www.sophiagenetics.com) to build its new imaging department and developed works initiated in Monc.

MORPHEME Project-Team (section vide)

<p style="text-align:center;color:red;font-weight:bold;">MYCENAE Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

- We have completed in [17] our series of studies [8], [12], [6], [2], [4], [3] on the mathematical and numerical analysis of our multiscale model of structured cell populations in terminally developing ovarian follicles.

- We have completed in [19] our series of studies [27], [26], [35], [29], [32] on the mathematical and numerical analysis of our model of GnRH pulse and surge generator.

NEUROSYS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Laurent Bougrain is one of the three members of the committee, with Laurent Koessler and Stéphanie Caharel, that has successfully valued and amplified Neuroscience in Lorraine building a network of research in neuroscience at university of Lorraine. Neuroscience is currently being developed in different laboratories at the university of Lorraine in different institutes such as Inria, CNRS, INSERM, INRA and the university hospital of Nancy. The network will bring together more than 80 researchers in neuroscience to propose common researchers and to give national and international visibilities to neuroscience in Lorraine.

- Neurosys is the leader of the Brain-Computer Interface (BCI) for stroke platform in the Inria Project Lab BCI LIFT (see section 8.2). We developed Grasp'it, an innovative Brain-Computer Interface designed to enhance the motor rehabilitation of stroke patients with Stéphanie Fleck from Perseus lab at university of Lorraine [7], [11], [14]. Our system records users' cerebral activity during the kinesthetic motor imageries (KMI) execution using an electroencephalographic system and gives patients some visual feedback according to the accuracy of the performed imagined task. The graspIT platform was ranked second in the IHM2017 conference demonstrations and first in terms of utility. Grasp'it tends to become a serious game, whose aim is to support the learning and the practice of the KMI tasks in playful and motivating conditions. A French national (ANR) project has been submitted with two other Inria teams (Hybrid and Camin), three rehabilitation centers and an industrial partner, OpenEdge.

NUMED Project-Team (section vide)

<p style="text-align:center">**PARIETAL Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. ERC

Demian Wassermann obtained an ERC starting grant, Neurolang, *Accelerating Neuroscience Research by Unifying Knowledge Representation and Analysis Through a Domain Specific Language*.

Besides, Alexandre Gramfort joined Parietal just after the start of his ERC grant entitled SLAB, *Signal processing and Learning Applied to Brain data*.

PLEIADE Team (section vide)

<p style="text-align: center; color: red;">**REO Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Mikel Landajuela Larma was awarded the 2017 SMAI-GAMNI PhD thesis prize by the French Society of Industrial and Applied Mathematics for his thesis supervised by Miguel Fernández.

SERENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The most important results of the ERC GATIPOR are now centralized in the ERC GATIPOR Gallery.

5.1.1. *Awards*

Laurent Monasse was awarded an ANR JCJC (young researcher) grant.

SERPICO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The Serpico team will be the organizer of the 7th International Conference on "Quantitative BioImaging" (QBI) in January 2019 (300 attendees) in Rennes.

Juan Manual Perez Ru, Vincent Briane and Hoai-Nam Nguyeen defended their PhD thesis in December 2017.

<p align="center" style="color:red">SISTM Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Funding by PIA3 of the Bordeaux Graduate's School in Digital Public Health, headed by Rodolphe Thiébaut. This Master/PhD program is built with the expertise coming from the Inria Sistm project team and in collaboration with several other teams (MONC, CARMEN, PHOENIX).

Successful application of integrative analyses tools on high dimensional immunogenicity data from an Ebola vaccine trial with identification of early correlates of later antibody responses [30]

We published a milestone paper in Biometrics comparing descriptive models (Marginal structural models) and mechanistic models (Ordinary differential equations with mixed effect models on parameters). This is impactful as it shows that mechanistic models can adequately estimate a treatment effect in time-varying confounders settings as it is in observational studies. This opens the perspective of in silico trials based on predictions based on the analysis of available cohorts. [26]

We published a robust and powerful statistical method to analyzed longitudinal RNAseq data, largely outperforming state-of-the-art methods. With the surge in RNAseq data production, e.g. in system vaccinology, this principled methodology has a broad impact in deepening our understanding of underlying molecular mechanisms in various contexts, paving the way for further biological innovation. [16]

5.1.1. *Awards*

The University of Bordeaux Initiative of Excellence (IdEx) and Zellidja travel grants for a research PhD student visit of 3 months to the CSIRO's machine learning Data61 team, Canberra, Australia (Perrine Soret).

5. Highlights of the Year

5.1. Highlights of the Year

The STEEP research team has initiated in 2016 a series of conferences-debates entitled "Understanding & Acting" (« Comprendre et agir ») that examines sustainability issues in order to help researchers and citizens to increase their awareness of the various issues at stake in order to initiate relevant individual and collective actions. The presentations are captured on video and then made directly accessible on the YouTube Channel "Comprendre et Agir". At the end of 2017 the YouTube channel reached almost **45,000 views with a rate of integral viewings remaining at above 25%. This rate is quite important since the YouTube videos of the conferences last between 35 and 45 minutes.**

<div align="center" style="color:red">

TAPDANCE Team

</div>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Tristan Stérin won a best poster award at the conference DNA 23.

5. Highlights of the Year

5.1. Highlights of the Year

We have developed [7] a new numerical method for solving any hyperbolic system of conservation laws (and among them the reduced plasma models). The method is based on a vectorial kinetic representation of the equations, an efficient transport solver (suc as DG or Semi-Lagrangian) and palindromic time integration. The resulting scheme is unconditionally stable, matrix-free and high order. We applied it successfully to the simulation of Rayleigh-Taylor instabilities and we are extending it to the simulation of MHD instabilities.

VIRTUAL PLANTS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- To obtain efficient data-structures from segmented images that can be used for later physical simulations, we developed a computational tool, DRACO-STEM, that interprets cell population images as 3D cell meshes. DRACO-STEM has been released as an independent package to enable biomechanical simulations on real-world data [33].

- *Modeling cell fate decisions during Acsidian embryo development*. Canalization of developmental processes ensures the reproducibility and robustness of embryogenesis within each species. In its extreme form, found in ascidians, early embryonic cell lineages are invariant between embryos within and between species, despite rapid genomic divergence. To resolve this paradox, we used live light-sheet imaging to quantify individual cell behaviors in digitalized embryos and explore the forces that canalize their development. This quantitative approach revealed that individual cell geometries and cell contacts are strongly constrained, and that these constraints are tightly linked to the control of fate specification by local cell inductions. While in vertebrates ligand concentration usually controls cell inductions, we found that this role is fulfilled in ascidians by the area of contacts between signaling and responding cells. We propose that the duality between geometric and genetic control of inductions contributes to the counterintuitive inverse correlation between geometric and genetic variability during embryogenesis [Submitted in Dec 2017].

VISAGES Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Recruitment

- Camille Maumet was recruited as Inria Researcher, starting from November 2017.

XPOP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Eric Moulines was elected at the Académie des Sciences.

The ADT *SPIX* (Analysis of very high-resolution mass spectra) was selected. This project started in November 2017 for a period of one year.

The Math-AmSud project *SaSMoTiDep* (Statistical and Stochastic modeling for time-dependent data) was selected. It begins in January 2018 for a period of two years.

AGORA Team

5. Highlights of the Year

5.1. Highlights of the Year

- Hervé Rivano was appointed as a Full Professor at INSA Lyon, starting from September 2017.
- Oana Iova was appointed as an Associate Professor at INSA Lyon and joined the team, starting from September 2017.

<p style="text-align: center; color: red;">**ALPINES Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards and Recognitions

5.1.1.1. Laura Grigori elected Member of the SIAM Council

January 2018 - December 2020.

ASAP Project-Team

4. Highlights of the Year

4.1. Awards

- Anne-Marie Kermarrec received the Inria/Dassault Systems/Académie des science/ Innovation Award in 2017.

ASCOLA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Remarkable results: research and third-party funding

Regarding scientific results, the team has produced a number of outstanding results on Fog/Edge architectures, notably on how to leverage renewable energy in this context [29], [9], [8], [33]. In the software engineering domain, particularly notable contributions have been made on software adaptability [4], [11].

Concerning third-party funding, 2017 has seen the acceptance of the large industrial/academic Hydda project as well as the start of two individual projects, the Kerdata and ConnectTalent projects, both of which issue of highly-competitive calls.

5.1.2. The future: the Gallinette and Stack teams

After a 10-year adventure, the research path of the Ascola team finishes at the end of 2017 after having given rise to two new teams in 2017: the Gallinette team in April and the Stack team in November. These new teams pursue and diversify Ascola's main research domains, respectively formal methods for programming languages and distributed software systems. Note that because of the rather early split of the Gallinette team, we have not included the corresponding results in this year's Ascola report.

5.1.3. Awards

In 2017 members of the team have been awarded three research-related awards: two personal awards and a best paper award:

- **Programme Jeunes Talents France Chine 2017:**

  Shadi Ibrahim was one of the 12 researchers selected for the "Programme Jeunes Talents France Chine" award (12 out of 54 applicants).

- **ICA3PP-2017 Outstanding Leadership Award:**

  Shadi Ibrahim received an Outstanding Leadership Award as program chair of the ICA3PP-2017.

BEST PAPERS AWARDS :

[27] **The 7th International Conference on Cloud Computing and Services Science (CLOSER 2017)**. J. LEJEUNE, F. ALVARES, T. LEDOUX.

AVALON Project-Team (section vide)

COAST Project-Team (section vide)

COATI Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

David Coudert and Nathann Cohen (LRI) won the Flinders Hamiltonian Cycle Problem (FHCP) Challenge 2016 (http://fhcp.edu.au/fhcpcs).

Guillaume Ducoffe, former PhD student of COATI, is the recipient of an accessit to the PhD prize Graphes "Charles Delorme" 2017 for his PhD thesis entitled "Metric properties of large graphs".

Frédéric Giroire and Joanna Moulierac are recipients of the Wilkes Award 2017 for the paper "Energy Efficient Content Distribution" [1] (The Wilkes Award is given once a year to the authors of the best paper published in the volume of *The Computer Journal* from the previous year).

CTRL-A Project-Team (section vide)

<p style="text-align:center; color:red;">**DANTE Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Official launch of Dylnet:

The aim of DyLNet [0] is to observe and characterise the relations between child socialisation and oral language learning during the preschool period by means of an innovative multidisciplinary approach that combines work in the fields of language acquisition, sociolinguistics and network science.

It is implemented through the 3-year follow-up of all the children and teaching staff (≈ 220) at a socially mixed preschool. The social interactions between individuals are recorded using wireless sensor technology which will record inter-individual proximity data at 5 second intervals. These sensors will be worn for one week every month for a period of 3 years. The children's language development is monitored on the basis of their results in general language tests and the recording of their social use of language in natural interactions, through microphones implemented on the sensors. Finally, the children's social profiles is identified by means of questionnaires sent to their families.

Thanks to the analytical power of the network science, the social interaction data will be matched against the children's linguistic performances and sociolinguistic usage. The task, in particular, will be to examine the influence of the children's social relations on their language development (if individuals stay in the same peer community between two observation times, does the linguistic distance between them falls over the same period?) and, equally, the influence of language on these social relations (if two individuals belong to the same linguistic group at time T, does the probability that they will be in the same peer community increase at time $T + n$?). We shall also examine the interactions between the pupils and the teaching staff – teachers and classroom assistants – in order to observe whether their frequency has an impact on the children's language development. Finally, DyLNet will result in the provision to the scientific community of a database indicating the relations between the recorded interaction frequencies and the language descriptions of a broad school community of children and adults followed up over three years.

Because preschool is the first step in a child's school career, it is necessary to understand how children from different social backgrounds integrate and adapt to it. Oral language plays a key role in this process because it is the mean and result of socialisation at school. Social inequalities are a key factor in this chain since, as of age 2, children from different backgrounds do not exhibit the same level of language skills and do not all use, to the same extent, the linguistic codes that are encouraged at school. These early differences, which are transmitted within the family, have given rise to numerous studies that have revealed the influence of the nature and quantity of the speech addressed to children in different social environments. However, these works tell us little about the influence of peers, which may modulate the impact of the family given that peer groups give rise to a certain social mix. The DyLNet project will bring an important insight to this under-researched issue.

5.1.2. Official launch of the Blaise Pascal Foundation

The foundation Blaise Pascal (hereafter denoted by FBP) has been created on the 14th of November 2016. Its founders are the CNRS and the University of Lyon. The objectives of the foundation are to promote mathematics and computer science and to attract young people to scientific fields like computer science and mathematics. The FBP closely pays attention to gender issues in these scientific domains and to the difficulties for disadvantaged public to embrace scientific careers.

The actions of the FBP focus on: - a support to actors that promote mathematics and computer science via allocated funding based on call of proposals; - a structuring of actors to increase the impacts of their actions, to coordinate the efforts and to share experiences; - a development of innovative experiences via summer camps and clubs of mathematics and computer science.

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[0] https://dylnet.univ-grenoble-alpes.fr/dylnet-project?language=en

The FBP has received an initial funding from the French government and its founders. To maintain its activities in the long term, external funding must be raised. Additional information on the FBP can be found here: http://fondationblaisepascal.strikingly.com.

Isabelle Guérin Lassous is the managing director of the foundation Blaise Pascal.

5.1.3. Books on Dynamic Networks by Márton Karsai

After a book chapter on *Control Strategies of Contagion Processes in Time-varying Networks* in Temporal Network Epidemiology in collaboration with Nicola Perra [57], a full book on *Bursty Human Dynamics* was just released at the end of the year in collaboration with Hang-Hyun Jo and Kimmo Kaski [56].

5.1.4. Public Data Lab and Fake News Field Guide

In February 2017, Tommaso Venturini has founded the Public Data Lab in collaboration with researchers from King's College London, the University of Amsterdam, the Politecnico di Milano, the University of Aalborg and other European research centres.

The PDL (http://publicdatalab.org) a network of young European researchers working on digital data and public interventions. The Public Data Lab seeks to facilitate research, engagement and debate around the future of the data society. We want to develop and disseminate innovative research, teaching, design and participation formats for the creation and use of public data. We work in collaboration with an interdisciplinary network of researchers, practitioners, journalists, civil society groups, designers, developers and public institutions across the world. Our approach is characterized by:

- Intervention around social, political, economic and ecological issues;
- Participation through involving different publics in the co-design of our work;
- Artisanship in advancing the craft of developing data projects and experiences;
- Openness in sharing our research, data and code for all to use.

In 2007, The Public Data Lab has published Field Guide on Fake News (http://fakenews.publicdatalab.org), which exemplifies our empirical approach to public debate inquiry and the way in which we mobilize digital methods in collaboration with stakeholders. The field guide has been selected as one of the project to be showcased during the celebration of the 50 years of the Inria.

More recently the PDL has received a small funding by the OrganiCities programme (http://organicity.eu/open-call/) to "develop a prototype service to support people in experimentation with urban data". In the Save Our Air project we will experiment combining air quality data and discursive inscriptions about urban environment.

5.1.5. Inria 50th anniversary

This year Inria has celebrated its 50th anniversary. In [19] the authors reflect on Inria's evolution through the decades and present its vision for the future.

DATAMOVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Startup Company

Creation of the Ryax company [0] by two former PhD students, Yiannis Georgiou, David Glesser. Ryax Technologies builds software to enable the seamless execution of Big Data and IoT applications upon Hybrid computing infrastructures, distributed across Edge, Fog and Cloud environments. The core software named Ryax is a new generation resource manager.

5.1.2. Best Paper Nominee

Danilo Carastan-Santos, DataMove, Univ ABC, Brazil, was nominated for the Best Paper and Best Student Paper at Supercomputing 2017 for his paper *Obtaining Dynamic Scheduling Policies with Simulation and Machine Learning* [11].

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[0]http://ryax-technologies.com/

DIANA Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Reproducibility'17 workshop

Our team was strongly involved in the Reproducibility'17@SIGCOMM workshop. Damien Saucez served as a co-chair of the workshop. Chadi Barakat and Mohamed Naoufal Mahfoudi participated to the workshop discussions. Mohamed Naoufal also presented our paper Lessons Learned while Trying to Reproduce the OpenRF Experiment [21]. See section 6.3.1 for more details about the workshop results.

4.1.2. R2lab demonstration at SIGCOMM

We have demonstrated the deployment of a standalone 5G network in less than 5 minutes in the R2lab tesbed. All the network components (base station, subscriber management, serving and packet gateways, network trafic analyzers) were run automatically using the nepi-ng experiment orchestration tool. Download and upload performance to the Internet from a commercial phone located in the anechoic chamber was also performed. This demo has been presented at the ACM SIGCOMM conference in August 2017 [33].

4.1.3. MOOC Python 3

Arnaud Legout and Thierry Parmentelat are co-authors of the MOOC: "Python 3 : des fondamentaux aux concepts avancés du langage" that lasts 9 weeks on FUN, UCA. For the first session there were 11677 registered persons. This MOOC is a brand new version of the past MOOC on Python 2, and has been funded by UCA.

DIONYSOS Project-Team

5. Highlights of the Year

5.1. Awards

BEST PAPER AWARD :

[43] **IEEE NCA 2017 - 16th IEEE International Symposium on Network Computing and Applications**.
C. HARDY, E. LE MERRER, B. SERICOLA.

DIVERSE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Publications
    - Learning-Contextual Variability Models, IEEE Software
    - Correctness Attraction: A Study of Stability of Software Behavior Under Runtime Perturbation, Empirical Software Engineering

    item Great positions for members (KTH, Univ Toulouse, Mc Gill, . . .)
- Three new direct collaborations with Industrial partners: Orange, Nokia, Safran
- Great visibility for AmIUnique and several popularization actions
- Kermeta transfer to Obeo

DYOGENE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

B. Blaszczyszyn has just been appointed ENS adjunct professor in September 2017.

<p style="text-align:center;color:red;font-weight:bold;">EVA Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

1. **Pascale Minet**, **Paul Muhlethaler** and Ines Khoufi received the best paper award for their paper "Coded Slotted Avoidance in a Wireless Network: Models and Simulations" at PEMWN 2017.

2. SolSystem selected as one of the 10 testbeds at the IoT Solutions World Congress, Barcelona, Spain, 3-5 October 2017.

3. SmartMesh IP awarded "Internet of Things Product of the Year" at the Annual Creativity in Electronics (ACE) Awards, 6 December 2017. (Note: this is not a personal award)

5.1.2. 6TiSCH Standardization Virtually Completed

Time Synchronized Channel Hopping (TSCH) is a Medium-Access Control (MAC) technique in which nodes synchronize, and a schedule orchestrates all communication in the network. Inria-EVA created the IETF 6TiSCH Working Group in 2013. The goal of 6TiSCH is to get the best of both world by combining TSCH ("industrial" performance) and the ease of use of IPv6 through the IETF upper stack (6LoWPAN, RPL, CoAP). Since the creation of 6TiSCH in October 2013, **Thomas Watteyne** co-chairs the working group, helps drive its technical developments, and coaches authors and authors technical documents. 6TiSCH also encompasses and important security aspect, where we look how to enable nodes to join a network efficiently, which includes mutual authentication between node and network. The 6TiSCH security solution if based on PSK, and relies on AES-128 CCM*.

421 people now follow the 6TiSCH activities through its mailing-list, with a healthy mix of industrial and academic contributors. In 2017, 6TiSCH has produced 2 RFCs, 6 working group document in the process of being published, and various individual submissions. The working group has met 3 times in person during 2017, tens of times through Webex. Inria-EVA co-organized a 6TiSCH interop event (attended by 15 entities) in July 2017. 6TiSCH is now supported by all major open-source implementations (OpenWSN , Contiki , RIOT, TinyOS), and several companies are building commercial product lines with it. 6TiSCH has been playing a real role of catalyst for the academic low-power wireless community, which has now mostly moved towards TSCH/6TiSCH.

5.1.3. Over 1,000 Sensors Deployed on 3 Continents

Inria-EVA uses SmartMesh IP as a low-power wireless building block for building end-to-end solutions. Deploying real networks allows Inria-EVA to do system-level cross-disciplinary research. Inria-EVA oversees over 1,000 sensors deployed on 3 continents:

- http://snowhow.io/. Monitoring the snowmelt process in the California Sierra Nevada. 945 sensors deployed in 21 networks. Collaboration with UC Berkeley Prof. Steven Glaser.

- http://www.savethepeaches.com/. Predicting frost events in peach orchards. 120 sensors deployed in Mendoza, Argentina. Collaboration with local agronomy/networking teams

- http://smartmarina.org/. Monitoring the occupancy and per-boat water/electricity consumption of the 3rd largest marina in Europe (Cap d'Agde, 4300 boats). Inria-EVA is working on turning this activity into a startup company.

FOCUS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Fabrizio Montesi, external collaborator in Focus, has been awarded the "Innovation Award 2017" from his university (University of Southern Denmark), for his work and contributions in the language Jolie.

<div align="center">

FUN Project-Team

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5. Highlights of the Year

5.1. Highlights of the Year

Valeria Loscrí has been elevated to the IEEE Senior Membership degree.

5.1.1. Awards

BEST PAPERS AWARDS :

[26] **2nd IEEE International Congress on Internet of Things, IEEE ICIOT 2017**. P. MERLE, C. GOURDIN, N. MITTON.

GANG Project-Team (section vide)

HIEPACS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We have presented two approaches using a Block Low-Rank (BLR) compression technique to reduce the memory footprint and/or the time-to-solution of the sparse supernodal solver PaStiX. Thanks to this compression technique, we have been able to solve a 1 billion unknown system (a 3D Laplacian matrix $100 \times 100 \times 100.000$) on a single node with 3Tb of memory. The factorization time for this system was less than 6 hours using 96 cores, and the precision achieved at the first solve was 10^{-5}. With 10 additional iterative refinement steps, we reached easily 10^{-8} in double precision. The cost of one solve was limited to 280 seconds. We were able to save 9Tb over the 11Tb that would be requested by the direct solver. The last release of the software (PaStiX 6.0) includes these implementations and the description of the parameters are documented in solverstack/pastix.

2017 has been the last year of the FASTLA associate team that has been for 6 years the framework of fruitful and intense research collaborations with Lawrence Berkeley National Laboratory and Stanford University on data sparse numerical algorithms; the joint research addressed especially fast multipole techniques and low rank calculation in sparse linear algebra. This successful collaboration has been concluded by the participation of E. Ng, head of Applied Mathematics Department at Berkeley, to the two HDR juries of A. Guermouche andP. Ramet that have been defended on the same day, November 27th.

INDES Project-Team (section vide)

INFINE Project-Team

4. Highlights of the Year

4.1. Awards

Laurent Massoulié received the Grand Prix Scientifique Cino Del Duca 2017, awarded by the French Academy of Sciences for his project on *S*ocial Information Networks. More details about the price here: http://www.academie-sciences.fr/fr/Prix-en-chimie-et-sciences-du-vivant/grand-prix-scientifique-fondation-simone-et-cino-del-duca.html. More details about his project here: https://www.inria.fr/en/centre/saclay/news/laurent-massoulie-grand-prix-cino-del-duca.

Oliver Hahm received the 1st prize of Université Paris Saclay (Prix Doctorant ED STIC 2017) for his PhD work on RIOT, supervised by Emmanuel Baccelli.

4.2. Associated team - EMBRACE

2017 was the first year of the EMBRACE Associated team. The EMBRACE (lEveraging huMan Behavior for Resource AlloCation and services orchestration modEls) team is composed by members of the INFINE and by three Brazilian teams from three different Brazilian Universities. The EMBRACE project addresses the topic of designing efficient solutions for 5G networks taking into account human behavior, uncertainty, and heterogeneity of networking resources.

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

4.3. RIOT Summit 2017

We successfully organized in September 2017 the second RIOT Summit in Berlin. The RIOT Summit 2017 gathered 100+ enthusiastic industrial participants, makers and academics involved in RIOT. Relevant partners such as Cisco, Fujitsu, OTA Keys, Wolf SSL, as well as 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/#speakers.

KERDATA Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Euro-Par Steering Committee. Luc Bougé has been elected as the new Steering Commitee Chairman of the Euro-Par international conference on parallel and distributed processing. He is the successor of Prof. Christian Lengauer, University of Passau, Germany.

IEEE Cluster 2017 conference. Three years after the 2014 edition, the KerData team had again a leading role in the organization of the 2017 edition: Gabriel Antoniu served as Program Chair, Alexandru Costan served as Submissions Chair.

IEEE Big Data 2017 conference. Alexandru Costan served as Posters Chair.

<div align="center" style="color:red">**MADYNES Team**</div>

5. Highlights of the Year

5.1. Highlights of the Year

- The team (Jérôme François and Lucas Nussbaum) organized the Cloud Days (GdR CNRS RSD, Virtualizaion and Cloud Action) in Loria (Nancy).

- Loic Rouch demonstrated in Blackhat Europe 2017 an attack to tack over a z-wave network https://www.blackhat.com/eu-17/briefings/schedule/#a-universal-controller-to-take-over-a-z-wave-network-8459.

BEST PAPER AWARD :

[17] **IFIP/IEEE Symposium on Integrated Network and Service Management (IM) - AnNet workshop**.
S. LAGRAA, J. FRANCOIS.

MIMOVE Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- R. Teixeira was selected to appear in the 2017 list of "N2Women: Stars in Computer Networking and Communications".

- The AppCivist project, which is a joint initiative between the Social Apps Lab at UC Berkeley and the MiMove team at Inria, won the 2016-17 Chancellor's Award for Public Service in the category of Campus-Community Partnership in collaboration with the City of Vallejo [20].

BEST PAPERS AWARDS :

[19] **IEEE International Conference on Collaboration and Internet Computing**. R. ANGARITA, N. GEORGANTAS, V. ISSARNY.

MYRIADS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The FogGuru project was accepted and started on September 1st 2017. FogGuru is a European H2020 Maria-Skłodowska-Curie Action (MSCA) European Industrial Doctorate (EID) training project which aims to to train eight talented PhD students with an innovative and intersectoral research program to constitute the next generation of European Cloud and Fog computing experts. It is coordinated by Guillaume Pierre.

- Cédric Tedeschi defended his *habilitation à diriger des recherches* summarizing his research activity of the last seven years.

5.1.1. Awards

- Best paper award for Timothée Haudebourg and Anne-Cécile Orgerie at the International Conference on Algorithms and Architectures for Parallel Processing (ICA3PP 2017) for the paper entitled "On the Energy Efficiency of Sleeping and Rate Adaptation for Network Devices"

- Christine Morin has been selected to be included in the 2017 list of "N2Women:Stars in Computer Networking and Communications". The "N2Women:Stars in Computer Networking and Communications" is an annual list focusing in amazing women who have had a major impact in networking and/or communications.

BEST PAPERS AWARDS :

[34] **ICA3PP 2017 - 17th International Conference on Algorithms and Architectures for Parallel Processing**. T. HAUDEBOURG, A.-C. ORGERIE.

NEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The NEO team underwent Inria's project-team creation process and was officially created as a project-team on 1/12/2017. Before then, it was a research team of Inria's research center Sophia-Antipolis Méditerranée.

5.1.1. Awards

The paper "Real-Time Fair Resource Allocation in Distributed Software Defined Networks", by Zaid Ally-bokus, Konstantin Avrachenkov, Jérémie Leguay and Lorenzo Maggi, received the Best Paper Award at *ITC'29*.

The paper "Ontology for a Voice Transcription of OpenStreetMap Data, The Case of Space Apprehension by Visually Impaired Persons", by Said Boularouk, Didier Josselin and Eitan Altman, received the WASET Best Paper Award.

The CEFIPRA project "Monte Carlo" received an excellent evaluation and was awarded an exceptional extension.

Eitan Altman was awarded the IEEE Technical Committee on Big Data (TCBD) the Distinguished Technical Achievement Recognition Award, for his outstanding technical leadership and achievement in stochastic modeling and big data analysis.

Giovanni Neglia has been nominated IEEE Infocom 2017 Distinguished TPC member based on "excellent performance in the review process."

BEST PAPERS AWARDS :

[17] **ITC 29 - 2017 29th International Teletraffic Congress**. Z. ALLYBOKUS, K. AVRACHENKOV, J. LEGUAY, L. MAGGI.

[34] **World Academy of Science, Engineering and Technology**. S. BOULAROUK, D. JOSSELIN, E. ALTMAN.

PHOENIX Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The College+ software, an assistive application on iPad for children with Autism Spectrum Disorders included in ordinary schools, has been distributed on the Apple store, starting in October 2017.

https://itunes.apple.com/us/app/college/id1289697202

POLARIS Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Publications

The paper *On the robustness of learning in games with stochastically perturbed payoff observations* (Panayotis Mertikopoulos and Mario Bravo) has been selected to appear in the John Nash Memorial Special Issues of GEB (Games and Economic Behavior), May 2017.

5.1.2. Grants

Patrick Loiseau has been granted the "Chaire d'excellence" on *Human-aware learning in the digital society* from IDEX Grenoble.

RAP2 Team (section vide)

REGAL Project-Team (section vide)

<p align="center" style="color:red">RMOD Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Release of Pharo 6

We released a new version Pharo (Pharo 6). More information at http://pharo.org.

5.1.2. Pharo Consortium joins InriaSoft

The Pharo Consortium is joining InriaSoft (part of the Inria Foundation).

5.1.3. Awards

- Guillermo Polito, Luc Fabresse and Stéphane Ducasse won the 1st place in the best paper award at IWST 2017.
- Sophie Kaleba and Clément Béra won the 3rd place in the best paper awards at IWST 2017.
- Benoit Verhaeghe won the 2nd place for SmartTest in the Innovation Technologies Award at ESUG 2017.
- Denis Kudriashov with PharoThings won the 3rd place in the Innovation Technologies Award at ESUG 2017.

5.1.4. Keynote at Programming 2017

Stéphane Ducasse and Guillermo Polito did a keynote presentation in Modularity 2017, hosted within Programming 2017.

ROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Anne Benoit was the program co-chair of ICPP'17 and of SC'17 (technical papers).
- Altair, EDF, Michelin, LSTC, and Total have renewed for three years their memberships in the MUMPS consortium.

5.1.1. Awards

- Aurélien Cavelan was awarded an accessit award for the Gilles Kahn 2017 PhD thesis award.

<p style="text-align:center">**SOCRATE Project-Team**</p>

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

Florent de Dinechin obtained the *community award* of the 27th International Conference on Field-Programmable Logic and Application (FPL17) for his software Flopoco, Parameterized Floating-Point Core Generator, see: https://www.fpl2017.org/awards/

4.1.2. Others

4.1.2.1. FIT/Grid5000 fusion

The mid-term evaluation of the FIT project was very well evaluated (excerpt of the report: "It is really hard to identify weaknesses of the equipment project"), FIT has also been promoted as national "Instrument de Recherche" and it is discussing with Grid5000 to apply to the status of TGIR (*Très grande infrastructure de recherche*). A ESFRI proposal has already been proposed (ESFRI is the european instrument for European Strategy on Research Infrastructures).

4.1.2.2. INSA-Lyon/Spie IoTS Chair

Spie-ICS funds a chair with the Citi-lab on IoT, Jean-Marie Gorce was the initiator of this big project (approximately 1M€ over 5 years) dedicated to Internet of Things, the Socrate team is highly involved in the Spie-IoT Chair

<p style="text-align:center">**SPIRALS Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

María Gómez Lacruz defended her PhD thesis [58] in 2016 in the Spirals project-team. She is now a post-doctoral researcher at Saarland University, Germany. During her thesis, she worked in the domain of crowdsensed data. She proposed algorithms to mine traces of mobile applications in order to detect and reproduce application crashes. This research led to techniques that improve the robustness of mobile applications deployed in the wild. For these results, she was awarded an accessit for the thesis prize of the CNRS GDR *Génie de la programmation et du logiciel* (GPL). See http://gdr-gpl.cnrs.fr/node/284.

Benjamin Danglot and his colleagues—Thomas Durieux, Martin Monperrus, Simon Urli, contributing to the development of the Spoon software library—received the 2017 OW2 Community award for Spoon specific and dynamic community, and the use of Spoon in other projects. OW2 is an independent, global, open-source community that promotes the development of open-source middleware, generic business applications, and cloud computing platforms. Spoon is an OW2 project and a software building block that is used in many of our research activities and projects on self-adaptation. See https://www.ow2con.org/bin/view/2017/Awards_Results?year=2017&event=OW2con17.

Philippe Merle, Christophe Gourdin, and Nathalie Mitton (Inria Fun) received a best paper award in the 2nd IEEE International Congress on Internet of Things (ICIOT 2017) for their work on mobile cloud robotics. The paper proposes a novel interface to bridge the gap between cloud systems and mobile robot systems. See http://iciot.org/2018/news.html.

BEST PAPERS AWARDS :

[35] **2nd IEEE International Congress on Internet of Things, IEEE ICIOT 2017**. P. MERLE, C. GOURDIN, N. MITTON.

STORM Project-Team (section vide)

TACOMA Team (section vide)

TADaaM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Guillaume AUPY was the Technical Program vice-chair of SC'17. This is the main conference of the field gathering more than $12,700$ attendees (practictionners, industrials and researchers) from 79 different nationalities. It is the first time someone from Inria is in charge of the technical program in 30 years of the conference. The Technical Program of SC17 comprises of 13 different elements (papers, workshops, panels, invited talks etc), for a total of 880 submissions from about 2900 unique individuals! 370 different volunteers participated in the review process of one or multiple elements of the Technical Program.

Guillaume MERCIER is the chairman of the Hardware Topologies Management Working Group of the MPI Forum. This working group was created officially in December by Inria's impulse and has been rallied since by many institutions taking part in the MPI Forum. The goal of this working group is to standardize hardware topologies management mechanisms and abstractions in the MPI standard.

5. Highlights of the Year

5.1. Highlights of the Year

As part of a collaborative effort with Timothy Bourke, Lélio Brun, Marc Pouzet (Parkas team), Xavier Leroy (Gallium team), Lionel Rieg (Collège de France) and Pierre-Évariste Dagand, our work on a certified Lustre compiler was accepted at PLDI [13].

Julia Lawall was invited to present a talk as part of the Colloquium Jacques Morgenstern at Inria - Sophia Antipolis. The talk was entitled "Coccinelle: synergy between programming language research and the Linux kernel". A video of the presentation is available. [0]

The work of Julia Lawall on the Linux kernel was featured in the Linux Foundation's 2017 Linux Kernel Development Report. [0]

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[0]https://www.canal-u.tv/video/inria/coccinelle_synergy_between_programming_language_research_and_the_linux_kernel.38185
[0]https://www.linuxfoundation.org/2017-linux-kernel-report-landing-page

<p align="center" style="color:red">ALICE Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Sylvain Lefebvre initiated the team creation process for MFX (Matter from Graphics), a new team that will focus on synthesizing and designing complex shapes for additive manufacturing.

Jonàs Martínez have been awarded an ANR JCJC 2017 project entitled MuFFin (Microstructures Procedurales et Stochastiques pour la Fabrication Fonctionnelle). MuFFin aims at contributing a unified pipeline for the efficient and scalable synthesis, visualization, and modeling of additively manufactured microstructures with tailored macroscopic physical behavior. In an interdisciplinary effort, MuFFin will blend together computer and material science perspectives to deliver an integrated approach that is both computationally and physically sound.

5. Highlights of the Year

5.1. Highlights of the Year

- ALMAnaCH's submission to the 2017 CoNLL multilingual parsing shared task was ranked 3rd (out of 33) in part-of-speech tagging, and 6th (out of 33) in dependency parsing.
- Joint submissions of ALMAnaCH and Stanford University to the Extrinsic Parsing Evaluation campaign ranked 1st and 3rd.

AVIZ Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

BEST PAPERS AWARDS :

[] **IEEE Transactions on Visualization and Computer Graphics**. J. ZHAO, M. GLUECK, P. ISENBERG, F. CHEVALIER, A. KHAN.

[] **IEEE Transactions on Visualization and Computer Graphics**. E. DIMARA, A. BEZERIANOS, P. DRAGICEVIC.

<p style="text-align:center;">**CEDAR Team**</p>

5. Highlights of the Year

5.1. Program Committee Chair

Yanlei Diao has been the PC chair of the IEEE International Conference on Data Engineering (ICDE) 2017.

5.2. Strong recruitment of PhD students

The team has started work on many new projects, particularly ; six new PhD thesis starting this year (M. Buron, L. Di Palma, L. Duroyon, F. Raimundo, A. Sevin and K. Zaouk) have rejoined the three more senior students (D. Cao, S. Cebiric, E. Huang). These recruitments boost our efforts on core topics of the team, namely: data exploration, fact checking and data journalism, and performance optimization in the cloud.

5.3. Keynotes

Y. Diao gave a distinguished talk at TU Darmstadt; I. Manolescu gave two keynotes at the international conferences DEXA 2017 and iiWAS 2017.

<p align="center">**CHROMA Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

- Chroma was created as EP Inria on December 1st, 2017.

- Christian Wolf, Associate Professor HDR at INSA Lyon and LIRIS Lab, obtained a full Inria delegation to join the Chroma team. He joined Chroma on September 2017.

- Laetitia Matignon, Associate Professor at Université de Lyon and LIRIS Lab, obtained a second-year half Inria delegation in Chroma.

- Vincent Le Doze joined the Chroma team in Lyon as Expert Inria Engineer, for 2 years, after we obtained the Inria ADT 'CORDES' project, focusing on UAVs control and planning (since Oct. 2017).

- We qualified to the international RobocupHome competition, after creating the 'LyonTech' team, which is composed of teacher-researchers from Chroma along with two engineers from LIRIS/CNRS lab. and CPE Lyon (we are the only french team qualified, the final is organized on June 2018 at Montreal).

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST PAPERS AWARDS :

[67] **Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers)**. B. LUDUSAN, R. MAZUKA, M. BERNARD, A. CRISTIA, E. DUPOUX.

DEFROST Project-Team

5. Highlights of the Year

5.1. Key Scientific results

Key Scientific results: - First closed looped control of a soft robot (Thesis of Thor Bieze and Paper of Zhongkai Zhang at IROS) - Inverse model of soft robots with contact handling (Paper of Eulalie Coevoet for RA-L Letters at ICRA)

5.2. Media coverage of the team work

- Christian Duriez took part in a show on France Culture: https://www.franceculture.fr/emissions/la-methode-scientifique/pourquoi-les-robots-deviennent-ils-mous
- One of the team's robot was shown on France 24: http://m.france24.com/fr/20171103-softrobotics-robots-mou-inria-cnrs-epfl-arabiesaoudite-neom-tamagotchi-parisgamesweek
- Le Point http://www.lepoint.fr/technologie/bientot-des-robots-a-avaler-04-11-2017-2169846_58.php
- France inter: https://www.franceinter.fr/emissions/futur-proche/futur-proche-01-septembre-2017

5.3. Arrival of new members in the team

- Gang Zheng as researcher.
- Félix Vanneste and Erwan Douaille as engineers.
- Thomas Morzadec and Stefan Escaida Navarro as postdoctoral researchers.
- Marwa Mohammed Alaa Eldean Eldiwiny as PhD student.

<p style="text-align:center">**EX-SITU Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Wendy Mackay: Doctor Honoris Causa, Aarhus University (Denmark), September 2017
- Wanyu Liu: "1er Prix Doctorants ED STIC" of Université Paris-Saclay, November 2017, for "BIGNav: Information Theory meets Human-Computer Interaction"

BEST PAPERS AWARDS :

[20] **ACM CHI 2017 - International conference of Human-Computer Interaction**. W. LIU, R. LUCAS D'OLIVEIRA, M. BEAUDOUIN-LAFON, O. RIOUL.

<p align="center" style="color:red">FLOWERS Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

- P-Y. Oudeyer was invited to give the 29th Eleanor J. Gibson and James J. Gibson Lecture in Experimental Psychology, by Cornell University, US.

- P-Y. Oudeyer co-organized with colleagues at Univ. Waterloo (Canada) the interdisciplinary workshop "Designing for curiosity" at CHI 2016 in Denver, Colorado, US. This workshop aimed to build a community of academic researchers-such as computer scientists (in human-computer interaction, artificial intelligence, robotics), developmental psychologists, behavioral economists, education, marketing, neuroscience-as well as practitioners-such as painters, architects, game designers, screenwriters who have engaged with the term curiosity in their work. Web site: https://www.crowdcurio.com/research/workshops/chi2017/.

- P-Y. Oudeyer co-organized (with V. Santucci, G. Baldassarre, A. Barto) the 3rd International Workshop on Intrinsically Motivated Open-Ended Learning (IMOL 2017). It aimed to further explore the promise of intrinsically motivated open-ended lifelong learning in robots and artificial systems. Web: http://www.imol-conf.org/. We also organized a follow-up special issue in the journal Fronties in Robotics and AI:
http://goo.gl/YkMYNN.

- The Flowers team organized the 3rd "Colloque Robotique et Education" in Bordeaux (general chair: Didier Roy), gathering around 200 attendees on the topic of educational robotics. Web: http://dm1r.fr/roboeduc17/. The team also contributed to the organization of the Scratch international conference, web:http://www.scratch2017bdx.org/en/hello-world-2/.

- The Flowers team, the Potioc team and two research teams in robotics and HCI at the University of Waterloo (Canada) initiated a new interdisciplinary collaboration around the design of interactive environments that foster curiosity-driven learning, and obtained a funding from Idex/University of Bordeaux.

GRAPHDECO Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

This year marked the start of the ERC Starting grant D^3 coordinated by Adrien Bousseau, on interpreting drawing for 3D design. This activity already includes the principal investigator, one postdoc (Y. Gryaditskaya) and one engineer (B. Wailly) and will be growing over the next year. The scientific production this year included four ACM Transactions on graphics papapers (three at SIGGRAPH and one at SIGGRAPH Asia, of which 2 were work performed by our visiting International Chair F. Durand during his stay in our group), one paper at Eurographics and several other top-level publications.

<p style="text-align:center;color:red;font-weight:bold;font-size:larger;">GRAPHIK Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

Organization of the 30th Workshop on Description Logics (Montpellier, July 2017), which is the major annual event of the Description Logics research community.

5.1.1. Awards

BEST PAPERS AWARDS :

[36] **EGC 2017 - Conférence Extraction et Gestion des Connaissances**. H. VILMART, J.-C. LÉON, F. ULLIANA.

<div align="center">

HEPHAISTOS Project-Team

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5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Science

- strong advances on the analysis of cable-driven parallel robots (section 7.1.1)
- collaboration with lawyers on the ethical and legal aspects of assistance robotics [11]
- strong collaboration with the medical community on walking analysis, rehabilitation (section 7.2.1) and activities detection (section 7.2.2)
- Eric Wajnberg, an INRA senior researcher, has joined the team this year. He will bring his expertise in statistics, an element which is essential when dealing with medical problems

5.1.2. Experimentation

- preliminary test of our immersive environment for rehabilitation (section 7.2.1)
- start of the daily activities monitoring in a day hospital (section 7.2.2)

HYBRID Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The Hybrid team has considerably grown this year, reaching a total of nearly 40 team members at the end of 2017. In particular, 10 new PhD Students have been recruited in 2017, and 2 new Associate Members have joined Hybrid this year: Guillaume Moreau (Professor, Ecole Centrale de Nantes), and Jean-Marie Normand (Associate Professor, Ecole Centrale de Nantes).

- The Hybrid team was strongly involved in conference organization this year, in particular with: IEEE ISMAR 2017 and IGRV 2017. The IEEE Symposium on Mixed and Augmented Reality 2017 (IEEE ISMAR 2017) notably took place for the first time in France with around 350 attendees, in Nantes, October 9-13, with G. Moreau and A. Lécuyer: General Chairs, J.-M. Normand: Deputy General Chair, F. Argelaguet: Posters Chair, F. Nouviale: Demos Chair, V. Gouranton and R. Gaugne: VR Tour Chairs.

- The team has also organized a 1-week "hackathon" on Virtual Reality, at Inria Rennes in June 2017, with more than 20 participants and 4 teams. It was a very successful event which ended up with 4 live demos presented at Inria/IRISA Rennes and assessed by a Jury of experts.

- We have officially started to work on the topic of "Augmented Reality" this year, with a first paper published in IEEE ISMAR 2017, and several PhD students recruited on this hot topic (Etienne Peillard, Hakim Si-Mohammed, Guillaume Bataille).

5.1.1. Awards

- IEEE VGTC Virtual Reality Best Dissertation Award 2017 - Honorable Mention : for former PhD student Merwan Achibet for his work "Contributions to the Design of Novel Hand-based Interaction Techniques for Virtual Environments".

- GdR IG-RV Best PhD Thesis Award 2017 - Honorable Mention : for former PhD student Merwan Achibet for his work "Contributions to the Design of Novel Hand-based Interaction Techniques for Virtual Environments".

- b<>com Award for Best Publication of the year 2017 for former PhD student Lucas Royer for his paper :

BEST PAPERS AWARDS :

[] **Medical Image Analysis**. L. ROYER, A. KRUPA, G. DARDENNE, A. LE BRAS, E. MARCHAND, M. MARCHAL.

ILDA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Caroline Appert was papers co-chairs for the 2017 ACM CHI Conference on Human Factors in Computing Systems, the flagship conference in HCI, with more than 2,400 submissions in 2017.
- Caroline Appert joined the editorial board of ACM ToCHI (Transactions on Computer-Human Interaction), one of the two top journals in HCI.

IMAGINE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- We had two papers accepted to Eurographics [23], [20] and a third paper was accepted by Computer Graphics Forum and also presented at Eurographics [18]. We had one paper accepted for publication in ACM transactions on Graphics and presented at Siggraph [16].

- Our paper "Shape from sensors: Curve networks on surfaces from 3D orientations" received the best paper award at SMI 2017 and was published in a special issue of Computers and Graphics .

- We co-organized the third Eurographics workshop on intelligent cinematography and editing, at the institut Lumière in Lyon on April 24, 2017.

- Three students defended their PhD within the team.

- ERC ADG EXPRESSIVE was successfully terminated in April 2017.

- We started three new ANR projects Anatomy 2020, E-Roma and Foldyn, and a new FUI project Collodi 2.

BEST PAPERS AWARDS :

[] **Computers and Graphics**. T. STANKO, S. HAHMANN, G.-P. BONNEAU, N. SAGUIN-SPRYNSKI.

LACODAM Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

This year's highlight was the exceptional success of LACODAM in the recruiting process: we could hire two new staff members.

- Elisa Fromont joined as a Professor of University of Rennes 1. She brings to the team her skills in Machine Learning, which include a precious expertise on dealing with numerical data.

- Luis Galárraga Del Prado joined as an Inria Researcher. He brings to the team his skills in exploiting knowledge bases, which will be strongly needed for including domain knowledge in our approaches. He will also reinforce our work on rule mining.

<p style="text-align:center; color:red;">**LAGADIC Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

- Claudio Pacchierotti has been elected Chair of the IEEE Technical Committee on Haptics for the term 2018-2020. He also published a review paper on the topic of wearable haptic devices for the hand [29].

- Julien Pettré will coordinate the H2020 ICT 25 EUropean Project CrowdBot starting from January 2018. The project gathers 5 academic partners - UCL (UK), EPFL and ETHZ (Switzerland), RWTH (Germany) and Inria (France) - as well as 2 industrial partners - Locomotec GmbH (Germany) and SoftBank Robotics (France). The project will address the navigation of robots in crowded environment. While having robot moving in crowds can be of crucial importance (e.g., semi-autonomous wheelchairs), the project will design new robot navigation techniques that minimize the risk of negative impact raised by the presence of the robot (traffic perturbation, collision, etc.).

5.1.1. Awards

- Lagadic was a member of the five finalist teams for the KUKA Innovation Award (https://www.kuka.com/en-de/press/events/kuka-innovation-award), together with the RIS group at LAAS (coordinator), the University of Siena, Italy, and the Seoul National University, South Korea. The goal was to address search and rescue operations in regions which are difficult to access or dangerous following disasters. For this, the team explored the collaboration between a quadrotor UAV and a KUKA lightweight arm for cooperative transportation and manipulation of rigid objects (e.g., long bards), with a final peg-in-hole task demonstrated live at the Hannover fair in April 2017.

<p style="text-align:center">**LARSEN Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- "2017 ISAL Award for Distinguished Young Investigator in the field of Artificial Life" to Jean-Baptiste Mouret
- "Prix du stage de recherche" awarded by the École Polytechnique to Rémi Pautrat (intern, supervised by Jean-Baptiste Mouret)
- "Prix de thèse DGA" awarded to Antoine Cully (former PhD student, co-supervised by Jean-Baptiste Mouret)

5.1.2. New Projects

- beginning of the AnDy project (H2020)
- beginning of the collaboration with ScanPyramds about "Minimally invasive robotics for heritage buildings"
- beginning of a new collaboration with Diatelic, a subsidiary of the Pharmagest group, for the development of an innovative tele-assistance service based on smart home technologies in order to allow elderlies to stay in their home longer. A PhD thesis has been funded by Diatelic to support this collaboration.

BEST PAPERS AWARDS :

[27] **Genetic and Evolutionary Computation Conference (GECCO 2017)**. A. GAIER, A. ASTEROTH, J.-B. MOURET.

[26] **18th AIAA/ISSMO Multidisciplinary Analysis and Optimization Conference**. A. GAIER, A. ASTEROTH, J.-B. MOURET.

LINKMEDIA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

LINKMEDIA organizer of the IEEE Workshop on Information Forensics and Security in Dec. 2017.

5.1.1. Awards

Best demo award at ACM Multimedia 2017 for collaborative work within the FUI project NexGenTV.

Best poster award at Advances in Intelligent Data Analysis.

Best paper award with colleagues of IRISA's EXPRESSION team at 24e conférence sur le Traitement Automatique des Langues Naturelles.

BEST PAPERS AWARDS :

[12] **MM 2017 - 25th ACM International Conference on Multimedia**. O. AHMED, G. SARGENT, F. GARNIER, B. HUET, V. CLAVEAU, L. COUTURIER, R. TRONCY, G. GRAVIER, P. BOUZY, F. LEMÉNOREL.

[28] **IDA 2017 - 16th International Symposium on Intelligent Data Analysis**. A. LODS, S. MALINOWSKI, R. TAVENARD, L. AMSALEG.

[40] **Traitement automatique du langage naturel (TALN)**. R. QADER, G. LECORVÉ, D. LOLIVE, P. SÉBILLOT.

<p style="text-align:center; color:red;">**LINKS Project-Team**</p>

5. Highlights of the Year

5.1. Book with the W3C on schemas validation for the semantic Web

I. Boneva et al. published a book [25] on Validating RDF Data based on the schema language ShEx. This book may have a important impact on the semantic Web community, given that one of her co-authors works for the W3C (E. Prud'hommeaux) where ShEx is considered for standardization.

5.2. Two associate professors recruited

F. Capelli and C. Paperman were hired as Associate Professors for LINKS by the University of Lille 3, so we are currently working on their integration.

5.3. Papers at PODS, LICS, 3 x ICALP, STACS, 2 x IJCAI

This year we obtained exceptional publications in all main theory conferences concerning databases, logic, and artificial intelligence.

5.4. ICALP best paper award

Pierre Bourhis' paper with Oxford (Benedikt and Vanden Boom) in Track B of ICALP'17 won the best paper award!

BEST PAPERS AWARDS :

[17] **ICALP 2017 - 44th International Colloquium on Automata, Languages, and Programming**. M. BENEDIKT, P. BOURHIS, M. V. BOOM.

MAGNET Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- First public release of the Mangoes software
- Major publications in machine learning and natural language processing (AISTATS'17, EACL'17)
- Increased visibility of the team on decentralized learning and privacy with applications on mobility data through publications, Workshops, invited talks and bilateral contracts
- Participation in the the Scikit-Learn development team with AURÉLIEN BELLET and WILLIAM DE VAZELHES through the ADT SkMetricLearn

5.1.1. Awards

- AURÉLIEN BELLET was awarded the Prime d'encadrement doctoral et de recherche (PEDR), category "junior"
- PASCAL DENIS was awarded the Prime d'encadrement doctoral et de recherche (PEDR), category "confirmé"

<p style="text-align:center">**MAGRIT Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

Our paper entitled "The grid method for in-plane displacement and strain measurement: a review and analysis" [23] has been awarded with the Fylde Best Paper in Strain Prize 2016 by the British Society for Strain Measurement (BSSM).

MANAO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We are regularly publishing our work at the prestigious conference Siggraph. This year was particularly successful with three plain papers [11], [12], [14].

<p style="text-align:center;color:red;font-weight:bold;">MAVERICK Project-Team</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Presentations at Siggraph

The paper "Programmable 2D Arrangements for Element Texture Design" co-authored by Joëlle Thollot and Romain Vergne was presented at SIGGRAPH 2017 [3] (see Section 7.5.1).

The paper "A Two-Scale Microfacet Reflectance Model Combining Reflection and Diffraction" co-authored by Nicolas Holzschuch was presented at SIGGRAPH 2017 [2] (see Section 7.3.2).

The work on "Direct 3D stylization pipelines" co-authored by Joëlle Thollot and Romain Vergne was presented at SIGGRAPH 2017 real-time live! [13] (see Section 7.1.2)

5.1.2. Awards

The paper "Shape from sensors: Curve networks on surfaces from 3D orientations" [6], co-authored by Tibor Stanko, Stefanie Hahmann, Georges-Pierre Bonneau and Nathalie Saguin-Sprinsky, published in the journal Computer and Graphics, has received the "Best Paper Award" during the conference Shape Modeling International in June 2017.

MIMETIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

The results of the PhD thesis of Pierre Plantard leaded to the software "Kimea" with a national APP deposit. Faurecia company encouraged us to create a start-up company based on these results. Hence, we get two grants of the SATT "Ouest Valorisation" (total 300K) to transform the thesis prototype into a professionnal solution. The Kimea project has been granted several industrial and innovation prices (see below). A software engineer and an ergonomist have been recruited to create the original team of the future start-up (creation planned beginning of 2018). The software is based on several previously published works [14], and validated in actual industrial context [13]. Franck Multon will be scientific expert in the future start-up as a co-founder of the company.

5.1.1. Awards

Kimea project has been granted by regional and national innovation committees:

- regional Pepite Tremplin competition by the Universities Bretagne Loire, October 2017,
- national Pepite Tremplin competition (53 projects granted among 700), November 2017,
- granted "Projet du futur" if the BPO foundation (10k), 18/10/2017,
- Top 500 national startup, "Hello Tomorrow" challenge, 25-27 october 2017.

<p style="text-align:center">**MINT2 Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. *Evita*

EVITA is a tactile feedback tablet, produced by Hap2U SME company, based in Grenoble. It has been presented at CES in January 2017, the SME has been awarded a CES innovation award. This device is issued from a strong collaboration with MINT group. EVITA is a very generic interaction device, and several projects are currently being discussed for understanding the fields of applications of this device. It is also, in particular, the hardware support for our haptic book for children, described below, that is our second highlight for this Raweb. XploreTouch tablet (the product sold by Hap2U) will be integrated in 2018 in "Palais de la Découverte" permanent exposure (La Villette, Paris).

5.1.2. *Haptic book*

The first digital book augmented with a high fidelity feedback was released in October 2016. Based on a scenario and illustrations made by Dominique Maes - an artist from Belgium - this haptic book was presented for the first time during "La nuit des bibliothèques" in Lille. This project had nice society visibility in 2017, with several expositions (3 exhibitions in the region in 2017, about 14 weeks of availability hired by city of Valenciennes in 2018).

5.1.3. *GoTouchVR spinoff*

Eric Vezzoli and Thomas Sednaoui (two former PhD students of the team) founded GoTouchVR company, that designs a lightweight device (the VRTouch device) for tactile feedback for VR systems. The company was present at CES 2017 and will be also present at CES 2018. An Inria Tech contract was devoted to the VRTouch SDK, taking benefit of MINT knowledge on gesture recognition and interaction design.

5.1.3.1. *Awards*

- SME Hap2U received a "CES innovation award", based on the collaboration that MINT group has with them (E-vita tactile feedback tablet) at CES (January 2017).

<p style="text-align:center;">**Mjolnir Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Personnel

Nicolas Roussel, founder and former leader of the team, left Inria Lille in July 2017 after being promoted Director of the Inria Bordeaux - Sud-Ouest research center. Stéphane Huot has been appointed team leader since then, and until the team comes to an end in December 2017.

Ed Lank, Associate Professor at University of Waterloo who already spent one year in our team funded by Région Hauts-de-France and Université Lille 1 until Aug. 2017, extended his stay for 6 months (funded by Inria).

In partnership with Campus France and Inria, Mitacs' Globalink Research Award program sponsored the visit of a Canadian student in our group: Jeff Avery (University of Waterloo).

5.1.2. Publications

Mjolnir presented four papers at ACM CHI and three papers at ACM UIST, the most prestigious conferences in our field.

5.1.3. Awards

"Honorable mention" (top 5% of the 2400+ submissions) from the ACM CHI conference to the paper "Visualization Literacy at Elementary School", from B. Alper, N. Henry Riche, F. Chevalier, J. Boy & T. M. Sezgin .

"Best paper honorable mention" (top 5% of the 173 submissions) from the IEEE VIS-VAST conference to the paper "Supporting Handoff in Asynchronous Collaborative Sensemaking Using Knowledge-Transfer Graphs", from J. Zhao, M. Glueck, P. Isenberg, F. Chevalier & A. Khan .

BEST PAPERS AWARDS :

[16] **CHI '17 - Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems**. B. ALPER, N. HENRY RICHE, F. CHEVALIER, J. BOY, T. M. SEZGIN.

[] **IEEE Transactions on Visualization and Computer Graphics**. J. ZHAO, M. GLUECK, P. ISENBERG, F. CHEVALIER, A. KHAN.

MOEX Project-Team (section vide)

MORPHEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Figure 2. The president Macron's visit of the Kinovis platform in May 2017

<p style="text-align:center;">**MULTISPEECH Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Best student paper award at LTC'2017 (8th Language & Technology Conference) [39]

Third best paper award at ICNLSP'2017 (International Conference On Natural Language, Signal and Speech Processing) [42]

BEST PAPERS AWARDS :

[39] **LTC 2017 - 8th Language & Technology Conference**. A. HOUIDHEK, V. COLOTTE, Z. MNASRI, D. JOUVET, I. ZANGAR.

[42] **ICNLSSP'2017 - International Conference on Natural Language, Signal and Speech Processing**. D. JOUVET, D. LANGLOIS, M. A. MENACER, D. FOHR, O. MELLA, K. SMAÏLI.

5. Highlights of the Year

5.1. Highlights of the Year

Classical properties of functions such as associativity, although algebraically easy to read, are hard to meaningfully interpret. In [60] Miguel Couceiro and colleagues at the University of Luxembourg (Jean-Luc Marichal, Jimmy Devillet) 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.

PANAMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

EDF and the French Academy of Technology awarded the 2017 *Paul Caseau Ph.D. prize to Luc Le Magoarou* for his work on "Efficient Matrices for signal processing and machine learning" defended in 2016 [83].

The thesis of Luc Le Magoarou [83] was also awarded a special mention of the AFRIF (the French Association for Shape Recognition and Interpretation) annual Ph.D. prize.

Nicolas Keriven has been awarded the Best Student Paper Award at the international workshop SPARS 2017 .

A 2017 EURASIP best paper award was awarded to the paper *Universal and efficient compressed sensing by spread spectrum and application to realistic Fourier imaging techniques*, co-authored by Gilles Puy, Pierre Vandergheynst, Rémi Gribonval and Yves Wiaux, published in EURASIP Journal on Advances in Signal Processing in 2012 [92].

BEST PAPERS AWARDS :

[] **Random Moments for Sketched Mixture Learning**.

PERCEPTION Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- In collaboration with several partners, PERCEPTION completed the three year EU STREP project EARS (2014-2017). PERCEPTION contributed to audio-source localization using microphone arrays and to the disambiguation of audio information using vision, in particular to discriminate between speaking and silent persons.
  Website: https://robot-ears.eu/

- PERCEPTION started and completed a one year collaboration (December 2016 – November 2017) with **Samsung Electronics Digital Media and Communications R&D Center**, Seoul, Korea. The topic of this collaboration, fully funded by Samsung, was *multi-modal methodologies for human-robot interaction* (a central topic of the team) and is part of a strategic partnership between Inria and Samsung Electronics. A follow-up of this collaboration is under preparation and it is planned to start soon (February 2018).

- As an ERC Advanced Grant holder, Radu Horaud was awarded a Proof of Concept grant for his project Vision and Hearing in Action Laboratory (VHIALab). The project will develop software packages enabling companion robots to robustly interact with multiple users.
  Website: https://team.inria.fr/perception/projects/poc-vhialab/

4.1.1. Awards

- Israel Dejene Gebru (PhD student) and his co-authors, Christine Evers, Patrick Naylor (both from Imperial College London) and Radu Horaud, received the best paper award at the IEEE Fifth Joint Workshop on Hands-free Speech Communication and Microphone Arrays, San Francisco, USA, 1-3 March 2017, for their paper Audio-visual Tracking by Density Approximation in a Sequential Bayesian Filtering Framework.

- Yutong Ban (PhD student) and his co-authors, Xavier Alameda-Pineda, Fabien Badeig, and Radu Horaud, were among the five finalists of the "Novel Technology Paper Award for Amusement Culture" at the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Vancouver, Canada, September 2017, for their paper Tracking a Varying Number of People with a Visually-Controlled Robotic Head.

BEST PAPERS AWARDS :

[41] **IEEE Workshop on Hands-free Speech Communication and Microphone Arrays**. I. GEBRU, C. EVERS, P. NAYLOR, R. HORAUD.

[38] **IEEE/RSJ International Conference on Intelligent Robots and Systems**. Y. BAN, X. ALAMEDA-PINEDA, F. BADEIG, S. BA, R. HORAUD.

PERVASIVE INTERACTION Project-Team (section vide)

PERVASIVE INTERACTION Project-Team (section vide)

PETRUS Project-Team (section vide)

<p align="center" style="color:red">**POTIOC Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

- A Handbook of Brain-Computer Interfaces was co-edited by Potioc (F. Lotte), involving the international BCI community [41]

5.1.1. Awards

- Best paper - Honorable mention award (top 5% over 2400 submissions), ACM CHI 2017, HOBIT, D. Furio, S. Fleck, B. Bousquet, J.-P. Guillet, L. Canioni, M. Hachet

- Best paper - Honorable mention award (top 5% over 2400 submissions), ACM CHI 2017, Inner Garden, J. S. Roo, R. Gervais, J. Frey, M. Hachet

- Honorable mention award, MUM'17, Bespoke map customization, A. Brock, B. Hecht, B. Signer, J. Schöning

- Best technnote award, IEEE 3DUI 2017, Hybrid space, J. S. Roo, M. Hachet

- Best Demo award for Teegi, IHM 17, T. Lainé, J. Frey, M. Hachet

- PhD thesis award, International PhD award committee from Bordeaux University 2017, C. Jeunet

- PhD thesis award, IFRATH/KAELIS 2017, C. Jeunet

- PhD thesis award, SMC Grant Initiative 2017 for the "Best PhD Thesis in Human-Machine Systems", C. Jeunet

- 2 Publons top peer reviewer awards in 2017, for the top 1% most peer reviews in both Engineering in Neuroscience, F. Lotte

BEST PAPERS AWARDS :

[24] **CHI'17 - Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems**. D. FURIO, S. FLECK, B. BOUSQUET, J.-P. GUILLET, L. CANIONI, M. HACHET.

[32] **CHI '17 - International Conference of Human-Computer Interaction**. J. SOL ROO, R. GERVAIS, J. FREY, M. HACHET.

[17] **MUM 2017 - 16th International Conference on Mobile and Ubiquitous Multimedia**. A. BROCK, B. HECHT, B. SIGNER, J. SCHÖNING.

[30] **3DUI - IEEE Symposium on 3D User Interfaces**. J. S. ROO, M. HACHET.

RITS Project-Team (section vide)

SEMAGRAMME Project-Team (section vide)

SIROCCO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

BEST PAPERS AWARDS :

[27] **MMSP 2017 - IEEE 19th International Workshop on Multimedia Signal Processing**. P. DAVID, M. LE PENDU, C. GUILLEMOT.

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Antitza Dantcheva has been awarded with the prestigious ANR Jeunes chercheuses / Jeunes chercheurs grant and is Principal Investigator of the project "ENVISION (see 9.2.1.3). Computer Vision for Automated Holistic Analysis of Humans" 2017–2020.

Antitza Dantcheva has received the Best Paper Award (Runner Up) at the 3rd IEEE International Conference on Identity, Security and Behavior Analysis (ISBA 2017) for the work "Spoofing Faces Using Makeup: An Investigative Study" , co-authored by Cunjian Chen, Thomas Swearingen and Arun Ross from the Michigan State University, USA.

BEST PAPERS AWARDS :

[26] **IEEE International Conference on Identity, Security and Behavior Analysis 2017**. C. CHEN, A. DANTCHEVA, T. SWEARINGEN, A. ROSS.

THOTH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cordelia Schmid was elected to the German National Academy of Sciences, Leopoldina, in 2017.
- Cordelia Schmid was a Highly Cited Researcher in 2017 (Clarivate Analytics former Thomson Reuters).
- Julien Mairal received the IEEE PAMI young researcher award.
- Gregory Rogez and Cordelia Schmid received an Amazon Academic Research Award.
- Gregory Rogez received an CVPR 2017 outsanding reviewer award.

5. Highlights of the Year

5.1. Highlights of the Year

We obtained five ANR grants end of 2017, including a young researcher grant EPITOME (principal investigator Yuliya Tarabalka). We started a collaboration with the Google Chrome/Youtube team, on the progressive compression of 3D models.

Pierre Alliez is now a member of the Steering Committee of the EUROGRAPHICS Symposium on Geometry Processing. He was also elected Executive Board Member for the Solid Modeling Association, for 4 years.

TYREX Project-Team (section vide)

Valda Team (section vide)

<p style="text-align:center">**WILLOW Project-Team**</p>

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- J. Sivic (together with J. Philbin, O. Chum, M. Isard, and A. Zisserman) received the Longuet-Higgins Prize for "Fundamental contributions in Computer Vision", awarded at the IEEE Conference on Computer Vision and Pattern Recognition, 2017.

- J. Sivic (together with A. Zisserman) received the Helmholtz Prize for "fundamental contributions to computer vision", awarded at the International Conference on Computer Vision, 2017.

- J. Sivic (together with B. Russell, A. Efros, B. Freeman and A. Zisserman) received the Helmholtz Prize for "fundamental contributions to computer vision", awarded at the International Conference on Computer Vision, 2017.

- I. Laptev (together with T. Lindeberg) received the Helmholtz Prize for "fundamental contributions to computer vision", awarded at the International Conference on Computer Vision, 2017.

WIMMICS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

We received a best paper presentation award for the paper about the WebAudio Guitar Tube Amp Simulator of the Wasabi Project at WebAudio Conference in August [49].

We received an UCA distinction for this award.

We received an UCA distinction for a spotlight paper at ISWC [32].

BEST PAPERS AWARDS :

[56] **AnSWeR 2017 - 1st International Workshop on Application of Semantic Web technologies in Robotics**. J. YOUNG, V. BASILE, M. SUCHI, L. KUNZE, N. HAWES, M. VINCZE, B. CAPUTO.

[31] **ICAIL-2017 - 16th International Conference on Artificial Intelligence and Law**. C. CARDELLINO, M. TERUEL, L. ALONSO ALEMANY, S. VILLATA.

ZENITH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

Best Papers Awards :

[32] **SBBD 2017: 32th Brazilian Symposium on Databases**. R. Souza, V. Silva, P. Miranda, A. Lima, P. Valduriez, M. Mattoso.