

Inria

RESEARCH CENTER
Paris

FIELD

Activity Report 2019

Section Highlights of the Team

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ANTIQUE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

CAMBIUM Project-Team (section vide)

CASCADE Project-Team

5. Highlights of the Year

5.1. Awards

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

KOPERNIC Team

5. Highlights of the Year

5.1. Highlights of the Year

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

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

OURAGAN Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Two new projects have started this year

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

PARKAS Project-Team (section vide)

PL.R2 Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

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

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

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

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

POLSYS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

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

PROSECCO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

5.1.1. Awards

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

BEST PAPERS AWARDS :

[17]

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

[16]

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

SECRET Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

5.1.1. Awards

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

BEST PAPERS AWARDS :

[31]

L. PERRIN. *Partitions in the S-Box of Streebog and Kuznyechik*, in "IACR Transactions on Symmetric Cryptology", March 2019, vol. 2019, n^o 1, p. 302-329 [DOI : 10.13154/TOSC.v2019.i1.302-329], <https://hal.inria.fr/hal-02396814>

[49]

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

CAGE Project-Team (section vide)

MATHERIALS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Grants

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

4.1.2. Awards

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

MATHRISK Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

5.1.2. Publications

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

MOKAPLAN Project-Team (section vide)

QUANTIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

SIERRA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

ANGE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Human ressources

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

5.1.2. Travel policy

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

5.1.3. Awards and new grants

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

ARAMIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

5.1.1. Awards

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

BEST PAPERS AWARDS :

[32]

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

COMMEDIA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

MAMBA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

REO Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

ERC consolidator grant MoDeLLiver (I Vignon-Clementel).

SERENA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

ALPINES Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

DELYS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

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

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

The US patent, titled “Distributing computing system implementing a non-speculative hardware transactional memory and a method for using same for distributed computing,” was awarded to inventors Julien Peeters, Nicolas Ventroux, Tanguy Sassolas and Marc Shapiro in April 2019, with number US 10 416 925 B2 [4].

BEST PAPERS AWARDS :

[28]

E. MAUFFRET, D. JEANNEAU, L. ARANTES, P. SENS. *The Weakest Failure Detector to Solve the Mutual Exclusion Problem in an Unknown Dynamic Environment*, in "20th International Conference on Distributed Computing and Networking (ICDCN 2019)", Bangalore, India, January 2019, Extended version: <https://hal.archives-ouvertes.fr/hal-01661127v3>, <https://hal.archives-ouvertes.fr/hal-01929224>

[7]

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

DYOGENE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

ERC NEMO

ERC NEMO, led by F. Baccelli, started in January 2019; see [9.3.1.1](#) .

Inria International Chair

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

Markov Lecture

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

EVA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

5.1.2. Transfer

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

GANG Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

Pierre Fraigniaud and his co-authors obtained the best paper award at SSS 2019:

BEST PAPERS AWARDS :

[19]

A. CASTAÑEDA, P. FRAIGNIAUD, A. PAZ, S. RAJSBAUM, M. ROY, C. TRAVERS. *Synchronous t -Resilient Consensus in Arbitrary Graphs*, in "SSS 2019 - 21st International Symposium on Stabilization, Safety, and Security of Distributed Systems", Pisa, Italy, October 2019 [DOI : 10.1007/978-3-030-34992-9_5], <https://hal.inria.fr/hal-02433524>

GANG Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

Pierre Fraigniaud and his co-authors obtained the best paper award at SSS 2019:

BEST PAPERS AWARDS :

[19]

A. CASTAÑEDA, P. FRAIGNIAUD, A. PAZ, S. RAJSBAUM, M. ROY, C. TRAVERS. *Synchronous t -Resilient Consensus in Arbitrary Graphs*, in "SSS 2019 - 21st International Symposium on Stabilization, Safety, and Security of Distributed Systems", Pisa, Italy, October 2019 [DOI : 10.1007/978-3-030-34992-9_5], <https://hal.inria.fr/hal-02433524>

MIMOVE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

WHISPER Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

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

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

ALMANACH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

COML Team (section vide)

RITS Project-Team (section vide)

VALDA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

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

5.1.1. Awards

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

WILLOW Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

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

5.1.2. Visibility

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

BEST PAPERS AWARDS :

[11]

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

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