



RESEARCH CENTER
Grenoble - Rhône-Alpes

FIELD

Activity Report 2015

Section Highlights of the Team

Edition: 2016-03-21

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AIRSEA Team

5. Highlights of the Year

5.1. Highlights of the Year

Early 2015 AIRSEA team succeed MOISE in developing of *mathematical and computational methods for the modeling of oceanic and atmospheric flows*.

The substantial changes compared to the scientific objectives of the MOISE team include a redefinition of the domains of applications now centered on oceanic and atmospheric modeling (the latter is a new target application for the team), the increased focus on statistical methods and hybrid deterministic/statistical approaches, as well as an emphasis on the development of numerical algorithms for high performance computing.

5.1.1. Awards

Clémentine Prieur was awarded by the Prix Blaise Pascal of GAMNI-SMAI.

Jose R. Leon was granted by an International Inria Chair.

ARIC Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. ARITH conference in Lyon

Since 1969, ARITH is the primary and reference international conference for presenting scientific work on the latest research in computer arithmetic. In June 2015, we organized it in Lyon.

5.1.2. Best student paper

At ISSAC'2015 [20].

5.1.3. Best papers

Best papers at Eurocrypt'2015 , Asiacrypt'2015 and ISSAC'2015 .

BEST PAPERS AWARDS :

[14] EUROCRYPT. J. H. CHEON, K. HAN, C. LEE, H. RYU, D. STEHLÉ.

[11] ASIACRYPT. S. BAI, A. LANGLOIS, T. LEPOINT, D. STEHLÉ, R. STEINFELD.

[16] ISSAC. J.-G. DUMAS, C. PERNET, Z. SULTAN.

AVALON Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. VHGW Demo on Green-Touch Final Meeting

GreenTouch was founded five years ago with the ambitious goal to improve energy efficiency of communications and data networks by a factor of 1,000.

Avalon was invited to give one of the 15 demonstration of key technology to reduce power consumption. The VHGW (Virtual Home Gateway) demonstration gives a proof of concept and focuses on the main challenges related to the virtualization of home gateways through dense service aggregation and precise energy management.

5.1.2. Dissemination

Laurent Lefevre has given an invited keynote talk on "Towards energy proportional clouds, data centers and networks: the holy grail of energy efficiency ?", in IEEE Online Greencomm Conference, November 10, 2015

5.1.3. Awards

BEST PAPERS AWARDS :

[26] **CloudTech'2015**. D. BALOUEK-THOMERT, E. CARON, P. GALLARD, L. LEFÈVRE.

BEAGLE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We organized the first EvoEvo workshop (York, July 2015) as a satellite meeting of the 2015 ECAL conference (<http://www.evoevo.eu>).

5.1.1. Awards

Best paper award at the ACM Genetic and Evolutionary Computation Conference GECCO'15, in category Evolutionary Machine Learning, for the following paper: .

BEST PAPERS AWARDS :

[31] **Genetic and Evolutionary Computation Conference (GECCO)**. S. PEIGNIER, C. RIGOTTI, G. BESLON.

BIPOP Project-Team (section vide)

Chroma Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Evolution of team

1. Creation of the team : March 2015.
2. Anne Spalanzani, Associate Professor at UPMF, joined the team on December 2015 (previously in Prima team).
3. Leaving of Dizan Vasquez, SRP Inria, for the Apple compagny, on January 2016.

5.1.2. Projects and results

1. Acceptation of the European H2020 Ecsel project "ENABLE" (European Initiative to Enable Validation for Highly Automated Safe and Secure Systems) (November 2015). Chroma is involved in the automated vehicles theme. Fundings for Chroma are 700K€, over 3 years.

COMPSYS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Scientific Results

2015 showed good successes, in terms of scientific results, with respect to the objectives we fixed for Compsys III, i.e., pushing static compilation beyond its present limits, both in terms of techniques and applications, bridging the gap between polyhedral techniques and abstract interpretation, sequential codes and parallel specifications, back-end and front-end techniques. Important advances in 2015 are as follows:

- **Towards a polynomial model** We developed new techniques to handle polynomials (see Section 7.11) and thereby generalizing polyhedral (e.g., affine) techniques, with applications to the analysis of the OpenStream parallel language (see Section 7.10).
- **Handling parallel specifications** In complement to our current studies of parallel languages such as X10 (see Sections 7.8 and 7.9) and OpenStream (see Section 7.10), and kernel offloading with pipelined specifications (see Section 7.7), we succeeded to extend liveness analysis (see Section 7.12) and array contraction (see Section 7.13) to parallel specifications.
- **Enhancing interactions between programmer and compiler** This is an important challenge for the expansion of the applicability of our techniques. The work exposed in Sections 7.9 and 7.15 (effort for collecting and analyzing real applications), as well as the interaction with users of HPC, including the organization a joint spring school in 2016, are important steps in this direction.
- **Links with abstract interpretation and SMT solvers** The extension of our previous work on loop termination, with an iterative technique relying on SMT solvers for exhibiting counter-examples (see Section 7.4), is an interesting combination of polyhedral and abstract interpretation techniques. This is the case also for the array analysis of Section 7.3.
- **Back-end analysis** Considering back-end optimizations remains important, as complementary to front-end optimizations. See the results on register spilling (Section 7.1), pointer analysis (Section 7.2), liveness analysis (Section 7.12), the latter exploiting the fact that a polyhedral representation of arrays and loops is a symbolic unrolled view of registers and traces.

Awards

The CC'15 paper on parametric tiling [3] was nominated as a best paper candidate for the group of conferences ETAPS'15 where, unfortunately, CC papers never finally got an award.

End of Compsys

Compsys exists since 2012 as an Inria team. It has been created in 2004 as an Inria project-team, and evaluated by Inria first in 2007, then in 2012. It will again be evaluated in March 2016, which will be its final evaluation as an Inria project-team is limited to 12 years. The construction of a new project is thus necessary. The research directions of Compsys III were already a shift towards this future project. A few tentative research directions may be:

- Shift the application domain from embedded systems to high performance computing (HPC) but at small scale (desktop HPC: FPGA, GPU, multicores). In fact, the two ecosystems are nowadays slowly converging.
- A stronger attention to real HPC users and real HPC applications may lead to better programming models (“putting the programmer in the loop”).
- Design new models of programs. The polynomial model is but an example.
- Explore the synergy between parallel programming and program verification and certification; in particular, import approximation methods from one field to the other. Abstract interpretation is a case in point.

However, while its field of expertise, compilation for parallel and heterogeneous systems, is still of crucial importance, the unexpected departure in Sep. 2015 of two of its staff members makes it difficult to have a clear view of the future.

CONVECS Project-Team (section vide)

CORSE Team (section vide)

CTRL-A Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Community

We have been invited to participate to the organization of events, which highlight our active presence in the scientific life in the two domains which we are bridging :

- autonomic computing: Eric Rutten is PC co-chair of the 3rd IEEE International Conference on Cloud and Autonomic Computing, CAC 2015 (<http://autonomic-conference.org/>) [19], Part of FAS* - Foundation and Applications of Self* Computing Conferences, Collocated with: The 9th IEEE Self-Adaptive and Self-Organizing System Conference, The 15th IEEE Peer-to-Peer Computing Conference ; and PC member, as well as workshops chair, of the 12th IEEE International Conference on Autonomic Computing, ICAC 2015 (<http://icac2015.imag.fr/>), the two major conferences on the topic.
- control: Eric Rutten is organizer of a Special Session on Dependable Discrete control for adaptive and reconfigurable computing systems at the 5th IFAC international workshop on Dependable Control of Discrete Systems , DCDS (<http://www.gdl.cinvestav.mx/dcds2015>) ; he is on the IFAC Technical Committee 1.3 on Discrete Event and Hybrid Systems, (<http://tc.ifac-control.org/1/3/>) and on the IEEE Control Systems Society Discrete Event Systems Technical Committee (<http://discrete-event-systems.ieeecss.org>).

5.1.2. Invited keynote talk

Eric Rutten was invited to give a talk at the 11th International Conference on Distributed Computing and Internet Technology (ICDCIT-2015) [13] and at the seminar of the College of Information and Computer Sciences (CICS), University of Massachusetts Amherst, USA, 28 sept.2015.

DANTE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. MOSAR results published

The joint analysis of carriage and Close proximity interactions (CPIs) showed that CPI paths linking incident cases to other individuals carrying the same strain (i.e. possible infectors) had fewer intermediaries than predicted by chance ($P < 0.001$), a feature that simulations showed to be the signature of transmission along CPIs. Additional analyses revealed a higher dissemination risk between patients via healthcare workers than via other patients. In conclusion, *S. aureus* transmission was consistent with contacts defined by electronically collected CPIs, illustrating their potential as a tool to control hospital-acquired infections and help direct surveillance [19], [18].

5.1.2. Time-varying social networks

. We introduce a temporal network model with adjustable community structure and emergent weight-topological correlations via the extension of the activity-driven time-varying network model. The model takes into account: i) reinforcement processes to model memory-driven interaction dynamics of individuals; ii) focal and cyclic closure to capture patterns responsible for the emerging community structure; iii) a node removal process. Using this temporal network model we demonstrate the effect of the scalable community structure and social reinforcement on information spreading, which co-evolves with the time-varying interactions [16].

5.1.3. Stationarity for graph signals

In a series of published works [14], [40], [36], [24], we formalised the concept of stationarity for graph signals. First, we had to introduce a new definition of graph-shift operator that, in contrast to the current alternatives, is isometric. Then, based on this operator preserving the L^2 -norm of graph signals, we were able to rigorously characterise the statistical property of wide sense stationarity for graph signals. Stationarity is a central concept in the theory of signal and image processing but was still lacking for graph signals. This contribution should now foster the development of a mathematically sound framework for graph signal processing.

5.1.4. Awards

FIT IoT Lab and OneLab received the best demo award at TRIDENTCOM 2015, 10th EAI International Conference on Testbeds and Research Infrastructures for the Development of Networks & Communities, Vancouver, Canada, June 24–25, 2015.

DICE Team (section vide)

DRACULA Project-Team (section vide)

ERABLE Project-Team (section vide)

EXMO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Our work on alignment revision (§7.3.2) has been published in *Artificial intelligence* [7].

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

A paper based on the PhD thesis of Jérôme Izard and the post-doctoral work of Cindy Gomez Balderas was published in *Molecular Systems Biology* this year [18]. The paper describes foundational results for the RESET project (Section 8.2). A paper by Eugenio Cinquemani and colleagues from the LIFEWARE project-team and from the University of Pavia was accepted for *PLoS Computational Biology* this year [20], while a paper based on the PhD thesis of Valentin Zulkower was published in a special issue of *Bioinformatics* associated with the major bioinformatics conference ISMB/ECCB [24].

IMAGINE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

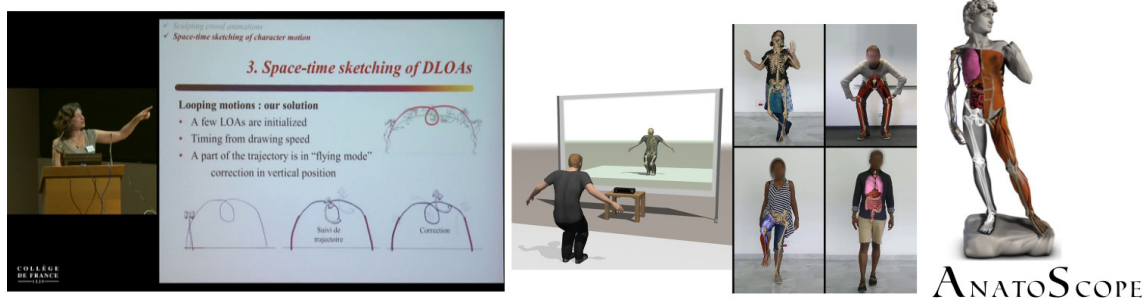


Figure 1. Left: Symposium organised by Marie-Paule Cani at Collège de France. Middle Demo of the Living Book of Anatomy presented in the Emergin Technologies at ACM SIGGRAPH Asia. Right: Creation of the startup Anatoscope by Francois Faure and Olivier Palombi.

- Marie-Paule Cani obtained the annual Chair of **Informatics and Computational Sciences** of the Collège de France in Paris. She organized a series of lectures about *Shaping Imaginary Content: from 3D Digital Design to Animated Virtual Worlds* and a **symposium** with 7 international invited speakers.
- Remi Ronfard organized the **EG Workshop on Intelligent Cinematography and Editing** which was for the first time an Eurographics Workshops.
- A demo of the Living Book of Anatomy (PhD work of Armelle Bauer) was presented in the **Emerging Technologies** exhibition at ACM SIGGRAPH Asia in November.
- François Faure and Olivier Palombi are creating a new startup **Anatoscope** since November 2015 on *Digital Anatomy for Personalized Healthcare*.
- We had 4 paper accepted to ACM SIGGRAPH [6], [8], [9], [15], and 2 accepted to ACM Transaction on Graphics (TOG) [10], [14], one has been presented at ACM SIGGRAPH Asia.

LEAR Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cordelia Schmid received the Humbolt research award, Alexander von Humbolt Foundation, Germany, 2015, and gave the Karen Spärck Jones lecture, annual event of the British Computer Society that honours women in computing research, 2015.
- Cordelia Schmid was ranked among the Thomson Reuters Highly Cited Researcher, 2015.
- Yang Hua, Karteek Alahari and Cordelia Schmid won the VOT-TIR2015 challenge.
- G. Cinbis (PhD, 2014) was awarded the 2014 AFRIF thesis prize for his thesis entitled “Fisher kernel based models for image classification and object localization” at Orasis 2015. He was supervised by Jakob Verbeek and Cordelia Schmid.
- N. Dalal (PhD, 2006) together with his supervisor B. Triggs was awarded the Longuet-Higgins Prize 2015 for his PhD work, in particular the paper entitled “Histograms of Oriented Gradients for Human Detection” (CVPR 2005 paper).

MAVERICK Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Three software platforms based on our research were released as open-source distributions in 2015. These platforms contain the result of several years of research, and have been supported by Inria through engineering support:

- **Gratin**, a node-based compositing software for creating, manipulating and animating 2D and 3D data. It uses an internal direct acyclic multi-graph and provides an intuitive user interface that allows to quickly design complex prototypes.
- **Proland**, a platform for real-time quality rendering and editing of large landscapes. All features can work with planet-sized terrains, for all viewpoints from ground to space.
- **Gigavoxel**, a software platform for real-time quality rendering of very large and very detailed scenes which couldn't fit memory. Performances permit showing details over deep zooms and walk through very crowded scenes (which are rigid, for the moment).

MESCAL Project-Team (section vide)

MISTIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Creation of the Pixyl startup (<http://pixyl.io>). Pixyl is a startup created in March 2015 by F. Forbes with M. Dojat (INSERM), a former post-doctoral fellow S. Doyle (CEO) and IT Translation. F. Forbes is a co-founder and a scientific advisor. Pixyl specializes in automatic pathological brain MRI segmentation. Pixyl delivers precise neuroimaging biomarker extraction for improved insight and decision-making in clinical studies. Our automatic neuroimaging solutions are designed for seamless integration into both web-based and locally deployed CRO platforms. Advanced algorithms are available for multiple sclerosis, chronic stroke, brain tumor and traumatic brain injury applications. The technology transferred is based on the P-LOCUS software.
- Xerox Foundation University Affairs Committee (UAC) collaborative grant. F. Forbes was co-laureate (with R. Horaud) of this grant (90 k\$) for a three year project (2014-2017) on Advanced and Scalable Graph Signal Processing Techniques. It was awarded in collaboration with Arijit Biswas and Anirban Mondal, research scientists at Xerox Research Center India (XRCI), Bangalore.

MOAIS Project-Team (section vide)

MORPHEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The multi-camera platform Kinovis (<http://kinovis.inrialpes.fr>) was inaugurated on May 26th 2015. Kinovis is French *Equipement d'excellence* (Equipex project) that provides a unique acquisition platform with 68 color cameras and enables therefore high precision 4D modeling of dynamic scenes.
- The QuickCSG boolean mesh computation software developed within the context of the Kinovis platform was transferred in November of 2015, to a (contractually undisclosed) major industrial actor of the 3D business.

NANO-D Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

We have released the first version of the SAMSON software platform for computational nanoscience on the SAMSON Connect website (<http://www.samson-connect.net>). Using the SAMSON Connect website, users may download SAMSON and choose which SAMSON Elements (modules for SAMSON) to add to their configuration (e.g. a nanotube creator, for users interested in materials science). Developers may download the SAMSON Software Development Kit (SDK) to develop SAMSON Elements and upload them to the SAMSON Connect website. We are frequently releasing updates, on Windows, Linux, and Mac (Figure 3).

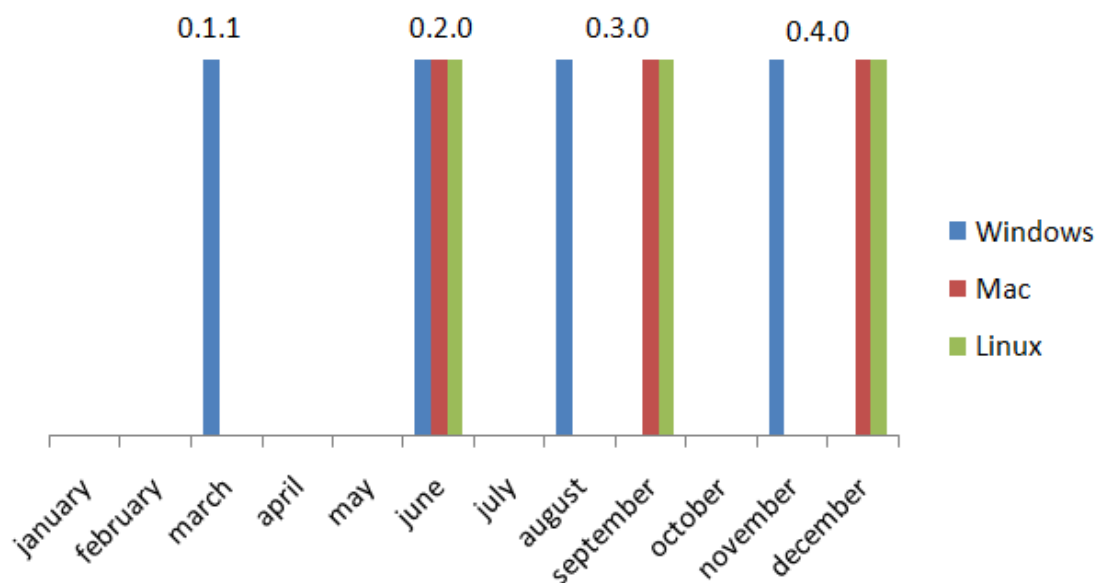


Figure 3. Release dates of the various versions of SAMSON

NECS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The publication of the book *Multisensor Data Fusion: From Algorithms and Architectural Design to Applications*, edited by Hassen Fourati
- Carlos Canudas de Wit was in the organizing committee of IPAM Long Program ‘New Directions in Mathematical Approaches for Traffic Flow Management’
- Hassen Fourati was elected at CNU 61 and Alain Kibangou was elected at Conseil du pôle MSTIC, UGA

NUMED Project-Team (section vide)

PERCEPTION Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Robotic Demonstration at ICMI'15. The PERCEPTION team was present at the ACM International Conference on Multimodal Interaction – ICMI'15 (November 2015, Seattle WA, USA) with the demonstration *A Distributed Architecture for Interacting with NAO* [27]. This software package enables robot programming using various languages, e.g. C, C++, Matlab, and Python. This distributed architecture is available under the NAOLab open-source software package. The development of NAOLab is part of PERCEPTION's participation in EU FP7 projects and is funded by STREP project *Embodied Audition for RobotS* (EARS) and ERC Advanced Grant *Vision and Hearing in Action* (VHIA).

The Xerox Foundation University Affairs Committee (UAC) awarded Radu Horaud and Florence Forbes (EPI MISTIS) with a three year grant *Advanced and Scalable Graph Signal Processing Techniques* (2015-2017). Collaboration with Arijit Biswas and Anirban Mondal, research scientists at Xerox Research Center India (XRCI), Bangalore. Information about these awards is available at page 9 of this document available online: http://www.xerox.com/downloads/usa/en/innovation/innovation_xig_brochure.pdf.

MOOC on Binaural Hearing for Robots. In May-June 2015 Radu Horaud taught a five hour MOOC dealing with the fundamental principles of robot hearing, from binaural signal processing to robotic implementations. MOOC content available at <https://team.inria.fr/perception/mooc-bhr/> and at <https://www.france-universite-numerique-mooc.fr/courses/inria/41004/session01/about>.

4.1.1. Awards

- **Vincent Drouard** (PhD student) and his co-authors received the “Best Student Paper Award” (second place) at IEEE ICIP'15 for the paper *Head Pose Estimation via High-Dimensional Regression*. The conference took place in Quebec City, Canada, September 2015. There were five papers awarded, two “Best Paper” and three “Best Student Paper” out of a total of 1033 (oral and poster) papers presented at the conference. IEEE ICIP is the premier international image processing conference series held every year. The work is funded by the ERC Advanced Grant VHIA.
- **Dionyssos Kounades-Bastian** (PhD student) and his co-authors received the “Best Student Paper Award” at IEEE WASPAA'15 for the paper *A Variational EM Algorithm for the Separation of Moving Sound Sources*. The conference took place in New Paltz, NY, USA, October 2015. There were six papers nominated for the award, out of a total of 80 (oral and poster) papers presented at the workshop. The IEEE WASPAA workshop series is among the premier international forums in the field of audio and acoustic signal processing, held every other year. The work is funded by the EU STREP project EARS and the ERC Advanced Grant VHIA.

BEST PAPERS AWARDS :

[28] **IEEE International Conference on Image Processing.** V. DROUARD, S. BA, G. EVANGELIDIS, A. DELEFORGE, R. HORAUD.

[31] **IEEE Workshop on Applications of Signal Processing to Audio and Acoustics.** D. KOUNADES-BASTIAN, L. GIRIN, X. ALAMEDA-PINEDA, S. GANNOT, R. HORAUD.

PRIMA Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. Awards

The paper "The Grenoble System for the Social Touch Challenge at ICMI 2015" by Viet Cuong Ta, Wafa Johal, Maxime Portaz, Eric Castelli, Dominique Vaufreydaz has won the "ICMI 2015 Touch Challenge" at the ICMI 2015 conference".

4.1.2. Events

On 5 June 2015, members of PRIMA have organised the inauguration of the EquipEx platform Amiqua4Home.

PRIVATICS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

Our work on “Probabilistic k^m -anonymity” was published in the IEEE International Conference on Big Data (BigData) 2015.

Our results on Password security, “Faster Password Guessing Using an Ordered Markov Enumerator” and “Interleaving Cryptanalytic Time-memory Trade-offs on Non-Uniform Distributions”, were published at ESSOS’15 and ESORICS’15.

The team published 2 papers about his research in the newspaper “Lemonde”, 1 article in “Science & Avenir” and in “La Recherche”.

The team organized the 31 November 2015 the conference “Privacy across cultures, Convergences and divergences in a global world” in the context of the Rencontres Jacques Cartier.

4.1.1. Awards

The paper "Reasoning about privacy properties of biometric system architectures in the presence of information leakage" [15] received the best paper award at ISC 2015.

BEST PAPERS AWARDS :

[15] **Information Security Conference (ISC 2015)**. D. LE MÉTAYER, H. CHABANNE, L. ROCH, J. BRINGER.

ROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

Yves Robert co-edited with Thomas Hérault (University of Tennessee, Knoxville) the book *Fault-Tolerance Techniques for High-Performance Computing* [38], which was published in May by Springer.

The version 5.0.0 of MUMPS was released in February 2015.

SOCRATE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

4.1.1. FIT/CortexLab Interference Alignment Demo on Green-Touch Final Meeting

Join GreenTouch in New York City on June 18th to celebrate the announcement of its final results. GreenTouch was founded five years ago with the ambitious goal to improve energy efficiency of communications and data networks by a factor of 1,000.

Socrate was invited to give one of the 15 demos of key technology to reduce power consumption. The demo gives a proof of concept and focuses on the main challenges related to interference alignment, namely the knowledge of the interference footprint and the scheduling algorithms to make use of the interference information to maximize the spectral efficiency. A wireless network is emulated on CorteXlab (<http://www.cortexlab.fr>), a controlled hardware facility located in Lyon, France with remotely programmable radios and multi-node processing capabilities. During the live demo, a control laptop is remotely connected to the facility, deploying software on the radios and launching an interference alignment scenario and collecting real-time performance feedback. The efficiency gain of interference alignment is then shown for various experimental conditions that can be tuned from the control laptop.

4.1.2. Awards

The article *Code generators for mathematical functions* received the best paper award of the 22d IEEE Symposium on Computer Arithmetic, Jun 2015, Lyon, France; and

The article *A parallel unbalanced digitization architecture to reduce the dynamic range of multiple signals* [28] was one of the best student paper award finalists of the 1st URSI Atlantic Radio Science Conference (URSI AT-RASC), 2015, May 2015, Gran Canaria, Spain.

Samir Perlaza was granted with a Marie Skłodowska-Curie Individual Fellowship (2015-2016) by the European Commission and he was elevated to *IEEE Senior Member* in June 2015.

BEST PAPERS AWARDS :

[13] **22d IEEE Symposium on Computer Arithmetic**. N. BRUNIE, F. DE DINECHIN, O. KUPRIANOVA, C. LAUTER.

SPADES Project-Team (section vide)

STEPP Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

The adventure continues!

The start of STEEP as an exploratory action in 2010 constituted a significant thematic change for all its members. This risky adventure was successfully consolidated in 2015, with the acceptance of STEEP as a full project-team. The adventure continues!

Various significant contributions

In other respects, two important results have been obtained this year on the ecological accounting front. First, a generic method of evaluation of environmental pressures from material flows has been developed and published (paper in press at the time of writing). Second, the errors associated to the national transport database which is heavily used in material flow analysis have been quantified; this work will be published in 2016 but is eagerly awaited by a number of researchers and agencies, as the disaggregated error is not evaluated in the database itself.

As a by-product of its investment in the ESNET project (Ecosystem Services Network), the team has developed an important expertise on the methodological aspects of LUCC modelling. This expertise has turned into a theoretical analysis of the foundations of LUCC theory itself, as important methodological flaws and their theoretical cures have been identified in the course of the project. These methodological and theoretical advances will be submitted to publication within the coming year.

Finally, our benchmarking tools designed for climate negotiations have been used by the “*Groupe Interdisciplinaire sur les Contributions Nationales*” (GICN) which has been mandated by french ministry of Sustainable Development to prepare the **climate change conference COP21** at Paris. Some contributions have been presented at the Side Events of COP 21, the 2nd of December 2015. Contributions have been published in a special working paper [11].

TYREX Project-Team (section vide)

URBANET Team

5. Highlights of the Year

5.1. Highlights of the Year

Awards

- The project "Mobile Traffic Signatures in the Urban Landscape" (participants: Angelo Furno, Razvan Stanica, Marco Fiore) was selected among the 10 finalists (from more than 200 submissions) of the Telecom Italia Big Data Challenge- <http://www.telecomitalia.com/tit/en/bigdatachallenge/news-social/tim-big-data-challenge-2015-finalisti.html>.