



RESEARCH CENTER
Grenoble - Rhône-Alpes

FIELD

Activity Report 2016

Section Highlights of the Team

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AIRSEA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

In collaboration with M. Asch and M. Bocquet, M. Nodet published a book about Data Assimilation [30].

5.1.1. Awards

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

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

L. Debreu was awarded IMarEST Deny Medal for the best paper in journal of operational oceanography for year 2014.

ARIC Project-Team (section vide)

AVALON Project-Team (section vide)

BEAGLE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

EvoMove

We completed the implementation of the EvoMove system, an evolving music generation system based on performer moves. The moves are not predefined, they are identified by an evolutionary subspace clustering algorithm that builds on-the-fly move categories. Such a category is created when similar moves are repeated, but it remains flexible in the sense that it can adapt to gradual changes of the moves. A category can also be forgotten when the corresponding moves do not occur any longer. We run working sessions with dancers and record parts of these performances on videos. The first prototype of EvoMove has been tested with the Anou Skan company (https://www.youtube.com/channel/UCoyfXJx_izpQZi6hD8w5M3A). The system immediately convinced the dancers of its interest and we are now working on the creation of a short play with Claire Lurin, an INSA-Lyon student who is also a semi-professional dancer.

ECAL

The Beagle team was chosen by the board of the ISAL (International Society For Artificial Life) to organize ECAL 2017, the 14th European Conference on Artificial Life. ECAL is the official conference of the ISAL on odd years. Organizing ECAL 2017 will confirm the Beagle team as a major player in the international artificial life community and as the domain leader in France.

BIPOP Project-Team (section vide)

CHROMA Team

5. Highlights of the Year

5.1. Highlights of the Year

- Laetitia Matignon, Associate Professor at Université de Lyon and LIRIS Lab has obtained an Inria delegation to join the Chroma team (half-time).
- Stephane d'Alu, research engineer at CITI lab., has joined the team for one year, half-time.
- Christian Laugier is a co-author with A. Broggi, A. Zelinski and U. Ozguner, of the chapter "Intelligent Vehicles" of the 2nd edition of the "Handbook of Robotics" edited by B. Sicilano and O. Khatib and published in July 2016.
- A new collaboration has been built with the team of Gabriella Czibula, from University of Babes-Bolyai in Cluj-Napoca, Romania. We obtained a bilateral french-romanian PHC project, called DRONEM, to support the collaboration for the period 2017-2018.
- A new collaboration has been built with the Volvo Group in Lyon, through the co-supervision of the PhD thesis of Guillaume Bono funded by the INSA-Volvo Chair.
- A new collaboration has been built with the GIPSA Lab in Grenoble and the team of Gerard Bailly (CNRS), through the co-supervision of the PhD thesis of Remi Cambuzat funded by the Region.
- The Chroma team has been reconducted for 2017 as a Nvidia CUDA lab, for his work related to "embedded perception and autonomous vehicles".
- A new Research contract on "robust sensor fusion involving vision data" has been signed with Toyota Motor Europe in 2016. The results have been patented by Inria and Toyota.
- The results obtained in the scope of the Research contract on "autonomous driving" have been patented by Inria, Insa and Toyota.
- Acquisition of a Pepper robot, funded by INSA de Lyon and CITI-Inria lab., and acquisition of 4 Crazyflies robots, funded by the CITI lab.

5.1.1. Awards

- Christian Laugier was awarded IROS Fellow at IROS 2016 and received the IROS Distinguished Award citation for his Outstanding Services to IROS Advisory/Steering Committee and IROS Conferences.

COMPSYS Team

5. Highlights of the Year

5.1. Highlights of the Year

Scientific Results and Dissemination

Despite the approaching end of Compsys, we continued the objectives we fixed for Compsys III, i.e., pushing static compilation beyond its present limits, both in terms of techniques and applications. Our most important efforts in 2016 were to extend static analysis from sequential codes to parallel specifications and languages, to develop polynomial techniques, and to increase inter-disciplinary collaborations and dissemination towards HPC users and their applications. The most important results in 2016 are the following:

- **Publications** Well recognized in the polyhedral community, we got three papers at IMPACT'16, the central event of this community, one paper at the main compiler conference (CC'16), and a last one in the field of FPGA, which remains an important target for polyhedral optimizations. See Sections 7.1 to 7.7 for more details.
- **Interdisciplinary spring school** With colleagues from HPC numerical simulation, we organized a very successful inter-disciplinary event in May 2016, to bridge the gap between polyhedral compilation and HPC users. See details in Section 10.1 .
- **Move towards HPC users** In addition to the spring school we organized, we increased our activity towards HPC users and their applications through the supervision of the internship of J. Versaci (quantum physics), the reviewing of T. Gasc's PhD thesis (fluid dynamics), and the regular contacts with the LMGC lab (mechanics).
- **PhD theses** The end of Compsys coincided also with the end of two PhD theses, the PhD thesis of Guillaume Iooss [16] and the PhD thesis of Alexandre Isoard [17], see Section 10.2.2 .
- **Final evaluation** The team was evaluated in March 2016, this was also its final evaluation.

Final Evaluation and End of Compsys

Compsys has been created in 2002 as an Inria team, then in 2004 as an Inria project-team, and evaluated by Inria first in 2007, then in 2012. It was evaluated again in March 2016, which was its final evaluation because an Inria project-team is limited to 12 years. The construction of a new project was planned in early 2015, following the shift in the research directions that started in the second half of Compsys III. A few tentative research directions were:

- 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 made this future impossible. We nevertheless continued in 2016, in particular to present our activities in this last evaluation, until the three last members had to split in three different cities (Lyon, Paris, Rennes). We report here some of the comments made by the external reviewers that, we think, summarize well some aspects of our efforts, successes, and difficulties during 15 years:

- *Compsys established and matured the polyhedral optimization approach, which is the state of the art for locality and parallelism optimization in optimizing compilers. The project has had world-wide impact.*
- *We strongly recommend that the members of the team are accommodated in Camus, Cairn, Parkas, or another complementary Inria team, irrespective of the geographical location. Otherwise, Inria will lose one of its peaks of research excellence in Computer Science.*
- *This team is a prime example where Inria requirements on teams are damaging science and collaboration.*
- *This team has produced many impactful results and is considered as the Polyhedral center of excellence. It is globally recognized for its research in both front-end (polyhedral optimizations) and back-end (graph optimizations) compiler optimization techniques integrating elegant foundational theory with real implementation on various architectures (multi-core, FPGAs, DSP, GPU etc.).*
- *In back-end optimizations, the team had developed the state-of-the-art SSA and decoupled register allocation techniques that are important to achieving peak performance.*
- *They have internationally visible and impactful research in compilers, technology transfer to companies through collaborations and through start-ups. They raised the global awareness of polyhedral analysis through creation of workshops, summer schools etc., essentially reviving interest in the topic about a decade ago, and finally educating next-generation of researchers in this area, who are now contributing to both academic and industrial research landscape in France and beyond.*
- *The start-up company (XtremLogic on HLS) is an excellent concrete evidence of technology transfer from the team. [...] In the future, a more careful analysis of the trade-off between technology transfer and academic research is necessary for small project teams so that a promising research direction does not get jeopardized in Inria.*
- *The Compsys team has truly achieved research excellence in compilation techniques. Unfortunately, the future of the team remains uncertain due to administrative policies. Inria should enable the team to continue with their research strengths in polyhedral analysis and graph-theory based SSA-type optimizations.*

CONVECS Project-Team (section vide)

CORSE Project-Team (section vide)

CTRL-A Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Outstanding publications

Results from our work in the ANR project Ctrl Green (see Section 7.2.1) were published in IEEE Transactions on Software Engineering [16].

Our work on Control of Autonomic Parallelism Adaptation on Software Transactional Memory [20] was nominated in the short list for best papers at the International Conference on High Performance Computing & Simulation (HPCS 2016), Innsbruck, Austria, July 2016.

5.1.2. 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 International Workshop on Autonomic High Performance Computing (AHPC 2016) (<http://hpcs2016.cisedu.info/2-conference/workshops—hpcs2016/workshop08-ahpc>) as part of the International Conference on High Performance Computing & Simulation (HPCS 2016) (<http://hpcs2016.cisedu.info> or <http://cisedu.us/rp/hpcs16>), July 18 - July 22, 2016, The University of Innsbruck, Innsbruck, Austria ; and PC member of the two major conferences on the topic : the 13th IEEE International Conference on Autonomic Computing (ICAC 2016) Wuerzburg, Germany, July 19-22, 2016 (<http://icac2016.uni-wuerzburg.de>) and the 4th International Conference on Cloud and Autonomic Computing (ICCAC 2016), Augsburg, Germany on September 12-16, 2016 (<http://iccac2016.se.rit.edu>), Part of FAS* - Foundation and Applications of Self* Computing Conferences, Collocated with the IEEE Self-Adaptive and Self-Organizing System Conference.

He is PC member of the 2017 edition of these two conferences as well.

He is invited editor of Cluster Computing, The Journal of Networks, Software Tools and Applications (Springer), for the special issue of ICCAC 2015 Best Papers (<http://link.springer.com/journal/10586/19/2/page/1>).

He is PC member for the SEfSAS Book 3 (Software Engineering for Self-Adaptive Systems: Assurances) Volume 3 to be published by Springer LNCS as nr. 9640 in 2017.

Gwenaël Delaval is PC member of the International Workshop on Autonomic High Performance Computing (AHPC 2016).

- control:

Eric Rutten is organizer of an Open Invited Track on "Control for Computing Systems" at the 20th IFAC World Congress, to be held in Toulouse, July 9-14, 2017, (<https://www.ifac2017.org/OIT#geht5>).

He is PC member of the 13th International Workshop on Discrete Event Systems (WODES 2016), Xi'an, China on May 30 - June 1, 2016 (<http://wodes2016.diee.unica.it>).

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>).

5.1.3. Invited talk

Eric Rutten was invited to give a talk at the 9th Cloud Control Workshop (by invitation only), Stockholm, June 27-29 2016 (<http://cloudresearch.org/workshops/9th>) and at the séminaire LIP / Avalon, 16 février 2016, ENS Lyon (<https://intranet.inria.fr/Actualite/SEMINAIRE-16-02-16-ERIC-RUTTEN-ENS-DE-LYON>).

DANTE Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Network Science Semester

Dante organised in 2016 a full semester on Network Science (<https://project.inria.fr/netspringlyon/>) in conjunction with the SiSyPhe team at ENS de Lyon, the Centre de Physique Théorique of Marseille, the Excellence Laboratory MILYON and the Institute of Scientific Interchange of Turino. This program intends to cover both the basics of and recent advances in Network Science. These questions, which are in the focus of contemporary network science, set the scope of the actual proposal where we aim to bring together world-known experts from the fields of mathematics, physics, signal processing, computer science, social science, epidemiology and linguistic to discuss and enhance our understanding about the interaction between the structure, evolution, and coupled dynamical processes of complex networks. The semester gathered 2 workshops and 1 conference. during the two workshop, 14 invited speakers spend time within Dante in short or long visit. Members of Dante also organised in June Socionet (<http://www.socionet2016.fr>) for young researchers and focus on the interdisciplinary meeting on social network: description, data, modelling, interpretation. It was a great success with a Datathon organised by the PhD student and PostDoc of DANTE.

5.1.2. Frutfull collaboration with GranData (<http://www.grandata.com/>)

Grandata integrates first-party and telco partner data to understand key market trends, predict customer behaviour, and deliver novel business results. We have published several papers [12], [41], [36], [11], [10] in collaboration with them on the socioeconomic correlations and stratification in social-communication networks, on the impact of university admission on freshmen' social egocentric network, on the correlations of consumption patterns in social-economic networks but also to validate DTN like protocols by taking benefits of the density and locality of urban communication patterns.

DATAMOVE Team (section vide)

DICE Team (section vide)

DRACULA Project-Team (section vide)

ERABLE Project-Team (section vide)

EXMO Project-Team (section vide)

IBIS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

A paper based on the PhD thesis of Manon Morin was published in *Molecular Microbiology* this year [14]. Furthermore, two papers appeared in *PLoS Computational Biology*, one by Eugenio Cinquemani and colleagues from the LIFEWARE project-team and the University of Pavia [13], and one describing results from the PhD thesis of Nils Giordano, in collaboration with colleagues from the BIOCORE project-team [12]. Eugenio Cinquemani co-organized the Fifth International Conference on Hybrid Systems Biology (HSB 2016) (<http://hsb2016.imag.fr/>) in Grenoble.

IMAGINE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- We had one paper accepted to EUROGRAPHICS [10].
- Our work on virtual paper crumpling, published in ACM TOG paper in Dec. 2015 [5], was presented at ACM SIGGRAPH 2016 in Anaheim (July 2016). Moreover, our paper on the sound of virtual paper [24] received the best paper award at the ACM-EG Symposium on Computer Animation (SCA) 2016.
- We participated to two state of the art papers published in Computer Graphics Forum, respectively on Adaptive physically based models in computer graphics [13], and on 3D Skeletons [15].
- The paper The 2D Shape Structure Dataset: A User Annotated Open Access Database. Axel Carlier, Kathryn Leonard, Stefanie Hahmann, Geraldine Morin, Misha Collins. SMI'16, Computer & Graphics 58, pp. 23-30 (2016).received the "Reproducibility Award" (<http://www.reproducibilitystamp.com>).
- Four students defended their PhD within the team.
- Anatoscope, the start-up founded by François Faure and Olivier Palombi, was selected by *Sud De France Développement* to have a booth at the CES, Las Vegas, in January. They featured a live demonstration of the Living Book of Anatomy.
- The first FUI project Collodi with TeamTo and Mercenaries engineering terminated this year. We have successfully delivered the physics simulation engine for cloth and hair to include it in the commercial distribution of the project. A second FUI project Collodi 2 focusing on animation is starting in December 2016.

4.1.1. Awards

BEST PAPERS AWARDS :

[24] Eurographics/ ACM SIGGRAPH Symposium on Computer Animation (2016). C. SCHRECK, D. ROHMER, D. L. JAMES, S. HAHMANN, M.-P. CANI.

MAVERICK Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Presentations at Siggraph

The paper “Flow-Guided Warping for Image-Based Shape Manipulation” co-authored by Romain Vergnes and Georges-Pierre Bonneau was presented at Siggraph 2016 [3]. The paper is completed by an open-source software running on mobile phones that allow interactive manipulation of images (<http://bonneau.meylan.free.fr/ShwarpIt/ShwarpIt.html>). See sections 6.7 and 7.1.3 .

MISTIS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- The Pixyl startup (<http://pixyl.io>) created in March 2015 by F. Forbes (Mistis) with M. Dojat (INSERM), a former Mistis post-doctoral fellow S. Doyle (CEO) and IT Translation is one of the two Inria start-ups winners of the NETVA 2016 competition. S. Doyle travelled to Washington to take part in a personalized support program to learn about the North American markets. The NETVA competition is open to French hi-tech start-ups. It is organized by the science and technology departments of the French embassies in Canada and the USA. Pixyl develops neuro-imaging software which automatically analyses brain lesion load using MRI scans, for improved decision-making during clinical trials and routine clinical use.
- Vision 4.0 FUI Minalogic project: Mistis is one of the 4 partners in the Vision 4.0 project that started in October 2016. This is one of the 8 projects funded by the Minalogic Pôle de compétitivité in 2016. The support is of 3.4 Meuros.

5.1.1. Awards

- 2016 Award for Outstanding Contributions in Neural Systems. Antoine Deleforge (now with the PANAMA team, Inria Bretagne-Atlantique), Florence Forbes (MISTIS team) and Radu Horaud (PERCEPTION team) received the 2016 Hojjat Adeli Award for Outstanding Contributions in Neural Systems for their paper: A. Deleforge, F. Forbes, and R. Horaud (2015), Acoustic Space Learning for Sound-source Separation and Localization on Binaural Manifolds, *International Journal of Neural Systems*, 25:1,(21 pages) [75]. The Award for Outstanding Contributions in Neural Systems established by World Scientific Publishing Co. in 2010, is awarded annually to the most innovative paper published in the previous volume/year of the *International Journal of Neural Systems*.
- MITACS Globalink Research Award - Inria - for research in Canada. Alexis Arnaud received the MITACS award and a 5 kdollars grant to spend 5 months in the Mathematics and statistics department of McGill University in Montreal, Canada, working with Prof. Russel Steele.

MORPHEO Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The work on estimating the visual contrast on a 3D mesh has been awarded the best paper award at the Pacific Graphics 2016 conference.

BEST PAPERS AWARDS :

[] **Computer Graphics Forum**. G. NADER, K. WANG, F. HÉTROUY-WHEELER, F. DUPONT.

NANO-D Project-Team (section vide)

NECS Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- C. Canudas de Wit has been elevated to the grade of Fellow of the IEEE.
- C. Canudas de Wit has been named a Fellow of the IFAC (International Federation of Automatic Control).
- C. Canudas de Wit has received an ERC Advanced Grant for the project “Scale-FreeBack”.
- The GTL platform and website went public in November.
- G. De Nunzio received the “Prix de thèse 2016 de la COMUE Université Grenoble Alpes” for his doctoral work, co-advised by C. Canudas de Wit and P. Moulin.
- A. Kibangou defended his HDR (Habilitation à diriger les recherches).
- P. Frasca and M.L. Delle Monache have joined the team as permanent researchers.
- H. Fourati has edited the book “Recent Advances on Multisensor Attitude and Heading Estimation: Fundamental Concepts and Applications”, by Taylor & Francis Group LLC.

NUMED Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

In the context of a long standing collaboration with Sanofi group, E. Grenier develops a software for the study of the stability of vaccines. This software has been used in a formal presentation of a new vaccine to the FDA (Food and Drug Administration).

4.1.1. Awards

Vincent Calvez has been award the prize of the European Mathematical Society (2016).

PERCEPTION Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- **The three-year FP7 STREP project *Embodied Audition for Robots* successfully terminated in December 2016.** The project has addressed the problem of robot hearing, more precisely, the analysis of audio signals in complex environments: reverberant rooms, multiple users, and background noise. In collaboration with the project partners, PERCEPTION contributed to audio-source localization, audio-source separation, audio-visual alignment, and audio-visual disambiguation. The humanoid robot NAO has been used as a robotic platform and a new head (hardware and software) was developed: a stereoscopic camera pair, a spherical microphone array, and the associated synchronization, signal and image processing software modules.
- This year, PERCEPTION started a one year collaboration with the **Digital Media and Communications R&D Center, Samsung Electronics** (Seoul, Korea). The topic of this collaboration is *multi-modal speaker localization and tracking* (a central topic of the team) and is part of a strategic partnership between Inria and Samsung Electronics.

4.1.1. Awards

- **Antoine Deleforge** (former PhD student, PANAMA team), **Florence Forbes** (MISTIS team) and **Radu Horaud** received the **2016 Award for Outstanding Contributions in Neural Systems** for their paper: "Acoustic Space Learning for Sound-source Separation and Localization on Binaural Manifolds," International Journal of Neural Systems, volume 25, number 1, 2015. The Award for Outstanding Contributions in Neural Systems established by World Scientific Publishing Co. in 2010, is awarded annually to the most innovative paper published in the previous volume/year of the International Journal of Neural Systems.
- **Xavier Alameda-Pineda** and his co-authors from the University of Trento received the **Intel Best Scientific Paper Award** (Track: Image, Speech, Signal and Video Processing) for their paper "Multi-Paced Dictionary Learning for Cross-Domain Retrieval and Recognition" presented at the 23rd IEEE International Conference on Pattern Recognition, Cancun, Mexico, December 2016 .

BEST PAPERS AWARDS :

[41] **IEEE International Conference on Pattern Recognition.** D. XU, J. SONG, X. ALAMEDA-PINEDA, E. RICCI, N. SEBE.

PERSVASIVE INTERACTION Team (section vide)

POLARIS Team (section vide)

PRIVATICS Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

In 2014, Jagdish Prasad Achara, Mathieu Cunche and Vincent Roca published with Aurelien Francillon from Eurecom a study on the Wi-Fi permissions used by mobile applications and their privacy implications. Two years after our research was published, the Federal Trade Commission (FTC) reached a \$950,000 settlement with InMobi for tracking millions of consumers' locations, including children, without their knowledge. The FTC allege that InMobi abused the WiFi State information on the Android system to track the location of people without their consent, which is exactly what we showed in our research. Its policy prevents the FTC of releasing the sources of its investigations, therefore there is no way to affirm that our research triggered this investigation or was used during this investigation. We can only be sure that we identified a privacy issue that was serious enough to justify an investigation of the FTC and a penalty of \$950,000. In addition to this, the company is under surveillance for their privacy behaviour for the next 20 years.

4.1.1. Awards

The software `MyTrackingChoices` designed by Claude Castellucia and Jagdish Prasad Achara from Privatics in collaboration with Javier Parra (former member of Privatics and now at Universitat Politecnica de Catalunya) was awarded 'Data protection by design' award by the Catalan Data Protection Authority.

ROMA Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

- Anne Benoit was the program chair of HiPC 2016 and the Algorithm-track vice-chair for SC'16.

5.1.1. Awards

- Yves Robert was awarded the *2016 Outstanding Service Award* of the *IEEE Technical Committee on Parallel Processing (TCPP)*

SOCRATE Project-Team

4. Highlights of the Year

4.1. Highlights of the Year

- The SPIE group's digital services subsidiary, and INSA Lyon announce their joint inauguration of a teaching and research chair in the Internet of Things (IoT). Backed by the CITI laboratory (Centre of Innovation in Telecommunications and Integration of service), this chair is being set up within the context of the future technological and social upheaval entailed by the Internet of Things. It will closely involve the skills of the laboratory within the IoT theme and will aim to develop and promote the know-how of SPIE ICS, the first digital services provider to appoint a chair, and INSA Lyon, through a research program aimed at innovation. Jean-Marie Gorce will be responsible for administration the chair funding within the Citi lab.
- The numap memory profiling library (developped in the team during Manuel Selva's PhD work) has been officially integrated into the Turnus dataflow profiler. Turnus [54] is a profiler dedicated to dynamic dataflow programs.
- Samir M. Perlaza and Selma Belhadj Amor delivered the tutorial "**Simultaneous Energy and Information Transmission**" in: (a)**International Conference on Telecommunications (ICT)**, Thessaloniki, Greece, May, 2016; (b)**International Conference on Cognitive Radio Oriented Wireless Networks (CROWNCOM)**, Grenoble, France, May, 2016; (c)**European Wireless Conference (EW)**, Oulu, Finland, May, 2016, together with Ioannis Kikridis (University of Cyprus, Cyprus).

SPADES Project-Team (section vide)

STEPP Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

This year represents an important landmark in the life of the team, who witnessed the first PhD defense since it has been formed.

The thesis of Jean-Yves Courtonne beared on ecological accounting, with the inception and implementation of a new downscaling method allowing us to track material flow through supply chains at various nested geographical scales; the method also provides an assessment of the associated environmental pressures and an analysis of the errors of the process. This thesis has been recognized by the two referees as a major step forward in France in this field. Four articles have come out of this work; they are published or considered for publication in the leading journals in the field.

A second PhD defense took place this year, by Laurent Gilquin who did most of his PhD studies in STEEP before he followed his supervisor (E. Arnaud) to the AIRSEA project-team.

THOTH Project-Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

- Cordelia Schmid received the Humboldt Research Award, granted by the Alexander von Humboldt Foundation.
- Cordelia Schmid was awarded the Longuet-Higgins Prize at CVPR 2016 for the paper co-authored with Svetlana Lazebnik (University of Illinois at Urbana-Champaign) and Jean Ponce (ENS Paris/Inria) entitled "Beyond bags of features: spatial pyramid matching for recognizing natural scene categories".
- Cordelia Schmid was awarded the Inria - Académie des Sciences Grand Prize 2016.
- Thoth is one of the recipients of a hardware donation in the Facebook AI Research Partnership Program.
- Julien Mairal was awarded one of the ERC starting grants 2016.

TYREX Project-Team (section vide)

URBANET Team

5. Highlights of the Year

5.1. Highlights of the Year

5.1.1. Awards

The paper by A. Boubrima *et al.* - “Cost-Precision Tradeoffs in 3D Air Pollution Mapping using WSN” received the Best Paper Award at the 2nd International Symposium on Ubiquitous Networking (UNET 2016).

Ahmed Boubrima was awarded the third place in the Best MS Thesis competition by IEEE ComSoc Chapter France for his work on optimal deployment of wireless sensor networks to monitor urban pollution (supervised by Walid Bechkit and Hervé Rivano).

BEST PAPERS AWARDS :

[13] UNET 2016 - 2nd International Symposium on Ubiquitous Networking. A. BOUBRIMA, W. BECHKIT, H. RIVANO, L. SOULHAC.