Activity Report 2016

Section Contracts and Grants with Industry

ARIC Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Bosch (Germany) ordered us some support for implementing complex numerical algorithms.

7.2. Bilateral Grants with Industry

- Marie Paindavoine is supported by an Orange Labs PhD Grant (from October 2013 to November 2016). She works on privacy-preserving encryption mechanisms.
- Miruna Rosca and Radu Titiu are employees of BitDefender. Their research internships (from October to December 2016) are supervised by Damien Stehlé and Benoît Libert, respectively. Miruna Rosca works on the foundations of lattice-based cryptography, and Radu Titiu works on functional encryption.
- Within the program Nano 2017, we collaborate with the Compilation Expertise Center of STMicroelectronics on the theme of floating-point arithmetic for embedded processors.

COMPSYS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Since the team was going to be stopped, Compsys did not try to establish any long-term contract with industry.

8.2. Bilateral Grants with Industry

Same situation.

CONVECS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

Participants: Umar Ozeer, Gwen Salaün.

Umar Ozeer is supported by a PhD grant (from November 2016 to November 2019) from Orange Labs (Grenoble) on detecting and repairing failures of data-centric applications distributed in the cloud and the Internet of Things (see § 6.5.1), under the supervision of Xavier Etchevers (Orange Labs), Gwen Salaün (CONVECS), François Gaël Ottogalli (Orange Labs), and Jean-Marc Vincent (POLARIS project-team).

CORSE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

- PSAIC Nano2017 is a bilateral Grant with STMicroelectronics. CORSE is involved in the development of trace analysis and hybrid compilation.

- DEMA Nano2017 is a bilateral Grant with STMicroelectronics. CORSE is involved in the development of debugging of multithreaded applications.

7.2. CIFRE contracts

- CORSE is involved in a contract with Kalray associated with the CIFRE PhD of Duco van Amstel who defended in Spring 2016. The subject of the collaboration is related to fine grain scheduling.

- CORSE is involved in a contract with Aselta for the CIFRE thesis of Nassim Halli. Nassim Halli was advised by Henri-Pierre Charles (CEA LIST, Grenoble and Jean-François Méhaut. The subject of this thesis is the code optimization of Java Applications. The thesis was defended in October 2016.

- CORSE is also involved in a contract with STMicroelectronics for the CIFRE thesis of Oleg Iegorov. The subject of this thesis is a Data Mining Approach to Temporal Debugging of Embedded Streaming Applications. Oleg Iegorov was advised by the SLIDE LIG team and the CORSE Inria team. The thesis was defended in April 2016.

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Worldline Wordline is a leader in B2B applications development, and is in the front line to provide new technical solution in the Web 2.0 era. We have a CIFRE partnership contract on the study of flow based architectures both at the data centers and at the Web browser level.

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. IPSec with pre-shared key for MISTIC security

Title: IPSec with pre-shared key for MISTIC security.

Type: CIFRE.

Duration: Juillet 2014 - Juillet 2017.

Coordinator: Inria

Others partners: Privatics, Moais and Incas-ITSec.

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- INRIA and Orange Labs have established this year a joint virtual research laboratory, called I/O LAB. We have been heavily involved in the creation of the laboratory and are actively involved in its operation (Jean-Bernard Stefani is one of the two co-directors of the lab). I/O LAB focuses on the network virtualization and cloudification. As part of the work of I/O LAB, we have cooperated with Orange Lab, as part of a cooperative research contract funded by Orange, on defining architectural principles and frameworks for network cloud infrastructures encompassing control and management of computing, storage and network resources.

- With Daimler (subcontracting via iUTBS): We have shown how to extend our current method for computing deadline miss models to real-time systems designed according to the Logical Execution Time paradigm.

7.2. Bilateral Grants with Industry

With Thales: Early Performance assessment for evolving and variable Cyber-Physical Systems. This CIFRE grant funds the PhD of Christophe Prévot.

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- CIFRE PhD thesis (N. Akhadkar) with Schneider Electric.

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

CIFRE PhD with SCHNEIDER (2015-2018).   F. Forbes and S. Girard are the advisors of a CIFRE PhD (T. Rahier) with Schneider Electric. The other advisor is S. Marié from Schneider Electric. The goal is to develop specific data mining techniques able to merge and to take advantage of both structured and unstructured (meta)data collected by a wide variety of Schneider Electric sensors to improve the quality of insights that can be produced. The total financial support for MISTIS is of 165 keuros.

PhD contract with EDF (2016-2018).   S. Girard is the advisor of a PhD (A. Clément) with EDF. The goal is to investigate sensitivity analysis and extrapolation limits in Extreme value theory with application to river flows analysis.

NANO-D Project-Team (section vide)

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. ALSTOM

Contract with ALSTOM in the framework of Inria/ALSTOM joint laboratory, and CIFRE PhD grant of Simon Gerwig. This thesis explores collaborative and reconfigurable resilient control design of hydroelectric power plants; current work is on improving performance of a hydro-electric power-plant outside its design operation conditions, by cancellation of oscillations that occur in such operation range.

AIRSEA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

A 3-year contract with ARTELIA Group: funding for the PhD thesis of M.P. Daou (CIFRE)

A 3-year contract named ALBATROS with Mercator-Ocean on the topic « Interaction océan, vagues, atmosphère à haute résolution ».

A 1-year contract with NOVELTIS on the thematic "Développement de démonstrateurs avec AGRIF": see 6.1

A 1-year contract with IFREMER on the thematic "Evolution de la librairie de raffinement de maillage en Fortran (AGRIF) : amélioration de la prise en compte du trait de côte et des frontiéres ouvertes en contexte paralléle MPI/OpenMP" : see 6.1

The Chair OQUAIDO – for "Optimisation et QUAntification d'Incertitudes pour les Données Onéreuses" in French – is the chair in applied mathematics held at Mines Saint-Étienne (France). It aims at gathering academical and technological partners to work on problems involving costly-to-evaluate numerical simulators for uncertainty quantification, optimization and inverse problems. This Chair, created in January 2016, is the continuation of the projects DICE and ReDICE which respectively covered the periods 2006-2009 and 2011-2015.

BEAGLE Project-Team (section vide)

<div align="center">**DRACULA Project-Team**</div>

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

The industrial connections of the Dracula team have been made through the "Modeling of the immune response" project. Contacts have been established with both large pharmaceutical companies (Sanofi-Pasteur and Merial) and SMEs (AltraBio and The Cosmo Company). The now finished ANR PrediVac project included the two aforementioned SMEs and therefore strengthened the ties between Dracula and its industrial local ecosystem. The same consortium applied to ANR grants on close research topics in 2016. Furthermore, the ties with The Cosmo Company have been strenghened through a joint CIFRE PhD (see below).

7.2. Bilateral Grants with Industry

A recent cooperation has been initiated with the start up "Neolys Diagnostics" about radiotherapy effects on healthy cells and tumor cells. A PhD student, Aurélien Canet, has started his doctorate studies in January 2016 paid for one half by the start up and for the other half by the labex Milyon. Aurélien Canet is co-supervized by Larry Bodgi (from Neolys), Nicolas Foray (from Inserm) and Laurent Pujo-Menjouet.

7.3. Bilateral Grants with Industry

Celine Vial is scientific responsible of a contract with the European Consortium Eurokin and in collaboration with IFP "Energies nouvelles" on the topic: "Design experiments, sensibility and uncertainty analysis and kriging". The delivrable: "How accurate is my model?" Report by Celine Vial (80 pages).

ERABLE Project-Team (section vide)

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

7. Bilateral Contracts and Grants with Industry

7.1. BGene

Participants: Johannes Geiselmann, Hidde de Jong, Corinne Pinel.

BGene is a start-up company of Université Grenoble Alpes in the field of DNA engineering. BGene proposes efficient and custom-made modifications of bacterial genomes, leaving no scars or antibiotics resistance genes. The company has know-how and expertise at all stages of the development process, including the *in-silico* design of a desired construction, the choice of the appropriate genetic tools, and the delivery of the finished product. Former IBIS-member Caroline Ranquet and Johannes Geiselmann are co-founders of BGene, together with Marie-Gabrielle Jouan (Floralis, Université Grenoble Alpes). Johannes Geiselmann and Hidde de Jong are members of its scientific advisory board. For more information on BGene, see http://www.bgene-genetics.com/.

7.2. Genostar

Participants: Hidde de Jong, Michel Page, François Rechenmann.

Genostar, an Inria start-up created in 2004, provides bioinformatics solutions for the comparative analysis of bacterial genomes, proteomes and metabolomes. Genostar's software suite performs the annotation of sets of genomic sequences, *i.e.*, the identification of the coding sequences and other features, followed by the prediction of the functions of the gene products. The modules which make up the software suite were originally developed within the Genostar consortium and the HELIX project team at Inria Grenoble - Rhône-Alpes. The software suite also includes the modeling and simulation tool GNA developed by members of IBIS (Section 5.1). Genostar offers a comprehensive service line-up that spans genome sequencing, read assembly, annotation, and comparison. Genostar thus works with trusted subcontractors, each specialized in state-of-the-art sequencing technologies. François Rechenmann is CEO of the company. For more information, see http://www.genostar.com.

NUMED Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

- Long standing contract with Sanofi company, on the stability of vaccines. This contract leads to the design and coding of a complete software devoted to the study of the degradation of vaccines. This software has been used in presentations of new vaccines to the FDA.
- Modeling of the quality of glass for a small French company.

<div align="center">

STEEP Project-Team

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8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

The PhD thesis of Jean-Yves Courtonne has been co-sponsored by ARTELIA and Inria, via a bilateral contract.

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

7.1.1. *NewGeneration-SR*

We have a collaboration with the company NewGeneration-SR (http://newgeneration-sr.com/). The aim of this company is to reduce the energy impact through solutions at each layer of the energy consumption (from datacenter design and the production to usage). NewGeneration-SR improves the life cycle (design, production, recycling) in order to reduce the environmental impact of it. NewGeneration-SR was member of the Nu@ge consortium: one of five national Cloud Computing projects with "emprunts d'avenir" funding. With a CIFRE PhD student (Daniel Balouek-Thomert), we are developing models to reduce the energy consumption for the benefit of data-center.

7.1.2. *IFPEN*

We also have a collaboration with IFPEN (http://ifpenergiesnouvelles.com/). IFPEN develops numerical codes to solve PDE with specific adaption of the preconditioning step to fit the requirement of their problems. With a PhD student (Adrien Roussel) we are studying the parallel implementation of multi-level decomposition domains on many-core architecture and GPGPU.

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

Our cooperation with CEA LETI/LIST DACLE at Grenoble Minatec is bilateral, involving the CEA PhD grant of Adja Sylla, to work with F. Pacull and M. Louvel on high-level programming on top of a rule-based middleware.

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. GranDATA

Participants: Márton Karsai [correspondant], Éric Fleury.

Founded in 2012, Grandata is a Palo Alto-based company that leverages advanced research in Human Dynamics (the application of âbig dataâ to social relationships and human behaviour) to identify market trends and predict customer actions. Leading telecom and financial services firms are using Grandataâs Social Universe product to transform âbig dataâ into impressive business results.

The DANTE team and Grandata started to collaborate in 2014 on the analysis of large datasets provided by the company. The aim of the collaboration is to gain better understanding about the dynamical patterns of human interactions, mobility, and the socio-economic structure of the society.

8.1.2. STACC, Skype/Microsoft Labs

Participant: Márton Karsai [correspondant].

The Software Technology and Applications Competence Centre (STACC) is a research and development centre conducting high-priority applied research in the field of data mining and software and services engineering. Together with Skype/Microsoft Labs, STACC maintains a long lasting research collaboration with Márton Karsai (DANTE) on the modelling the adoption dynamics of online services.

8.2. Inria Alcatel-Lucent Bell Labs joint laboratory

Participants: Isabelle Guérin Lassous, Paulo Gonçalves Andrade, Thomas Begin, Éric Fleury [correspondant].

The main scientific objectives of the collaboration within the framework Inria Alcatel-Lucent Bell Labs joint laboratory is focused on network science:

- to design efficient tools for measuring specific properties of large scale complex networks and their dynamics;
- to propose accurate graph and dynamics models (*e.g.*, generators of random graph fulfilling measured properties);
- to use this knowledge with an algorithmic perspectives, for instance, for improving the QoS of routing schemes, the speed of information spreading, the selection of a target audience for advertisements, etc.

8.3. Bilateral Grants with Industry

8.3.1. Orange R&D

Participant: Isabelle Guérin Lassous.

A contract has been signed between Inria and France Télécom for the PhD supervision of Laurent Reynaud. The PhD thesis subject concerns mobility strategies for fault resilience and energy conservation in wireless networks.

DATAMOVE Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

BULL-ATOS SE (2015-2018). Two PhD grants (David Glesser and Michael Mercier). Job and resource management algorithms.

7.2. Bilateral Grants with Industry

CEA DAM (2016-2018). PhD grant support contract (PhD of Estelle Dirand, funded by CEA). In situ analysis for Molecular Simulations.

<p align="center">**POLARIS Team**</p>

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry: Alcatel Lucent-Bell

A common laboratory between Inria and the Alcatel Lucent-Bell Labs was created in early 2008 and consists on three research groups (ADR). POLARIS leads the ADR on self-optimizing networks (SELFNET). The researchers involved in this project are Bruno Gaujal and Panayotis Mertikopoulos.

- Contract with Schneider Electric (2015–2018). Distributed optimization in electrical distribution networks. Associated to a CIFRE PhD grant (Benoît Vinot, started in 4/2015). Partners: Inria (Polaris), Schneider Electric, G2ELab.

7.2. National Initiatives

7.2.1. ANR

- *GAGA (2014–2017)*
  GAGA is an ANR starting grant (JCJC) whose aim is to explore the Geometric Aspects of GAmes. The GAGA team is spread over three different locations in France (Paris, Toulouse and Grenoble), and is coordinated by Vianney Perchet (ENS Cachan). Its aim is to perform a systematic study of the geometric aspects of game theory and, in so doing, to establish new links between application areas that so far appeared unrelated (such as the use of Hessian Riemannian optimization techniques in wireless communication networks).

- *MARMOTE (2013–2016)*
  Partners: Inria Sophia (MAESTRO), Inria Rocquencourt (DIOGEN), Université Versailles-Saint-Quentin (PRiSM lab), Telecom SudParis (SAMOVAR), Université Paris-Est Créteil (*Spécification et vérification de systèmes*), Université Pierre-et-Marie-Curie/LIP6.
  The project aims at realizing a software prototype dedicated to Markov chain modeling. It gathers seven teams that will develop advanced resolution algorithms and apply them to various domains (reliability, distributed systems, biology, physics, economy).

- *NETLEARN (2013–2017)*
  Partners: Université Versailles – Saint-Quentin (PRiSM lab), Université Paris Dauphine, Inria Grenoble (POLARIS), Institut Mines–Telecom (Telecom ParisTech), Alcatel–Lucent Bell Labs (ALBF), and Orange Labs.
  The main objective of the project is to propose a novel approach of distributed, scalable, dynamic and energy efficient algorithms for mobile network resource management. This new approach relies on the design of an orchestration mechanism of a portfolio of algorithms. The ultimate goal of the proposed mechanism is to enhance the user experience, while at the same time ensuring the more efficient utilization of the operator's resources.

- *ORACLESS (2016–2021)*
  ORACLESS is an ANR starting grant (JCJC) coordinated by Panayotis Mertikopoulos. The goal of the project is to develop highly adaptive resource allocation methods for wireless communication networks that are provably capable of adapting to unpredictable changes in the network. In particular, the project will focus on the application of online optimization and online learning methodologies to multi-antenna systems and cognitive radio networks.

- *ANR SONGS, 2012–2016*. Partners: Inria Nancy (Algorille), Inria Sophia (MASCOTTE), Inria Bordeaux (CEPAGE, HiePACS, RunTime), Inria Lyon (AVALON), University of Strasbourg, University of Nantes.

  The last decade has brought tremendous changes to the characteristics of large scale distributed computing platforms. Large grids processing terabytes of information a day and the peer-to-peer technology have become common even though understanding how to efficiently exploit such platforms still raises many challenges. As demonstrated by the USS SimGrid project funded by the ANR in 2008, simulation has proved to be a very effective approach for studying such platforms. Although even more challenging, we think the issues raised by petaflop/exaflop computers and emerging cloud infrastructures can be addressed using similar simulation methodology.

  The goal of the SONGS project (Simulation of Next Generation Systems) is to extend the applicability of the SimGrid simulation framework from grids and peer-to-peer systems to clouds and high performance computation systems. Each type of large-scale computing system will be addressed through a set of use cases and led by researchers recognized as experts in this area. Any sound study of such systems through simulations relies on the following pillars of simulation methodology: Efficient simulation kernel; Sound and validated models; Simulation analysis tools; Campaign simulation management. Such aspects are also addressed in the SONGS project.

7.2.2. National Organizations

- Jean-Marc Vincent is member of the scientific committees of the CIST (Centre International des Sciences du Territoire).

- *REAL.NET (2016)*
  REAL.NET is a CNRS PEPS starting grant (JCJC) coordinated by Panayotis Mertikopoulos. Its objective is to provide dynamic control methodologies for nonstationary stochastic optimization problems that arise in wireless communication networks.

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Mumps Consortium (2014-2019)

In 2016, in the context of the MUMPS consortium (http://mumps-consortium.org):

- We have signed two new membership agreements, with Free Field Technologies and Safran in 2016, on top of the on-going agreements signed in 2014 and 2015 with Altair, EDF, ESI-Group, LSTC, Michelin, Siemens SISW (Belgium) and TOTAL.
- We have organized point-to-point meetings with several members.
- We have provided technical support and scientific advice to members.
- We have provided non-public releases in advance to members, with a specific licence.
- We have organized the second consortium committee meeting, at Michelin (Clermont-Ferrand).
- Two engineers have been funded by the membership fees, for software engineering and software development, performance study and comparisons, business development and management of the consortium.
- 0.5 year of a PhD student were funded by the membership fees (see Section 9.1).

8.2. Technological Transfer: XtremLogic Start-Up

The XTREMLOGIC start-up (former Zettice project) was initiated 5 years ago by Alexandru Plesco and Christophe Alias.

The goal of XTREMLOGIC is to provide energy-efficient circuit blocks for FPGA reconfigurable circuits. These circuits are produced automatically through an high-level synthesis (HLS) tool based on state-of-the-art automatic parallelization technologies, notably from the polyhedral community. The compiler technology transfered to XTREMLOGIC is the result of a tight collaboration between Christophe Alias and Alexandru Plesco. In a way, XTREMLOGIC can be viewed as "applied research" targetting a direct industrial application.

XTREMLOGIC won several awards and grants: Rhône Développement Initiative 2015 (loan), "concours émergence OSEO 2013" at Banque Publique d'Investissement (grant), "most promising start-up award" at SAME 2013 (award), "lean Startup award" at Startup Weekend Lyon 2012 (award), "excel&rate award 2012" from Crealys incubation center (award).

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

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

7.1.1. Research Contract with Orange Labs (2015-2017)

The goal of this project "PErformances Théoriques des réseaux cellulaires pour la 5G" No. F05151 (50KEuro) is to develop a theoretical approach allowing to study the energy efficiency spectral efficiency tradeoff for 5G networks, by revisiting information theory for dense networks and short packets transmissions.

7.1.2. Research Contract with Bosch (2015-2016)

This contract between Bosch and two project-teams (AriC and Socrate) focusses on the evolution of high-performance embedded controllers.

7.1.3. Research Contract with Sigfox (2015-2016)

A collaboration with Sigfox to work on extension of Sigfox Network to dense cities: 2 years of engineering associated to a Cifre grant

7.1.4. Research Contract with Atlantic

Socrate has a collaborative contract with Atlantic, around wireless communications in HVAC systems.

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

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- We have contracted bilateral cooperation with Rtone, an SME focusing on the connected objects area. This collaboration is associated with the CIFRE PhD grant for Alexis Duque, on the subject of Visible Light Communication.

- We have contracted bilateral cooperation with industrial and academic partners in the context of the PSPC Fed4PMR project (2015-2018). In this context, we are working on the design of new professional mobile radio solutions, compatible with 4G and 5G standards. This collaboration funds the PhD thesis of Jad Oueis and a part of the PhD thesis of Abderrahman Ben Khalifa.

8.2. Bilateral Grants with Industry

- Common Laboratory Inria/Nokia Bell Labs - ADR Green.
  UrbaNet is part of the ADR Green of the common laboratory Inria/Nokia Bell Labs. This ADR provides the PhD grant of Soukaina Cherkaoui on the channel access capacity evaluation in 5G networks.

- Spie - INSA Lyon IoT Chaire.
  Urbanet is involved in the SPIE INSA Lyon IoT Chaire, launched in November 2016. The PhD thesis work of Alexis Duque and Abderrahman Ben Khalifa are our main contributions in this structure.

- Volvo - INSA Lyon Chaire.
  Urbanet is involved in the Volvo Chaire at INSA Lyon, on the area of autonomous electrical distribution vehicle in urban environments. Razvan Stanica is a member in the steering committee of this structure.

CHROMA Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Toyota Motors Europe*

[2006 - 2017]

The contract with Toyota Motors Europe is a joint collaboration involving Toyota Motors Europe, Inria and ProBayes. It follows a first successful short term collaboration with Toyota in 2005.

This contract aims at developing innovative technologies in the context of automotive safety. The idea is to improve road safety in driving situations by equipping vehicles with the technology to model on the fly the dynamic environment, to sense and identify potentially dangerous traffic participants or road obstacles, and to evaluate the collision risk. The sensing is performed using sensors commonly used in automotive applications such as cameras and lidar.

This collaboration has been extended for 4 years and Toyota provides us with an experimental vehicle Lexus equipped with various sensing and control capabilities. Several additional connected technical contracts have been signed also.

8.1.2. *Renault*

[2010 - 2017]

This contract was linked to the PhD Thesis of Stephanie Lefèvre. The objective is to develop technologies for collaborative driving as part of a Driving Assistance Systems for improving car safety. Both vehicle perception and communications are considered in the scope of this study. An additional short-term contract (3 months) has also been signed in november 2012.

8.1.3. *IRT-Nano Perfect (2012-2014, and 2015-2017)*

Perfect is a project supported by ANR in the scope of the IRT (Technological Research Institute) Nano-electronic driven by the CEA (Nuclear Energy Agency). The partners of the project are the CEA-LETI LIALP laboratory, ST-Microelectronics and Inria. The goal of this project is to propose integrated solutions for "Embeeded Bayesian Perception for dynamic environments" and to develop integrated open platforms. During the first phase of the project (2012-2014), the focus is on the domain of transportation (both vehicle and infrastructure); health and smart home sectors will also be considered in the second phase (2015-2017).

8.2. Bilateral Grants with Industry

8.2.1. *INSA-VOLVO Chair PhD grant*

[Oct 2016 - Oct 2019]

This grant is linked to the PhD Thesis of Guillaume Bono, funded by the INSA-VOLVO Chair. The objective is to deal with Global-local Optimization Under Uncertainty for Goods Distribution Using a Fleet of Autonomous Vehicles.

EXMO Project-Team (section vide)

IMAGINE Project-Team (section vide)

MAVERICK Project-Team (section vide)

MORPHEO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. QuickCSG Contract with undisclosed industrial partner

QuickCSG software was licensed in October 2015 to an industrial partner whose name is contractually kept undisclosed for a finite time period. Integration of QuickCSG into the partner's software is continuing and is scheduled to be sold with this industrial partner's products. An additional support contract has been signed with this partner for the purpose of the transfer.

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- In December, 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.

- Over the past six years we have collaborated with Aldebaran Robotics (now SoftBank). This collaboration was part of two EU STREP projects, HUMAVIPS (2010-2012) and EARS (2014-2016). This enabled our team to establish strong connections with SoftBank, to design a stereoscopic camera head and to jointly develop several demonstrators using three different generations of the NAO robot.
  Website: https://team.inria.fr/perception/nao/

- In 2015 we started a collaboration with Xerox Research Center India (XRCI), Bangalore. This three-year collaboration (2015-2017) is funded by a grant awarded by the **Xerox Foundation University Affairs Committee (UAC)** and the topic of the project is *Advanced and Scalable Graph Signal Processing Techniques*. The work is done in collaboration with EPI MISTIS and our Indian collaborators are Arijit Biswas and Anirban Mondal.

PERVASIVE INTERACTION Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. *Learning daily routines by observing activity in a smart home.*

Members of the Pervasive interaction team are working with Orange Labs on techniques for observing activity and learning routines in a smart home. Activity is observed by monitoring use of electrical appliances and Communications media (Telephone, Television, Internet). Activities are described using Bayesian Situation Modeling techniques demonstrated in earlier projects. A log of daily activities is used to discover daily routines expressed as temporal sequences of contexts, where each context is expressed as a network of situations. Experiments will be performed using the Smart home living lab that has been constructed as part of the EquipEx Amiqual4home.

7.1.2. *IRT Silver Economy*

Participants: James Crowley, Pierre Baret, Maxime Belgodere Partners: CEA, Schneider Electric.

Members of the Pervasive Interaction team are working with the CEA and Schneider Electric to develop environmental sensors that can detect when a hospital patient or elderly person has fallen and is unable to get up. The project uses an infrared Bolometric image sensor to observe human activity. Image processing and fall detection logic are to be performed by an embedded image processor on board.

THOTH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. MSR-Inria joint lab: scientific image and video mining

Participants: Cordelia Schmid, Karteek Alahari, Yang Hua.

This collaborative project, which started in September 2008, brings together the WILLOW and Thoth project-teams with researchers at Microsoft Research Cambridge and elsewhere. It builds on several ideas articulated in the "2020 Science" report, including the importance of data mining and machine learning in computational science. Rather than focusing only on natural sciences, however, we propose here to expand the breadth of e-science to include humanities and social sciences. The project focuses on fundamental computer science research in computer vision and machine learning, and its application to archeology, cultural heritage preservation, environmental science, and sociology.

8.2. MSR-Inria joint lab: structured large-scale machine learning

Participants: Julien Mairal, Alberto Bietti, Hongzhou Lin.

Machine learning is now ubiquitous in industry, science, engineering, and personal life. While early successes were obtained by applying off-the-shelf techniques, there are two main challeges faced by machine learning in the " big data " era : structure and scale. The project proposes to explore three axes, from theoretical, algorithmic and practical perspectives: (1) large-scale convex optimization, (2) large-scale combinatorial optimization and (3) sequential decision making for structured data. The project involves two Inria sites and four MSR sites and started at the end of 2013.

8.3. Amazon

Participants: Grégory Rogez, Cordelia Schmid.

We received an Amazon Faculty Research Award end of 2016. The objective is 3D human action recognition from monocular RGB videos. The idea is to extend our recent work on human 3D pose estimation [19] to videos and to develop an approach for action recognition based on temporal pose based on appropriate 3D features.

8.4. Google

Participants: Karteek Alahari, Cordelia Schmid.

We received a Google Faculty Research Award in 2015. The objective is to interpret video semantically in the presence of weak supervision. We will focus on answering questions such as *who* is in the scene, *what* they are doing, and *when* exactly did they perform their action(s). We propose to develop models for detection and recognition of objects and actions learned from minimally annotated training data.

8.5. Facebook

Participants: Cordelia Schmid, Jakob Verbeek, Karteek Alahari, Julien Mairal.

The collaboration started in 2016. The topics include image retrieval with CNN based descriptors, weakly supervised semantic segmentation, and learning structure models for action recognition in videos. In 2016, Pauline Luc started her PhD funded by a CIFRE grant, jointly supervised by Jakob Verbeek (Inria) and Camille Couprie (Facebook). THOTH has been selected in 2016 as a recipient for the Facebook GPU Partnership program. In this context Facebook will donate a state-of-the-art server with 8 GPUs.

8.6. MBDA

Participants: Jakob Verbeek, Julien Bardonnet.

Since 2004 we have collaborated with MBDA on a variety of subjects, namely object detection, tracking and matching. Several PhD students have been funded by MBDA, and code has been transferred which is integrated in products. Our collaboration resulted in 2010 in the award of the MBDA prize for innovation. Since May 2015 we have one engineer funded by MBDA working on incremental learning of object detection models. The goal is to take pre-existing vehicle models, and to quickly adapt them to new images of these vehicles when they are acquired in the field.

8.7. Xerox Research Center Europe

Participants: Mattis Paulin, Karteek Alahari, Vladyslav Sydorov, Cordelia Schmid, Julien Mairal, Jakob Verbeek.

The collaboration with Xerox has been on-going since October 2009 with two co-supervised CIFRE scholarships (2009–2012; 2011-2014). Starting June 2014 we signed a third collaborative agreement for a duration of three years. The goal is to develop approaches for deep learning based image description and pose estimation in videos. Jakob Verbeek (Inria) and Diane Larlus (XRCE) jointly supervise a PhD-level intern for a period of 6 months in 2016-2017.

TYREX Project-Team (section vide)