



RESEARCH CENTER
Grenoble - Rhône-Alpes

FIELD

Activity Report 2015

Section Contracts and Grants with Industry

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ARIC Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. 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.
- 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 Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. ManycoreLabs Project with Kalray

Compsys was part of 3-years a bilateral contract with Kalray called ManycoreLabs, funded by “Investissements d’avenir pour le développement de l’économie numérique”. The goal of this project was to allow the company Kalray, based on a collaboration with several partners, to become the European leader of the market of many-core chips for embedded systems. Industrial partners of this project included Bull, CAPS Entreprise, Digigram, Thales, Renault. Academic partners are CEA, Inria (Parkas, Compsys, and Corse), VERIMAG.

Compsys role was to explore analysis and compilation techniques linked to streaming languages, with the Kalray MPPA platform as long-term target. The research on OpenStream described in Section 7.8 corresponds to extensions of the work package WP 2.5.3. This study showed the need for extending polyhedral techniques to polynomials, which is one of the motivation of the work described in Section 7.11. The work on parametric tiling (Section 7.7), first in the context of FPGA, then of GPUs, was also a first step towards the automatic generation of blocking algorithms for multicores such as the Kalray MPPA.

This project ended in June 2015.

8.2. Technological Transfer: XtremLogic Start-Up

The XTREMLOGIC start-up (<http://xtremlogic.com/>) was initiated, initially with the name Zettice, at the end of 2010 by Alexandru Plesco and Christophe Alias, after the PhD thesis of Alexandru Plesco under the guidance of Christophe Alias, Alain Darté and Tanguy Risset. The goal of XTREMLOGIC is to build on the disruptive technologies emerging from the polyhedral compilation community, and particularly the results obtained in Compsys, to provide the HPC market with efficient and communication-optimal circuit blocks (IP) for FPGA.

The compiler technology transferred to XTREMLOGIC (see Sections 6.2 and 7.5) is the result of a tight collaboration between Christophe Alias and Alexandru Plesco. XTREMLOGIC is one way to spread the polyhedral technology to industry. In 2015, XTREMLOGIC was supported by the Rhône Développement Initiative 2015 (loan).

CONVECS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

Participants: Hubert Garavel, Abderahman Kriouile, Radu Mateescu, Wendelin Serwe.

Abderahman Kriouile is supported by a CIFRE PhD grant (from March 2012 to March 2015) from STMicroelectronics (Grenoble) on the verification of cache coherency in systems on chip (see § 6.5.1), under the supervision of Guilhem Barthes (STMicroelectronics), Christophe Chevallaz (STMicroelectronics), Grégory Faux (STMicroelectronics), Radu Mateescu (CONVECS), Wendelin Serwe (CONVECS), and Massimo Zendri (STMicroelectronics).

CORSE Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contract with Industry

- Tirez is a bilateral contract with Kalray. The subject is a prototyping of hybrid alias analysis. The collaboration led to a recent publication which corresponding work is described in [6.4](#).

7.2. Bilateral Grants with Industry

- ManyCoreLabs is a bilateral Grant (BGLE) with Kalray. CORSE is involved in the development of generalized register tiling.
- 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.

7.3. CIFRE contracts

- CORSE is involved in another contract with Kalray associated with the CIFRE PhD of Duco van Amstel. The subject of the collaboration is related to fine grain scheduling. Corresponding work is described in [6.3](#).
- CORSE is involved in a contract with [Aselta](#) for the CIFRE thesis of Nassim Halli.
- CORSE is also involved in two contracts with [STMicroelectronics](#) for the CIFRE theses of Serge Emteu and Oleg Iegorov.

DICE Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants 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.

PRIVATICS Project-Team

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.

SPADES Project-Team

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 applied our recent improvements regarding the analysis of deadline miss models for real-time systems to the specific needs of Daimler in the context of CAN buses.

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.

BIPOP Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Schneider Electric : CIFRE PhD thesis of Narendra Akadkhar (end of contract 31/12/2015).
- ANSYS France : CIFRE PhD thesis of Mounia Haddouni (end of contract 01/05/2015).
- ADEPT Technology : CIFRE PhD thesis of Saed AlHomsy (end of contract 31/12/2015).
- Aldebaran : CIFRE PhD thesis of Jory Lafaye (end of contract 30/06/2015).

MISTIS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

DGARapid WIFUZ (2015-2017). F. Forbes is the principal investigator for MISTIS of the 2 year project WIFUZ on *Wireless multi sensors FUSion*. The project is supported by DGA and led by the ACOEM company <http://www.acoemgroup.fr/> and involves another company, the HIKOB startup, <http://www.hikob.com/>. The objective is to develop a prototype for surveillance and monitoring that is able to combine multi sensor data coming from acoustic sensors (microphones or antennas) and optical sensors (infrared cameras) and to distribute the processing to multiple algorithmic blocs. The financial support for MISTIS is of 122,4 keuros for a project of a total cost of 375 keuros.

CIFRE PhD with SCHNEIDER (2015-2018). F. Forbes and S. Girard are the advisors of a starting 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 will be of 165 keuros.

PhD contract with EDF (2015-2018). S. Girard is the advisor of a starting PhD (A. Clement) with EDF. The goal is to investigate sensitivity analysis and extrapolation limits in Extreme value theory with application to river flows analysis.

8.2. Bilateral Grants with Industry

UAC XEROX INDIA (2014-2017). F. Forbes is co-principal investigator with R. Horaud (PERCEPTION) of a Xerox Foundation University Affairs Committee (UAC) collaborative grant *Advanced and Scalable Graph Signal Processing Techniques*, in collaboration with Arijit Biswas and Anirban Mondal, research scientists at Xerox Research Center India (XRCI) Bangalore. This collaboration is an opportunity to launch a joint research program with a Xerox Indian team. We plan to investigate robust mixture models and techniques to deal with graphical data. Xerox Foundation funding: 80 keuros.

NANO-D Project-Team (section vide)

NECS Project-Team

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.

8.1.2. INRIX

A collaboration with INRIX has concerned floating car data, namely data about cars velocity collected from mobile devices, that are useful to complement density and velocity measurements from road sensors.

AIRSEA Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- A 4-year contract named ReDICE (Re Deep Inside Computer Experiments) with EDF, CEA, IRSN, RENAULT, IFP on the thematic computer experiments.
- A 3-year contract with ARTELIA Group: funding for the PhD thesis of M.P. Daou (CIFRE)
- 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 frontières ouvertes en contexte parallèle MPI/OpenMP" : see [6.1](#)

BEAGLE Project-Team (section vide)

DRACULA Project-Team

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 Cosmo). The current ANR PrediVac incorporates the two aforementioned SMEs and therefore strengthens the ties between Dracula and its industrial local ecosystem. Furthermore, the ties with the COSMO companies have been strengthened through a joint CIFR PhD (see below).

ERABLE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

From April 2013 to April 2015, N. Pisanti had a 60,000 euros + TVA grant from the private company Galileo Research srl for Scientific Counseling on “New technological Platform for Immunotherapy of cancers with synergic treatment”.

IBIS Project-Team

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 Joseph Fourier 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 Joseph Fourier). Corinne Pinel works part-time at BGene, and 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

5. Bilateral Contracts and Grants with Industry

5.1. Bilateral Contracts with Industry

- Industrial contract with Sanofi Pasteur (sept 2014 - march 2016)
- Four years framework contract with Servier (2014-2017)
- Industrial contract with Tiama (june 2015 - january 2016)

STEPP Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

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

Related to the former computer vision research activities of team members, we still had one contract with EADS Astrium Satellites (now Airbus Defence and Space), where we appear as sub-contractor: DECSA (DGA).

AVALON Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Animerique

One of the goals of the CapRézo company is to provide an original tool to make 2D/3D animation films. This tool is an innovative and distributed numerical platform. This platform is built on software developed by Avalon like DIET. Technologies developed in collaboration between CapRézo and Inria are based on Cloud federation environment. The collaboration, started in 2014, is scheduled for the next 5 years.

8.2. Bilateral Grants with Industry

8.2.1. NewGeneration-SR

We have a collaboration with the company NewGeneration-SR. The aim of this company is to reduce the energy impact through solutions on each layer of the energy consumption (from the data-center design and the production to usage). NewGeneration-SR improve 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), we are developing models to reduce the energy consumption for the benefit of data-center

8.2.2. IFPEN

We have collaboration with IFPEN. IFPEN develops numerical code 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 parallel implementation of multi-level decomposition domain on many-core architecture and GPGPU.

CTRL-A Team

8. Bilateral Contracts and Grants with Industry

8.1. CIFRE PhD grant Orange

This Cifre PhD started in the beginning of 2012, and was defended in may 2015, on the topic of "Discrete Control in the Internet of things and Smart Environments through a Shared Infrastructure" [8]. Hassane Alla and Eric Rutten advised the PhD student for 10%.

One result of this cooperation is that a patent deposited at the INPI on "Configuration automatique du controle discret d'entites physiques dans un systeme de supervision et de controle", by Gilles Privat et Mengxuan Zhao (Orange labs), Hassane Alla (Gipsa-lab), Eric Rutten (Inria).

8.2. 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.

DANTE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. HiKoB

Participant: Éric Fleury.

A bilateral contract has been signed between the DANTE Inria team and HiKoB to formalise their collaboration in the context of the Equipex FIT (Futur Internet of Things) FIT is one of 52 winning projects in the Equipex research grant program. It will set up a competitive and innovative experimental facility that brings France to the forefront of Future Internet research. FIT benefits from 5.8 euros million grant from the French government Running from 22.02.11 – 31.12.2019. The main ambition is to create a first-class facility to promote experimentally driven research and to facilitate the emergence of the Internet of the future.

8.1.2. 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 “big data” to social relationships and human behavior) to identify market trends and predict customer actions. Leading telecom and financial services firms are using Grandata’s Social Universe product to transform “big data” 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. As a part of this collaboration Carlos Sarraute (Grandata - R&D Director) visited the Dante team on November and Yannick Leo (DANTE - PhD student) visited Grandata office in Buenos Aires in 2014 December.

8.1.3. 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 modeling 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.

MESCAL Project-Team

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). MESCAL leads the ADR on self-optimizing networks (SELFNET). The researchers involved in this project are Bruno Gaujal and Panayotis Mertikopoulos.

7.2. Bilateral Contracts with Industry: Stimergy

Stimergy is a startup that aims at developing a distributed data center built by connecting mini data centers embedded in digital boilers installed in multi-unit residential buildings. Each boiler contains several servers and the dissipated power can thus be used to cover a large part of the annual energy requirements for preparing domestic hot water for a building. Such infrastructure drastically reduces the energy required to operate data centers, while reducing total cost of infrastructure and ownership. Mescal (Olivier Richard, and Michael Mercier, full-time Inria engineer) provides the necessary expertise for the realization and implementation of software infrastructure allowing the coordination of operating such mini data center.

MOAIS Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

6.1.1. CEA

Thanks to past collaboration with CEA, XKaapi was used for multi-core version of EPX. We have a contract with CEA [2014-2015] to manage transition from XKaapi to OpenMP as well as specific loop scheduling among hierarchical NUMA architecture.

ROMA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Mumps Consortium (2014-2019)*

In the context of the MUMPS consortium (<http://mumps-consortium.org>):

- We have signed three new membership agreements, with ESI-Group, Siemens SISW (Belgium) and TOTAL in 2015, on top of the on-going agreements signed in 2014 with Altair, EDF, LSTC, Michelin.
- 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 first consortium committee meeting, at EDF (Clamart).
- Two engineers have been funded by the membership fees, for software engineering and software development, comparison with other solvers, business development and management of the consortium.

8.1.2. *Contract with EMGS (Norway)*

Following a strong interest from EMGS (Norway) in the latest evolutions of MUMPS (see Section 6.1) we worked on the third and final phase of a contract related to low-rank compression for electromagnetics applications in geophysics; the contract was managed by INP Toulouse.

8.2. Technological Transfer: XtremLogic Start-Up

The XTREMLOGIC start-up (former Zettice project) was initiated 4 years ago by Alexandru Plesco and Christophe Alias. The goal of XTREMLOGIC is to build on the state-of-the-art research results from the polyhedral community to provide the HPC market with efficient and communication-optimal circuit blocks (IP) for FPGA. The compiler technology transferred to XTREMLOGIC is the result of a tight collaboration between Christophe Alias and Alexandru Plesco.

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).

SOCRATE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Socrate has strong collaboration with Orange Labs (point to point collaboration) and Alcatel Lucent through the Inria-ALU common lab and the GreenTouch initiative.

Socrate also works with Sigfox a important french young company deploying the first cellular network operator dedicated to M2M and IoT. A bilateral cooperation with sigfox supported the PhD of Minh Tien Do and continues with the PhD of Yuqi Mo. Socrate has also regular collaboration with HIKOB a start-up originated from the Citi laboratory providing sensor networks.

Socrate also collaborates with Euromedia group on advanced wireless techniques for sports events broadcasting systems.

7.1.1. Contractual Study - SigFox - “Standardization support” (2015-2016, 50 keuros)

SigFox is a French start-up deploying and exploiting a network for Internet of Things data collection. Their network is currently being deployed worldwide, and gaining more and more interest from customers. The network is based on a patented transmission protocol (Ultra Narrow Band and Random frequency multiple access), which is now entering standardisation process. The goal of this work is to support this standardization, by providing a deep analysis of the network performances.

7.1.2. CIFRE - SigFox - “Analysis and optimization of a bidirectional network based on UNB” (2015-2018, 50 keuros)

The goal of this thesis is to characterize and improve the network performance. To do so, the following tasks are envisioned:

1. retransmissions strategies to reach a targeted QoS;
2. feedback exploitation (acknowledgment);
3. coherent detection of signals provided by all the base stations (spatial diversity exploitation); and
4. nodes position estimation, and use of this knowledge in the access protocol.

URBANET Team

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 some industrial partners on the subject of smart casing. However, these contracts are under non disclosure agreements and cannot be mentioned here.
- We have contracted bilateral cooperation with industrial and academic partners in the context of the PSPC Fed4PMR project (2015-2018). In this context, we will be working on the design of new professional mobile radio solutions, compatible with 4G and 5G standards.

8.2. Bilateral Grants with Industry

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

Chroma Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Toyota Motors Europe*

[Feb 2006 - Feb 2009] [Dec 2010 - Dec 2015]

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*

[Jan 2010 - Feb 2013]

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).

EXMO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Collaboration with Meaning engines

EXMO collaborates with the meaning engine start-up company whose goal is to help improve the knowledge of corporate knowledge, e.g., catalogs, customer data, through linked data principles (the application of semantic web technology for publishing data). Among their prospective customers are music aggregators as well as banks. We have benefited from the position of Nicolas Guillouet for developing generic connectors based on our Alignment API. They introduce two novel features: using the notion of link keys to identify identical items in a data flow and performing hybrid integration which either identifies or creates objects from the incoming flows. In fact, hybrid integration is a type of knowledge evolution that provides new interesting research problems.

IMAGINE Project-Team (section vide)

LEAR Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. 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.

8.2. 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.

8.3. Facebook

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

End of 2015 we received a gift from Facebook. The collaboration will start in 2016. The topics include image retrieval with CNN based descriptors, weakly supervised semantic segmentation, and learning structure models for action recognition in videos.

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

Participants: Anoop Cherian, Zaid Harchaoui, Yang Hua, Cordelia Schmid, Karteek Alahari.

This collaborative project, which started in September 2008, brings together the WILLOW and LEAR 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. Yang Hua is funded by this project.

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

Participants: Julien Mairal, Zaid Harchaoui.

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 challenges 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.

8.6. Xerox Research Center Europe

Participants: Zaid Harchaoui, Mattis Paulin, Karteek Alahari, Vladyslav Sydorov, Cordelia Schmid.

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.

MAVERICK Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

WetaFX (New-Zealand) has given us 30,000 euros in 2015, as a unilateral gift.

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. QuickCSG is being integrated into the partner's software and is scheduled to be sold with this industrial partner's products during the year of 2016. An additional support contract has been signed with this partner for the purpose of the transfer.

PERCEPTION Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

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.

PRIMA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Far-Infrared Visual Sensors

PRIMA has worked with Schneider Electric on embedded image analysis algorithms for a new generation of far-infrared visual sensors. The objective is to develop an integrated visual sensor with very low power consumption. Such systems can be used to estimate temperature in different parts of a room, as well as to provide information about human presence and human activity.

7.1.2. Learning Routines in a Smart Home

PRIMA is 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 Modelling 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 LovelyLoft Smart home living lab that has been constructed as part of the EquipEx Amigual4home.

TYREX Project-Team (section vide)