



RESEARCH CENTER
Sophia Antipolis - Méditerranée

FIELD

Activity Report 2015

Section Contracts and Grants with Industry

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ABS Project-Team (section vide)

ACUMES Team (section vide)

AOSTE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Kontron CIFRE

This contract, ended in April 2015, provided partial support for the PhD thesis of Mohamed Bergach. It was extended until the end of September with a direct collaborative contrat funded by Kontron until the PhD defense [16]

The topic is to study how to efficiently implement various sizes of the FFT (Fast Fourier Transform) algorithm on multicore and GP-GPU architectures from the range of processors used at Kontron, in order to understand in a second phase how to best allocate several such algorithms in parallel, as part of a single application, in the most efficient way (regarding performance but also power consumption and thermal constraints).

8.1.2. Airbus CIFRE

This contract, started on March 2014, provides full support for the PhD thesis of Cristian Maxim. The thesis concerns the statistical timing analysis while different variability factors are taken into account. This method is built on top of existing statistical approaches while proving appropriate programs for training these methods and thus learning from the history of the execution.

8.1.3. CNES/Airbus DS

Financing comes here through the CNES R&T programme, which has partly funded the post-doctorate of Raul Gorcitz (Sep 2013-Aug 2015) and the acquisition of an industry-grade evaluation platform based on TTEthernet and VxWorks 653.

The objective of our collaboration with Airbus Defence and Space and the CNES is to determine how the design and implementation of embedded software and system/network configuration can be largely automated in an aerospace context, while preserving an assurance level superior to that of the Ariane 5 flight program. We are exploring the novel algorithms developed and implemented in the Lopht tool.

APICS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contract CNES-Inria-XLIM

This contract (reference Inria: 7066, CNES: 127 197/00) involving CNES, XLIM and Inria, focuses on the development of synthesis algorithms for N -ports microwave devices. The objective is to derive analytical procedures for the design of multiplexers and routers, as opposed to "black box optimization" which is usually employed in this field (for $N \geq 3$). Emphasis at the moment bears on so-called "star-topologies".

7.2. Contract CNES-Inria-UPV/EHU

This contract (reference CNES: RS14/TG-0001-019) involving CNES, University of Bilbao (UPV/EHU) and Inria aims at setting up a methodology for testing the stability of amplifying devices. The work at Inria is concerned with the design of frequency optimization techniques to identify the unstable part of the linearized response and analyze the linear periodic components.

7.3. Contract BESA GmbH-Inria

This is a research agreement between Inria (Apics and Athena teams) and the German company BESA⁰, which deals with head conductivity estimation and co-advising of the doctoral work of C. Papageorgakis, see Section 6.1.1. BESA is funding half of the corresponding research grant, the other half is supported by Region PACA (BDO), see Section 8.1.

7.4. Flextronics

Flextronics, active in the manufacturing of communication devices all over the world, bought two sets of licenses for Presto-HF and Dedale-HF. Deployment of our tools in their production facilities for wireless communication units is being studied.

⁰<http://www.besa.de/>

ASCLEPIOS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. CIFRE PhD Fellowships

7.1.1.1. Neurelec/Oticon Medical

The work of Thomas Demarcy, *Segmentation and anatomic variability of the cochlea and other temporal bone structures from medical images*, is supported by a PhD fellowship from the Neurelec/Oticon Medical company.

7.1.2. Inria - Mauna Kea Technologies I-Lab SIWA

Participants: Nicholas Ayache [correspondent], Xavier Pennec, Marzieh Kohandani Tafreshi, Rémi Cuingnet.

This I-lab involves the Mauna Kea Technologies company.

The first focus of this I-lab is to develop efficient and friendly content-based image retrieval (CBIR) tools to help users make a diagnosis. The second focus is on image registration to provide near real-time and robust image registration tools built on GPU implementations for image stabilization and super-resolution since it is a critical method for the smart atlas.

For more information, see [this link](#)⁰.

7.1.3. Microsoft Research

Microsoft Research is funding through the Inria-Microsoft joint lab the projects "[4D Cardiac MR Images](#)"⁰ and "[Medilearn](#)"⁰ which aim at analyzing large databases of cardiac images to help the diagnosis of cardiac diseases and planning of therapy. This project involves A. Crimisi from MSR and partially funds the PhDs of Loic Le Folgoc and Jan Margeta, as well as the post doctoral stay of Hervé Lombaert.

7.1.4. Spin-off company Therapixel

[Therapixel](#)⁰ is a spin-off of the Asclepios (Inria Sophia Antipolis) and Parietal (Inria Saclay) project teams founded in 2013. Therapixel makes surgical information systems. It relies on depth sensing, advanced software processing and innovative user interfaces to provide touchless control of the computer. This technology allows for a direct control of the computer, which sterility constraints made impractical in the past. In 2015, Therapixel obtained the CE marking of its product on touchless visualization of medical images.

7.1.5. Other contracts

Contracts with Philips and Siemens are described in our previous activity reports.

⁰<https://lisa.sophia.inria.fr/siwa-loasis-numerique-dinria-et-de-mauna-kea-706.html>

⁰<http://www.msr-inria.fr/projects/4d-cardiac-mr-images>

⁰<http://www.msr-inria.fr/projects/medilearn>

⁰<http://www.therapixel.com/>

ATHENA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

- The **Olea Medical** company from La Ciotat (FR) funds 50% of the PhD of Marco Pizzolato, supervised by Rachid Deriche, which is funded by the PACA Region for the remaining 50%.
- The **BESA** company (Brain Electrical Source Analysis) from Germany funds 50% of the PhD of Christos Papageorgakis, co-supervised by Maureen Clerc (Athena) and Juliette Leblond (Apics), which is funded by the PACA Region for the remaining 50%.
- The **Neurelec company** (Cochlear Implants) has obtained a CIFRE PhD funding for Kai Dang, supervised by Maureen Clerc.

AYIN Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Airbus D&S*

Participants: Paula Craciun, Josiane Zerubia [contact].

Automatic object tracking on a sequence of images taken from a geostationary satellite. Contract #7363.

8.1.2. *L'OREAL Cosmétique Active International*

Participants: Zhao Liu, Josiane Zerubia [contact].

Acne detection on images using a Markov random field model and chromophore descriptors extracted by bilateral decomposition. Contract #201514035.

8.2. Bilateral Grants with Industry

8.2.1. *CNES Toulouse*

Participants: Aurélie Boisbunon, Josiane Zerubia [contact].

Parameter estimation for automatic object change detection in a sequence of very high resolution optical images. Full post-doctoral grant funded by CNES, given to Aurélie Boisbunon during her 16 month stay in AYIN team.

BIOCORE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

BioEnTech: the contract with the BioEnTech start-up is aiming at developing new functionalities for ODIN in order to improve the advanced monitoring and control of industrial anaerobic digesters.

CASTOR Project-Team (section vide)

COATI Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Amadeus*

Participants: Marco Biazzini, David Coudert, Stéphane Pérennes, Michel Syska.

Duration: May 2014 - April 2015

Inria teams: COATI, SCALE

Abstract: This collaboration aims at assessing the benefits that digital technologies can bring in complex travel distribution applications. Indeed, these applications require both high performance algorithms and distributed programming methods to search for the best solutions among billions of combinations, in a very short time thanks to the simultaneous use of several hundreds (if not thousands) of computers. These benefits will be demonstrated in an application to build 'off the shelf' optimized packages, fully customized to best meet the complex demands of the traveler.

8.2. Bilateral Grants with Industry

8.2.1. *Contract CIFRE with KONTRON*

Participants: Michel Syska, Mohamed Amine Bergach.

We have contracted with KONTRON (worldwide company which designs and manufactures embedded systems) a "Convention de recherche encadrant une bourse CIFRE" on the topic *Graphic Processing Units for Signal Processing*, which work is a joint supervision with AOSTE project.

Duration: November 2011 - April 2015

8.2.2. *ADR Network Science, joint laboratory Inria / Alcatel-Lucent Bell-labs France*

Participants: David Coudert, Nicolas Nisse.

COATI is part of the joint laboratory Inria / Alcatel-Lucent Bell-labs France within the ADR Network Science and works on the fast computation of topological properties (hyperbolicity, covering, etc.).

Duration: January 2013 - December 2015

8.2.3. *Allocation Carnot Inria / Instant System*

Participants: David Coudert, Idriss Hassine.

The Instant System startup company develop a platform in the area of Intelligent transportation systems (ITS). The partnership with COATI aims at designing algorithms for itinerary planning in multimodal transportation networks. The main objective is to combine public transport system and dynamic car-pooling.

Duration: December 2015 - November 2016 (12 man-month)

COFFEE Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

The project has industrial collaborations with Total, GDFSuez EP and Storengy on oil and gas recovery and gas storage.

The collaboration with Andra is concerned with the modelling and the simulation of mass and heat exchanges between porous media and ventilation channels. It leads to consider porous medium equations and hydrodynamic systems, coupled through intricate boundary conditions. Clearly one of the difficulties relies on the multiphase nature of the flows (at least water and air are present). We identify relevant physical scales, typical of the flows under consideration in nuclear waste engineering. We start by dealing with quite simple geometries, in order to discuss properly the order of magnitude of the different phenomena, and to design suitable schemes

DEMAR Project-Team (section vide)

DIANA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Programmable data plane network functions

In the context of the common Inria - Alcatel Lucent Bell-Labs laboratory on Communication networks of the future, we participate to the Content Centric Networking ADR (Action de Recherche). In the context of this ADR, a post-doctoral position is working on the Most network applications and network functions today are implemented using specialized hardware middleboxes. The dedicated specialized hardware makes packet processing rates match that of the line rates that has been difficult to achieve on general purpose hardware. Recently the advancement in general purpose processors has made it possible to use general purpose CPU's for packet processing at line rates. If general purpose CPU's can replace dedicated hardware, this will drastically reduce the cost as the network functions can be moved from dedicated hardware to software. Currently, Virtualization has been promoted to realize network functions on general purpose computing devices and this is currently popular in both academia and industry. There are a number of problems with using virtualization to realize network functions, the most important being the latency introduced by the software stacks. In this work, we will be looking at alternative approaches to implementing network functions on general purpose hardware. One of the main outcomes will be an approach that performs much better than the existing solutions. One of the goals of the work will be to find appropriate use cases for which the proposed architecture is a clear advantage with respect to other NFV solutions. Alcatel Lucent has joined Nokia in 2015. See <http://company.nokia.com/en>.

7.2. Privacy leaks monitoring and control

We are collaborating with the startup Novathings to deploy early stage privacy leaks monitoring and control solutions. We have proposed in Meddle a VPN based infrastructure performing SSL-bumping in order to capture all the mobile data traffic and to inspect even the SSL flows. The biggest advantage is that, as most mobile platforms support VPNs, we don't need any installation or root access on the devices to perform traffic redirection and inspection. We have a Carnot funding for a one year engineer position that started in April 2015 to implement a new solution on a home appliance sold by Novathings to improve transparency and control for personal devices.

We implemented a first prototype on a raspberry Pi device and started an integration following the Novathings graphical chart. See <http://www.novathings.com/#/?lang=en>.

ECUADOR Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Ecuador and Lemma share the results of Gautier Brèthes' thesis, which is partly supported by Lemma, the other part being supported by a PACA region fellowship.
- Ecuador and Lemma have a bilateral contract to share the results of Stephen Wornom, Lemma engineer provided to Inria and hosted by Inria under a Inria-Lemma contract.
- Ecuador and EDF have a bilateral contract on AD of the hydrology code "Mascaret". The correspondent on the Ecuador side is Valérie Pascual.

FOCUS Project-Team (section vide)

GALAAD2 Team (section vide)

GEOMETRICA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Cifre Contract with Geometry Factory

Mael Rouxel-Labbé's PhD thesis is supported by a Cifre contract with GEOMETRY FACTORY (<http://www.geometryfactory.com>). The subject is the generation of anisotropic meshes.

8.1.2. Commercialization of cgal packages through Geometry Factory

In 2015, GEOMETRY FACTORY (<http://www.geometryfactory.com>) had the following new customers for CGAL packages developed by GEOMETRICA:

CSM3D (UK, Cad chaussures): surface parametrization

Silvaco (USA, simulation) : 3d mesh generation

Cimmi (Canada): Approximation of Ridges and Umbilics on Triangulated Surface Meshes, Estimation of Local Differential Properties, AABB Tree, Principal Component Analysis, Point Set Processing

Varel (France, forage): 2D triangulations

Powel (Norway, GIS): point set processing, surface reconstruction

ExxonMobil (USA) : 2D triangulations, surface parametrization

Metrologic (France, metrology): point set processing

Geomage (Israel, oil&gas): 2D and 3D triangulations

Corvid (USA, simulation) : 3D triangulations

Medicim (Belgium, medical imaging): 3D mesh generation

Huntsman (Belgium), Pasco (Japan), Qualcomm (USA), Facebook (USA): industrial research licenses

GRAPHDECO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

We received a donation from Adobe research in the context of the collaboration with W. Li and a donation from Technicolor for a new collaboration which will start in 2016 on image manipulation.

We collaborate extensively with Testaluna SA, and other game companies in the context of the CR-PLAY EU project.

We have started a Regional Ph.D. these with the local company Kaleidoscope (Toulon).

GRAPHIK Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. CTFC

Participants: Patrice Buche, Jérôme Fortin.

In 2015, we relied on our collaboration with the technical center of Comtois' cheese (CTFC : Centre Technique des Fromages Comtois), initiated in the previous years, to build an enlarged project involving different traditional food chains (CNAOL, Conseil National des Appellations d'Origine Laitière). The aim of this project is to develop a platform that will be used in traditional cheese processing for expert knowledge management. This project was pre-selected by the French Ministry of agriculture but finally not accepted, hence we are working on a new version.

8.1.2. ABES

Participants: Michel Leclère, Michel Chein.

See results in Section [7.3](#) and the ANR project Qualinca in Section [9.1](#) .

HEPHAISTOS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Participant: Yves Papegay.

We had a short-term collaboration with the Exelsius company devoted to innovative solutions in processes of electronic business and namely conformal coating. Path-planning algorithms have been designed for inclusion in a new machine for selective surface activation based on atmospheric pressure plasma. Transfer of know-how has been covered by a research contract, and by a technology cession.

8.2. Bilateral Grants with Industry

Participant: Jean-Pierre Merlet.

We have got a grant from the company GénérationRobot to develop a pedagogical cable-driven parallel robot

INDES Project-Team (section vide)

LAGADIC Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Robocortex*

Participants: Souriya Trinh, Fabien Spindler, François Chaumette.

no. Inria Rennes 8492, duration: 22 months.

This contract with the Inria spin off company Robocortex started in March 2014. It is devoted to the visual tracking and 3D localization of some particular targets.

8.2. Bilateral Grants with Industry

8.2.1. *Astrium EADS*

Participants: Tawsif Gokhool, Patrick Rives.

no. Inria Sophia 7128, duration: 36 months.

The objective of this project that started in February 2012 was to investigate the general problem of visual mapping of complex 3D environments that evolve over time. This contract supported Tawsif Gokhool's Ph.D. (see Section 7.4.3).

8.2.2. *ECA Robotics*

Participants: Romain Drouilly, Patrick Rives.

no. Inria Sophia 7030, duration: 36 months.

This project started in May 2012. It aimed at specifying a semantic representation well adapted to the problem of navigation in structured environment (indoors or outdoors). This contract was devoted to support the Cifre Convention between ECA Robotics and Inria Sophia Antipolis regarding Romain Drouilly's Ph.D. (see Section 7.4.5).

8.2.3. *Technicolor*

Participants: Salma Jiddi, Eric Marchand.

Univ. Rennes 1, duration: 36 months.

This project funded by Technicolor started in October 2015. It supports Salma Jiddi's Ph.D. about augmented reality.

8.2.4. *Pôle Saint Hélier*

Participants: Louise Devigne, Marie Babel.

no. Insa Rennes 2015/0890, duration: 36 months.

This project started in November 2015. It will address the following two issues. First, the idea is to design a low-cost indoor / outdoor efficient obstacle avoidance system that respects the user intention, and does not alter user perception. This involves embedding innovative sensors to tackle the outdoor wheelchair navigation problem. The second objective is to take advantage of the proposed assistive tool to enhance the user Quality of Experience by means of biofeedback as well as the understanding of the evolution of the pathology.

LEMON Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Free surface hydraulics*

The finite volume-based, SW2D computational code (see Software section) is used by **Cereg Ingénierie** and **Enveo** (Montpellier Lavérune location) on a regular basis to carry out flood risk assessment studies. The code is constantly being developed on a work-for-hire basis depending on the company needs. The developments mostly concern pre- and post-processing functionalities, as well as specific hydraulic modules.

8.1.2. *Hydrodynamics of coastal lagoons with porosity models*

A two-dimensional shallow water with depth-variable porosity has been developed. The depth-variable porosity allows the subgrid-scale variations of the topography and hydraulic connectivity to be accounted for. The governing equations are written in conservation form and solved using a finite volume scheme. This allows the CPU time of the computational code to be divided by 2 to 3 orders of magnitude. The model is currently being tested against in situ measurements in the Vaccarès system in collaboration with Tour du Valat.

8.2. Bilateral Grants with Industry

Antoine ROUSSEAU collaborates with ARTELIA in the framework of M-P Daou's PhD thesis (CIFRE).

MAESTRO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

MAESTRO members are involved in the

- Inria Alcatel-Lucent Bell Labs joint laboratory: the joint laboratory consists of six ADRs (Action de Recherche/Research Action) in its second phase (starting October 2012). MAESTRO members participate in two ADRs (see §8.1.1 and §8.1.2).
- Inria ALSTOM joint laboratory: the joint laboratory consists of four projects. MAESTRO members participate in project P11 (see §8.1.3).

8.1.1. ADR “Self-Organized Networks in Wireless” (July 2008 – June 2016)

Participant: Eitan Altman.

- Contractor: Alcatel-Lucent Bell Labs (<http://www.alcatel-lucent.com/bell-labs>)
- Collaborators: Laurent Rouillet (coordinator), Véronique Capdevielle.

Coordinator for Inria: Bruno Gaujal (team MESCAL).

During the investigations carried out within this ADR, in collaboration with Alcatel-Lucent Bell Labs and WIRELESS ENB teams (System Engineering and Modem), three technical solutions to the LTE Mobility State Estimation problem have been proposed. In particular,

- Three patents have been submitted and filed (two in 2013, and one in 2014);
- A white paper written by the joint team (Inria/Bell-Labs and Wireless SE) summarizing the theoretical baseline of the methods, their performances, as well as the implementation issues, is documented.

These solutions have been set up between Inria and Alcatel-Lucent Bell Labs iteratively after numerous meetings, in order to cope with the product requirements.

8.1.2. ADR “Network Science” (June 2013 – August 2016)

Participants: Konstantin Avrachenkov [coordinator], Jithin Kazhuthuvelil Sreedharan, Philippe Nain, Giovanni Neglia.

- Contractor: Alcatel-Lucent Bell Labs (<http://www.alcatel-lucent.com/bell-labs>)
- Collaborators: Philippe Jacquet (coordinator), Alonso Silva.

“Network Science” aims at understanding the structural properties and the dynamics of various kind of large scale, possibly dynamic, networks in telecommunication (e.g., the Internet, the web graph, peer-to-peer networks), social science (e.g., community of interest, advertisement, recommendation systems), bibliometrics (e.g., citations, co-authors), biology (e.g., spread of an epidemic, protein-protein interactions), and physics. The complex networks encountered in these areas share common properties such as power law degree distribution, small average distances, community structure, etc. Many general questions/applications (e.g., community detection, epidemic spreading, search, anomaly detection) are common in various disciplines and are being analyzed in this ADR “Network Science”. In particular, in the framework of this ADR we are interested in efficient network sampling (see §7.1.2).

8.1.3. Project P11 “Data Communication Network Performance” (December 2013 – May 2016)

Participants: Sara Alouf [coordinator], Konstantin Avrachenkov, Abdulhalim Dandoush, Philippe Nain, Giovanni Neglia, Alina Tuholukova.

- **Contractor:** ALSTOM Transport (<http://www.alstom.com/transport/>)
- **Collaborators:** Pierre Cotelle, Pascal Derouet (coordinator from November 2015), Pierre Dersin, Sébastien Simoens (coordinator until October 2015).

The objective of this study is to build a simulation platform (see §6.2) and develop an evaluation methodology for predicting Quality of Service and availability of the various applications supported by the data communication system of train networks.

8.2. Bilateral Grants with Industry

8.2.1. “Multi-Objective Optimization for LTE-Advanced Networks” (December 2012 – November 2015)

Participant: Eitan Altman.

- **Contractor:** Orange Labs (<http://www.orange.com/en/innovation>)
- **Collaborators:** Zwi Altman, Abdoulaye Tall.

The objective of this Cifre thesis is threefold: (1) to develop solutions based on stochastic approximations and optimal control for the optimization and setting of LTE-Advanced Networks; (2) to develop queuing models to capture the dynamics of the traffic and the physical layer mechanisms (e.g. relay, MIMO, scheduling); and (3) to apply the developed methods to engineering problems such the interference management, load balancing, optimization of coverage and capacity, and mobility management.

MARELLE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

In 2015, we discussed a contract with a potential industrial partner, but these discussions are currently covered by a non-disclosure agreement. We expect this discussion to become visible in 2016.

MCTAO Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Thales Alenia Space - Inria

“Transfert orbital dans le problème des deux et trois corps avec la technique de propulsion faible”.

This contract started October, 2012 and ended September, 2015. It partially supported Helen Heninger’s PhD.

The goal was to improve transfer strategies for guidance of a spacecraft in the gravitation field of one central body (the two-body problem) or two celestial bodies (three-body problem).

7.2. CNES - Inria - UMB

“Poussée faible et moyennation”.

CNES number: 130777/00.

This three year contract started in 2014. It involves CNES and McTAO (both the Inria and the Université de Bourgogne parts). It concerns averaging techniques in orbit transfers around the earth while taking into account many perturbations of the main force (gravity for the earth considered as circular). The objective is to validate numerically and theoretically the approximations made by using averaging, and to propose methods that refine the approximation.

MODEMIC Project-Team (section vide)

MORPHEME Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

General Electric Healthcare: a 6 months (from february to july) contract to finalize the PhD work of T. Benseghir.

NACHOS Project-Team (section vide)

NEUROMATHCOMP Project-Team (section vide)

SCALE Team (section vide)

STARS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- **Toyota Europ:** this project with Toyota runs from the 1st of August 2013 up to 2017 (4 years). It aims at detecting critical situations in the daily life of older adults living home alone. We believe that a system that is able to detect potentially dangerous situations will give peace of mind to frail older people as well as to their caregivers. This will require not only recognition of ADLs but also an evaluation of the way and timing in which they are being carried out. The system we want to develop is intended to help them and their relatives to feel more comfortable because they know potentially dangerous situations will be detected and reported to caregivers if necessary. The system is intended to work with a Partner Robot (to send real-time information to the robot) to better interact with older adults.
- **LinkCareServices:** this project with Link Care Services runs from 2010 upto 2015. It aims at designing a novel system for Fall Detection. This study consists in evaluating the performance of video-based systems for Fall Detection in a large variety of situations. Another goal is to design a novel approach based on RGBD sensors with very low rate of false alarms.

TITANE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *Astrium*

Participants: Sven Oesau, Florent Lafarge, Pierre Alliez.

The main goal of this collaboration is to devise new algorithms for reconstructing 3D indoor models that are more accurate, meaningful and complete than existing methods. The conventional way for modeling indoor scenes is based on plane arrangements. This type of representation is particularly limited and must be improved by devising more complex geometric entities adapted to a detailed and semantized description of scenes.

- Starting date: April 2012

- Duration: 3 years

8.1.2. *Geoimage*

Participants: Liuyun Duan, Florent Lafarge.

The aim of this collaboration is to devise a new type of 2.5D representation from satellite multi-view stereo images which is more accurate, compact and meaningful than the conventional DEMs. A key direction consists in incorporating semantic information directly during the image matching process. This semantic information is related to the type of components of the scene, such as vegetation, roofs, building edges, roads and land.

- Starting date: November 2013

- Duration: 3 years

8.1.3. *CSTB*

Participants: Sven Oesau, Florent Lafarge.

The goal of this collaboration is to consolidate and integrate research codes implemented in Titane for urban semantization and reconstruction, into the CSTB reconstruction framework.

- Starting date: September 2015

- Duration: 6 months

8.2. Bilateral Grants with Industry

8.2.1. *CNES Toulouse*

Participants: Emmanuel Maggiori, Yuliya Tarabalka [PI].

Hierarchical approaches for object-oriented classification of multi-source images. Contract 150490/00.

- Starting date: November 2015

- Duration: 2 years

TOSCA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- TOSCA Sophia is involved in a Cifre convention with Koris International. M. Bossy supervises M. Bonelli's Ph.D. thesis.
- TOSCA Nancy had a bilateral contract coordinated by M. Deaconu with the SME Alphability on financial risk measures with applications in portfolio management.
- M. Deaconu is involved in a bilateral contract with Venathec. She is supervising, with E. Vincent (EPI MULTISPEECH), the Ph.D. thesis of B. Dumortier on the acoustic control of wind farms noise.

VIRTUAL PLANTS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Guillaume Garin has been funded by ITK.

WIMMICS Project-Team (section vide)

ZENITH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Microsoft (2013-2017)

Participants: Ji Liu, Esther Pacitti, Patrick Valduriez.

This joint project is on advanced data storage and processing for cloud workflows with the Kerdata team in the context of the Joint Inria – Microsoft Research Centre. The project addresses the problem of advanced data storage and processing for supporting scientific workflows in the cloud. The goal is to design and implement a framework for the efficient processing of scientific workflows in clouds. The validation will be performed using synthetic benchmarks and real-life applications from bioinformatics: first on the Grid5000 platform in a preliminary phase, then on the Microsoft Azure cloud environment.

8.2. Triton I-lab (2014-2016)

Participants: David Fernandez, Housseem-Eddine Chihoud, Didier Parigot.

Triton is a new common lab. (i-lab) created between Zenith and Beepeers (<http://beepeers.com>) to work on a platform for developing social networks in mobile/Web environments. The main objective of this project is to design and implement a new architecture for beepeers applications to move to the scale. This new architecture will build on our SON middleware and new NoSQL database technologies, especially graph databases.