Activity Report 2011

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7. Contracts and Grants with Industry

7.1. Orange Labs CIFRE

We work with Orange Labs on Eimc project. The contracts is a CIFRE convention that pays Zheng Hu PhD work.

7.2. Bull SA CIFRE

We work in a joint work between Bull SA and Amazones for the design of a RealTime OSGi framework. Manuel Selva is the granted phd student on this Topic.
# 7. Contracts and Grants with Industry

## 7.1. Contracts with Industry

One contract with STMicroelectronics and one contract with Kalray, in the context of two PhD CIFRE grants; see § 7.2.

## 7.2. Grants with Industry

### 7.2.1. STMicroelectronics CIFRE PhD Grant

**Participants:** Claude-Pierre Jeannerod, Jingyan Jourdan-Lu, Jean-Michel Muller.

Jingyan Jourdan-Lu is supported by a CIFRE PhD grant (from March 2009 to September 2012) from STMicroelectronics (Compilation Expertise Center, Grenoble) on the theme of floating-point arithmetic code generation and specialization for embedded processors. Advisors: Claude-Pierre Jeannerod and Jean-Michel Muller (Arénaire), Christophe Monat (STMicroelectronics). A contract between STMicroelectronics and INRIA (duration: 36 months; amount: 36,000 euros; signature: fall 2010) aims at supporting the developments done in the context of this PhD.

### 7.2.2. Mediacom Project with STMicroelectronics

**Participants:** Florent de Dinechin, Claude-Pierre Jeannerod, Jingyan Jourdan-Lu, Jean-Michel Muller, David Pfannholzer, Nathalie Revol.

We have been involved in Mediacom since September 1, 2009. Mediacom is a 40-month joint project with the Compiler Expertise Center (STMicroelectronics Grenoble) and INRIA project-teams Alchemy, Alf, and Compsys, and a Nano 2012 partner project. For Arénaire, it funds in particular the 3-year MEFI PhD grant of David Pfannholzer. The development this year is the generation of some elementary functions, focusing on the pre-processing (argument reduction, exception handling) and post-processing (argument reconstruction). Our long-term goal with this project is the design and implementation of a dynamic code generation tool, for numerical kernels typical of intensive mediaprocessing, and that could be integrated into production compilers.

### 7.2.3. STMicroelectronics CIFRE PhD Grant

Nicolas Brunie is supported by a CIFRE PhD grant (from 15/04/2011 to 14/04/2014) from Kalray. Its purpose is the study of a tightly-coupled reconfigurable accelerator to be embedded in the Kalray multicore processor. Advisors: Florent de Dinechin (Arénaire) and B. de Dinechin (Kalray). The support contract between Kalray and Inria amounts to 76,000 euros on three years.

### 7.2.4. Altera hardware donation

Altera donated to the team an FPGA-based acceleration card (Altera DK-DEV-4SGX530N) worth 8000 euros for the Table-Maker’s Dilemma acceleration project.
ARTIS Project-Team

7. Contracts and Grants with Industry

7.1. GARDEN

Participants: Olivier Hoel, Isabelle Delore, Frank Rochet, Nicolas Holzschuch, Mahdi Mohammad-Bagher, Cyril Soler [contact].

The GARDEN project a cooperative research work with the video game company EDEN Games in Lyon. This cooperation is funded by the french “Fonds de Compétitivité des Entreprises”, the “Pole de Compétitivité” Imaginove in Lyon, the Région Rhône-Alpes, the city of Lyon and the Grand Lyon urban area. The research themes for ARTIS are real time rendering of complex materials, vegetation and human bodies for video games. This project started in March 2009, for 24 months.
BAMBOO Team (section vide)
Beagle Team (section vide)
7. Contracts and Grants with Industry

7.1. Contracts


- ANR Multiple Impact: INRIA Bipop, Peking’s university PKU (State Key Laboratory for Turbulence and Complex Systems).
- EdF: Documentation of the noisedf software
- L’OREAL: Contrat de recherche et de transfert with L’Oréal, performed from February to November 2011 for validating our model of frictional contact within large fiber assemblies.
COMPSYS Project-Team

7. Contracts and Grants with Industry

7.1. MEDIACOM: Nano2012 Project with STMicroelectronics on SSA, Register Allocation, and JIT Compilation

Participants: Benoit Boissinot, Florian Brandner, Quentin Colombet, Alain Darte, Fabrice Rastello.

This contract has started in September 2009 as part of the funding mechanism Nano2012. This is the continuation of the successful previous project Sceptre with STMicroelectronics, which ended in December 2009. This new project concerns both aggressive optimizations and the application of the previously-developed techniques to JIT compilation. Related activities are described in Sections 6.2 to 6.7.

Unfortunately, due to a unilateral decision of the government, all fundings related to Nano2012 have been cancelled, or at least frozen, in 2011. The salary of PhD students (such as Quentin Colombet) was guaranteed by contract but neither the salary of engineers and post-docs, nor the regular budget. Thanks to Inria who covered his salary, we succeeded to keep Florian Brandner until October 2011. However, the whole travelling budget was cut. Mediacom survived and will continue, as planned, until the end of 2012, but in a less ambitious format.

7.2. S2S4HLS: Nano2012 Project with STMicroelectronics on Source-to-Source Transformations for High-Level Synthesis

Participants: Christophe Alias, Alain Darte, Paul Feautrier, Alexandru Plesco.

This contract has started in January 2009 as part of the funding mechanism Nano2012. This is a joint project with the Cairn Inria project-team and STMicroelectronics, whose goal is the study and development of source-to-source program transformations, in particular loop transformations, that are worth applying on top of HLS tools. This includes restructuring transformations, program analysis, memory optimizations and array reshaping, etc. Some of the work presented in Section 6.9 is part of this project.

The fact that Nano2012 was cancelled or only frozen (depending on the day) forced us to quit the project. We were indeed about to hire a post-doc on this topic and could not do it due to this unexpected governmental decision. This contract was therefore closed in 2011.

7.3. Creation of the Start-Up Zettice

Following his PhD, Alexandru Plesco initiated a start-up on high-level synthesis for FPGAs, named Zettice, and the use and extension of tools/techniques developed in Compsys (for high-level code transformations) and Arénaire (for the development of pipelined operators). The results described in Sections 5.7, 6.9, 6.10, and 6.11 are directly linked to this effort.

The incubation of Zettice is supported by Crealys, the “Région Rhône-Alpes”, and Inria: Alexandru Plesco is “ingénieur technologie et innovation” (ITI) since October 2011. Christophe Alias is in charge of the collaboration between Compsys and Zettice.
DNET Team

7. Contracts and Grants with Industry

7.1. Contracts with Industry

A bilateral contract has been signed between the DNET INRIA team and ACT750 to formalize their collaboration in the context of churn prediction.
7. Contracts and Grants with Industry

7.1. Contracts with Industry

Two contracts have been written with the industry:


7.2. Grants with Industry

- We got a grant with Merial (10 keuros), it allowed us to pay an internship for 4.5 months (Adour Mikirditsian).

- We are actually working on an application to a FUI (Fonds Unique Interministériel) contract, involving Merial; The application occurred in November, and we still have no answer.

- We also applied to the IRT program, with Merial and Sanofi-Pasteur, decisions are expected in the first semester of 2012.
E-MOTION Project-Team

6. Contracts and Grants with Industry

6.1. Contracts with Industry

6.1.1. Toyota Motors Europe

[Feb 2006 - Feb 2009] [Dec 2010 - Dec 2014]

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 danger. 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.

6.1.2. Renault

[Jan 2010 - Feb 2013]

This contract is 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.

6.1.3. GRAAL

[January 2009 - January 2011]

The Graal project aims to produce a generic behaviour construction toolkit for video games and small autonomous robots. It is based on probabilist modelling techniques, and will last two years, starting in January 2009. It involves four partners:

- INRIA/e-Motion provides the core scientific basis for probabilist modelling and autonomous robot programming;
- ProBayes (“Born of INRIA” in 2003) builds upon its generic Bayesian inference engine ProBT, and its expertise of decision systems;
- POB-Technology develops small robots for education and entertainment, sold in high schools and universities all over the world;
- Ageod (in the project during its first year) developed simulation-like historic strategy games.

The goal of the project is the extension and application of Bayesian modelling techniques for industrial behaviour construction:

- programming and maintaining complex behaviours for virtual entities; - teaching simple behaviours to small robots;
- bringing behaviour modification into the hands of students and hobbyists;
- integrating probabilistic reasoning into the tools of industrial behaviour programmers.

The Graal project is funded as a FUI (Fonds Unitaire Interministériel) project by the French Ministère de l’Industrie, the Rhône-Alpes region, and the Greater Lyon metropolitan area. It is labelled and supported by the Imaginove (game and entertainment) and Minalogic (intelligent miniaturized products) clusters.
6.1.4. PROTEUS

[November 2009 - October 2013]

PROTEUS (“Robotic Platform to facilitate transfer between Industries and academics”) is an ANR project involving 6 industrial and 7 academic partners. This project aims to develop a software platform which helps to share methods and softwares between academics and industries in the field of mobile robotics.

The project works on three main aspects:

- Specification of different scenarios and its associated formalism.
- Definition of a domain specific language (DSL) to specify and execute the given scenarios.
- Setting up 4 robotic challenges to evaluate the capacity and the usability of the platform.

The contribution of e-Motion to PROTEUS is first to provide its expertise on mobile robotics to develop the DSL and next to provide a simulation environment with its platform “CycabTK”.

Juan Lahera-Perez has been recruited as engineer to work on this project with Amaury Nègre.

6.2. National Initiatives

6.2.1. ADT ArosDyn

[Nov 2008 - Nov 2011]

The Technology Development Action (ADT) ArosDyn, coordinated by the project team e-Motion, aims to develop an embedded software for robust analysis of dynamic scenes and assessment of risk during car driving. The system will be used in the scope of a Driver Assistance System. ADT ArosDyn is supported by the INRIA’s Direction of Technological Development (D2T).

The principal participants of the project are the project-teams e-Motion, PERCEPTION, the SED of INRIA Grenoble Rhône-Alpes and the project-team EVOLUTION of INRIA Sophia-Antipolis. The spin-off company Probayes and the project-team PRIMA of INRIA Grenoble Rhône-Alpes help us on the development of some specialized modules.

The robustness of the analysis methods is based on the Bayesian fusion of sensor data. The applied algorithms provide to detect and track in real time multiple moving objects in various traffic scenarios. The perception of traffic environment relies on the processing of range and visual information gathered by a laser scanner and a stereo vision camera. These two types of sensors possess complementary technical features. They ensure the detection of objects in various traffic scenarios. The proprioceptive perception makes use of the inertial and odometry sensors. The system is implemented onto our experimental vehicle Lexus which has been provided by Toyota.

6.2.2. AEN PAL

[Nov 2009 - Nov 2013]

The objective of this project is to create a research infrastructure that will enable experiments with technologies for improving the quality of life for persons who have suffered a loss of autonomy through age, illness or accident. In particular, the project seeks to enable development of technologies that can provide services for elderly and fragile persons, as well as their immediate family, caregivers and social groups.

The INRIA Project-Teams (IPT) participating in this Large-scale initiative action Personally Assisted Living (LSIA Pal) propose to work together to develop technologies and services to improve the autonomy and quality of life for elderly and fragile persons. Most of the associated project groups already address issues related to enhancing autonomy and quality of life within their work programs. This goal of this program is to unite these groups around an experimental infrastructure, designed to enable collaborative experimentation.
Working with elderly and fragile to develop new technologies currently poses a number of difficult challenges for INRIA research groups. Firstly, elderly people cannot be classified as a single homogeneous group with a single behavior. Their disabilities may be classified as not just physical or cognitive, motor or sensory, but can also be classified as either chronic or temporary. Moreover, this population is unaccustomed to new technologies, and can suffer from both cognitive and social inhibitions when confronted with new technologies. None-the-less, progress in this area has enormous potential for social and financial impact for both the beneficiaries and their immediate family circle.

The spectrum of possible actions in the field of elderly assistance is large. We propose to focus on challenges that have been determined through meetings with field experts (medical experts, public health responsible, sociologists, user associations...). We have grouped these challenges into four themes: monitoring services, mobility aids, transfer and medical rehabilitation, social interaction services. These themes correspond to the scientific projects and expectations of associated INRIA projects. The safety of people, restoring their functions in daily life and promoting social cohesion are all core motivations for this initiative.

e-Motion concentrates his work on mobility aids using the wheelchair.

6.3. European Initiatives

6.3.1. Collaborations in European Programs

6.3.1.1. BACS project

Program: FP6-IST-027140  
Project acronym: BACS  
Project title: Bayesian Approach to Cognitive Systems  
Duration: January 2006 - February 2011  
Coordinator: Agostino Martinelli, Pierre Bessière  
Other partners: LPPA, ETHZ (suiss)

Abstract: Despite very extensive research efforts contemporary robots and other cognitive artifacts are not yet ready to autonomously operate in complex real world environments. One of the major reasons for this failure in creating cognitive situated systems is the difficulty in the handling of incomplete knowledge and uncertainty. In this project we are investigating and applying Bayesian models and approaches in order to develop artificial cognitive systems that can carry out complex tasks in real world environments. We are taking inspiration from the brains of mammals including humans and applying our findings to the developments of cognitive systems. The conducted research results in a consistent Bayesian framework offering enhanced tools for probabilistic reasoning in complex real world situations. The performance is demonstrated through its applications to drive assistant systems and 3D mapping, both very complex real world tasks. P. Bessière, C. Laugier and R. Siegwart edited a book titled “Probabilistic Reasoning and Decision Making in Sensory-Motor Systems” [34] which regroups 12 different PhD theses defended within the BIBA and BACS European projects. See: [33], [36], [37], [42], [62], [63], [74], [89], [82].

6.3.1.2. Intersafe 2 project

Project acronym: Intersafe 2  
Project title: Intersafe 2  
Duration: September 2008 - September 2011  
Coordinator: M. Parent and O. Aycard
Abstract: The INTERSAFE-2 project aims to develop and demonstrate a Cooperative Intersection Safety System (CISS) that is able to significantly reduce injury and fatal accidents at intersections. The novel CISS combines warning and intervention functions demonstrated on three vehicles: two passenger cars and one heavy goods vehicle. Furthermore, a simulator is used for additional R&D. These functions are based on novel cooperative scenario interpretation and risk assessment algorithms.

6.3.1.3. sFly project

Program: FP7-ICT-2007-3.2.2
Project acronym: sFly
Project title: Swarm of Micro Flying Robot
Duration: January 2009 - December 2011
Coordinator: A. Martinelli

Abstract: sFly is an European research project involving 4 research laboratories and 2 industrial partners. This project will focus on micro helicopter design, visual 3D mapping and navigation, low power communication including range estimation and multi-robot control under environmental constraints. It shall lead to novel micro flying robots that are:

- Inherently safe due to very low weight (<500g) and appropriate propeller design;
- Capable of vision-based fully autonomous navigation and mapping;
- Able of coordinated flight in small swarms in constrained and dense environments.

The contribution of e-Motion to sFly focuses on autonomous cooperative localization and mapping in open and dynamic environments. It started on 01/01/09. For the moment, Alessandro Renzaglia (PhD student) and Agostino Martinelli work on this project. A new Postdoc will be recruited for the project as well quickly.

6.3.1.4. HAVEit project

Program: ICT-212154
Project acronym: HAVEit
Project title: Highly Automated Vehicles for Intelligent Transport
Duration: February 2008 - January 2011
Coordinator: F. Nashashibi and T. Fraichard

Abstract: HAVEit aims at the realization of the long-term vision of highly automated driving for intelligent transport. The project will develop, validate and demonstrate important intermediate steps towards highly automated driving.

HAVEit will significantly contribute to higher traffic safety and efficiency usage for passenger cars, buses and trucks, thereby strongly promoting safe and intelligent mobility of both people and goods. The significant HAVEit safety, efficiency and comfort impact will be generated by three measures:

- Design of the task repartition between the driver and co-drivingsystem (ADAS) in the joint system.
- Failure tolerant safe vehicle architecture including advanced redundancy management.
- Development and validation of the next generation of ADAS directed towards higher level of automation as compared to the current state of the art.

The contribution of e-Motion to HAVEit focuses on safe driving.

6.3.2. Major European Organizations with which you have followed Collaborations
Department of Electrical & Computer Engineering: University of Thrace, Xanthi (GREECE)
Subject: 3D coverage based on Stochastic Optimization algorithms

BlueBotics: BlueBotics Company, Lausanne (Switzerland)
Subject: Implementation of self-calibration strategies for wheeled robots and SLAM algorithms for industrial purposes

Autonomous Systems laboratory: ETHZ, Zurich (Switzerland)
Subject: Vision and IMU data Fusion for 3D navigation in GPS denied environment.

6.4. International Initiatives

6.4.1. “ict-PAMM”
[September 2011- September 2013]
ict-PAMM is an ICT-ASIA project accepted in 2011 for 2 years. It is funded by the French Ministry of Foreign Affairs and INRIA. This project aims at conducting common research activities in the areas of robotic mobile service and robotic assistance of human in different contexts of human life. French partners are INRIA-emotion from Grenoble, INRIA-IMARA from Rocquencourt and Institut Blaise Pascal from Clermont-Ferrand. Asian Partners are IRA-Lab from Taiwan, ISRC-SKKU from Suwon in Korea, ITS-Lab from Kumamoto in Japan and Mica Institute from Hanoi in Vietnam.

6.4.2. “Predimap”
[September 2011- September 2013]
Predimap is an ICT-ASIA project accepted in 2011 for 2 years. It is funded by the French Ministry of Foreign Affairs and INRIA. This project aims at conducting common research activities in the area of perception in road environment. The main objective is the simultaneous use of local perception and Geographic Information Systems (GIS) in order to reach a global improvement in understanding road environment. Thus the research topics included in the project are: local perception, precise localization, map-matching and understanding of the traffic scenes. French partners are Inria-emotion from Grenoble, Heudiasyc team from CNRS/UTC, and Matis team from IGN. Foreign partners are Peking University and Shanghai Jiao Tong University in China, CSIS lab from Tokyo University in Japan and AIT Geoinformatics Center in Thailand.

6.4.3. “PRETIV”
[November 2011- October 2014]
Multimodal Perception and REasoning for Transnational Intelligent Vehicles” (PRETIV) is a three-year ANR project accepted in the framework of the Blanc International II Programme with participants from France (e-Motion of INRIA, Heudiasyc of CNRS, PSA Peugeot Citroen DRIA in Velizy) and China (Peking University, PSA Peugeot Citroen Technical Center in Shanghai). The project aims at developing of an online multimodal perception system for a vehicle and offline reasoning methods, dealing with incompleteness and uncertainties in the models and sensor data, as well as at conducting experiments in typical traffic scenarios in France and China to create an open comparative dataset for traffic scene understanding. The perception system will incorporate vehicle localization, mapping of static environmental objects, detecting and tracking of dynamic objects in probabilistic frameworks through multimodal sensing data and knowledge fusion. The reasoning methods are based on sensor data to learn semantics, activity and interaction patterns (vehicle - other objects, vehicle - infrastructure) to be used as a priori information to devise effective online perception algorithms toward situation awareness. The comparative dataset will contain experimental data of typical traffic scenarios with ground-truth, which will be used to learn country-specific traffic semantics and it will be open to the public.

6.4.4. Visits of International Scientists
John-David Yoder from Ohio Northern University visited us 12 months.
6.4.4.1. Internship

Procopio Stein, PhD at LAR (Laboratório de Automação e Robótica) at UA (Universidade de Aveiro) is in our team for November 2011 to April 2012.

6.4.5. Participation In International Programs

Submission of a international program with Taiwan called I-Rice. Partners for this proposition of an international center are IRA-lab (Taiwan university), LAAS, INRIA and UPMC. Topics are related to Cognitive Systems and Robotics. Project under evaluation (hearing step).

Submission of an ANR Blanc GeoProb in collaboration with the spinoff Probayes (Mexico). Project on complementary list.
7. Contracts and Grants with Industry

7.1. Contracts and Grants with Industry


Participants: Adrien Bernhardt, Marie-Paule Cani, Jean-Claude Léon.

We extended the Aestem Studio software to cover the needs of the company Axiatec, which sells 3D printers in France. The goal is to provide 3D modeling system based on a very intuitive sketch-based technique, in order to enable the general public to model 3D shapes. Our extensions included the introduction of texturing methods and of interactive editing mechanisms, in addition to an eraser tool enabling to carve the surface through sketching.

7.1.2. EADS - Idealization of components for structural mechanics (05/2011 - 04/2014)

Participants: Jean-Claude Léon, Stefanie Hahmann.

Cifre PhD in partnership with EADS IW to generate the shape of mechanical components through dimensional reduction operations as needed for mechanical simulations, e.g. transformations from volume bodies to shells or plates forming surface models, usually non-manifold ones. The topic addressed covers also the shape detail removal process that takes place during the successive phases where subsets of the initial shape are idealized. Mechanical criteria are taken into account that interact with the dimensional reductions and the detail removal processes. The goal is to define the transformation operators such that a large range of mechanical components can be processed as automatically and robustly as possible. Some results from the homology computation topic may be used in the present context. An ongoing publication should address the description of the various stages of a component shape transformation in the context of assemblies.
7. Contracts and grants with industry

7.1. Contracts with industry

7.1.1. Thesaurus alignment environment

Participants: Jérôme Euzenat [Contact], Jérôme David, Cássia Trojahn dos Santos.

Exmo has been subcontractor of the Mondeca company in a project for the OPOCE (the office for the official publications of the european union) which developed a matching environment for thesauri. Exmo’s role has been to integrates the Alignment API technology within Mondeca’s thesaurus edition environment and the development and evaluation of new matchers adapted to thesauri matching. We have developed a special version of our matcher AROMA for this task, which uses a consensus-based matcher.

Concerned thesauri are large multilingual vocabularies expressed in SKOS, such as Eurovoc, GEMET and ETT.
GRAAL Project-Team (section vide)
6. Contracts and Grants with Industry

6.1. Genostar

Participant: François Rechenmann.

Genostar, an INRIA start-up created in 2004, is a company developing software and solutions for the management and analysis of genomic and post-genomic data. The software has been developed, from 1999 to 2004, by the Genostar consortium (INRIA, Institut Pasteur, and the two biotech companies Genome Express and Hybrigenics) and by the HELIX project-team. It includes several modules originally developed by HELIX, notably GenoAnnot, GenoLink, GenoBool and GenoExpertBacteria. The modules have been integrated in the Iogma bioinformatics environment, which also includes the modeling and simulation tool GNA developed by members of IBIS (Section 4.1). François Rechenmann is scientific consultant of the company. For more information, see http://www.genostar.com.
7. Contracts and Grants with Industry

7.1. Start-up Milpix

Participants: Hervé Jégou [INRIA Rennes], Cordelia Schmid.

In 2007, the start-up company MILPIX has been created by a former PhD student of the LEAR team, Christopher Bourez. The start-up exploits the technology developed by the LEAR team. Its focus is on large-scale indexing of images for industrial applications. Two software libraries were licensed to the start-up: BIGIMBAZ and OBIDIAN.

7.2. MBDA Aerospatiale

Participants: Florent Dutrech, Frédéric Jurie [University of Caen], Cordelia Schmid.

The collaboration with the Aerospatiale section of MBDA has been on-going for several years: MBDA has funded the PhD of Yves Dufurnaud (1999-2001), a study summarizing the state-of-the-art on recognition (2004), a one year transfer contract on matching and tracking (11/2005-11/2006) as well as the PhD of Hedi Harzallah (2007-2010). In September 2010 started a new three-year contract on object localization and pose estimation. The PhD of Florent Dutrech is funded by this contract.

7.3. MSR-INRIA joint lab: scientific image and video mining


This collaborative project, starting 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. The PhD student Adrien Gaidon is funded by this project.

7.4. Xerox Research Center Europe


In a collaborative project with Xerox, staring October 2009, we work on cross-modal information retrieval. The challenge is to perform information retrieval and document classification in databases that contain documents in different modalities, such as texts, images, or videos, and documents that contain a combination of these. The PhD student Thomas Mensink is supported by a CIFRE grant obtained from the ANRT for the period 10/09 – 09/12. A second three-year collaborative project on large scale visual recognition started in 2011. The PhD student Zeynep Akata is supported by a CIFRE grant obtained from the ANRT for the period 01/11 – 01/14.

7.5. Technosens

Participants: Guillaume Fortier, Cordelia Schmid, Jakob Verbeek.

In October 2010 we started an 18 month collaboration with Technosens (a start-up based in Grenoble) in applying robust face recognition for application in personalized user interfaces. During 18 months an engineer financed by INRIA’s technology transfer program, implements and evaluates our face recognition system on Technosens hardware. Additional development aims at dealing with hard real-world conditions.
LICT Exploratory Action

6. Contracts and Grants with Industry

6.1. Contracts with Industry

The European project FI-WARE involves various industrial actors in the areas of security and internet services. The main interactions of LICIT within the project are with Nokia Siemens, SAP and Thales.
7. Contracts and Grants with Industry

7.1. Contracts with Industry

7.1.1. Real-Time-At-Work

RealTimeAtWork.com is a startup from Inria Lorraine created in December 2007. Bruno Gaujal is a scientific partner and a founding member of the startup. Its main target is to provide software tools for solving real time constraints in embedded systems, particularly for superposition of periodic flows. Such flows are typical in automotive and avionics industries who are the privileged potential users of the technologies developed by http://www.RealTimeAtWork.com.

7.1.2. CILOE with Bull, Compagnie des Signaux, TIMA, CEA-LETI, LIG, Edxact, Infiniscale, Probayes, SCelectronique

The increasingly miniaturization of components and the ever-increasing complexity of electronic circuits for communication systems requires a set of sophisticated tools for design and simulation. These tools in turn often require immense computational resources, sometimes more than several orders of magnitude above the performance of a desktop PC or a workstation. These tools are so compute-intensive that they require supercomputers, clusters and grids. However, these types of computing resources are often not within the reach of PME’s (relatively small companies or start-ups) in the semiconductor industry and sometimes even large companies, not only because of the cost of infrastructure, but also because of the lack of adequate methods and technologies for high performance computing.

In association with Minalogic, there are about twenty PME’s that develop CAD software, and other companies in the field of embedded systems, the design of electronic circuits, and the simulation process. The most advanced companies utilize high performance computing, and the others will have to do so in 2 or 3 years. All of these companies are confronted with a notable lack of services and facilities for intensive computing, which heavily affect their competitiveness and speed of development.

It is in this context that the partners of this CILOE project propose to design and develop a complete computational infrastructure, including methodologies, software, and security mechanisms. This infrastructure will contribute decisively to the development and visibility of the international PME partners in the project. It will be an essential tool for a sustainable boost in the sector of electronic CAD, embedded software and high-performance simulation and moreover, facilitate growth for all companies in the electronics industry in Alpes region.

7.1.3. ADR Selfnets with Alcatel

Selfnets is an ADR (action de recherche) of the common laboratory between Inria and Alcatel Lucent Bell Labs. Bruno Gaujal is co-leading the action with Vincent Rocca. Selfnets is mainly concerned with self-optimizing wireless networks (Wifi, 3G, LTE). Eight Inria teams are participating in Selfnets. As for MESCAL, we mainly work on recent mobile equipment (e.g. using the norm IEEE 802.21) can freely switch between different technologies (vertical handover). This allows for some flexibility in resource assignment and, consequently, increases the potential throughput allocated to each user. We develop and analyze fully distributed algorithms based on evolutionary games that exploit the benefits of vertical handover by finding fair and efficient user-network association schemes.

A patent on a simplified version of our algorithm has been taken by the common lab in 2010.

In 2011, a new patent has been filed on new algorithms that are robust to noise on measurements as well as to several revision scenarios (mobiles change their connections to base stations simultaneously or asynchronously).
7.2. Grants with Industry

7.2.1. CIFRE contracts with Bull

- Gaël Gorgo started his PhD with Bull in October 2010. He works on performance models for new computer architectures.
- Mathieu Ospici started his PhD with Bull in 2008. He works on the bigDFT project.

7.2.2. CIFRE contracts with Orange Labs

- Charbel El Kaed is doing his PhD thesis in France Télécom on the usage of communication devices.

7.2.3. CIFRE contracts with STMicroelectronics

- Carlos Prada Rojas did his PhD thesis with STMicroelectronics. He started in September 2007 and defended in June 2011. The objective of his thesis was to develop methods and tools for multiprocessor embedded applications.
- Kiril Georgiev is doing his PhD with STMicroelectronics on distributed file systems.
- Patricia Cueva has started her PhD with STMicroelectronics on high performance computing.
- Kevin Pouget has started his PhD with STMicroelectronics on multi-core computers.
MISTIS Project-Team (section vide)
7. Contracts and Grants with Industry

7.1. Contracts with Industry

- Contract with EDF (2010-2013). High performance scientific visualization. Fund 1 postdoc and 1 PhD. Partners: INRIA (MOAIS and EVASION), EDF R&D
7. Contracts and Grants with Industry

7.1. 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 EDF: project MeCSiCo (coupling methods for the simulation of river flows): see 4.4
- A 3-year contract with ADEME on the thematic "Stochastic Downscaling Method": see 6.9.
- A 1-year contract with IFREMER on the thematic “Optimization of the parallel performance of the AGRIF software”: see 5.1
7. Contracts and Grants with Industry

7.1. Contracts with Technicolor

Participants: Abdelaziz Djelouah, Jean-Sébastien Franco, Edmond Boyer.

A three year collaboration with Technicolor has started in 2011. The objective of this collaboration is to develop new gesture interfaces. Such interfaces should go beyond the Microsoft Kinect capabilities and be able to capture and interpret complex dynamic scenes in uncontrolled environments. A PhD co-supervised has started on this topic.
NANO-D Team (section vide)
7. Contracts and Grants with Industry

7.1. Grants and contracts with Industry

7.1.1. IFP

Accompanying contract with IFPEN (IFP Energies Nouvelles), in the framework of the PhD grant of A. Ben Khaled. The thesis explores new architectures and flexible scheduling methods to enhance the trade-off between the integration accuracy and the simulation speed of distributed real-time (hardware-in-the-loop) simulators, in particular in the framework of automotive power-trains [25].

7.1.2. AIRBUS

Accompanying contract with AIRBUS in the framework of the CIFRE PhD grant of P. Andrianiaina. The goal of this PhD thesis is to study flexible implementation methods for real-time controllers, aimed at reducing the conservatism induced by the current approach purely based on worst case considerations [24], [63], [51].

7.2. Technology transfer: start-up Karrus

The NeCS team is continuing its activity in road traffic modeling and control. The expected scientific contribution of NeCS in this field concerns the development of new estimation prediction and identification algorithms based on the measurements collected through sensor networks installed on freeways. The team study also the problems of time-to destination and control algorithms for ramp metering. The team is currently setting up a consortium with local authorities involved in traffic management to build to demonstrator called GTL for Grenoble Traffic Lab. One target of this activity is to transfer part of the developed technology to a start-up named Karrus and led by Denis Jacquet (http://www.karrus.fr/). The start-up was created in January 2010.
6. Contracts and Grants with Industry

6.1. Etoile Projet
Participants: Benjamin Ribba, Branka Bernard.

Etoile is a research consortium on hadrontherapy. B. Ribba is responsible for the modeling part and focuses on the study tumor growth models.

6.2. Vaccine design
Participants: Vincent Calvez, Benjamin Ribba, Emmanuel Grenier.

One year industrial contract with Sanofi, on vaccine design.

6.3. ANR Modpol "cell polarization modeling
Participants: Vincent Calvez, Paul Vigneaux.

Three years ANR young researcher contract, on the modeling of cellular polarization, with T. Lepoutre (INRIA Dracula), N. Meunier (Paris 5), M. Piel (Institut Curie) and R. Voitierie (Paris 6).

6.4. ANR "Bimbo"
Participants: Marie-Aimée Dronne, Thierry Dumont, Emmanuel Grenier.

The "Bimbo" ANR project (head: F. Gueyffier, Lyon I) is devoted to the study atheroma. Numed members has the task to help to parametrize the various models which will emerge from this project.

6.5. ANR "Sechelles"
Participants: Violaine Louvet, Thierry Dumont.

The "Sechelles" ANR project (head: S. Descombes, Nice) is devoted to new numerical methods and scheme for stiff reaction diffusions equations, in particular strokes simulation. Numed members has the task to develop the associated software in order to have efficient tools (in particular, parallel software) for this simulations.

6.6. Weizmann Institute
Participants: Benjamin Ribba, Floriane Lignet.

B. Ribba is involved in the PhD direction of Floriane Lignet (MSc) on the modeling of in vivo tumor growth data from the Weizmann Institute of Science (on-going collaboration with Prof. Yossi Yarden, dept Biological Regulation).
OPALE Project-Team

7. Contracts and Grants with Industry

7.1. Contracts with Industry

ArcelorMittal-INRIA industrial contract n. 5013 : Opale started a thorough collaboration in optimal design of high performance steel with the mentioned world leader industrial. The present contract has three years duration and funds a Ph.D. thesis and Research financial support.

7.2. National Initiatives

7.2.1. Project "Bulbe"

This project is funded by the Ministry of Fishing and gathers OPALE Project-Team, K-Epsilon company (specialized in CFD for naval hydrodynamics) and PROFIL company (naval architect). The objective is to design and optimize bow shapes for trawler ships, in order to reduce the fuel consumption during fishing campaigns. Our role is to construct an automated optimization loop to improve bow efficiency, on the basis of CFD tools provided by K-Epsilon company and naval architect recommendations.

7.2.2. Project "OASIS"

The OASIS project, Optimization of Addendum Surfaces In Stamping, is an R&D consortium (CS, Arcelor-Mittal, ErDF, INRIA, UTC, EURODECISION, ESILV, NECS, DeltaCAD, SCILAB-DIGITEO) of the Pole Systemtic Paris-Region dedicated to develop an optimal design framework (methods-software platforms-applications) for stamping processes. The EPI OPALE/INRIA is the leader within the consortium for the Optimization work-package (one of six WP). The OASIS project yields 2.4 Meuro total financial support (one Ph.D thesis, two post-doctoral positions and 12 months internship for OPALE).

7.2.3. Project "OMD2", Optimisation Multi-Disciplinaire Distribuée (Distributed Multidisciplinary Optimization)

This project funded by ANR deals with the development of a software platform devoted to Multidisciplinary Design Optimization (MDO) in the context of distributed computing.

The notion of optimization platform based on distributed and parallel codes is undertaken with a distributed workflow management system running on a grid infrastructure using the ProActive middleware from INRIA, in collaboration with the OASIS project at INRIA Sophia-Antipolis.

Renault is the coordinator of this project, which involves also EMSE, ENS Cachan, EC Nantes, Université de Technologie de Compiègne, CD-Adapco, Sirehna, Activeon, and INRIA project TAO, OASIS and OPALE. This contract provides the grant supporting two PhD theses (A. Zerbinati and L. Trifan)

7.2.4. Project "Optican"

This project is funded by the Ministry of sports and aims at improving the efficiency of canoes, in the perspective of London Olympic Games in 2012.
7.3. European Initiatives

7.3.1. FP7 Projects

7.3.1.1. EXCITING

Title: Exact Geometry Simulation for Optimized Design of Vehicles and Vessels
Type: COOPERATION (TRANSPORTS)
Instrument: Specific Targeted Research Project (STREP)
Duration: October 2008 - Mars 2012
Coordinator: Jozef Kepler universitet (Austria)
Others partners: SINTEF (SW), SIEMENS (GER), NTUA (GR), HRS (GR), TUM (GER), HYDRO (AUS), DNV (NOR)
See also: http://exciting-project.eu/
Abstract: The objective is to develop simulation and design methods and software based on the isogeometric concepts, that unify Computer-Aided Design (CAD) and Finite-Elements (FE) representation bases. Applications concern hull shape, turbine and car structure design.

7.3.1.2. MARS

Title: Manipulation of Reynolds Stress
Type: COOPERATION (TRANSPORTS)
Instrument: Specific Targeted Research Project (STREP)
Duration: October 2010 - September 2013
Coordinator: CENTRE INTERNACIONAL DE METODES NUMERICS EN ENGINYERIA (Spain)
Others partners: USFD (UK), AIRBUS (SP), FOI (SW), ALENIA (IT), DLR (GER), CNRS (FR), DASSAULT (FR), NUMECA (BEL), UNIMAN (UK), EADS (UK)
See also: http://www.cimne.com/mars/
Abstract: The objective is to study flow control devices for aeronautical applications. This project gathers twelve European partners and twelve Chinese partners for a common work that includes both experimental and numerical studies. Opale Project-Team is in charge of developing numerical algorithms to optimize flow control devices (vortex generators, synthetic jets).

7.3.1.3. GRAIN

Title: GReener Aeronautics International Networking
Type: CAPACITIES (TRANSPORTS)
Instrument: Coordination and Support Action (CSA)
Duration: October 2010 - September 2012
Coordinator: CENTRE INTERNACIONAL DE METODES NUMERICS EN ENGINYERIA (Spain)
Others partners: AIRBUS (SP), ALENIA (I), EADS-IW (F), Rolls-Royce (UK), INGENIA (SP), NUMECA (B), U. SHEFFIELD (UK), U. BIRMINGHAM (UK), CIRA (I), VKI (B), AIRBORNE (NL), LEITAT (SP), CERFACS (F), U. CRANFIELD (UK), CAE (CN), GTE (CN), ARI (CN), FAI (CN), ASRI (CN), SAERI (CN), BIAM (CN), ACTRI (CN), BUAA (CN), NPU (CN), PKU (CN), NUAA (CN), ZJU (CN).
See also: http://www.cimne.com/grain
Abstract: The GReener Aeronautics International Networking (GRAIN) is a 24 month project co-funded by the 7th Framework Programme of the European Community (EC) and by the Chinese Ministry of Industry and Information Technology (MIIT). It is managed by the European Commission as a Coordination and Support Action. The main objectives of GRAIN are to identify and assess the future development of large scale simulation methods and tools needed for greener technologies reaching the Vision 2020 environmental goals. GRAIN will prepare the R&T development and exploitation with new large scale simulation tools used on distributed parallel environments to deeper understand and minimize the effects of aircraft/engine design on climate and noise impact. This objective can be met by supporting joint Europe-China networking actions for defining the necessary technologies to improve green aircraft performance.

7.3.1.4. TraM3

Title: TRaffic Management by Macroscopic Models
Type: IDEAS
Instrument: ERC Starting Grant (Starting)
Duration: October 2010 - September 2015
Coordinator: INRIA (France)
See also: http://www-sop.inria.fr/members/Paola.Goatin/tram3.html

Abstract: The project intends to investigate traffic phenomena from the macroscopic point of view, using models derived from fluid-dynamics consisting in hyperbolic conservation laws. The scope is to develop a rigorous analytical framework and fast and efficient numerical tools for solving optimization and control problems, such as queues lengths control or buildings exits design.

7.3.2. Collaborations in European Programs, except FP7

Program: PHC Polonium
Project acronym: CROM3
Project title: Crowd Motion Modeling and Management
Coordinator: P. Goatin (France), M.D. Rosini (Poland)
Other partners: ICM, Warsaw University (Poland)

Abstract: The aim of this collaboration is to provide new analytical and numerical tools for solving control and optimization problems arising in pedestrian traffic management. Our scope is to develop a rigorous analytical framework and fast and efficient numerical tools for solving optimization and control problems, such as buildings exits design. This will allow to elaborate reliable predictions and to optimize traffic fluxes. To achieve this goal, we will study in details the structure of the solutions of the partial differential equations modeling traffic dynamics, in order to construct ad hoc methods to tackle the analytical and numerical difficulties arising in this study.

7.3.3. Major European Organizations with which you have followed Collaborations

Brescia University, Mathematics Department, Italy.
Analytical and numerical study of conservation laws with application to traffic modeling.

Jyväskylä University, Mathematics and Information Technology (MIT), Finland.
Numerical simulation and optimization.
7. Contracts and Grants with Industry

7.1. Contract with Samsung Electronics

We continued a 12 months collaboration with the Samsung Advanced Institute of Technology (SAIT), Seoul, South Korea. Within this project we develop a methodology able to combine data from several types of visual sensors (2D high-definition color cameras and 3D range cameras) in order to reconstruct, in real-time, an indoor scene without any constraints in terms of background, illumination conditions, etc. The final software package was successfully installed in October 2011 at Samsung.
PLANETE Project-Team

7. Contracts and Grants with Industry

7.1. Contracts with Industry

Industrial contract with Alcatel Lucent - Bell Labs (2008-2011):

The goal of this study is the use of AL-FEC techniques in broadcasting systems and in particular on the optimization of FEC strategies for wireless communications. Two persons are working in the context of this contract: Ferdaouss Mattoussi works on the design, analysis and optimization of a Generalized LDPC AL-FEC scheme, and Rodrigue Imad work focuses on Unequal Erasure Protection capabilities (UEP) and file bundle protection systems.

7.2. Grants with Industry

CEA LETI, Grenoble (2008-2011):

CEA LETI is providing a phd grant to support the activity on wireless sensor network security. This grant supports Sana Ben Hamida.
7. Contracts and Grants with Industry

7.1. Grants with Industry

7. Contracts and Grants with Industry

7.1. European and National Projects

7.1.1. FUI 3Dlive

Participants: Frédéric Devernay, Matthieu Volat, Sylvain Duchêne, Vijay Ch. A. V.

3Dlive (http://3dlive-project.com) is a collaborative project, supported by French Ministry of Industry, and involving 3 industry and research clusters: Images & Réseaux (Brittany and Pays-de-la-Loire regions), Imaginove (Rhône-Alpes region), Cap Digital (Paris region).

There are eight partners:

- R&D/industry:
  - Orange Labs (project leader),
  - Technicolor (3D R&D),
  - Thomson Video Networks (encoders),
  - Thales Angenieux (optics).

- Small companies:
  - AMP (TV shooting),
  - Binocle (specific 3D HW & SW manufacturer).

- University labs:
  - INRIA/PRIMA,
  - Institut Telecom.

The objectives of this project are to create expertise in France for the live filming and transmission of 3D stereo contents, and to help French industry and universities to be major global 3D actors.

The role of PRIMA within this project is to develop new algorithms for real-time processing of stereoscopic video streams. This includes:

- stereoscopic video rectification and geometric adjustments.
- view interpolation, and extraction of stereoscopic metadata for the adaptation of the stereoscopic content to the projection screen.

These algorithms rely on view- and scale- invariant feature extraction, feature matching, dense stereoscopic reconstruction, and computer graphics techniques (matting, and accelerated processing and rendering using the GPU).

3Dlive won the Loading the Future trophy from the Images & Réseaux cluster in 2011.

7.1.2. OSEO Project MinImage: Embedded Integrated Vision Systems

Start Date: 1 March 2008

Duration: 60 months
The consortium consists of:

- STMicroelectronics
- Saint-Gobain Recherche
- CEA-LETI and LIST
- Varioptic
- INRIA Grenoble Rhone-Alpes Research Centre
- DxO

The goal of the MinImage project is to develop integrated micro-cameras for portable telephones. This is a 141 Million Euro development program provided with 70 Million Euros of Aide by OSEO/AII. The program includes major development efforts in micro-electronics, optics, image processing, and image analysis.

Within the MinImage program, PRIMA has created a fast integer-coefficient O(N) algorithm for computing scale and orientation normalized Gaussian derivatives that is suitable for implementation as a dedicated image processing component within an CMOS integrated vision system. The PRIMA feature extraction engine is currently under evaluation for use in the next generation integrated vision systems for mobile devices sold by ST Microelectronics.

Within MinImage, we have achieved video rate calculation an image pyramid with exactly scale invariant impulse responses using an integer coefficient O(N) algorithm suitable for embedded computer vision. Our software implementation software provides a practical method for obtaining invariant image features from very large retinas for detection, tracking and recognition at video rates. This method is at the core of the real time embedded image description system for mobile applications being developed by ST Microelectronics and the CEA.

John-Alexandre Ruiz-Hernandez has recently demonstrated that the steerable scale invariant Gaussian derivative features outperform the popular “Integral Images” method for face detection using a cascade of linear classifiers popularized by Viola and Jones. We are currently extending these results other applications such as gender recognition, character recognition and place recognition. Key results in this area include:

1. Fast, video rate, calculation of scale and orientation for image description with normalized chromatic receptive fields.
2. Real time indexing and recognition using a novel indexing tree to represent multi-dimensional receptive field histograms.
3. Robust visual features for face tracking, bodies, and other objects.
RESO Project-Team

7. Contracts and Grants with Industry

7.1. Contracts with Industry


Participants: Isabelle Guerin-Lassous, Paulo Gonçalves, Thomas Begin, Doreid Ammar, Marina Sokol, Mohamad Jaber.

RESO participates in the ADR (Action de Recherche/Research Action) “Semantic Networking” (SEM-NET), one of the three ADRs of the INRIA ALCATEL-LUCENT BELL LABS joint laboratory. This ADR started on January 1st 2008 and will end in October 2012. I. Guérin Lassous and L. Noirie are the respective coordinator for INRIA and for ALCATEL-LUCENT of the ADR SEMNET.

The new paradigm of “semantic networking” for the networks of the future brings together “flow-based networking”, “traffic-awareness” and “self-management” concepts to get “plug-and-play” networks. The natural traffic granularity is the flow. RESO task is to elaborate on the admission control of flows in routers having in mind the current status of the network and the underlying applications. I. Guérin Lassous and T. Begin are co-advising the PhD work of D. Ammar. P. Gonçalves participates with Ph. Nain (INRIA project-team MAETSRO) to the supervision of the PhD thesis of M. Sokol (INRIA project-team MAESTRO), which aims at developing graph-based semi-supervised approaches applied to content- and user-based classifications in networks.
6. Contracts and Grants with Industry

6.1. Contracts with Industry

- PhD grant Loris Bouzonnet, funded by Bull.
- PhD grant Quentin Sabah, funded by STMicroelectronics.
- PhD grant Xavier Etchevers, funded by Orange Labs.
6. Contracts and Grants with Industry

6.1. Contracts with Industry

6. Contracts and Grants with Industry

6.1. Industry

SWING has developed a strong relationship with Orange Labs through several “Contrat de Recherche Extérieur” (CRE). In 2009, three CREs with Orange Labs are supporting the thesis of:

- Ahmed Benfarah,
- Ochirkhand Erdene-Ochir,
- Quentin Lampin.

SWING also works in collaboration with SIRADEL, a french worldwide company working on wireless system simulations. A bilateral cooperation supports the PhD of Laurent Maviel, and Siradel is a member of the Ecoscell ANR project in which Swing is involved.

SWING started in September 2011 a strong bilateral cooperation with the Euromedia group about Body Area Networks in which Hervé PArvery and Jean-Marie Gorce are involved and the project supports the thesis of Matthieu Lauzier.
7. Contracts and Grants with Industry

7.1. The Multival Project

Participants: Hubert Garavel, Rémi Hérilier, Frédéric Lang, Radu Mateescu, Christine McKinty, Vincent Powazny, Wendelin Serwe.

MULTIVAL (Validation of Multiprocessor Multithreaded Architectures) is a project of MINALOGIC, the pôle de compétitivité mondial dedicated to micro-nano technologies and embedded software for systems on chip (EMSoC cluster of MINALOGIC). It is funded by the French government (Fonds Unique Interministériel) and the Conseil Général de l’Isère. MULTIVAL addresses verification and performance evaluation issues for three innovative asynchronous architectures developed by BULL, CEA/LETI, and STMicroelectronics.

MULTIVAL started in December 2006 and was extended until May 2011. In 2011, we focused our activities on the enhancement of CADP (see § 6.2.2 and § 6.2.3) and, in collaboration with our partners, on the verification of the DTD (see § 6.3.2).

7.2. The Topcased Project

Participants: Hubert Garavel, Frédéric Lang, Wendelin Serwe, Damien Thivolle.

TOPCASED (Toolkit in OPen-source for Critical Application and SystEms Development) is a project of AESE, the French pôle de compétitivité mondial dedicated to aeronautics, space, and embedded systems. This project gathers 23 partners, including companies developing safety-critical systems such as AIRBUS (leader), ASTRIUM, ATOS ORIGIN, CS, SIEMENS VDO, and THALES AEROSPACE.

TOPCASED develops a modular, open-source, generic CASE (Computer-Aided Software Engineering) environment providing methods and tools for embedded system development, ranging from system and architecture specifications to software and hardware implementation through equipment definition. VASY contributes to the combination of model-driven engineering and formal methods for asynchronous systems.

TOPCASED started in August 2006 and completed in December 2010. In 2011, we enhanced the FLAC translator from FiACRE to LOTOS (see § 6.2.3). We participated in the final review of TOPCASED and gave three lectures during the TOPCASED Days (see § 9.3).

During the International Paris Air Show (salon international du Bourget), the TOPCASED project received the AESE trophy of the best R&D project (category Systèmes, équipements et logiciels pour l’aéronautique et l’espace).
WAM Project-Team (section vide)