



RESEARCH CENTER
Nancy - Grand Est

FIELD

Activity Report 2015

Section Contracts and Grants with Industry

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ALICE Project-Team (section vide)

BIGS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

T. Bastogne, full Professor at Université de Lorraine and BIGS member is head of the startup Cybernano that provides computational solutions for biopharma and nano-medicine. <http://www.cybernano.eu/>

CAMUS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

The CAMUS team is taking part of the NANO 2017 national research program and its sub-project PSAIC (Performance and Size Auto-tuning thru Iterative Compilation) with the company STMicroelectronics, starting January 2015. Luis Esteban Campostrini has been recruited as PhD student in this project. His work is focusing in extending advanced loop optimization techniques to nonlinear loops using a linear virtual data layout remapping. Artiom Baloian has been recruited in October 2015 as research engineer, in order to make the Apollo framework applicable to ARM Cortex platforms and to merge all the last extensions inside the framework.

CAPSID Project-Team (section vide)

CAMEL Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Training and Consulting with HTCS

The training and consulting activities begun in 2012 with the HTCS company have been pursued, and the existing contract has been renewed in identical form for 2013, 2014 and 2015.

8.2. Consulting with Docapost

In the context of our activities on electronic voting, in collaboration with the Cassis team, we had a consulting contract with the Docapost company. The goal was to evaluate their e-voting product and to propose various directions for future improvements.

CARTE Project-Team (section vide)

CASSIS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Electronic Voting Systems

Participant: Véronique Cortier.

A collaboration agreement has been signed between Loria and Scytl, a Spanish company who is proposing solutions for the organization of on-line elections, including legally binding elections, in several countries. We have a collaboration with David Galindo (who joined Scytl in July 2014) on defining security properties for e-voting (privacy as well as verifiability properties) and designing e-voting schemes that meet all these properties. Further contracts may cover the analysis of the solutions developed at Scytl.

8.2. Electronic Voting Systems

Participants: Véronique Cortier, Stéphane Glondu.

Docapost has signed a 6 months contract with Cassis for defining potential collaborations around the voting protocol used by Docapost. We have examined their source code and proposed a list of enhancements, delivered at the end of the contract. Based on this list, further collaborations should take place in the following years.

COAST Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Grants with Industry

6.1.1. CIFRE Grant with Bonitasoft

Participants: François Charoy, Samir Youcef, Guillaume Rosinosky.

Bonitasoft is a leading software company in the domain of open source Business Process Management Systems. The objective of this grant is to help Bonitasoft to support effective elastic BPM operation in the Cloud by leveraging both the business knowledge, the process models and the execution history of process instances and correlate them with cloud resource consumption. Guillaume Rosinosky has been recruited as a PhD Student to work on this project. We will define models that will be validated based on a detailed analysis of existing use cases that we have started to collect from Bonitasoft and its clients.

LARSEN Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Emiota

Participant: Jean-Baptiste Mouret.

- Company: Emiota (<http://www.wearbelty.com/> / <http://www.emiota.fr/>)
- Duration: 03/2015 – 12/2015
- Abstract: Emiota is a startup that works on a “smart” belt: a motorized and sensorized belt that both senses bio-medical data and adapts its length to the activity of its holder. For instance, the belt could tighten if it detects that its holder is getting up and relax if he sits down. In this contract, the Larsen team demonstrated how Bayesian optimization and Gaussian processes, two machine learning techniques used in our recent Nature paper [11], can be used to achieve this adaptation.

MADYNES Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Xilopix (Epinal, France):
 - Pay-per-use contract for the use of Grid'5000
 - Support contract for their use of Grid'5000 (define experimental requirements and plans)

8.2. Bilateral Grants with Industry

- CIFRE, Thales TRT (Paris, France):
 - CIFRE PhD (Florian Greff, managed by Ye-Qiong Song and Laurent Ciarletta)
 - Dynamic reconfiguration and graceful degradation of distributed real-time applications over mesh networks
- CIFRE, Orange Labs (Issy-Les-Moulineaux, France)
 - CIFRE PhD (Maxime Compastie, managed by Olivier Festor and Remi Badonnel)
 - Software-Defined Security for Distributed Cloud Infrastructures
- CIFRE, Xilopix (Epinal, France):
 - CIFRE PhD (Abdulqawi Saif, managed by Ye-Qiong Song and Lucas Nussbaum)
 - Open Science for the scalability of a new generation search technology

MAGRIT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

The partnership with GE Healthcare started in 1993. In the past few years, it bore on the supervision of CIFRE PhD fellows on the topic of using a multi-modal framework and augmented reality in interventional neuroradiology. The PhD thesis of Charlotte Delmas started in April 2013 with the aim to perform 3D reconstruction of tools in interventional neuroradiology. Our goal is to help clinical gesture by providing the physician with a better understanding of the relative positions of the tools and of the pathology.

MIMESIS Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

InSimo is a startup we created in January 2013, after two years of thinking, maturation and incubation. Its founding members were all former team members of the SHACRA team (our previous team): Jérémie Allard, Juan Pablo de la Plata Alcalde and Pierre Jean Bensoussan have joined the operation team, while Stéphane Cotin and Christian Duriez serve as scientific advisors. The business model of the company is based on the SOFA platform and its community to transfer state-of-the-art simulation technologies into commercially-supported software components that medical simulator vendors can integrate into their products. The goal is to foster the creation of a new generation of medical simulators, highly realistic, faster to develop, allowing a broader commercial offer and novel uses. InSimo participated to the 2012 OSEO / MESR national innovative technology company creation competition (Emergence category) and was selected as the best project in the Alsace region as well as one of the three projects highlighted at the national level. InSimo also won the HelpMeSee contract (in partnership with Moog and SenseGraphics) and entered in February 2013 into a 3-year development phase to build a first batch of 100 MSICS simulators.

In the context of the SOFA Consortium, the team is also in close collaborations with:

Altran : is a global leader in innovation and high-tech engineering consulting, Altran accompanies its clients in the creation and development of their new products and services. At the occasion of the “Journée Poster”, several members of the team (Rosalie Plantefève, Bruno Marques Jaime Guevara and Christoph Paulus) presented their work.

Anatoscope: is a young start-up company created in 2015 by researchers, engineers and one surgeon. We develop a software solution to automatically build 3D digital avatars based on medical images of patients. The avatars allow biomechanical simulations of the real person.

TruPhysics: develops Industry 4.0 software solutions to support manufacturing companies in development and sales processes by using a real-time and high-resolution physics simulation. We provide software that enables developers and engineers to simulate control programs, physical properties, kinematics and behavior of industrial robots, machines and assemblies.

MULTISPEECH Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. MAIA

Company: **Studio MAIA**

Duration: September 2014 - August 2015

Supported by: Bpifrance

Abstract: A pre-study contract was signed to investigate speech processing tools that could eventually be transferred as plugins for audio mixing software. Prosody modification, noise reduction, and voice conversion are of special interest.

8.1.2. Venathec

Company: **Venathec SAS**

Other partners: **ACOEM Group, GE Intelligent Platforms** (contracted directly with Venathec)

Duration: June 2014 - August 2017

Supported by: Bpifrance

Abstract: The project aims to design a real-time control system for wind farms that will maximize energy production while limiting sound nuisance. This will leverage our know-how on audio source separation and uncertainty modeling and propagation.

NEUROSYS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. CertiViBE

Laurent Bougrain is a member of the steering committee of OpenViBE and CertiViBE.

CertiViBE, a medically certifiable core for OpenViBE, the software for Brain Computer Interfaces and Neuroscience research. It is a iLAB project between the Inria project-team Hybrid and Mensia Technologies SA (<http://www.mensiatech.com/>)

Founded in 2012, Mensia Technologies is a medical-device spin-off of Inria owning an exclusive worldwide license of the OpenViBE software for commercial applications. So far, OpenViBE has raised a lot of interest in the research community, especially on medical applications. However, OpenViBE being a research-software, it does not yet matches the requirements of medical devices in terms of stability, performance, documentation, as well as engineering processes in general, slowing down the transfer of OpenViBE-based medical research to the industry. Within the CertiViBE project, Inria and Mensia Technologies are putting their task forces and respective expertise together to deliver a certifiable core for the OpenViBE software. While the OpenViBE software will continue to be published as an Open Source software, the project will dramatically facilitate the transfer of the research made with OpenViBE as it will be built on ready-to-certify foundations, following the processes and normative regulation of medical devices development including risk analysis, quality assurance and medical device software development and maintenance.

ORPAILLEUR Project-Team (section vide)

SEMAGRAMME Project-Team (section vide)

SPHINX Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Grants with Industry

In June 2015, Boris Caudron began a CIFRE thesis with Thales under the academic supervision of Xavier Antoine. The accompanying support contract, about 45 000 euros, will be signed in January 2016.

TONUS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

We are involved in a common project with the company AxesSim in Strasbourg. The objective is to help to the development of a commercial software for the numerical simulation of electromagnetic phenomena. The applications are directed towards antenna design and electromagnetic compatibility. This project was partly supported by DGA through "RAPID" (régime d'appui à l'innovation duale) funds. The CIFRE PhD of Thomas Strub is part of this project. Another CIFRE PhD has started in AxesSim on the same kind of subjects in March 2015 (Bruno Weber). The new project is devoted to the use of runtime system in order to optimize DG solvers applied to electromagnetism. The resulting software will be applied to the numerical simulation of connected devices for clothes or medicine. The project is supported by the "Banque Public d'Investissement" (BPI) and coordinated by the Thales company.

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.

VEGAS Project-Team (section vide)

VERIDIS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. ADN4SE Project

Participants: Stephan Merz, Martin Riener.

Joint work with Damien Doligez of Inria Paris Rocquencourt.

The ADN4SE project started in 2013 within *Programme d'Investissements d'Avenir: Briques Génériques du Logiciel Embarqué* and is coordinated for Inria by the Gallium team in Rocquencourt. The objective of this project is to develop and commercialize the PharOS real-time micro-kernel operating system. In cooperation with researchers at CEA List, we are contributing to the project by verifying key properties (in particular, determinism) of a high-level model of the system written in TLA⁺. The proof was completed in the summer of 2015, and the project ended in December 2015.

8.2. Proving formulas over streams

Participants: Pascal Fontaine, Stephan Merz.

In an exploratory project with *Atelier de Qualification Logicielle* of RATP, we studied the use of SAT solving techniques for proving certain formulas expressed over infinite Boolean streams. Such formulas arise as proof obligations generated from SCADE models used by RATP, and they are currently proved using proprietary tools. We showed that in the absence of recursive definitions, checking a small number of instances of a proof obligation ensures its validity for all instances. For models that contain recursive definitions, the bound on the number of instances that must be checked becomes much bigger, making it unwieldy to apply the same technique, and inductive reasoning should be used. We implemented our proposal in a prototype checker and validated it using several benchmarks provided by RATP.