



RESEARCH CENTER
Saclay - Île-de-France

FIELD

Activity Report 2018

Section Contracts and Grants with Industry

Edition: 2019-03-07

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COMETE Project-Team (section vide)

DATASHAPE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Collaboration with Sysnav, a French SME with world leading expertise in navigation and geopositioning in extreme environments, on TDA, geometric approaches and machine learning for the analysis of movements of pedestrians and patients equipped with inertial sensors (CIFRE PhD of Bertrand Beaufils).
- Research collaboration with Fujitsu on the development of new TDA methods and tools for Machine learning and Artificial Intelligence (started in Dec 2017).

8.2. Bilateral Grants with Industry

- DATASHAPE and Sysnav have been selected for the ANR/DGA Challenge MALIN (funding: 700 kEuros) on pedestrian motion reconstruction in severe environments (without GPS access).

DEDUCTEAM Project-Team (section vide)

GRACE Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Nokia

Participants: Daniel Augot, Nicholas Coxon, Françoise Levy-Dit-Vehel.

Phase 2 has been finished, while a new phase, phase 3, has been negotiated between Inria and Nokia. Grace finished his work on fast algorithms for polynomials over fields of small characteristic, with application to coding theory, multiplicity codes and private information retrieval. The new phase will fund a project on rank-metric codes for security and privacy in cloud storage (in collaboration with Gilles Zémor, Uni. Bordeaux).

MEXICO Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Our cooperation with industry took place in the context of a multi-lateral SystemX project, see below.

PARSIFAL Project-Team (section vide)

SPECFUN Project-Team (section vide)

TOCCATA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. *ProofInUse Joint Laboratory*

Participants: Claude Marché [contact], Jean-Christophe Filliâtre, Andrei Paskevich, Guillaume Melquiond, Sylvain Dailier.

The objective of ProofInUse is to provide verification tools, based on mathematical proof, to industry users. These tools are aimed at replacing or complementing the existing test activities, whilst reducing costs.

This laboratory is a joint effort of the Inria project-team Toccata, the AdaCore company which provides development tools for the Ada programming language, and the TrustInSoft company which provides static analysis tools for the C and C++ programming language.

The objective of ProofInUse is thus to significantly increase the capabilities and performances of verification environments proposed by these two companies. It aims at integration of verification techniques at the state-of-the-art of academic research, via the generic environment Why3 for deductive program verification developed by Toccata.

This joint laboratory is a follow-up of the former “LabCom ProofInUse” between Toccata and AdaCore, funded by the ANR programme “Laboratoires communs”, from April 2014 to March 2017 <http://www.spark-2014.org/proofinuse>.

The SME AdaCore is a software publisher specializing in providing software development tools for critical systems. A previous successful collaboration between Toccata and AdaCore enabled *Why3* technology to be put into the heart of the AdaCore-developed SPARK technology.

The SME TrustInSoft is a company whose speciality is the verification of critical software, written in the C or C++ languages. It is interested in integrating the novelties of ProofInUse in its own environment TIS Analyzer.

8.2. Bilateral Grants with Industry

8.2.1. *CIFRE contract with TrustInSoft company*

Participants: Guillaume Melquiond [contact], Raphaël Rieu-Helft.

Jointly with the thesis of R. Rieu-Helft, supervised in collaboration with the TrustInSoft company, we established a 3-year bilateral collaboration contract, that started in October 2017. The aim is to design methods that make it possible to design an arbitrary-precision integer library that, while competitive with the state-of-the-art library GMP, is formally verified. Not only are GMP’s algorithm especially intricate from an arithmetic point of view, but numerous tricks were also used to optimize them. We are using the Why3 programming language to implement the algorithms, we are developing reflection-based procedures to verify them, and we finally extract them as a C library that is binary-compatible with GMP [20] [26].

COMMANDS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Contract with Safety Line: support of an Ilab and of a Cifre PhD. Toolbox Bocop is a component of the commercial service OptiClimb used by several airplane companies.

DEFI Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- A CIFRE PhD thesis started in December 2015 with Safran Tech. The student is Mrs Perle Geoffroy who is working on "topology optimization by the homogenization method in the context of additive manufacturing".
- A CIFRE PhD thesis started in April 2017 with Safran Tech. The student is M. Florian Feppon who is working on "topology optimization for a coupled thermal-fluid-structure system".
- A CIFRE PhD thesis started in October 2017 with Renault. The student is Mrs Lalaina Rakotondrainibe who is working on "topology optimization of connections between mechanical parts".
- A CIFRE PhD thesis started November 2017 with EDF. The student is H. Girardon who is working on "level set method for eddy current non destructive testing".
- A CIFRE PhD thesis started May 2017 with ArianeGroup. The student is M. Mickael Rivier who is working on "Optimization under uncertainty methods for expensive computer codes".
- A CIFRE PhD thesis started November 2018 with CEA CESTA. The student is M. Paul Novello who is working on "Deep Learning for atmospheric reentry".

8.2. Bilateral Grants with Industry

- The SOFIA project (Solutions pour la Fabrication Industrielle Additive métallique) started in the summer of 2016. Its purpose is to make research in the field of metallic additive manufacturing. The industrial partners include Michelin, FMAS, ESI, Safran and others. The academic partners are different laboratories of CNRS, including CMAP at Ecole Polytechnique. The project is funded for 6 years by BPI (Banque Publique d'Investissement).
- G. Allaire is participating to the TOP project at IRT SystemX which started in February 2017. It is concerned with the development of a topology optimization platform with industrial partners (Renault, Safran, Airbus, ESI).
- FUI project Saxsize. This three years project started in October 2015 and extended till April 2019 and it involves Xenocs (coordinator), Inria (DEFI), Pyxalis, LNE, Cordouan and CEA. It is a followup of Nanolytix where a focus is put on SAXS quantifications of dense nanoparticle solutions.
- Contract with THALES, Activity around the numerical certification of debris codes, Coordinator: P.M. Congedo.
- Contract with ArianeGroup, Activity around techniques for Uncertainty Quantification, Coordinator: P.M. Congedo.

DISCO Project-Team (section vide)

GAMMA3 Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

- Boeing
- Safran Tech

6.2. Bilateral Grants with Industry

- Projet RAPID DGA

RANDOPT Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Contract with the company Storengy partially funding the PhD thesis of Cheikh Touré (2017 - 2020)
- Contract with Thales in the context of the CIFRE PhD thesis of Konstantinos Varelas (2017 - 2020)

SELECT Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Contract with NEXTER

Participants: Gilles Celeux, Florence Ducros, Patrick Pamphile.

SELECT has a contract with Nexter regarding modeling the reliability of vehicles.

TAU Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

TAU will continue TAO policy about technology transfer, accepting any informal meeting following industrial requests for discussion (and we are happy to be too much solicited), and deciding about the follow-up based upon the originality, feasibility and possible impacts of the foreseen research directions, provided they fit our general canvas. This lead to the following 5 on-going CIFRE PhDs, with the corresponding side-contracts with the industrial supervisor, plus 3 other bilateral contracts. In particular, we now have a first “Affiliate” partner, the SME DMH, and hope to further develop in the future this form of transfer. Note that it can also sometimes lead to collaborative projects, as listed in the following sections.

- **CIFRE RTE** 2015-2018 (72 kEuros), with Réseau Transport d’Electricité, related to Benjamin Donnot’s CIFRE PhD
Coordinator: Olivier Teytaud (until May 2016), then Isabelle Guyon, and Antoine Marot (RTE)
Participants: Benjamin Donnot, Marc Schoenauer
- **Myndblue**, 2017-2018 (1 an, 50kEuros) related to consulting activities with DMH (Digital for Mental Health)⁰.
Coordinator: Aurélien Decelle and Simon Moulieras (DMH)
Participants: Michèle Sebag
- **Contrat LFI** 2017-2018 (30kEuros), with La Fabrique de l’Industrie, related to quality of life at work (Section 7.3.1).
Coordinator: Michèle Sebag and Thierry Weil (La Fabrique de l’Industrie)
Participants: Olivier Goudet, Diviyam Kalainathan
- **POC Renault** 2017-2018 (125 kEuros), *Clusterisation et optimisation de scenarii pour la validation des véhicules autonomes*
Coordinator: Marc Schoenauer and Philippe Reynaud (Renault)
Participants: Guillaume Charpiat, Raphaël Jaiswal (engineer), Marc Schoenauer
- **CIFRE Renault** 2017-2020 (45 kEuros), related to Marc Nabhan’s CIFRE PhD *Sûreté de fonctionnement d’un véhicule autonome - évaluation des fausses détections au travers d’un profil de mission réduit*
Coordinator: Marc Schoenauer and Hiba Hage (Renault)
Participants: Marc Nabhan (PhD), Yves Tourbier (Renault)
- **OPLa** 2017-2018, Organizing Platform Labor (27k euros), funded by Force Ouvrière.
Coordinator: A.A. Casilli (Telecom ParisTech)
Participants: Paola Tubaro
- **DiPLab** 2017-2018, Digital Platform Labor (24k euros), funded by MSH Paris-Saclay.
Coordinators: Paola Tubaro (avec A.A. Casilli, Telecom ParisTech)
- **CIFRE Thalès** 2018-2021 (45 kEuros), with Thales Teresis, related to Nizam Makdoud’s CIFRE PhD
Coordinator: Marc Schoenauer and Jérôme Kodjabatchian
Participants: Nizam Makdoud
- **CIFRE RTE** 2018-2021 (72 kEuros), with Réseau Transport d’Electricité, related to Balthazar Donon’s CIFRE PhD
Coordinator: Isabelle Guyon and Antoine Marot (RTE)

⁰This “Affiliate” contract has been inspired by [the affiliate program of Technion](#)

Participants: Balthazar Donon, Marc Schoenauer

- **CIFRE FAIR** 2018-2021 (45 kEuros), with Facebook AI Research, related to Leonard Blier's CIFRE PhD
Coordinator: Marc Schoenauer and Yann Olliver (Facebook)
Participants: Guillaume Charpiat, Michèle Sebag, Léonard Blier
- **Google Zurich** 2018 (50kEuros), related to the **AutoDL** (see Section 3.4)
Coordinator: Isabelle Guyon and Olivier Bousquet (Google)
Participants: Zhengying Liu and Lisheng Sun
- **IFPEN** (Institut Français du Pétrole Energies Nouvelles) 2018-2022 (300 kEuros), to hire an Inria Starting Research Position (PhD + 4-6 years) to work in all topics mentioned in Section 3.2 relevant to IFPEN activity (see also Section 4.2).

TROPICAL Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Yield management methods applied to the pricing of data traffic in mobile networks. CRE (research contract) with Orange Labs (Orange Labs partner: Mustapha Bouhtou).
- Decentralized mechanisms of operation of power systems: equilibria and efficiency. Collaboration with Nadia Oudjane and Olivier Beaudé from EDF-labs, with the PhD work of Paulin Jacquot (CIFRE PhD), supervised by Stéphane Gaubert.
- Stochastic optimization of multiple flexibilities and energies in micro-grids, collaboration with Wim Van Ackooij, from EDF labs, with the PhD work of Maxime Grangereau (CIFRE PhD), supervised by Emmanuel Gobet (CMAP) and cosupervised by Stéphane Gaubert.

GALEN-POST Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

PhD Contract with General Electric Healthcare

Project title: Minimally invasive assesement of coronary disease

Duration: 2018-2021

Leader: Hugues Talbot

PhD Contract with General Electric Healthcare

Project title: Optimization methods for breast tomosynthesis

Duration: 2017-2020

Leader: J.-C. Pesquet

PhD Contract with IFP Energies nouvelles

Project title: Graph-based learning from integrated multi-omics and multi-species data

Duration: 2019-2022

Leader: F. Malliaros and J.-C. Pesquet

GPU grant from NVIDIA

NVIDIA's Academic Programs Team is dedicated to empowering and collaborating with professors and researchers at universities worldwide. For a research project on compressing CNNs input, Edouard Oyallon received a TitanXP from NVIDIA.

LIFEWARE Project-Team (section vide)

M3DISIM Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Contract with start-up 3c-industry for quantitative imaging of their printed product (1.5keuros)
- Contract with L'Oreal for the development of an experimental set-up (29.8keuros)

PARIETAL Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

In 2018, a CIFRE PhD thesis was launched with the Canadian company Interaxon <https://choosemuse.com>. This contract supports the PhD thesis of Hubert Banville.

XPOP Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

Contract with Dassault Systèmes

INFINE-POST Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

6.1.1. Fujitsu (*RunMyProcess*):

Participants: Emmanuel Baccelli, Francisco Acosta.

In 2018 we have worked with Fujitsu RIOT enhancements to demonstrate dynamic application software loading and execution on top of RIOT running on Arduino-like hardware, managed remotely from Fujitsu's RMP Cloud component. The results of this work were published in several conferences in 2018, and a prototype was demonstrated.

6.1.2. Thalès:

Participant: Cedric Adjih.

In 2018, studies were made with Thalès (TRT) on IoT systems.

6.1.3. GranData:

Participants: Guangshuo Chen, Adriano Di Luzio, Aline Carneiro Viana.

Since June 2014, we have a collaboration with GranData (<http://grandata.com/>), Buenos Aires, Argentina on traffic vs mobility modeling of smartphone users. GranData is a small company that integrates first-party and telco partner data to understand key market trends, to predict customer behavior, and to deliver business results. For the time being, the collaboration with Grandata has generated knowledge transfer. From both directions, (1) from myself to GranData, I have been transferring my knowledge in modeling and analysing human behavior in terms of mobility, encounters, and content demand, (2) from them to myself, they have advising me on issues related to machine learning and statistical methods to be used. It describes **an industrial partner's collaboration having the outcomes of our works impacting their products** (e.g., GranData data mining algorithms can be improved based on the better understanding on mobility and content consumption of mobile users) **or research/business decisions** (e.g., proved strong correlations between mobility and data traffic consumption can open new perspectives of services to telecom operators, i.e., clients of GranData).

Part of the thesis of Guangshuo Chen (ended April 2018) and of Eduardo Mucelli (ended in 2015) on data traffic analysis used telco traces provided by GranData.

POEMS-POST Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Contract and CIFRE PhD with EDF on *the FEM-BEM coupling for soil-structure interactions*
Participants: M. Bonnet, S. Chaillat, Z. Adnani
Start: 11/2014. End: 02/2018. Administrator: CNRS
- Contract and CIFRE PhD with Airbus on *time-harmonic acoustic scattering in a vortical flow*
Participants: P. Joly, J.-F. Mercier, A. Bensalah
Start: 10/2014, End: 04/2018. Administrator: ENSTA
- Contract and CIFRE PhD with Naval Group on *modelling the fluid-structure coupling caused by a far-field underwater explosion*
Participants: M. Bonnet, S. Chaillat, D. Mavaleix-Marchessoux
Start: 11/2017. End: 10/2020. Administrator: CNRS
- Contract and CIFRE PhD with Naval Group on *flow noise prediction*
Participants: J-F Mercier, S. Cotté, N. Trafny
Start: 04/2018. End: 03/2021. Administrator: ENSTA

AVIZ Project-Team (section vide)

CEDAR Project-Team (section vide)

EX-SITU Project-Team (section vide)

ILDA Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

- Tecknowmetrix (TKM): ANRT/CIFRE PhD (Hugo Romat), 3 years, started June 2016.

PETRUS Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. OwnCare II-Lab (Jul 2017 - Dec 2020)

Partners: PETRUS (Inria-UVSQ), Hippocad (SME)

End 2016, the Yvelines district launched a public call for tender to deploy an industrial solution aiming at covering the whole district (10.000 patients). The Hippocad company, in partnership with Inria, won this call for tender with a solution called DomYcile in May 2017 and the project was launched in July 2017. DomYcile is based on a home box combining the PlugDB hardware/software technology developed by the Petrus team and a communication layer based on SigFox. Hippocad and Petrus then decided to launch a joint II-Lab (Inria Innovation Lab) named OwnCare. The objective is threefold: (1) build an industrial solution based on PlugDB and deploy it in the Yvelines district in the short-term, (2) use this Yvelines testbed to improve the solution and try to deploy it at the national/international level in the medium-term and (3) design flexible/secure/mobile personal medical folder solutions targeting individual uses rather than professional uses in the long-term. The DomYcile project with the Yvelines district has started in July 2017 and the II-Lab was officially created in January 2018.

8.2. Bilateral Grants with Industry

8.2.1. Cozy Cloud CIFRE - Tran Van contract (Oct 2014 -Feb 2018)

Partners: Cozy Cloud, PETRUS

Following a bilateral contract with Cozy Cloud (a French startup providing a personal Cloud platform), the CIFRE PhD thesis of Paul Tran Van capitalized on the Cozy-PlugDB platform to devise new access and usage control models to exchange data among devices of the same user (devices may have different levels of trustworthiness) and among different users thanks to a user-friendly sharing model [14].

8.2.2. Cozy Cloud CIFRE - Loudet contract (Apr 2016 - Apr 2019)

Partners: Cozy Cloud, PETRUS

In relation with the bilateral contract mentioned above, a second CIFRE PhD thesis has been started by Julien Loudet. The objective is to allow for a secure execution of distributed queries on a set of personal clouds associated to users, depending on social links, user's localization or user's profile. The general idea is to build secure indexes, distributed on the users' personal clouds and to devise a secure execution protocol revealing solely the query result to the querier. Such highly distributed secure queries potentially enable new (social) applications fed by user's personal data which could be developed on the Cozy-PlugDB platform.