Activity Report 2018

Section Contracts and Grants with Industry

<p style="text-align:center;color:red;">**CAMUS Team**</p>

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Caldera

Vincent Loechner and Cédric Bastoul are involved in a collaboration with the Caldera company (http://www.caldera.com), specialized in software development for wide image processing. The goal of this collaboration is the development of parallel and scalable image processing pipeline for industrial printing. The project started in September 2016 and involves a contract established between the ICube laboratory and the Caldera company. It also includes the funding of the industrial thesis (CIFRE) of Paul Godard (started in September 2016) on the topic of the collaboration, under the supervision of Vincent Loechner and Cédric Bastoul.

CARAMBA Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- We have training and consulting activities with the French Ministry of Defense.

- Together with the PESTO team, we have a contract with the Docapost company, the purpose of which is to impove their e-voting solution by adding some verifiability properties and switching to elliptic curve cryptography.

- In this contract handled in collaboration with the University of Bristol and the PESTO team, the goal is to audit and prove security properties of a new e-voting protocol called CHVote, to be used in a few cantons of Switzerland.

8.2. Bilateral Grants with Industry

- This contract with Orange Gardens at Chatillon-Montrouge is dedicated to the supervision of Sandra Rasoamiaramanana's PhD thesis about security in the white box context. The co-supervisor for Orange Gardens is Gilles Macario-rat.

- This contract with Thales (Thales Communication & Security, Genneviliers, subsidiary of Thales Group) is dedicated to the supervision of Simon Masson's PhD thesis about elliptic curves for bilinear and post-quantum cryptography. The co-supervisor for Thales is Olivier Bernard.

GAMBLE Project-Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- Company: WATERLOO MAPLE INC
  Duration: 2 years
  Participants: GAMBLE and OURAGAN Inria teams
  Abstract: A two-years licence and cooperation agreement was signed on April 1st, 2018 between WATERLOO MAPLE INC., Ontario, Canada (represented by Laurent Bernardin, its Executive Vice President Products and Solutions) and Inria. On the Inria side, this contract involves the teams GAMBLE and OURAGAN (Paris), and it is coordinated by Fabrice Rouillier (OURAGAN).

  F. Rouillier and GAMBLE are the developers of the ISOTOP software for the computation of topology of curves. One objective of the contract is to transfer a version of ISOTOP to WATERLOO MAPLE INC.

- Company: GEOMETRYFACTORY
  Duration: permanent
  Participants: Inria and GEOMETRYFACTORY
  Abstract: CGAL packages developed in GAMBLE are commercialized by GEOMETRYFACTORY.

MOCQUA Team (section vide)

<p style="text-align:center;color:red;">**PESTO Project-Team**</p>

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

We have several contracts with industrial partners interested in the design of electronic voting systems:

- Since 2014, a collaboration agreement has been signed between Pesto and Scytl, a Spanish company which proposes solutions for the organization of on-line elections, including legally binding elections, in several countries. In this context, a first contract has been signed in 2016 to design a formal proof of both verifiability and privacy of the protocol developed by Scytl, for a deployment in Switzerland. In 2018, a new contract has been signed to adapt the previous security proof to the new protocol proposed by Scytl, in order to achieve universal verifiability.

- The canton of Geneva signed a contract in October 2017 with Pesto and Caramba, as well as Manifold Security (Bogdan Warinschi and David Bernhard) to design a formal and cryptographic proof of individual and universal verifiability of the protocol developed by the canton of Geneva, for a deployment in Switzerland.

- Docapost signed a 18-month contract in September 2017, with Pesto and Caramba, to enhance the voting solution of Docapost, in particular with respect to verifiability.

8.2. Bilateral Grants with Industry

A CIFRE contract with Numeryx has started with the Resist research group at Inria Nancy and Pesto, to develop algorithms for optimizing sets of filtering rules in Software Defined Networks.

VERIDIS Project-Team (section vide)

SPHINX Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Grants with Industry

From April 2018, Th. Chambrion is the advisor of a thesis, which is funded by Saint Gobain Research (CIFRE contract). The aim of this thesis is to improve the cast process used in the Saint Gobain pipes factory of Pont-à-Mousson. Complex physical processes (centrifugation of multi-phasic flows with variable viscosity) prevent a physical based modeling approach. Using a statistical modeling of the plant, we aim to obtain efficient control laws and a significative cost reduction.

TOSCA Project-Team

6. Bilateral Contracts and Grants with Industry

6.1. Bilateral Contracts with Industry

- M. Bossy is member of a MERIC project (MERIC is the marine energy research & innovation center in Chile) on stochastic Lagrangian models to better estimate energy production variability with water turbine, granted with the Lemon Inria Team.

- M. Bossy is the Coordinator of the POPART Industrial partnership project at UCA-JEDI on the modelling of fibre transport in turbulent flow. This partnership is granted by EDF and by UCA, and in collaboration with Observatoire de la Côte d'Azur.

BIGS Project-Team

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

Bruno Scherrer has done some consulting for EDF. This was a skill transfer activity involving training and consulting on the theory and algorithms for reinforcement learning, for the Research & Development team of EDF conducted by Lorenzo Audibert. This R&D team wants to apply reinforcement learning to several EDF problems: optimizing maintenance of uranium rods in the cores of nuclear power plants, optimizing the control of dam, optimization of load profiles for a network of electric vehicles. Bruno Scherrer's role was to give them the basics of reinforcement learning theory, and help them to use the algorithms of the literature. It was a one-shot action, running in 2018, and contractualized via a "framework agreement" Inria-EDF. This contract brings in approximately 12,000 euros to BIGS team (among which 2,000 for mission expenses).

R. Azaïs, A. Gégout-Petit, F. Greciet collaborated with SAFRAN Aircraft Engines (through a 2016-2019 contract). SAFRAN Aircraft Engines designs and products Aircraft Engines. For the design of pieces, they have to understand mechanism of crack propagation under different conditions. It appeals to BIGS for modeling crack propagation with Piecewise Deterministic Markov Processes (PDMP).

CAPSID Project-Team (section vide)

MIMESIS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- **Altran:** A global leader in innovation and high-tech engineering consulting, Altran accompanies supports its clients in the creation and development of their new products and services. We have a common history of successful collaboration via CIFRE Ph.D. thesis of Rosalie Plantefève.

- **Siemens:** A global leader in healthcare industry. Via IHU, we collaborate with Siemens in the context of the IHU project CIOS Alpha Fusion dealing with augmentation of the intra-operative image provided by a fluoroscopic imaging modality with pre-operative data.

- **Naviworks:** A South Korean company specialized in ICT convergence simulation/IoT smart controlling. We collaborate on simulation and visualization in the context of interventional radiology.

NEUROSYS Project-Team (section vide)

TONUS Team

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

We are involved in the PhD supervision of Lucie Quibel in collaboration with EDF Chatou (CIFRE support). The objective is to design new Equations Of States (EOS) for the simulation of multiphase flows. The EOS cannot be chosen arbitrarily if one wants to ensure the stability of the fluid model. We are also interested to apply our palindromic method for computing low-Mach liquid-vapor flows.

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

7.1.1. Contrat Open Group 2017-2020

Participants: Claudia-Lavinia Ignat, François Charoy [contact], Gérald Oster, Olivier Perrin, Anis Ahmed Nacer.

The objective of the project is to propose and validate a model of service composition for middleware services for software as a service architecture. The composition must take into account middleware service quality attributes and service plan in order to optimise the operational cost while ensuring a level of quality of service.

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

- RED ALERT LABS (Paris, France)
  - Verification of the security requirements of an IoT device (a connected doorbell) using the SCUBA tool suite.
  - An extension of SCUBA (see 6.6) is developed to verify the security requirements provided in Common Criteria format by the industrial partner. The verification uses the information of the Security Knowledge Bases (SKB) built by the SCUBA tool suite.

8.2. Bilateral Grants with Industry

- Thales (Palaiseau, France):
  - CIFRE PhD (Pierre-Olivier Brissaud, supervised by Isabelle Chrisment and Jérôme François)
  - Anomaly detection in encrypted network traffic
- Orange Labs (Issy-Les-Moulineaux, France):
  - CIFRE PhD (Maxime Compastie, supervised by Olivier Festor and Rémi Badonnel)
  - Software-Defined Security for Distributed Cloud Infrastructures
- Orange Labs (Issy-Les-Moulineaux, France):
  - CIFRE PhD (Paul Chaignon, supervised by Olivier Festor and Jérôme François)
  - Monitoring of Software-Defined Networks
- Xilopix then Qwant (Épinal, France):
  - CIFRE PhD (Abdulqawi Saif, supervised by Ye-Qiong Song and Lucas Nussbaum)
  - Open Science for the scalability of a new generation search technology
- Numeryx Technologies (Paris, France):
  - CIFRE PhD (Ahmad Abboud, supervised by Michael Rusinowitch, Abdelkader Lahmadi and Adel Bouhoula)
  - Compressed and Verifiable Filtering Rules in Software-defined Networking

ALICE Project-Team (section vide)

<p style="text-align:center">**LARSEN Project-Team**</p>

8. Bilateral Contracts and Grants with Industry

8.1. Cifre Diatelic-Pharmagest

Participants: François Charpillet, Yassine El Khadiri, Cedric Rose, Gabriel Corona.

Cedric Rose and Gabriel Corona are from Diatelic.

The ageing of the population and the increase in life expectancy will confront modern societies with an unprecedented demographic transformation. The placement of older people in a nursing home (EPHAD) is often only a choice of reason and can be rather poorly experienced by people. One answer to this societal problem is the development of Smart home technologies that facilitate elderly to stay in their homes longer than they can do today. This new collaboration with Diatelic a subsidiary of the Pharmagest group is supported through a PhD thesis (Cifre) which started in June 2017. The objective is to enhance the CareLib solution developed by Diatelic and Larsen Team through a previous collaboration (Satelor project). The Carelib offer is a solution, consisting of

- a connected box (with touch screen),
- a 3D sensor (capable (1)to measure characteristics of the gait such as the speed and step length, (2) to identify Activities of Daily Life and (3) to detect emergency situation such as Fall),
- universal sensors (motion, ...) installed in each part of the housing.

The objective of the PhD program is to provides personalized follow-up by learning life habits, the main objective being to track the Activities of Daily Life (ADL) and detect emergency situations needing external interventions (E.G fall detection). This year we have developed an algorithm capable to detect sleep-wake cycles using only motion sensors. The approach is based on bayesian inference. The algorithms have been evaluated using publicly available dataset and Diatelic's own dataset.

8.2. Cifre iFollow

Participants: Francis Colas, Jérôme Truc, Cédric Pradalier, Susana Sanchez Restrepo.

Cédric Pradalier is co-supervisor at GeorgiaTech Lorraine and Susana Sanchez Restrepo is at iFollow.

iFollow is a startup, located in Paris area, providing solutions for shopping carts. Their first market of interest is logistics, wherein they develop robots for alleviating the workload of order pickers. Their second, longer-term, target is retail, with the development of intelligent shopping carts to help persons with disabilities.

The aim of this Cifre program is to endow the robots with more intelligent behaviors. In warehouses, the aim will be to improve the autonomy of the robots to better assist the pickers, leveraging the knowledge of the current order being prepared. In supermarket, the shopping carts should learn to properly interact with other carts and people while positioning themselves to better serve its current user.

The PhD thesis of Jérôme Truc has started in September with bibliography work on human detection and pose estimation, as well as socially acceptable motion planning.

MAGRIT Project-Team (section vide)

<p style="text-align:center; color:red;">**MFX Team**</p>

7. Bilateral Contracts and Grants with Industry

7.1. Bilateral Contracts with Industry

In 2018 we had several discussions and collaborations with industrial partners, one leading to an active R&D collaboration contract. All are confidential.

<p style="text-align:center">**MULTISPEECH Project-Team**</p>

8. Bilateral Contracts and Grants with Industry

8.1. Bilateral Contracts with Industry

8.1.1. Dolby

Company: Dolby (Spain)

Duration: Sep – Dec 2018

Participants: Antoine Liutkus (Inria Zenith), Emmanuel Vincent

Abstract: This contract aims to evaluate the feasibility of state-of-the-art source separation technology and related technologies for four use cases, and to identify those which could be commercially exploited, possibly after a follow-up R&D phase.

8.1.2. Honda Research Intitute Japan (first contract)

Company: Honda Research Intitute Japan (Japan)

Duration: Feb – Mar 2018

Participants: Aditya Nugraha, Romain Serizel, Emmanuel Vincent

Abstract: This contract targets collaborative research on multichannel speech and audio processing and eventual software licensing in order to enable voice-based communication in challenging noisy and reverberant conditions in which current hands-free voice-based interfaces perform poorly.

8.1.3. Honda Research Intitute Japan (second contract)

Company: Honda Research Intitute Japan (Japan)

Duration: Aug 2018 – Mar 2019

Participants: Nancy Bertin (CNRS - IRISA), Antoine Deleforge, Diego Di Carlo

Abstract: This is a follow-up contract, which also targets collaborative research on multichannel speech and audio processing and eventual software licensing in order to enable voice-based communication in challenging noisy and reverberant conditions in which current hands-free voice-based interfaces perform poorly.

8.1.4. Studio Maia

Company: Studio Maia SARL (France)

Other partners: Imaging Factory

Duration: Jul 2017 – March 2019

Participants: Yassine Boudi, Vincent Colotte, Mathieu Hu, Emmanuel Vincent

Abstract: This Inria Innovation Lab aims to develop a software suite for voice processing in the multimedia creation chain. The software is aimed at sound engineers and it will rely on the team's expertise in speech enhancement, robust speech and speaker recognition, and speech synthesis.

8.2. Bilateral Grants with Industry

8.2.1. Orange

Company: Orange SA (France)

Duration: Nov 2016 – Nov 2019

Participants: Laureline Perotin, Romain Serizel, Emmanuel Vincent

Abstract: This CIFRE contract funds the PhD thesis of Laureline Perotin with Orange Labs. Our goal is to develop deep learning based speaker localization and speech enhancement algorithms for robust hands-free voice command. We are especially targeting difficult scenarios involving several simultaneous speakers.

8.2.2. Invoxia

Company: Invoxia SAS (France)

Duration: Mar 2017 – Mar 2020

Participants: Guillaume Carbajal, Romain Serizel, Emmanuel Vincent

Abstract: This CIFRE contract funds the PhD thesis of Guillaume Carbajal. Our goal is to design a unified end-to-end deep learning based speech enhancement system that integrates all steps in the current speech enhancement chain (acoustic echo cancellation and suppression, dereverberation, and denoising) for improved hands-free voice communication.

8.2.3. Ministère des Armées

Company: Ministère des Armées (France)

Duration: Sep 2018 – Aug 2021

Participants: Raphaël Duroselle, Denis Jouvet, Irina Illina

Abstract: This contract corresponds to the PhD thesis of Raphaël Duroselle on the application of deep learning techniques for domain adaptation in speech processing.

8.2.4. Facebook

Company: Facebook AI Research (France)

Duration: Nov 2018 – Nov 2021

Participants: Adrien Dufraux, Emmanuel Vincent

Abstract: This CIFRE contract funds the PhD thesis of Adrien Dufraux. Our goal is to explore cost-effective weakly supervised learning approaches, as an alternative to fully supervised or fully unsupervised learning for automatic speech recognition.

ORPAILLEUR Project-Team (section vide)

SEMAGRAMME Project-Team (section vide)