

*Inria*

RESEARCH CENTER  
Bordeaux - Sud-Ouest

FIELD

Activity Report 2019

# Section Contracts and Grants with Industry

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## **Auctus Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral collaboration with SAFRAN EP**

An industrial collaboration has been initiated with SAFRAN EP (Villemur-sur-Tarn) on the analysis of manual industrial activities for the improvement of working conditions in highly demanding tasks. Vincent Padois and Jean-Marc Salotti have supervised the internship of Gaëlle Lannuzel who was focusing on knot tying activities for electrical cables. A CIFRE PhD thesis is being discussed to pursue this work.

## **8.2. Bilateral collaboration with SUEZ**

A contract has been signed with Suez (see [7.12](#)) for a 6-month internship under Auctus supervision (David Daney and Jean-Marc Salotti). The objective was the development of a new method to improve strenuous manual activities and an implementation of the method for the specific activity of pipe cover raising. This study has been performed by Nina Doctor, ENSC student (recruitment February - September 2019).

## **8.3. Bilateral collaboration with PSA**

An industrial collaboration has been initiated with PSA on the synthesis and dynamic analysis of shared workspaces for safety in collaborative robotics. A CIFRE PhD thesis has been approved by ANRT and will start in February 2020.

## **CAGIRE Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

- EDF: "Advanced modelling of heat transfer for industrial configurations with or without accounting of the solid wall", contract associated to the PhD thesis of Gaëtan Mangeon
- EDF: "Hybrid RANS/LES modelling for unsteady loadings in turbulent flows", contract associated to the PhD thesis of Vladimir Duffal
- IFPEN: "3D simulation of non-reactive internal aerodynamics of spark-ignition engines using an hybrid RANS/LES method", contract associated to the PhD thesis of Hassan Al Afailal
- PSA: ""Turbulence modelling in the mixed and natural convection regimes in the context of automotive applications", contract associated to the PhD thesis of Saad Jameel.

## **8.2. Bilateral Grants with Industry**

- EDF (Cifre PhD grant): "Advanced modelling of heat transfer for industrial configurations with or without accounting of the solid wall", PhD student: Gaëtan Mangeon
- EDF (Cifre PhD grant): "Hybrid RANS/LES modelling for unsteady loadings in turbulent flows", PhD student: Vladimir Duffal
- IFPEN (PhD grant): "3D simulation of non-reactive internal aerodynamics of spark-ignition engines using an hybrid RANS/LES method", PhD student: Hassan Al Afailal
- PSA (Cifre PhD grant): "Turbulence modelling in the mixed and natural convection regimes in the context of automotive applications", PhD student: Saad Jameel.
- Dassault Aviation (Cifre PhD grant): "Amélioration des modèles pour la turbulence. Applications à la prédiction des écoulements aérodynamiques.", PhD student: Gustave Sporschill.

**CARDAMOM Project-Team (section vide)**

**CARMEN Project-Team (section vide)**

## CQFD Project-Team

# 7. Bilateral Contracts and Grants with Industry

## 7.1. Bilateral Contracts with Industry

### 7.1.1. *Naval Group*

Participants: Huilong Zhang, François Dufour, Dann Laneuville, Alexandre Genadot.

The increasing complexity of warfare submarine missions has led Naval Group to study new tactical help functions for underwater combat management systems. In this context, the objective is to find optimal trajectories according to the current mission type by taking into account sensors, environment and surrounding targets. This problem has been modeled as a discrete-time Markov decision process with finite horizon. A quantization technique has been applied to discretize the problem in order to get a finite MDP for which standard methods such as the dynamic and/or the linear programming approaches can be applied. Different kind of scenarios have been considered and studied.

### 7.1.2. *Thales Optronique*

Participants: Benoîte de Saporta, François Dufour, Tiffany Cerchi.

Maintenance, optimization, fleet of industrial equipments The topic of this collaboration with Université de Montpellier and Thales Optronique is the application of Markov decision processes to the maintenance optimization of a fleet of industrial equipments.

### 7.1.3. *Case Law Analytics*

Pierrick Legrand is a consultant for the startup Case Law Analytics. The object of the consulting is confidential.



## FLOWERS Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Autonomous Driving Commuter Car*

**Participants:** David Filliat [correspondant], Emmanuel Battesti.

We developed planning algorithms for a autonomous electric car for Renault SAS in the continuation of the previous ADCC project. We improved our planning algorithm in order to go toward navigation on open roads, in particular with the ability to reach higher speed than previously possible, deal with more road intersection case (roundabouts), and with multiple lane roads (overtake, insertion...).

## 8.2. Bilateral Grants with Industry

### 8.2.1. *Perception Techniques and Sensor Fusion for Level 4 Autonomous Vehicles*

**Participants:** David Filliat [correspondant], Vyshakh Palli-Thazha.

Financing of the CIFRE PhD grant of Vyshakh Palli-Thazha by Renault.

### 8.2.2. *Incremental Methods of Deep Learning for detection and classification in an robotics environment*

**Participants:** David Filliat [correspondant], Timothée Lesort.

Financing of the CIFRE PhD grant of Timothée Lesort by Thales.

### 8.2.3. *Exploration of reinforcement learning algorithms for drone visual perception and control*

**Participants:** David Filliat [correspondant], Florence Carton.

Financing of the CIFRE PhD grant of Florence Carton by CEA.

### 8.2.4. *Incremental learning for sensori-motor control*

**Participants:** David Filliat [correspondant], Hugo Caselles Dupré.

Financing of the CIFRE PhD grant of Hugo Caselles-Dupré by Softbank Robotics.

### 8.2.5. *Curiosity-driven Learning Algorithms for Exploration of Video Game Environments*

**Participant:** Pierre-Yves Oudeyer [correspondant].

Financing of a postdoc grant for a 2 year project with Ubisoft and Région Aquitaine.

### 8.2.6. *Intrinsically Motivated Exploration for Lifelong Deep Reinforcement Learning in the Malmo Environment*

**Participants:** Pierre-Yves Oudeyer [correspondant], Remy Portelas.

Financing of the PhD grant of Rémy Portelas by Microsoft Research.

### 8.2.7. *Explainable continual learning for autonomous driving*

**Participants:** Natalia Díaz Rodríguez [correspondant], Adrien Bennetot.

Financing of the CIFRE PhD grant of Adrien Bennetot by Segula Technologies.

## **GEOSTAT Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

InnovationLab with I2S company, starting scheduled after 1st 2019 COPIL in January 2019.

**HIEPACS Project-Team (section vide)**

**LFANT Project-Team (section vide)**

## **MAGIQUE-3D Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Contracts with TOTAL**

- Depth Imaging Partnership (DIP)
- Depth Imaging Partnership (DIP2)  
Period: 2014 May - 2019 April , Management: Inria Bordeaux Sud-Ouest, Amount: 120000 euros/year.
- Depth Imaging Partnership (DIP3)  
Period: 2019 May - 2021 December , Management: Inria Bordeaux Sud-Ouest, Amount: 120000 euros/year.
- Tent Pitcher algorithm for space-time integration of wave problems Period: 2019 November - 2022 October, Management: Inria Bordeaux Sud-Ouest, Amount: 165000 euros.
- Isogeometric analysis of sharp boundaries in fullwaveform inversion Period: 2019 January - 2021 December, Management: Inria Bordeaux Sud-Ouest, Amount: 55000 euros.
- FWI (Full Waveform Inversion) dans le domaine temporel utilisant des méthodes numériques hybrides pour la caractérisation de milieux élasto-acoustiques. Period: 2017 October - 2020 December , Management: Inria Bordeaux Sud-Ouest, Amount: 180000 euros.
- Petrophysics in pre-salt carbonate rocks  
Period: 2019 November - 2021 June, Management: Inria Bordeaux Sud-Ouest, Amount: 142000 euros.

## **MANAO Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

### ***8.1.1. CIFRE PhD contract with Imaging Optics (2017-2020)***

**Participants:** C. Herzog & X. Granier

For this project, we aim at developing 3 dimensions X-rays imaging techniques for medical applications.

## **MEMPHIS Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry: EDF**

40kEuro contract for a study on the development of projection-based reduction strategies for the shallow-water equations, for applications in Hydraulics.

## **8.2. Bilateral Grants with Industry: ANDRA**

36kEuro contract for the development of a projection-based reduced model for a thermo-hydraulic-mechanical (THM) system.

## MNEMOSYNE Project-Team

# 8. Bilateral Contracts and Grants with Industry

## 8.1. Bilateral Contracts with Industry

### 8.1.1. *Contract with CEA Cesta*

**Participants:** Frédéric Alexandre, Guillaume Padiolleau.

In the context of the PhD of Guillaume Padiolleau, we are working with the CEA on possible interactions between model-based and model-free approaches of reinforcement learning, based on cognitive consideration. Particularly, to decrease the complexity of exploration of a large data space in model-free approaches, we aim at considering introducing a priori knowledge coming from a model and we also propose to consider motivation as another way to orient the search in the learning space. This is applied in the robotic domain to manipulations by a robotic arm.

### 8.1.2. *Contract with Ubisoft*

**Participants:** Frédéric Alexandre, Pramod Kaushik.

Together with the Inria Project-team Flowers, we are working with the video game editor Ubisoft to define original bio-inspired learning methods, to qualify the behavior of human players observed during runs of games. Such learning algorithms will be specifically considered in the PhD of Pramod Kaushik.



## **MONC Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

- Research contract between Roche and the MONC team.
- Collaboration contract with Sophia Genetics in the context of the Pimiento project.

## **8.2. Bilateral Grants with Industry**

Pimiento project from MSDAvenir (<http://www.msdatenir.fr/>) through Inria Foundation.

**PLEIADE Project-Team (section vide)**

## **POTIOC Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

### **Ullo:**

Duration: 2017-2020

Local coordinator: Martin Hachet

Following our work with the Introspectibles (Teegi, TOBE, Inner Garden), we are currently working with the ULLO company to bring these new interfaces to healthcare centers.

### **AKIANI:**

Duration: 2019-2020

Local coordinator: Fabien Lotte

InriaTech project on physiological computing and neuroergonomics.

## **REALOPT Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

We have an on-going contract with SNCF on scheduling of rolling-stock. The PhD thesis of Mohamed Benkirane is part of this contract.

Following the PhD thesis of Rodolphe Griset, our collaboration with EDF has continued through a new contract within Inria Tech. Its goal is to investigate the possibility of developing an operational prototype (called Fenix) for strategic planning of nuclear plant outages. Two scientific questions are raised. The first one concerns the new mechanisms of management of the power capacity market on the French power grid. The second one is about a new model of the stock variation during a refueling operation, which requires information of several previous production campaigns.

We also have a contract with RTE to develop strategies inspired from stochastic gradient methods to speed-up Benders' decomposition. The PhD thesis of Xavier Blanchot is part of this contract.

We have a contract with Thales Avionique to study a robust scheduling problem.

## **SISTM Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Contracts and Grants with Industry**

Implication in research for the development of Ebola vaccine has lead to several indirect contracts with industry:

- The EBOVAC1, EBOVAC2 and EBOVAC3 project, collaboration with Janssen from Johnson et Johnson.
- The Prevac trial vaccine trial (legal sponsors: Inserm, NIH, London School of Hygiene and Tropical Medicine) involves collaborations with Merck and Janssen. The purpose of this study is to evaluate the safety and immunogenicity of three vaccine strategies that may prevent Ebola virus disease (EVD) events in children and adults. Participants will receive either the Ad26.ZEBOV (rHAd26) vaccine with a MVA-BN-Filo (MVA) boost, or the rVSV $\Delta$ G-ZEBOV-GP (rVSV) vaccine with or without boosting, or placebo. The EDCTP-2 funded Prevac-UP project is set as a continuation of Prevac trial in the same framework.

A new collaboration has started with the pharma company Ipsen on the integration of OMICS data into an in-silico trials pipeline (Cifre Phd to start in January 2020)

## **STORM Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Contracts with Industry**

- Contract with ATOS/Bull for the PhD CIFRE of Tassadit Célia Ait Kaci (2019-2021),
- Contract with Airbus for 1 year, renewable, on StarPU in Flusepa code (2019-), for the engineer contract of Alexis Juven,
- Contract with CEA for the PhD of Arthur Loussert (2017-2019), for the PhD of Van Man Nguyen (2019-2021) and other short contracts.

## **TADAAM Project-Team**

# **8. Bilateral Contracts and Grants with Industry**

## **8.1. Bilateral Grants with Industry**

### **8.1.1. Intel**

INTEL granted \$30k and provided information about future many-core platforms and memory architectures to ease the design and development of the HWLOC software with early support for next generation hardware.

### **8.1.2. EDF**

With Yvan Fournier from EDF R&D, we co-advise the PhD thesis of Benjamin Lorendeau under a CIFRE funding.

### **8.1.3. CEA**

CEA/DAM granted the CIFRE PhD thesis of Florian Reynier on non-blocking MPI collectives.