Activity Report 2013

Section highlights of the Team

ALGORILLE Project-Team (section vide)

ALICE Project-Team (section vide)

BIGS Project-Team (section vide)

CALVI Project-Team

2.2. Highlights of the Year

The Selalib project has made important progress in its development as it prepares for a release in 2014 with new additions in terms of capabilities and contributors.

CAMUS Team

2.2. Highlights of the Year

- Sept. 2013, Cédric Bastoul joined the CAMUS team as a Professor of the University of Strasbourg.

CARAMEL Project-Team

2.2. Highlights of the Year

- A spectacular new result has been obtained in the context of the cryptanalysis of the discrete logarithm problem in certain types of fields [22]. The complexity for solving this hard problem has been reduced from « sub-exponential » complexity, roughly $\exp(O(n^{1/3}))$ for an input size n, to the much lower « quasi-polynomial » complexity written as $\exp(O((\log n)^2))$. As a result, a whole range of cryptographic proposals have lost momentum, notably proposals related to pairing-based cryptography over small characteristic fields.

- Still in the realm of the computation of discrete logarithm, a new record computation has been completed by the team for binary fields of *prime* extension degree [15], using the Function Field Sieve algorithm. This establishes a useful comparison point between the Function Field Sieve and the newly proposed algorithm discussed above.

- The 2.0 release of the CADO-NFS software package, developed by the team, was made available in november. This releases incorporates an important number of improvements over the previous release which was 2 years earlier. CADO-NFS is available from the project page http://cado-nfs.gforge.inria.fr/.

CARTE Project-Team

2.2. Highlights of the Year

Our team made remarkable progress into the difference between "real world" systems and artefacts due to exact (infinite) precision computations. Olivier Bournez, Daniel Graça and Emmanuel Hainry succeeded in proving an equivalence between robustness and computability: Robust dynamical systems have computable dynamical properties [12], a strong evidence that "real world" systems will not exhibit undecidability properties.

Another highlight of the year is a paper by Hugo Férée, Mathieu Hoyrup and Walid Gomaa, accepted in LICS 2013 [19] that provides a systematic approach to define and analyse the complexity of algorithms acting on infinite precision numbers (infinite words).

CASSIS Project-Team

2.4. Highlights of the Year

- We have released the first version of *Belenios*, an electronic voting protocol based on a previous system, Helios. *Belenios* is an open-source voting system that offers transparent and verifiable elections. We have also signed a contract with a French company on electronic voting, Voxaly, to discuss their solution and a possible adaptation to *Belenios*' concepts.

- We have found a weakness in the biometric passports: under certain circumstances, it is possible to trace a passport holder, despite the existing security measures. Our flaw has been reported in the journals "Pour la Science" and "Journal du CNRS".

CORIDA Project-Team

2.2. Highlights of the Year

Marius Tucsnak has been nominated Senior Member of the Institut Universitaire de France.

George Weiss visited our team in the frame of the "Chercheur d'excellence" program of Région Lorraine.

CORTEX Team (section vide)

<h1 style="color:red; text-align:center">MADYNES Project-Team</h1>

2.2. Highlights of the Year

The following points of 2013 deserves to be highlighted:

- Two new permanent members joined the MADYNES team: Bernardetta Addis and Thibault Cholez. They are associate professor at the University of Lorraine with teaching activities at Mines Nancy and TELECOM Nancy, respectively.

- An outstanding publication was achieved in the journal "IEEE Communications Surveys and Tutorials" which has an impact factor of 4.8.

- In relation with research (Aetournos project, R2D2 ADT), the Alérion project has been one of the "15ème concours national de création d'entreprises innovantes" (national innovative startup program) prize-winner in 2013 in the "emerging" category. The Alérion project is offering an e-falconry solution based on interconnected cyber-physical bricks which will allow for the design of advanced and innovative services, and other serious games. Increasingly autonomous vehicles (UAV, UGV ...) and systems are becoming part of our daily world and can offer novel civilian applications (gaming "drones", aerial photography, vacuum cleaners ...).

- To foster the new application domain developed by the team on Software Defined Networking, the team co-organized the SDN Days (GdR CNRS RESCOM) in Loria (Nancy)

MAGRIT Project-Team

2.2. Highlights of the Year

- Several members of the team received the *best paper-honourable mention* at ISMAR 2013 for the paper : *Image-guided Simulation of Heterogeneous Tissue Deformation For Augmented Reality during Hepatic Surgery, by by Nazim Haouchine, Jeremie Dequidt, Igor Peterlik, Erwan Kerrien, Marie-Odile Berger, Stéphane Cotin.*

- Gilles Simon received the *Lasting Impact Award* at ISMAR 2013 for the paper: *Markerless Tracking using Planar Structures in the Scene by Simon Gilles, Andrew W. Fitzgibbon, Andrew Zisserman in Proceedings of the IEEE and ACM International Symposium on Augmented Reality, 2000 (ISAR), pages 120-128* .

BEST PAPERS AWARDS :

[18] **ISMAR - IEEE International Symposium on Mixed and Augmented Reality 2013**. N. HAOUCHINE, J. DEQUIDT, I. PETERLIK, E. KERRIEN, M.-O. BERGER, S. COTIN.

MAIA Project-Team

2.2. Highlights of the Year

- the MAIA team was rewarded as "*the most influential team of the research field*" during the French conference on Planification, Decision and Learning (JFPDA 2013).
- M. Tlig, O. Buffet, O. Simonin got the Best Paper Award for their paper presented at RJCIA-13 [38].

<h1 style="text-align:center; color:red">MASAIE Project-Team</h1>

2.4. Highlights of the Year

The estimation of sequestered parasite population has been a challenge for the biologist and modeler, with many authors having studied this problem. The difficulty is that the infected erythrocyte leaves the circulating peripheral blood and binds to the endothelium in the microvasculature of various organs. A measurement of Plasmodium falciparum parasitaemia taken from a blood smear therefore samples young parasites only and there is no clinical methods to measure the sequestered parasites. We have developed a simple tool to estimate the sequestered parasites and hence the total parasite burden for *Plasmodium falciparum* malaria patients. We have also given a method to estimate a crucial parameter in the model of infection. This parameter β can be thought as the "transmission/invading" factor between merozoites and erythrocytes. This work [11] will be published in "Mathematical Biosciences and Engineering".

NEUROSYS Team

2.2. Highlights of the Year

In the last years we have been working on models of anaesthetic action on neural populations based on published experiments of other research groups. This year we have been able to participate in the analysis of experimental animal data measured under anaesthesia by the University of North Carolina-Chape Hill [9]. The corresponding common publication with this experimental laboratory is a perfect basis for a future international cooperation.

ORPAILLEUR Project-Team

2.2. Highlights of the Year

For the highlights of the year, we would like to mention the work of Anisah Ghoorah on the KBDOCK system which was accepted in the Database issue of Nucleic Acids Research [6] and as well her paper on "Protein Docking Using Case-Based Reasoning" for the special issue CAPRI [21].

PAREO Project-Team (section vide)

PAROLE Project-Team (section vide)

SCORE Team (section vide)

SÉMAGRAMME Project-Team

2.2. Highlights of the Year

Dr. Ekatarina Lebedeva (together with Wesley H. Holliday, Stanford University) winned the E.W. Beth Dissertation Prize, awarded by FoLLI (the Association for Logic, Language, and Information) to outstanding dissertations in the fields of Logic, Language, and Information. Dr. Ekatarina Lebedeva prepared her PhD thesis in the Sémagramme team, under the supervision of Philippe de Groote. She obtained her PhD degree from the *Université de Lorraine* in April 2012.

SHACRA Project-Team

2.3. Highlights of the Year

2.3.1. Scientific exhibition for the french government

The intergovernmental seminar on digital sciences was held in february at the University of Cergy-Pontoise. Within this context, the team has exhibited a demonstration of a cataract surgery simulator which is dedicated to train surgeons to a new cost-effective cataract surgery procedure MSICS (*manual small incision cataract surgery*). This simulator was developed at Inria and has been transferred to the start-up InSimo.

../../../../projets/shacra/IMG/IMG_4902_web.jpg ../projets/shacra/IMG/IMG_4945_web.j

Figure 2. Demonstration of a cataract surgery simulator during the intergovernmental seminar on digital sciences.

2.3.2. Best Papers

We received the runner-up best paper award for the paper published in ISMAR 2013, the leading conference in Augmented and Mixed Reality.

BEST PAPERS AWARDS :

[22] **ISMAR - IEEE International Symposium on Mixed and Augmented Reality 2013**. N. HAOUCHINE, J. DEQUIDT, I. PETERLIK, E. KERRIEN, M.-O. BERGER, S. COTIN.

TOSCA Project-Team (section vide)

TRIO Team

2.2. Highlights of the Year

This is the last activity report of TRIO team, as the team ends in 2013. TRIO has been, originally, created in 2002 under the guidance of Françoise Simonot-Lion. In 2010, when Françoise became director of Laboratoire Lorrain de Recherche en Informatique et ses Applications (LORIA), Nicolas Navet became the leader of the team. In 2012, when Nicolas Navet became Professor at University of Luxembourg, Liliana Cucu-Grosjean became the last leader of TRIO team. The team ends on an excellent Inria evaluation in 2012 that underlines the important contribution of its members within their scientific communities. Following the natural life process of an Inria team, the end of TRIO indicates the evolution of its members to new exciting research problems.

Liliana Cucu-Grosjean gave the keynote talk of the 21st International Conference on Real-Time Networks and Systems. Her talk concerned the probabilistic real-time systems.

Dorin Maxim and Liliana Cucu-Grosjean published a paper entitled "Response Time Analysis for Fixed-Priority Tasks with Multiple Probabilistic Parameters" at the IEEE Real-Time Systems Symposium (RTSS), the flag conference on real-time systems.

The FP7 STREP PROARTIS has been successfully completed in July 2013. TRIO was leader of the work package on the probabilistic approaches and tools within this project.

VEGAS Project-Team (section vide)

VERIDIS Project-Team

2.2. Highlights of the Year

Uwe Waldmann received a LICS Test of Time Award for the paper "Set constraints are the monadic class" published at LICS 1993 together with Leo Bachmair and Harald Ganzinger. He also won the TFA category (typed first-order logic with arithmetic) of the CADE ATP System Competition 2013 using the prover SPASS+T.

Pascal Fontaine was the main organizer and program committee chair (with Christophe Ringeissen and Renate Schmidt) of FroCos 2013 in September in Nancy.