

JAIME ARIAS

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<https://himito.github.io>

Personal Information

Given Name: Jaime Eduardo
Last Name: Arias Almeida

Birth Date: 15/04/1989
Birthplace: Cali, Colombia

Citizenship: Colombian
Marital Status: Married

Research Interests

Formal specification and verification of timed and reactive concurrent systems; interactive multimedia systems.

Experience

- **Research Engineer** at *CNRS, Laboratoire d'Informatique de Paris Nord (LIPN)* **2018 - Present**
Villetaneuse, France
I am in charge of the coordination, development and deployment of the software projects in the LoVe team of the LIPN at the Université Paris 13.
- **R&D Engineer** at *Inria Grenoble Rhône-Alpes* **2016 - 2018**
Montbonnot, France
My main objective was to improve the functional MRI inference software PyHRF in order to make it user-friendly and usable by non experts and clinicians. To this end, I worked in a multidisciplinary group composed of statisticians from the research team MISTIS and neuroscientists from GIN.
- **R&D Engineer** at *Inria Bordeaux Sud-Ouest* **2015 - 2016**
Bordeaux, France
I was in charge of developing in HASKELL a formal framework for writing and executing interactive systems. For that, I worked with computer scientists from LaBRI and artists from SCRIME. Moreover, I developed in collaboration with Shlomo Dubnov, a system to create interactive music pieces from a formal specification.
- **Ph.D. Student** at *Université de Bordeaux* **2013 - 2015**
Bordeaux, France
I developed a complete framework for the specification and automatic verification of interactive multimedia scenarios using formal methods such as Timed Automata, Synchronous Languages, Colored Petri Nets, and Linear Logic. Moreover, I proposed a true parallel implementation of these scenarios on a reconfigurable hardware (FPGAs) for their low-latency and real-time interpretation.
- **Young Researcher** at *AVISPA Research Group* **2012 - 2013**
Cali, Colombia
I developed and implemented the first model checking algorithm for the timed concurrent constraint calculus TCC. Moreover, I implemented in OCAML the first symbolic model checker for the NTCC calculus.

Education

- **Ph.D. in Computer Science** at *Université de Bordeaux, France.* **2012 - 2015**
Thesis: *Formal Semantics and Automatic Verification of Hierarchical Multimedia Scenarios with Interactive Choice*
Supervisors: Prof. Myriam DESAINTE-CATHERINE and Prof. Camilo RUEDA
- **Engineering Degree in Computer Science** at *Universidad Javeriana, Colombia.* **2011 - 2012**
Thesis: *Model Checking for tcc Calculus*
Supervisors: Dr. Carlos OLARTE and Dr. Eugenio TAMURA
- **Electronics Engineering Degree** at *Universidad Javeriana, Colombia.* **2005 - 2010**
Thesis: *Model Checking for tcc Calculus*
Supervisors: Dr. Carlos OLARTE and Dr. Eugenio TAMURA

Distinctions








- Doctoral Scholarship for a 3-year Ph.D. studies from ANR (the French National Research Agency). **2012**
- Laureate thesis award from Pontificia Universidad Javeriana (*twice*). Highest honor distinction for outstanding research in both Computer Science and Electronics Engineering undergraduate programs. **2013**
- Young research scholarship in the REACT+ project, a joint project between École Polytechnique de Paris, IRCAM and Javeriana University. **2012**
- Honorable mention from Pontificia Universidad Javeriana for *highest GPA* in Computer Science undergraduate program. **2011**
- Honorable mention (**3 times**) from Pontificia Universidad Javeriana for *highest GPA* in Electronics Engineering undergraduate program. **2006-2007**
- Honorable mention from Instituto Técnico Industrial San Juan Bosco (High School) given to the *best student* in the specialty of electricity. **2005**

Additional Information



- **Programming Languages:** Ocaml, Haskell, Python, C++, C, ReactiveML, and Bash.
- **Others:** OSX, GNU/Linux, \LaTeX , CSS, HTML, Javascript, Docker, and Git.
- **Languages:** Spanish (Native), French (DELF B2), and English (Fluent).
- **Hobbies:** Playing guitar, reading fantasy books, and cooking Colombian and French food.

Tools

The reader can visit my Git repository (<https://github.com/himito>) to see the full list of my developments.

- **VMO-Score** ( python): Tool to create an interactive score from an audio recording. The resulting I-SCORE score allows to control the improvisation carried out by the system VMO. **Demo:** <http://bit.ly/2nW9waw>
- **tccMChecker** ( python): Model checker for the timed concurrent constraint calculus TCC.
- **SyMoN** ( ocaml): Symbolic model checker for a non-deterministic timed concurrent constraint calculus.
- **ReactiveIS** ( ocaml): Synchronous programming language for composing and interpreting interactive scores. Its operational semantics is based on labeled trees with a correspondence to linear logic (SELL).
- **IS2UPPAAL** ( ocaml): Tool to translate an interactive score written in I-SCORE into its UPPAAL model for its automatic verification. This tool has been integrated into i-score as the plug-in `iscore-addon-staticanalysis`.
- **RitMos (REACTIVEML)**: Interpreter of interactive scores implemented in REACTIVEML. Thanks to its reactive approach and INScore, it provides a real-time graphical feedback of the execution state of the score.
- **FO-Haskell** ( Haskell): Haskell implementation of the Factor Oracle structure for musical improvisation.
- **HINScore** ( Haskell): Haskell API for the interactive system INScore. **Demo:** <http://bit.ly/2mNmPY9>.

In addition, I actively contribute to the development of the following projects:

- **IMITATOR** ( ocaml): Tool for parametric verification and robustness analysis of real-time systems with parameters. It relies on the formalism of networks of parametric timed automata, augmented with integer variables and stopwatches.
- **PyHRF** ( python): Tool that jointly detect the neuronal activation and estimate the hemodynamic response function (HRF) induced by brain activity. **Video:** <http://bit.ly/2EJq6V1>.
- **ReactiveSessions (REACTIVEML)**: Library for the specification of communication-based software featuring declarative, reactive, timed and contextual behaviors.

Publications

The reader can find all my publications on my website and the HAL server (<http://bit.ly/2s54yfo>).

1. Jaime Arias, Jean-Michaël Celerier, and Myriam Desiante-Catherine. Authoring and automatic verification of interactive multimedia scores. *Journal of New Music Research*, 2016. doi: 10.1080/09298215.2016.1248444.
2. Mauricio Cano, Jaime Arias, and Jorge A. Pérez. Session-based concurrency, reactively. In *37th IFIP WG 6.1 International Conference on Formal Techniques for Distributed Objects, Components, and Systems (FORTE 2017), Neuchâtel, Switzerland, June 19-22, 2017*, volume 10321 of *Lecture Notes in Computer Science*, pages 74–91. Springer, 2017. doi: 10.1007/978-3-319-60225-7_6.
3. Jaime Arias, Philippe Ciuciu, Michel Dojat, Florence Forbes, Aina Frau-Pascual, Thomas Perret, and Jan M. Warnking. PyHRF: A python library for the analysis of fMRI data based on local estimation of hemodynamic response function. In *15th Python in Science Conference (SciPy 2017)*, pages 34–40, 2017. doi: 10.25080/shinma-7f4c6e7-006.
4. Jaime Arias, Michell Gúzman, and Carlos Olarte. A symbolic model for timed concurrent constraint programming. *Electronic Notes in Theoretical Computer Science*, 312:161–177, 2015c. doi: 10.1016/j.entcs.2015.04.010.
5. Jaime Arias, Myriam Desainte-Catherine, Carlos Olarte, and Camilo Rueda. Foundations for reliable and flexible interactive multimedia scores. In *5th International Conference on Mathematics and Computation in Music, MCM 2015, London, UK, June 22-25, 2015*, volume 9110 of *Lecture Notes in Computer Science*, pages 29–41. Springer, 2015a. doi: 10.1007/978-3-319-20603-5_3.
6. Jaime Arias, Myriam Desainte-Catherine, and Camilo Rueda. A framework for composition, verification and real-time performance of multimedia interactive scenarios. In *15th International Conference on Application of Concurrency to System Design, ACSD 2015, Brussels, Belgium, June 21-26, 2015*, pages 140–151. IEEE Computer Society, 2015b. doi: 10.1109/ACSD.2015.8.
7. Jaime Arias, Myriam Desainte-Catherine, and Camilo Rueda. Modelling data processing for interactive scores using coloured petri nets. In *14th International Conference on Application of Concurrency to System Design, ACSD 2014, Tunis La Marsa, Tunisia, June 23-27, 2014*, pages 186–195. IEEE Computer Society, 2014. doi: 10.1109/ACSD.2014.23.

Talks

The reader can find all my presentations on my website and the Speaker Deck site (<http://bit.ly/2saLV4Z>).

1. Jaime Arias. A tree-based operational semantics for interactive multimedia scores. Presented at the Seminar on Formal Methods and Languages in Inria Grenoble, France, 2017b. URL <http://bit.ly/2yIMtE0>
2. Jaime Arias. Hunting Moby Dick: An introduction to Docker. Presented as a workshop for the Inria Team Mistis in Montbonnot, France, 2017a. URL <http://bit.ly/2iZF4ZK>.
3. Jaime Arias. Automatic verification of interactive multimedia scenarios with branching behavior. Presented at the Colloquium of Computer Science of the University of Groningen in Groningen, the Netherlands, 2016. URL <http://bit.ly/2sQ0dKi>.
4. Jaime Arias and Shlomo Dubnov. Automatic construction of interactive machine improvisation scenarios from audio recordings. Presented at the Workshop on Dynamics of Creative Improvisation in Bordeaux, France, 2016. URL <http://bit.ly/2sFp9FV>.
5. Jaime Arias. Towards an automatic verification of interactive scores and their real-time performance. Presented at the Journées INEDIT in Bordeaux, France, 2015. URL <http://bit.ly/2rQFJiZ>.
6. Jaime Arias. Formal models to compose and execute multimedia interactive scores. Presented at the research seminar of the Javeriana University in Cali, Colombia, 2014. URL <http://bit.ly/2EYZpvf>.