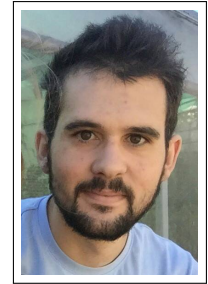


Jordy Ruiz, Ph.D

Postdoctoral Research Applicant

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Profile

Young motivated PhD graduate with research experience in program analysis, abstract interpretation and critical systems. Enjoys mathematics and well-structured programming. Highly enthusiastic towards mathematical abstractions and (formal) proofs for computer science. Looking to learn and intersect scientific fields and theories.

Research work

- Postdoctoral fellowship 2018/06 – 2019/06
Development of methods to compute an upper bound on the worst-case execution time of a software task in embedded systems Lille, France
Supervision: Pr. Giuseppe Lipari (EMERAUDE)
Design and mathematical proof of an abstract polyhedral domain to capture properties on arrays for program analysis on binary code.
Co-development of a C++ tool using OTAWA and the PPL Polyhedra Library.
- Ph.D. thesis 2014/10 – 2017/12
Identifying data flow properties to improve worst-case execution time estimations Toulouse, France
Supervision: Pr. Christine Rochange ; Dr. Hugues Cassé (TRACES)
Development of a C++ plugin for the WCET tool OTAWA, performing program analysis on binary code, extracting data flow properties from actual critical embedded applications (DEBIE-1, PapaBench...). Collaboration with V. Mussot's tool for the exploitation of (infeasible paths information, yielding the development of a toolchain in OTAWA.
- Masters thesis 2014/08
Detecting infeasible paths on machine code to improve worst-case execution time estimations Toulouse, France
Supervision: Dr. Hugues Cassé (TRACES)
Development of an infeasible paths detection C++ prototype for OTAWA.
- Internship 2013/07
Co-inductive reasoning for the transformation of deterministic automata Toulouse, France
Supervision: Dr. Ralph Matthes (ACADIE)
Complete formal proof of Brozowski's algorithm¹ in Coq.

¹Based on the categorical proof by Bonchi et al., *Brzozowski's Algorithm (Co)Algebraically* (2012)

Education

University Toulouse III

- Masters in **Computer Science** 2012 – 2014
Second year: Critical Software & Distributed systems (ranked 2/8)
First year: Artificial Intelligence & Pattern Recognition (ranked 1/15)
- Bachelor in **Fundamental Mathematics** 2009 – 2012
Bachelor in **Computer Science** 2009 – 2012
Parallel studies and simultaneous graduation from two bachelors.

Publications at international conferences and workshops

- Static Analysis Of Binary Code With Memory Indirections Using Polyhedra. ⚡ 2019/01
C. Ballabriga, J. Forget, L. Gonnord, G. Lipari, **J. Ruiz** Cascais, Portugal
In: *VMCAI – International Conference on Verification, Model Checking, and Abstract Interpretation, 2019.* (regular paper)
- ⚡ best paper award
- Working around loops for infeasible path detection in binary programs. 2017/09
J. Ruiz, H. Cassé, M. De Michiel. Shanghai, China
In: *SCAM – IEEE International Working Conference on Source Code Analysis and Manipulation, 2017.* (regular paper)

- The W-SEPT project: Towards Semantic-aware WCET Estimation. 2017/06
Dubrovnik, Croatia
 C. Maïza, P. Raymond, C. Parent-Vigouroux, A. Bonenfant, F. Carrier, H. Cassé,
 P. Cuenot, D. Claraz, N. Halbwachs, F. Carrier, H. Cassé, E. Jahier, H. Li, M. De Michiel,
 V. Mussot, I. Puaut, C. Rochange, E. Rohou, **J. Ruiz**, P. Sotin, W.-T. Sun.
 In: WCET – Workshop on Worst-Case Execution Time Analysis, 2017. (regular paper)
- Expressing and Exploiting Path Conflicts in WCET Analysis. 2016/07
Toulouse, France
 V. Mussot, **J. Ruiz**, P. Sotin, M. De Michiel, H. Cassé.
 In: WCET – Workshop on Worst-Case Execution Time Analysis, 2016. (regular paper)
- Using SMT Solving for the Lookup of Infeasible Paths in Binary Programs. 2015/07
Lund, Sweden
J. Ruiz, H. Cassé.
 In : WCET – Workshop on Worst-Case Execution Time Analysis, 2015. (regular paper)
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Skills

Theories:

- Seasoned with **abstract interpretation** (esp. polyhedra), **static analysis** (esp. on binary code), and worst-case execution time problems.
- Worked on and written pending papers for **data caches** (access profiling) and **formal proofs**.
- Resourceful with **algebra**, **probabilities**, and mathematics in general.
- Learned and taught compiling techniques.

Development:

- Well-versed in **C++** programming, both for independent projects and contributions to existing work, debugging (gdb, callgrind, massif) and autodoc.
- Done substantial work with **Coq** (proof assistant), **Python** (scripting and prototypes), **ARM** assembly code (analysis, prototyping).
- Some knowledge of various functional languages (OCaml, Haskell).
- Can quickly adapt and contribute to existing projects.

Tools:

- Proficient with the OTAWA static analysis framework
 - Experienced with the SMT solvers **Z3** and **CVC4** (sent some minor fixes through git). Has worked with ILP solvers.
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Teaching

- 40h** of teaching in practical work classes at the Polytech engineering school 2018-2019
214h (incl. 10h of volunteering) of teaching in practical work classes at university 2014-2017
- *Levels taught* range from freshman to last year master classes (~15 students each).
 - *Topics taught* include algorithmics, logic, programming in C, Java, Python, OCaml, Ada, ARM assembly, and compiling techniques and theories.
 - *Assisting*: conception, supervision and grading of practical exams.
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Languages

English: fluent (TOEIC: 990/990).
 French: native.
 Sinographs (Chinese characters): intermediate.