

Personal information

Alejandro Sánchez

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Gender Male | Date of birth 24 February 1984 | Nationalities Italian, Argentinian

WORK EXPERIENCE

2015 – Present

Post-doctoral Researcher

IMDEA Software Institute

Madrid, Spain

My current work comprises the formalization of novel decidable theories for concurrent data types, the development of decision procedures for non-trivial concurrent data structures and the implementation of these decision procedures on top of SMT solvers.

2009 – 2015

Research Student

IMDEA Software Institute

Madrid, Spain

My work involved the construction of a formal deductive verification framework for the analysis of imperative concurrent programs, which enabled the verification of temporal properties of both safety and liveness. The main application target were concurrent programs that dynamically manipulate the memory, with a special emphasis on pointer-based concurrent data structures.

2007 – 2008

JAVA Software Engineer

Gameloft

Córdoba, Argentina

As part of the *Source Improvement* team, my work encompassed the porting, improvement and implementation of new features for JAVA games designed for mobile devices based on the J2ME technology.

2006 – 2006

JAVA Software Engineer

Instituto Tecnológico Córdoba

Córdoba, Argentina

My work consisted on the design and implementation of clean-room JAVA libraries to be integrated as part of the *Apache Harmon Project*, which is the JAVA Standard Edition of the *Apache Software Foundation*.

EDUCATION

2012 – 2015

PhD in Computer Science

Universidad Politécnica de Madrid, Spain

The main research areas covered during my PhD include:

- Parametrized concurrent systems
- Concurrent data structures
- Dynamic memory analysis
- SAT/SMT Solvers
- Decision procedures
- Temporal logics

PhD Thesis: "*Formal Verification of Temporal Properties for Parametrized Concurrent Programs and Concurrent Data Structures*", qualified with the highest grade (*cum laude*).

2010 – 2011 Master in Programming and Software Technology

Universidad Complutense de Madrid, Madrid, Spain

The taken courses include:

- Design of embedded systems
- Software validation
- Modeling of concurrent and distributed systems
- Automatic deduction
- Fuzzy logic

Final general average qualification of 9.66/10 points.

Master Thesis: "*Decision Procedures for the Temporal Verification of Concurrent Data Structures*", qualified with the highest grade "Matrícula de Honor" (10/10 points).

2002 – 2007 Bachelor of Science in Computer Science

Universidad Nacional de Córdoba, Córdoba, Argentina

Final general average qualification of 9.26/10 points.

Final career project: "*Towards a Proof Assistant Based on PTS*", qualified with 10/10 points.

INTERNSHIPS

Sep. 2010 Visiting Intern

Ecole Polytechnique Federale de Laussane (EPFL)

Laussane, Switzerland

As part of a short term scientific mission of three weeks, I worked in collaboration with the LARA team in the development and implementation of decidable theories and decision procedures for specific concurrent data structures.

Jan. 2009 – Sep. 2009 Research Intern

IMDEA Software Institute

Madrid, Spain

My main work involved the study and research of formal verification techniques specifically designed for the analysis of concurrent programs that dynamically manipulate the memory.

Apr. 2008 – Sep. 2008 Research Intern

Institut National de Recherche en Informatique et Automatique (INRIA)

Sophia Antipolis, France

My work as part of the PULSAR team (previously ORION) comprised the theoretical development and implementation in C++ of relations as an extension of a knowledge representation language which was part of an artificial intelligence framework.

TEACHING EXPERIENCE

2005 – 2008 Teaching Assistant

Universidad Nacional de Córdoba

Córdoba, Argentina

Student Position at the Facultad de Matemática, Astronomía y Física. Teaching topics include:

- Algorithms and Data Structures
- Programming Language Paradigms
- Software Engineering
- Operating Systems

PERSONAL SKILLS

Mother tongue(s) Spanish

Other language(s)

	Understanding		Speaking		Writing
	Listening	Reading	Spoken interaction	Spoken production	
English	C2	C2	C2	C2	C2
Macedonian	B1	B1	B1	B1	B1
French	A1	A2	A1	A1	A1

Levels: A1/A2: Basic user - B1/B2: Independent user - C1/C2: Proficient user
Common European Framework of Reference (CEF) level

Programming Languages and tools

Knowledge of the following programming languages and development tools:

- Advanced level in: JAVA, OCaml, C, Bash, LaTeX
- Intermediate level in: C++, Python, HTML, JavaScript
- Wide knowledge in: SAT, SMTLIB, SMT solvers (Yices, Z3, CVC4)
- Development tools: Eclipse, Vim, Git, SVN

PUBLICATIONS

- 2015 **Parametrized Invariance for Infinite State Processes**
Alejandro Sánchez and César Sánchez
Acta Informatica Journal
Impact factor: 0.410
- 2014 **Formal Verification of Skiplists with Arbitrarily Many Levels**
Alejandro Sánchez and César Sánchez
12th International Symposium on Automated Technology for Verification and Analysis (ATVA)
CORE Rank: A - Acceptance ratio: 41%
- 2014 **Parametrized Verification Diagrams**
Alejandro Sánchez and César Sánchez
21st International Symposium on Temporal Representation and Reasoning (TIME)
CORE Rank: B - Acceptance ratio: 53%
- 2014 **LEAP: A Tool for the Parametrized Verification of Concurrent Datatypes**
Alejandro Sánchez and César Sánchez
26th International Conference on Computer Aided Verification (CAV)
CORE Rank: A* - Acceptance ratio: 20%
- 2012 **Invariant Generation for Parametrized Systems Using Self-reflection**
Alejandro Sánchez, Sriram Sankaranarayanan, César Sánchez and Bor-Yuh Evan Chang
19th International Symposium of Static Analysis (SAS)
CORE Rank: A - Acceptance ratio: 37%
- 2011 **A Theory of Skiplists with Applications to the Verification of Concurrent Datatypes**
Alejandro Sánchez and César Sánchez
3rd International Symposium of NASA Formal Methods (NFM)
CORE Rank: C - Acceptance ratio: 27%
- 2010 **Decision Procedures for the Temporal Verification of Concurrent Lists**
Alejandro Sánchez and César Sánchez
12th International Conference on Formal Engineering Methods (ICFEM)
CORE Rank: B - Acceptance ratio: 37%

OTHER GIVEN PRESENTATIONS

- Jun. 2013 **Invariant Generation for Parametrized Systems using Self-Reflection**
Rich Model Toolkit COST Action Meeting
Valeta, Malta
- Nov. 2012 **Assisted Verification of Invariance for Parametrized Systems**
Rich Model Toolkit COST Action Meeting
IBM Haifa Research Lab, Haifa, Israel
- Mar. 2012 **A Decision Procedure for Skiplists with Unbounded Height and Length**
Synthesis, Verification, and Analysis of Rich Models
Tallinn University of Technology, Tallinn, Estonia
- Apr. 2011 **Deductive Temporal Verification of Parametrized Concurrent Systems**
Synthesis, Verification, and Analysis of Rich Models
Saarland University of Technology, Saarbrücken, Germany