

César Sánchez

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Research Statement

My main research interest is the study of *mathematically rigorous* and *applicable* approaches for the understanding and developing of robust dynamic computational systems, particularly using a reactive systems approach. More general, I am interested in applications of logic to computer science, and formal methods for the design, analysis and verification of systems. I advocate for powerful and scalable technologies, and that require human intervention only in the most creative parts of the process. Some particular topics that I am interested on nowadays are:

1. Stream runtime verification.
2. Formal approaches to Blockchain and Smart Contracts, using logics, programming languages and formal methods.
3. Temporal hyperproperties, including specification languages, algorithms and dynamic monitoring.
4. Reactive synthesis and its application to the analysis of temporal requirements for critical systems.
5. Logic, games and automata theory (both foundations and applications).

Research Experience

- Nov 2013– present* **Associate Research Professor** (tenured), Madrid Institute for Advanced Studies in Software Development Technologies (IMDEA Software Institute), Spain.
- Mar 2012– Oct 2020* **Research Scientist**, Institute for Physics and Information Technology “Torres Quevedo”, CSIC, Spain. CSIC is the Spanish National Council for Research. Currently on leave of absence (full time at IMDEA Software).
- Jun 2009–Feb 2012* **Research Scientist**, Institute for Applied Physics, CSIC, Spain.
- Jan 2008–Nov 2013* **Assistant Research Professor** (tenure-track), IMDEA Software Institute.
- May 2007– Dec 2007* **Postdoctoral Scholar**, University of California at Santa Cruz, working with Prof. Luca de Alfaro. Focusing on real-time testing for embedded systems.
- 2001–May 2007* **Research Assistant**, Computer Science Department, Stanford University, in prof. Zohar Manna’s research group. Developed novel techniques for deadlock avoidance in distributed embedded real-time systems. Developed the theory of finite-state event correlation for publish-subscribe architectures. Run-time verification of hardware and software synchronous systems. From 2004 to 2007 under grant “Foundations of Event Correlation” of the NSF program Foundations of Computing Processes and Artifacts. From 2001 to 2004 under grant “Automating the Development and Analysis of Embedded Systems” of the DARPA program Constraint-Based Embedded System (PCES).
- Summer 2005* Research Intern, Intel Research, Hillsboro, OR. As part of the PlanetLab group, developed new algorithms for large-scale distributed event-based systems.
- 1998–1999* Research Assistant, School of Computer Science (UPM). Implemented new transactional models using design-patterns for distributed systems.

Education

- 2007 **PhD** in Computer Science, Stanford University. Adviser prof. Zohar Manna. Defended November 2006, graduated May 2007.
- 2001 **Master of Science** degree in Computer Science, Stanford University. Specializations: Software Theory and Theoretical Computer Science. Avg. GPA: 4.120.
- 1998 **“Ingeniero de Telecomunicación”** (BS+MS in EE, six years degree), Universidad Politecnica de Madrid (UPM) (Spain), *graduation with Honors*. Specialization: telematics.

Dissertation

“Deadlock Avoidance for Distributed Real-time and Embedded Systems.”

Adviser: Zohar Manna. Coadviser: Henny B. Sipma.

My thesis presents a novel method for deadlock avoidance in distributed real-time and embedded systems, using the combination of static analysis and run-time protocols. Program analysis allows the extraction of the call dependencies between remote components. Run-time protocols then ensure that the interleavings of executions cannot reach to deadlocks, while maximizing concurrency. This solution out-performs existing techniques to deal with deadlocks in distributed systems.

Funding and projects

- MADQUANTUM-CM: . Tezos Foundation and Nomadic-Labs. Start-End date: 1-Jan-2022 to 30-Jun-2024. Duration: 4 years. IMDEA PI. Total amount: 18.570.000€ (IMDEA’s budget 4.012.161€).
- OFFCHAIN-RV: *Offchain Monitoring of the Tezos Blockchain*. Tezos Foundation and Nomadic-Labs. Start-End date: 1-Jan-2022 to 30-Jun-2024. Duration: 4 years. PI. Total amount: 502.500€.
- BLOQUES-CM: *Intelligent Contracts and Scalable Blockchains and Insurance through Verification and Analysis*. Comunidad de Madrid. S2018/TCS-4339 Start-End date: 1-Jan-2019 to 31-Dec-2022. Duration: 4 years. Researcher. Total amount: 763.600€. Researcher.
- OPEN-QKD: *Open European Quantum Key Distribution Testbed*. H2020-SU-ICT-2018-3-857156, Start-End date: 02/09/2019 to 01/09/2022. IMDEA PI. Total amount: 14.999.989,89€.
- MFOC: *Madrid Flight-on-chip* . Comunidad de Madrid. HUBS 49/520608.9/18. Start-End date: 11/01/2019 - 10/01/2022. Duration: 3 years. IMDEA PI. WP Leader. Total amount: 3.750.000€(IMDEA’s budget 227.892€).
- BOSCO: *Foundations for the development, analysis and understanding of BLock chains and Smart COntracts* Basic research. Spanish National Project. Start-End date: 01/01/2019 - 31/12/2021. Duration: 3 years. PI. Total amount: 94.380€.
- ElasTest: *An elastic platform for testing complex distributed large software systems*. H2020-ICT ICT-10-2016 Ref: 731535. Start-End date: 01/01/2017 to 31/12/2019. Duration: 3 years. IMDEA PI. Total amount: 5.031.187€. (IMDEA’s budget: 288.875€).
- EU COST Action IC1402: *ArVi: Runtime Verification Beyond Monitoring*. EU COST. Start-End date: 01/01/2016 to 31/12/2019. Duration: 4 years. WG Leader, MC Member. Total amount: 360.000€.
- RISCO: *Rigorous Technologies for the Analysis and Verification of Sophisticated Concurrent Software*. Spanish National Project. Start-End date: 01/01/2016 - 31/12/2018. Duration: 3 years. Researcher. Total amount: 108.416€.
- N-GreensSoftware-CM *Next-Generation Energy-Efficient Secure Software* Madrid Regional Government. Start-End date: 01/10/2014 to 31/12/2018. Duration: 4 years. Researcher. Total amount: 825.000€.

- Strongsoft. Spanish National Project. MINECO TIN2012-39391-C04-03. Start-End date: 01/01/2013 to 31/12/2015. Duration: 3 years. Researcher. Total amount: 113.000€.
- EU COST Action IC0901: *RichModel Toolkit*. EU COST. Start-End date: 01/10/2009 to 15/10/2013. Duration: 4 years. MC Chair (PI). Total amount: 360.000€.

Publications

Journal Publications

1. Felipe Gorostiaga and César Sánchez: *Stream runtime verification of real-time event streams with the Striver language*. International Journal on Software Tools for Technology Transfer. 23(2): pp 157–183 (2021).
2. Sandro Stucki, César Sánchez, Gerardo Schneider and Borzoo Bonakdarpour: *Gray-box monitoring of hyperproperties with an application to privacy*. Formal Methods Syst. Des. 58(1-2): pp 126–159 (2021).
3. Martin Leucker, César Sánchez, Torben Scheffel, Malte Schmitz, Alexander Schramm: *Runtime verification of real-time event streams under non-synchronized arrival*. Software Quality Journal. 28(2): pp 745–787 (2020).
4. César Sánchez, Gerardo Schneider, Wolfgang Ahrendt, Ezio Bartocci, Domenico Bianculli, Christian Colombo, Yliès Falcone, Adrian Francalanza, Srđan Krstić, João M. Lourenço, Dejan Nickovic, Gordon J. Pace, José Rufino, Julien Signoles, Dmitriy Traytel, Alexander Weiss: *A survey of challenges for runtime verification from advanced application domains (beyond software)*. Formal Methods Syst. Des. 54(3): pp 279–335 (2019).
5. Laura Bozzelli and César Sánchez: *Visibly Linear Temporal Logic*. Journal of Automated Reasoning 60(2): pp 177–220, 2018.
6. Alejandro Sánchez and César Sánchez: *Parametrized verification diagrams: temporal verification of symmetric parametrized concurrent systems*. Annals of Mathematics and Artificial Intelligence. 80(3-4): pp 249–282, 2017.
7. Laura Bozzelli and César Sánchez. *Foundations of Boolean Stream Runtime Verification*. Theoretical Computer Science, vol 631, pp 118–138, June 2016.
8. Alejandro Sánchez and César Sánchez. *Parametrized Invariance for Infinite State Processes*. Acta Informatica, vol 52(6), pp 525–557, 2015.
9. Laura Bozzelli and César Sánchez. *Visibly Rational Expressions*. Acta Informatica, vol 51(1), pp 25–49, 2014.
10. Maria-Cristina Marinescu and César Sánchez. *Fusing Statecharts and Java*. ACM Transactions in Embedded Computing Systems, vol 12, issue 1s, pp 45:1-45:21, ACM, 2013.
11. Mark Marron, César Sánchez, Zhendong Su and Manuel Fähndrich. *Abstracting Runtime Heaps for Program Understanding*. IEEE Transactions on Software Engineering 39(6): 774-786, 2013.
12. Marina Zapater, César Sánchez, José Luis Ayala, José Manuel Moya, and José Luis Risco-Martín. *Ubiquitous Green Computing. Techniques for High Demand Applications in Smart Environments*, In Sensors, vol. 12, issue 8, pp. 10659–10677, 2012.

Conference Publications

13. Margarita Capretto, Martin Ceresa, Antonio Fernández-Anta, Antonio Russo and César Sánchez: *Setchain: Improving Blockchain Scalability with Byzantine Distributed Sets and Barriers*. To appear in IEEE Blockchain (2022), IEEE, 2022.

14. Margarita Capretto, Martin Ceresa and César Sánchez: *Transaction Monitoring of Smart Contracts*. To appear in RV'22, Springer, 2022.
15. Laura Bozzelli, Adriano Peron and César Sánchez: *Expressiveness and Decidability of Temporal Logics for Asynchronous Hyperproperties*. To appear in CONCUR'22. LIPiCS, 2022.
16. Hannes Kallwies, Martin Leucker and César Sánchez: *Anticipatory Recurrent Monitoring with Uncertainty and Assumptions*. To appear in RV'22. Springer, 2022.
17. Hannes Kallwies, Martin Leucker and César Sánchez: *Symbolic Runtime Verification for Monitoring under Uncertainties and Assumptions*. To appear in ATVA'22. Springer, 2022.
18. Felipe Gorostiaga and César Sánchez: *Monitorability of Expressive Verdicts*. In NFM'22: pp 693–712, Springer, 2022.
19. Jan Baumeister, Norine Coenen, Borzoo Bonakdarpour, Bernd Finkbeiner and César Sánchez: *A Temporal Logic for Asynchronous Hyperproperties*. Proc. of the 33rd International Conference on Computer Aided Verification (CAV'21), Part I 2021. Vol 12759 of LNCS: pp 694–717, Springer 2021.
20. César Sánchez: *Synchronous and asynchronous stream runtime verification*. Proc. of Proceedings of the 5th ACM Int'l Workshop on Verification and mOnitoring at Runtime EXecution (VORTEX@ISSTA'21): pp 5–7, ACM 2021.
21. Felipe Gorostiaga and César Sánchez: *HStriver: A Very Functional Extensible Tool for the Runtime Verification of Real-Time Event Streams*. Proc. of the 24th Int'l Symposium on Formal Methods (FM'21). Vol 13047 of LNCS: pp 563–580, Springer, 2021.
22. Felipe Gorostiaga and César Sánchez: *Nested Monitors: Monitors as Expressions to Build Monitors*. RV'21: pp 164–183, Springer 2021
23. Laura Bozzelli, *Asynchronous extensions of HyperLTL*. To In Proc. of the 36th Annual Symposium on Logic in Computer Science (LICS'21), 2021.
24. Sebastián Zudaire, Felipe Gorostiaga, César Sánchez, Gerardo Schneider and Sebastián Uchitel. *Assumption Monitoring Using Runtime Verification for UAV Temporal Task Plan Executions*. 2021 IEEE International Conference on Robotics and Automation (ICRA'21). IEEE, 2021.
25. Tzu-Han Hsu, César Sánchez and Borzoo Bonakdarpour: *Bounded Model Checking for Hyperproperties*. Proc. of the 27th International Conference in Tools and Algorithms for the Construction and Analysis of Systems (TACAS'21). Part I. Vol 12651 of LNCS: pp94–112, Springer 2021.
26. Felipe Gorostiaga and César Sánchez: *HLola: a Very Functional Tool for Extensible Stream Runtime Verification*. Proc. of the 27th International Conference in Tools and Algorithms for the Construction and Analysis of Systems (TACAS'21). Part II. Vol 12652 of LNCS: pp349–356, Springer 2021.
27. Martín Ceresa, Felipe Gorostiaga, César Sánchez: *Declarative Stream Runtime Verification (hLola)*. Proc. of 18th Asian Symposium on Programming Languages and Systems (APLAS'20) Vol 12470 of LNCS: pp25–43, Springer 2021.
28. Borzoo Bonakdarpour, Pavithra Prabhakar and César Sánchez: *Model Checking Timed Hyperproperties in Discrete-Time Systems*. Proc. 12th International Symposium of NASA Formal Methods (NFM'20). Vol 12229 of LNCS: pp311–328, Springer 2020.
29. Felipe Gorostiaga, Luis Miguel Danielsson and César Sánchez: *Unifying the Time-Event Spectrum for Stream Runtime Verification*. Proc. of the 20th Int'l Conf. on Runtime Verification (RV'20). Vol 12399 of LNCS: pp462–481, Springer 2020.

30. Norine Coenen, Bernd Finkbeiner, César Sánchez, Leander Tentrup: *Verifying Hyperliveness*. Proc. of the 31st Int'l Conf. on Computer Aided Verification (CAV'19). Part I. Vol 11561 of LNCS: pp121–139, Springer 2019.
31. Sandro Stucki, César Sánchez, Gerardo Schneider, Borzoo Bonakdarpour: *Gray-Box Monitoring of Hyperproperties*. Proc of the Third World Congress on Formal Methods (FM'19). Vol 11800 of LNCS: pp406–424, Springer 2019.
32. Luis Miguel Danielsson, César Sánchez: *Decentralized Stream Runtime Verification*. Proc. of the 19th Int'l Conf. on Runtime Verification (RV'19). Vol 11757 of LNCS: pp185–201, Springer 2019.
33. Martin Leucker, César Sánchez, Torben Scheffel, Malte Schmitz, Daniel Thoma: *Runtime Verification for Timed Event Streams with Partial Information*. Proc. of the 19th Int'l Conf. on Runtime Verification (RV'19). Vol 11757 of LNCS: pp273–291, Springer 2019.
34. Raúl Pardo and César Sánchez and Gerardo Schneider: *Timed Epistemic Knowledge Bases for Social Networks*. Proc. of the 22nd Int'l Symp. on Formal Methods (FM'2018), vol 10951 of LNCS: pp185–202, Springer 2018.
35. Pablo Chico de Guzmán and Felipe Gorostiaga and César Sánchez: *Pipekit: A Deployment Tool with Advanced Scheduling and Inter-Service Communication for Multi-Tier Applications*. Proc. of the IEEE Int'l Conf. on Web Services (ICWS 2018), pp 379–382, IEEE Computer Society, 2018.
36. Borzoo Bonakdarpour and César Sánchez and Gerardo Schneider: *Monitoring Hyperproperties by Combining Static Analysis and Runtime Verification*. Proc. of the 8th Int'l Symp. Leveraging Applications of Formal Methods, Verification and Validation. Industrial Practice (ISoLA'18), Part II. vol 11245 of LNCS, pp 8–27, Springer, 2018.
37. Christian Colombo and Yliès Falcone and Martin Leucker and Giles Reger and César Sánchez and Gerardo Schneider and Volker Stolz: *COST Action IC1402 Runtime Verification Beyond Monitoring*. Proc. of the 18th Int'l Conf. on Runtime Verification (RV'18), vol 11237 of LNCS, pp 18–26, Springer, 2018.
38. César Sánchez: *Online and Offline Stream Runtime Verification of Synchronous Systems*. Proc. of the 18th Int'l Conf. on Runtime Verification (RV'18), vol 11237 of LNCS, pp 138–163, Springer, 2018.
39. Felipe Gorostiaga and César Sánchez: *Striver: Stream Runtime Verification for Real-Time Event-Streams*. Proc. of the 18th Int'l Conf. on Runtime Verification (RV'18), vol 11237 of LNCS, pp 282–298, Springer, 2018.
40. Martin Leucker and César Sánchez and Torben Scheffel and Malte Schmitz and Alexander Schramm: *TeSSLa: runtime verification of non-synchronized real-time streams*. Proc. of the 33rd Annual ACM Symposium on Applied Computing (SAC 2018): pp 1925–1933, ACM 2018.
41. Pablo Chico de Guzmán and Felipe Gorostiaga and César Sánchez: *i2kit: A Deployment Tool with the Simplicity of Containers and the Security of Virtual Machines*. Proc. of the 19th Int'l Conf. on Web Information Systems Engineering (WISE 2018), vol 11233 of LNCS, pp 81–95, Springer, 2018.
42. Raúl Pardo, Ivana Kellyerova, César Sánchez and Gerardo Schneider. *Specification of Evolving Privacy Policies for Online Social Networks*. Proc. of the 23rd Int'l Symp. on Temporal Representation and Reasoning (TIME'16), pp 70–79. IEEE Computer Society Press, 2016.
43. Bernd Finkbeiner, Markus N. Rabe, César Sánchez: *Algorithms for Model Checking HyperLTL and HyperCTL** In Proc. of the 27th Int'l Conf. on Computer Aided Verification (CAV'15), vol 9206 of LNCS, pp 30–48, Springer, 2015.

44. Alejandro Sánchez, César Sánchez: *Formal Verification of Skiplists with Arbitrary Many Levels*. Proc. of the 12th Int'l Symp. on Automated Technology for Verification and Analysis (ATVA'14), vol 8837 of LNCS, pp 314–329, Springer, 2014.
45. Laura Bozzelli, César Sánchez: *Visibly Linear Temporal Logic*. Proc. of the 7th Int'l Joint Conf. on Automated Reasoning (IJCAR'14), vol 8562 of LNCS, pp 418–433, Springer, 2014.
46. Alejandro Sánchez, César Sánchez: *LEAP: A Tool for the Parametrized Verification of Concurrent Datatypes*. Proc. of the 26th Int'l Conf. on Computer Aided Verification (CAV'14), vol 8859 of LNCS, pp. 620–627, Springer, 2014.
47. Michael R. Clarkson, Bernd Finkbeiner, Masoud Koleini, Kristopher K. Micinski, Markus N. Rabe, César Sánchez: *Temporal Logics for Hyperproperties*. In Proc. of the Third Int'l Conf on Principles of Security and Trust (POST 2014), vol 8414 of LNCS, pp 265–284, Springer, 2014.
48. Laura Bozzelli, César Sánchez: *Foundations of Boolean Stream Runtime Verification*. In Proc. of the 5th Int'l Conf. on Runtime Verification (RV'14), vol 8734 of LNCS, pp 64–79, Springer, 2014.
49. Alejandro Sánchez, César Sánchez: *Parametrized Verification Diagrams*. Proc. of the 21st Int'l Symp. on Temporal Representation and Reasoning (TIME'14), pp 132–141. IEEE Computer Society, 2014.
50. Laura Bozzelli and César Sánchez. *Visibly Rational Expressions*, In IARCS Proc. of the Annual Conf. on Foundations of Software Technology and Theoretical Computer Science, (FSTTCS 2012), LIPIcs 18, Schloss Dagstuhl - Leibniz-Zentrum fuer Informatik, 2012.
51. César Sánchez and Julian Samborski-Forlese. *How to Efficiently Translate Extensions of Temporal Logics into Alternating Automata*, In Proc. of the 9th International Conf. on Theoretical Aspects of Computing (ICTAC 2012), Bangalore, India, September 24–27, 2012. vol 7521 of LNCS,
52. César Sánchez and Julian Samborski-Forlese. *Efficient Regular Linear Temporal Logic using Dualization and Stratification*, In Proc. of the 19th International Symposium on Temporal Representation and Reasoning (TIME 2012). pp 13–20. IEEE Computer Society, 2012.
53. Alejandro Sánchez, Sriram Sankaranarayanan, César Sánchez and Evan Chang. *Invariant Generation for Parametrized Systems using Self-Reflection*, In Proc. of the 19th International Symposium on Static Analysis (SAS 2012), September 11–13, Deauville, France. 2012. vol 7460 of LNCS pp146–163, Springer 2012.
54. Alejandro Sánchez and César Sánchez: *A Theory of Skiplists with Applications to the Verification of Concurrent Datatypes*, In Proc. of the Third International Symposium on NASA Formal Methods (NFM'11), vol 6617 of LNCS, pp343–358, Springer 2011.
55. Martin Leucker and César Sánchez: *Regular Linear-Time Temporal Logic*, In Proc. of the 17th International Symposium on Temporal Representation and Reasoning (TIME'10), pp 3–5, IEEE Computer Society, 2010.
56. Alejandro Sánchez and César Sánchez: *Decision Procedures for the Temporal Verification of Concurrent Lists*, In Proc. of the 12th International Conf. on Formal Engineering Methods (ICFEM'2010), vol. 6447 LNCS, pp 74–89, Springer, 2010.
57. Krishnendu Chaterjee, Luca de Alfaro, Vishwanath Raman and César Sánchez. *Analyzing the Impact of Change in Multi-threaded Programs*, In Proc. of the 13th Int'l Conf. on Fundamental Approaches to Software Engineering (FASE'2010), vol. 6013 of LNCS, pp 293–307. Springer, 2010.

58. César Sánchez and Martin Leucker. *Regular Linear Temporal Logic with Past*, In Proc. of the Eleventh International Conf. on Verification, Model Checking, and Abstract Interpretation (VMCAI'10), vol. 5944 of LNCS, pp 295–311. Springer, 2010.
59. César Sánchez, Matteo Slanina, Henny B. Sipma and Zohar Manna: *The Reaction Algebra: A Formal Language for Event Correlation*. In Pillars of Computer Science: Essays Dedicated to Boris (Boaz) Trakhtenbrot on the Occasion of His 85th Birthday (Trakhtenbrot/Festschrift), vol. 4800 of LNCS, pp 596–619, Springer, 2008.
60. César Sánchez, Henny B. Sipma and Zohar Manna: *Generating Efficient Distributed Deadlock Avoidance Controllers*. In Proc. of the 15th Int'l Workshop on Parallel and Distributed Real-Time Systems (WPDRTS'07), collocated with IPDPS'07, IEEE Computer Society Press, 2007.
61. César Sánchez, Henny B. Sipma and Zohar Manna: *A Family of Distributed Deadlock Avoidance Protocols and their Reachable State Spaces*. In Proc. of the 10th Int'l Conf. on Fundamental Approaches to Software Engineering (FASE'07), vol. 4422 of LNCS, pp 155–169, Springer, 2007.
62. César Sánchez, Henny B. Sipma, Christopher D. Gill and Zohar Manna *Distributed Priority Inheritance for Real-Time and Embedded Systems* In Proc. of the 10th Int'l Conf. On Principles Of Distributed Systems (OPODIS'06), vol. 4305 of LNCS, pp 110–125, Springer, 2006.
63. César Sánchez, Henny B. Sipma, Zohar Manna and Christopher D. Gill *Efficient Distributed Deadlock Avoidance with Liveness Guarantees*, In Proc. of the 6th ACM & IEEE Conf. on Embedded Software (EMSOFT'06), pp 12–20, ACM Press, 2006.
64. Venkita Subramonian, Christopher D. Gill, César Sánchez and Henny B. Sipma: *Reusable Models for Timing and Liveness Analysis of Middleware for Distributed Real-Time Embedded Systems*. In Proc. of the 6th ACM & IEEE Conf. on Embedded Software (EMSOFT'06), pp 252–261, ACM Press, 2006.
65. César Sánchez, Henny B. Sipma, Zohar Manna, Venkita Subramonian and Christopher D. Gill: *On Efficient Distributed Deadlock Avoidance for Real-Time and Embedded Systems*, In 20th IEEE Int'l Parallel and Distributed Processing Symp. (IPDPS'06), IEEE Computer Society Press, 2006.
66. César Sánchez, Henny B. Sipma, Venkita Subramonian, Christopher Gill, and Zohar Manna: *Thread Allocation Protocols for Distributed Real-Time and Embedded Systems*, In Proc. of the 25th IFIP WG 2.6 Int'l Conf. on Formal Techniques for Networked and Distributed Systems (FORTE'05), vol. 3731 of LNCS, pp 159-173, Springer, 2005.
67. César Sánchez, Matteo Slanina, Henny B. Sipma, and Zohar Manna: *Expressive Completeness of an Event-Pattern Reactive Programming Language*, In Proc. of FORTE'05, vol. 3731 of LNCS, pp 529-532, Springer, 2005.
68. César Sánchez, Henny B. Sipma, Matteo Slanina, and Zohar Manna: *Final Semantics for Event-Pattern Reactive Programs*, In Algebra and Coalgebra in Computer Science (CALCO'05), vol 3629 of LNCS, pp 364-378, Springer, 2005.
69. Ben D'Angelo, Sriram Sankaranarayanan, César Sánchez, Will Robinson, Bernd Finkbeiner, Henny B. Sipma, Sandeep Mehrotra, and Zohar Manna *LOLA: Runtime Monitoring of Synchronous Systems*, In Proc. of the 12th Int'l Symp. of Temporal Representation and Reasoning (TIME 2005), pp 166-174, IEEE Computer Society Press, 2005.
70. César Sánchez, Sriram Sankaranarayanan, Henny B. Sipma, Ting Zhang, David Dill, and Zohar Manna, *Event Correlation: Language and Semantics*, In Embedded Software (EMSOFT'03), vol 2855 of LNCS, pp 323-339, Springer, 2003.

71. César Sánchez and Angel Alvarez: *A Lightweight Asynchronous Algorithm for Causal Delivery Using Extra Message Insertion*, Short paper in 14th Int'l Symp. on DIStributed Computing (DISC'2000), 2000.

Chapters in Books

72. Adrian Francalanza and Jorge A. Pérez and César Sánchez: *Runtime Verification for Decentralised and Distributed Systems*. Lectures on Runtime Verification 2018, pp 176-210, Springer, 2018.

Volumes and Special Issues edited

73. Gordon J. Pace, César Sánchez, Gerardo Schneider: *Reliable Smart Contracts*. Proc. of the 9th International Symposium on Leveraging Applications of Formal Methods, Verification and Validation: Applications, Part III. Vol 12478 of LNCS: pp3-8, Springer 2020.
74. Yliès Falcone and César Sánchez. *Introduction to the special issue on runtime verification*. Formal Methods in System Design 53(1): pp 1-5, 2018.
75. César Sánchez and Gerardo Schneider and Martin Leucker: *Reliable Smart Contracts: State-of-the-Art, Applications, Challenges and Future Directions*. Proc. of the 8th Int'l Symp. Leveraging Applications of Formal Methods, Verification and Validation. Industrial Practice (ISoLA'18), Part IV. vol 11247 of LNCS, pp 275-279, Springer, 2018.
76. Yliès Falcone and César Sánchez. *Proc. of the 16th Intl Conf. on Runtime Verification (RV'16)*, vol 10012 of LNCS, pp 1-2, Springer, 2016.
77. Bernd Finkbeiner and César Sánchez. *Special Issue on Rich Models, EU-COST Action IC0901 Rich-Model Toolkit*. Acta Informatica, vol 53(4), pp 325-326, June 2016.
78. César Sánchez, Kristen Brent Venable and Esteban Zimanyi. *Special Issue on Temporal Representation and Reasoning (TIME'13)*. Acta Informatica, vol 53(2), pp 87-88, March 2016.
79. César Sánchez, Kristen Brent Venable and Esteban Zimányi: *2013 20th International Symposium on Temporal Representation and Reasoning*, Pensacola, FL, USA, September 26-28, 2013. IEEE Computer Society 2013.

Doctoral Students and Student Supervision

- Doctoral Thesis*
- Alejandro Sanchez: *Formal Verification of Temporal Properties for Parametrized Concurrent Programs and Concurrent Data Structures*. Graduated: 10-Sep-2015 (cum Laude).
 - Felipe Gorostiaga: *Theory and Practice of Stream Runtime Verification for Sequences and Real-Time Event Based Systems*. Graduated: 19-May-2022
 - Luis Miguel Danielsson Villegas (in progress, expected 2023)
 - Margarita Capretto (in progress)
 - Andoni Rodriguez-Herrera (in progress)
 - Matias Brizzio (in progress)
- Masters Thesis*
- Aldana Ramirez: *Generación de monitores C embebidos para especificaciones Lola*. Universidad Nacional de Rosario, Argentina, 2022.
 - Luis Miguel Danielsson Villegas: *Decentralised Stream Runtime Verification*. UPM, 2018.
 - Felipe Gorostiaga: *Towards a Stream-Based Monitoring Language for Asynchronous Systems*. UPM, 2018.
 - Alexander Schramm: *An Asynchronous Evaluation Engine for Stream Based Specifications*. University of Lübeck, Germany, 2016.

- Alejandro Sanchez, *Decision Procedures for the Temporal Verification of Concurrent Data Structures*, UCM, 2011.
- Julian Samborski-Forlese: *Two Algorithms for Model Checking Regular Linear Temporal Logics*, UCM, 2011.
- Santiago Romero: *Verificación en Tiempo de Ejecución con Streams*. Universidad Nacional de Córdoba, Argentina, 2010.
- Undergrad Thesis* –Victor de Juan: *Pruebas de Primer Orden de Programas Concurrentes*, Universidad Autónoma de Madrid, 2016.
- Doctoral Committee Member* –Maximilian Schwenger: *Statically Analyzed Stream Monitoring for Cyber-Physical Systems*. Defended: 13 June 2022. Saarlands University, Germany. Director: Bernd Finkbeiner.
- Elena Gutiérrez Viedma: *New Perspectives on Classical Automata Constructions*. Defended: 17 Sep 2020. Universidad Politécnica de Madrid. Director: Pierre Ganty.
- Peter Faymonville: *Monitoring with Parameters*. Defended: 17 May 2019. Saarlands University, Germany. Director: Bernd Finkbeiner.
- Raúl Nestor Neri Alborodo: *A Model Driven Methodology for the Construction of Reliable Concurrent Software*. Defended: 17-Dec-2019. Universidad Complutense. Director: Julio Mariño.
- Miriam García: *An Algorithmic Approach for Stability Verification of Hybrid Systems*. Defended: a 31-Jul-2017. Universidad Politécnica de Madrid. Director: Pavithra Prabhakar.
- Germán Andrés Delbianco: *Hoare-style Reasoning with Higher-order Control: Continuations and Concurrency*. Defended: 14-Jul-2017. Universidad Politécnica. Director: Aleks Nanevski.
- David Romero Hernández *Revisiting Logical Semantics for Processes and Their Distances*. Defended: 2-Feb-2016. Universidad Complutense. Director: David de Frutos Escrig.
- Agustin Santos Mendez: *Quid Pro Quo: Mecanismos para la asignacion de tareas en entornos distribuidos*. Defended: 2-Jun-2013. Universidad Rey Juan Carlos. Director: Antonio Fernández-Anta, Luis López-Fernández.
- Edison Mera: *A Unified Framework for Resource and Execution Time Analysis, Run-Time Checking and Unit-Testing*. Defended: 26-Sep-2010. Universidad Politecnica de Madrid. Director: Pedro Lopez.
- Interns and Visitors* –Martin Ceresa (visiting PhD student from Rosario, Argentina)
- Aldana Ramirez (intern)
- Andoni Rodriguez (intern)
- Margarita Capreto (intern)
- Alexander Schramm (intern)
- Amir Goharshadi (intern)
- Markus Rabe (visiting from Saarland University, Germany)
- Antonio Artes (intern)
- Santiago Romero (intern)
- Juan Manuel Crespo (intern)
- Alejandro Sánchez (intern)
- Victor de Juan (intern)
- Elena Gutierrez (intern)

Program Committees and Journal Editing

- Editor* –Guest editor of the special issue of Formal Methods in Systems Design for selected papers of RV’16.
- Guest editor of the special issue of Acta Informatica for selected papers of TIME’13.

–Guest editor of the special issue Acta Informatica for selectated papers of EU COST Action RichModel Toolkit IC0901.

PC Chair

–PhD Symposium at iFM (PhD@iFM'19)

–16th International Conference on Runtime Verification (RV'16)

–20th International Symposium on Temporal Representation and Reasoning (TIME'2013)

PC Member

TACAS'23, RV'22, PROLE'22, FMBC'22, DAPSS'22, VORTEX'22, ATVA'22, TACAS'22, RV'21, PROLE'21, FMBC'21, DAPSS'21, VMCAI'22, RV'21, RV'20, ICTAC'20, FORMATS'19, FMBC'20, RV'19, iFM'19, GAUSS'19, SEFM'19, FORTE'19, SEFM'18, FORMATS'18, PROLE'18, RV'18, VORTEX'18, PROLE'17, PrePost'17, RV'17, FSEN'17, iFM'16, FORMATS'16, VeriComp'16, FORMATS'15, FSEN'15, SOAP'15, SOA'15, SAC'15, RV'15, ACM Transaction on Embedded Computing Systems'15, GandALF'14, MOD*14, TTSS'14, FSEN'14, TASE'14, FMCAD'13, FSEN'13, TIME'12, PROLE'12, PROLE'11, TIME'11, SVARM'10, VLSI-SoC'10, PDMC'09, ICTAC'09, TIME'09

Awards and Recognitions

- 2021* Three “sexenios” (6 years) of research excellence (2001–2006, 2007–2015 and 2016–2021) awarded by ANECA.
- 2012* Two “quinquenios” (5 years) of research excellence (2000–2005 and 2005–2010) awarded by CSIC.
- 2007* **Juan de la Cierva** Fellowship, supporting an early career researcher position at IMDEA-Software; provided by the Spanish Ministry of Education and Science.
- 2006* **ACM SIGBED/SIGSOFT Frank Anger Memorial Student Award.**
- 2005* **Best** Theory Lunch **Talk** of the Spring Quarter'05: “Thread Allocation for Distributed Real-Time and Embedded Systems”, Stanford University.
- 2000* A check by Don Knuth for \$2.56 for finding an error in Graham, Knuth, Patashnik “Concrete Mathematics”, Addison Wesley, 1994.
- 2000* Champion team of the 24th ACM International programming contest (Southwest Europe). 15th place in the world finals.
- 1999* **La Caixa Graduate Fellowship**, from 1999 to 2001. This prestigious Spanish Fellowship provides full funding for the Fellows during two years of graduate studies.
- 1998* **UPM Graduation with Honors** for the MS thesis “Causal Order Communication in Asynchronous Distributed Systems.” Thesis adviser: Angel Alvarez.
- 1997* IEEE Award for Outstanding Leaderships and Service.

Teaching Experience

- Winter 2018* “Formal Methods for Concurrent and Reactive Systems”. Masters MUSS (Master Universitario Software y Sistemas), Universidad Politecnica de Madrid (UPM).
- Winter 2017* “Formal Methods for Concurrent and Reactive Systems”. Masters MUSS, Universidad Politecnica de Madrid (UPM).
- Winter 2016* “Formal Methods for Concurrent and Reactive Systems”. Masters MUSS, Universidad Politecnica de Madrid (UPM).
- Spring 2015* “Concurrent Programming”. Undergraduate Degree in Computer Science, Universidad Politecnica de Madrid (UPM).
- Winter 2003* Teaching fellow, Stanford University, CS department. Independently taught CS156: “Logic and automated reasoning”.
- Fall 2004* Teaching assistant (T.A.) Stanford, CS154: “Introduction to Automata and Complexity Theory”. Prof: David Dill.
- Winter 2003* T.A. Stanford, CS256: “Verification of Reactive Systems”. Instr.: Matteo Slanina.

Fall 2001 T.A. Stanford, CS157: “Logic and Automated Reasoning”. Prof: Zohar Manna.

Invited Lectures

- February 14, 2019 University of the Basque Country, Spain. “Temporal Verification of Hyperproperties”
- February 14, 2019 Dagstuhl, Germany. “Overview of Stream Runtime Verification”
- January 21, 2019 COEMS Workshop @ HiPEAC. Valencia, Spain. “Stream Runtime Verification Revisited”
- November 10, 2019 RV Tutorials. Cyprus. “Stream Runtime Verification. A Tutorial”
- March 21, 2018 ArVi Winter School, Praz sur Arly, France. “Stream Runtime Verification”
- May 19, 2016 DRV Workshop, Bertinoro, Italy. “Distributed Deadlock Avoidance”.
- September 7, 2016 6th Iberian Mathematical Meeting. “A Gentle Introduction to Linear-Temporal Logic”.
- November 4, 2015 University of Oslo, Norway, “Temporal Deductive Verification of Parametrized Systems”.
- March 19, 2015 Shonan Meeting, Japan, “Stream Runtime Verification”.
- December 5, 2012 Saarbruecken, Germany, “A Decision Procedure for Skiplists of Unbounded Height and Length.”
- July 12, 2011 University of Colorado, Boulder, CO, USA. “Deductive Temporal Verification of Parametrized Concurrent Systems.”
- February 18, 2011 Luebeck, Germany, “Temporal Verification of Concurrent Data-Structures.”
- January 21, 2011 Saarbruecken, Germany, “Decision Procedures for the Temporal Verification of Concurrent Lists.”
- January 18, 2011 Saarbruecken, Germany, “Deadlock Avoidance for Distributed Real-Time and Embedded Systems.”
- November 8, 2010 Schloss Dagstuhl, Germany, “Stream Runtime Verification Revisited.”
- February 2, 2010 MIT, “Regular Linear Temporal Logic with Past.”
- February 21, 2008 Universidad Rey Juan Carlos, Spain “Temporal Verification of Concurrent Data-Structures.”
- April 5, 2007 EPFL, Lausanne, Switzerland. “Distributed Deadlock Avoidance”.
- February 26, 2007 NASA, Ames Research Center, Mountain View, CA, USA. “Distributed Deadlock Avoidance”.
- December 19, 2006 VERIMAG, Grenoble, France. “Deadlock Avoidance for Distributed Real-Time and Embedded Systems”.
- December 18, 2006 TU Munich, Germany. “Deadlock Avoidance for Distributed Real-Time and Embedded Systems”.
- September 21, 2005 Facultad Informática, UCM, Madrid, Spain. “Final Semantics of Event-Pattern Reactive Programs”.
- September 20, 2005 ETSI Telecomunicación, UPM, Madrid, Spain. “Thread Allocation for Distributed Real-Time and Embedded Systems”.
- September 12, 2005 Facultad Informática, UPM, Madrid, Spain. “Final Semantics of Event-Pattern Reactive Programs”.
- May 8, 2002 ETSI Telecomunicación, UPM, Madrid, Spain. “Introduction to Term-Rewriting Systems”.

Other Publications

- 2003* In Steven S. Skiene, Miguel A. Revilla: “Programming Challenge: The Programming Contest Training Manual”. Springer, 2003. Section 7.6.2: “Carmichael Number”, pp 158–158.
- July 2000–September 2001* A series of articles regarding the problems and solutions of the 24th ACM International Programming Contest, for “Novatica” (ISSN: 0211-2124).
- January 1997–August 1999* A series of articles regarding the Ada programming language and the GNU/Linux Operating System in the magazines “Solo Programadores” (ISSN: 1134-4792), “Programación Actual” (ISSN: 1137-5531) and “Linux Actual”. (ISSN:1138-9443).

Professional Experience

- 2019–* External consultant, Developair Technologies, Spain.
- Summer 2005* Research Intern, Intel Research, Hillsboro, OR.
- 1997–1998* Lucent Technologies Development Center in Tres Cantos (Spain). Software Engineer position, developed components for Telecommunication equipment, in C.
- 1994–1996* Telematics Department, UPM, Madrid. Software Developer for the teleconference project ISABEL. Developed video codecs for multimedia infrastructure, in C++.

Service and Membership

- 1999–* ACM Member.
- 1995–* IEEE Senior Member.
- 2002–2005* President (2004–2005), Vice-president (2003–2004) and Treasurer (2002–2003) of Iberia, Association of Spanish Students at Stanford.
- 1994–1996* Vice-president of the IEEE Student Branch, UPM, Madrid.