

SIMONE TINI

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EDUCATION

University of Pisa

PhD in Computer Science

February 2000

University of Pisa

M.D. in Computer Science

June 1995

EXPERIENCE

University of Insubria

Associate Professor in Computer Science

March 2005 - Present

University of Insubria

Assistant Professor in Computer Science

October 2001 - February 2005

University of Pisa

Post Doc in Computer Science

August 2000 - September 2001

RESEARCH INTERESTS

- Formal methods for *synchronous* languages (Esterel, Lustre, Argos, ...).
- Formal tools, like modal logics and related model-checking algorithms, for specifying and verifying qualitative and *quantitative* properties of complex systems, mainly *biological systems*, such as biochemical networks and regulatory networks, and cyber-physical systems.
- Metrics and approximate semantics reasoning on probabilistic languages, supporting the study of quantitative properties of systems, such as their robustness and security.
- Study of process calculi and their semantics for modelling qualitative and quantitative aspects of concurrent and distributed systems.

PAPERS

- V. Castiglioni, R. Lanotte, M. Loreti, S. Tini:
DT-Stark: a tool for evaluating the effectiveness of digital twins through feedback and perturbations.
Softw. Tools Technol. Transf. 27(5), 443-464 (2025)
- J. Xiang, R. Lanotte, S. Tini, M. Merro:
Formal Robustness for Cyber-Physical Systems under Timed Attacks.
CSF 2025, IEEE.
- J. Xiang, R. Lanotte, S. Tini, S. Chong, M. Merro:
Measuring Robustness in Cyber-Physical Systems under Sensor Attacks.
Nonlinear Analysis: Hybrid Systems, 56, 101559 (2025).
- V. Castiglioni, R. Lanotte, M. Loreti, D. Manicardi, S. Tini:
Robustness for biochemical networks: Step-by-step approach
Theoretical Computer Science, 1022, 114934 (2024).

- V. Castiglioni, M. Loreti, S. Tini:
RobTL: Robustness Temporal Logic for CPS.
CONCUR 2024, LIPIcs 311, 2024, 15.
- V. Castiglioni, M. Loreti, S. Tini:
STARK: A tool for the analysis of CPSs robustness.
Science of Computer Programming 236: 103134 (2024).
- V. Castiglioni, M. Loreti, S. Tini:
Bio-Stark: A Tool for the Time-Point Robustness Analysis of Biological Systems.
CMSB 2024, LNCS 14971.
- V. Castiglioni, R. Lanotte, M. Loreti, S. Tini:
Evaluating the Effectiveness of Digital Twins Through Statistical Model Checking with Feedback and Perturbations.
FMICS 2024, LNCS 14952.
- V. Castiglioni, R. Lanotte, S. Tini:
Back to the format: A survey on SOS for probabilistic processes.
Journal of Logical and Algebraic Methods in Programming 137:100929 (2024).
- S. Manicardi, R. Lanotte, S. Tini:
Step-by-step Robustness for Biochemical Networks.
ICTCS 2023, CEUR, 299-313.
- V. Castiglioni, M. Loreti, S. Tini:
DisTL: A Temporal Logic for the Analysis of the Expected Behaviour of Cyber-Physical Systems.
ICTCS 2023, CEUR, 15-30.
- S. Chong, R. Lanotte, M. Merro, S. Tini, J. Xiang:
Quantitative Robustness Analysis of Sensor Attacks on Cyber-Physical Systems.
HSCC 2023, ACM.
- V. Castiglioni, M. Loreti, S. Tini:
A framework to measure the robustness of programs in the unpredictable environment.
Logical Methods in Computer Science 19(3), 2:1-2:46 (2023).
- V. Castiglioni, M. Loreti, S. Tini:
STARK: A Software Tool for the Analysis of Robustness in the unKnown environment.
COORDINATION 2023, LNCS.
- R. Lanotte, M. Merro, A. Monteanu, S. Tini:
Formal Impact Metrics for Cyber-Physical Systems.
CSF 2021, IEEE.
- V. Castiglioni, M. Loreti, S. Tini:
How Adaptable and Reliable is your System?
FORTE 2021, LNCS 12719, 60-79.
- R. Lanotte, S. Tini:
A Weak Semantic Approach to Bisimulation Metrics in Models with Nondeterminism and Continuous State Spaces.
Theoretical Computer Science 869 (2021) 29-61.
- R. Lanotte, M. Merro, S. Tini:
A Probabilistic Calculus of Cyber-Physical Systems.
Information and Computation 279:104618 (2021).

- V. Castiglioni, M. Loreti, S. Tini:
Measuring Adaptability and Reliability of Large Scale Systems.
ISoLA 2020, LNCS 12477, 380-396.
- V. Castiglioni, S. Tini:
Raiders of the lost equivalence: Probabilistic branching bisimilarity.
Information Processing Letters 159-160 (2020).
- V. Castiglioni, M. Loreti, S. Tini:
The Metric Linear Time-Branching Time Spectrum on Nondeterministic Probabilistic Processes.
Theoretical Computer Science 813 (2020) 20-69.
- A. Gianola, S. Kasangian, D. Manicardi, N. Sabadini, F. Schiavio, S. Tini:
CospanSpan(Graph): a Compositional Description of the Heart System.
Fundamenta Informaticae 171 (2020) 221-237.
- V. Castiglioni, S. Tini:
Probabilistic Divide & Congruence: Branching Bisimilarity.
Theoretical Computer Science 808, 147-196 (2020).
- R. Lanotte, S. Tini:
Computing Bisimilarity Metrics for Probabilistic Timed Automata.
iFM 2019, LNCS 11918, 303-321.
- R. Lanotte, S. Tini:
Fully syntactic uniform continuity formats for bisimulation metrics.
The Art of Modelling Computational Systems, LNCS 11760, 2019, 293-312.
- V. Castiglioni, S. Tini:
Logical Characterization of Branching Metrics for Nondeterministic Probabilistic Transition Systems.
Information and Computation 268 (2019).
- R. Lanotte, M. Merro, S. Tini:
Equational reasoning in wireless network gossip protocols.
Logical Methods in computer Science 14(3) (2018).
- R. Lanotte, S. Tini:
Weak bisimulation metrics in models with nondeterminism and continuous state spaces.
ICTAC 2018, LNCS 11187, 292-312.
- R. Lanotte, M. Merro, S. Tini:
Towards a formal notion of impact metric for cyber-physical attacks.
iFM 2018, LNCS 11023, 296-315.
- V. Castiglioni, D. Gebler, S. Tini:
SOS modal decomposition on nondeterministic probabilistic processes.
Logical Methods in Computer Science 14(2) (2018).
- D. Gebler, S. Tini:
SOS specifications for uniformly continuous operators.
Journal of Computer and System Sciences 92: 113-151 (2018).
- R. Lanotte, M. Merro, S. Tini:
Weak Simulation Quasimetric in a Gossip Scenario.
FORTE 2017, LNCS 10321, 139-155.
- R. Lanotte, M. Merro, S. Tini:
Compositional Weak Metrics for Group Key Update.
MFCS 2017, LIPICS, 72:1-72:14.

- V. Castiglioni, S. Tini:
Logical Characterization of Trace Metric.
QAPL 2017, EPTCS.
- D. Gebler, Kim G. Larsen, S. Tini:
Compositional bisimulation metric reasoning with Probabilistic Process Calculi.
Logical Methods in Computer Science 12(4) (2016).
- V. Castiglioni, R. Lanotte, S. Tini:
A Function Elimination Method for Checking Satisfiability of Arithmetical Logics.
Fundamenta Informatica 143(1-2): 51-71 (2016).
- V. Castiglioni, D. Gebler, S. Tini:
Modal Decomposition on Nondeterministic Probabilistic Processes.
CONCUR 2016, LIPIcs 59, 36:1-36:15.
- R. Lanotte, S. Tini:
Extending Taylor Approximation to Hybrid Systems with Integrals.
CS&P 2016, 141-152.
- V. Castiglioni, D. Gebler, S. Tini:
Logical Characterization of Bisimulation Metric.
QAPL 2016, EPTCS 227, 44-62.
- D. Gebler, S. Tini:
SOS specifications of probabilistic systems by uniformly continuous operators.
CONCUR 2015, LIPIcs 42, 155-168.
- D. Gebler, K.G. Larsen, S. Tini:
Compositional metric reasoning with probabilistic process calculi.
FoSSaCS 2015, LNCS 9034, 230-245.
- V. Castiglioni, R. Lanotte, S. Tini:
A specification format for rooted branching bisimulation.
Fundamenta Informaticae 135(4): 355-369 (2014).
- G. Pardini, R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
Compositional semantics and behavioural equivalences for reaction systems with restriction.
Theoretical Computer Science 551: 1-21 (2014).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, G. Pardini, S. Tini:
Systolic Automata and P Systems.
Computing with New Resources, LNCS 8808, 2014: 17-31.
- D. Gebler, S. Tini:
Fixed-point characterization of compositionality properties of probabilistic processes combinators.
EXPRESS/SOS 2014, EPTCS 160, 63-78.
- G. Pardini, R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
A compositional semantics of reaction Systems with restriction.
CiE 2013, LNCS 7921, 330-339.
- D. Gebler, S. Tini:
Compositionality of approximate bisimulation for probabilistic systems.
EXPRESS/SOS 2013, EPTCS 120, 32-46.
- R. Barbuti, G. Caravagna, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
Foundational aspects of multiscale modelling of biological systems with process algebras.
Theoretical Computer Science 431: 96-116 (2012).

- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
An overview on operational semantics in membrane computing.
International Journal of Foundations of Computer Science 22(1): 119-131 (2011).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
Compositional semantics of spiking neural P systems.
The Journal of Logic and Algebraic Programming 79(6): 304-316 (2010).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
Membrane systems working in generating and accepting modes: Expressiveness and encodings.
Membrane Computing 2010, LNCS 6501: 103-118.
- S. Tini:
Non-expansive epsilon-bisimulations for probabilistic processes.
Theoretical Computer Science 411(22-24): 2202-2222 (2010).
- R. Barbuti, G. Caravagna, P. Milazzo, A. Maggiolo-Schettini, S. Tini:
Aspects of multiscale modelling in a process algebra for biological systems.
MeCBIC 2010, EPTCS 40, 54-69.
- R. Lanotte, S. Tini:
Probabilistic bisimulation as a congruence.
ACM Transactions on Computational Logic 10(2): (2009).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
P Systems with Transport and Diffusion Membrane Channels.
Fundamenta Informaticae 93(1-3): 17-31 (2009).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
A P systems flat form preserving step-by-step behaviour.
Fundamenta Informaticae 87(1): 1-34 (2008).
- R. Barbuti, A. Maggiolo-Schettini, P. Milazzo, S. Tini:
Compositional semantics and behavioral equivalences for P Systems.
Theoretical Computer Science 395(1): 77-100 (2008).
- S. Tini:
Non expansive epsilon-Bisimulations.
AMAST 2008, LNCS, 362-376.
- R. Lanotte, S. Tini:
Taylor approximation for hybrid systems.
Information and Computation 205(11): 1575-1607 (2007).
- S. Tini:
Notes on generative probabilistic bisimulation.
SOS 2006, ENTCS 175(1), 77-88.
- R. Lanotte, S. Tini:
Probabilistic congruence for semistochastic generative processes.
FoSSaCS 2005, LNCS 3441, 63-78.
- R. Lanotte, S. Tini:
Taylor approximation for hybrid systems.
HSCC 2005, LNCS 3414, 402-416.
- R. Lanotte, A. Maggiolo-Schettini, S. Tini, A. Troina, E. Tronci:
Automatic covert channel analysis of a multilevel secure component.
ICICS 2004, LNCS 3269, 249-261.

- R. Lanotte, A. Maggiolo-Schettini, S. Tini:
Information flow in hybrid systems.
ACM Transactions on Embedded Computer Systems 3(4): 760-799 (2004).
- R. Lanotte, A. Maggiolo-Schettini, S. Tini, A. Troina, E. Tronci:
Automatic analysis of the NRL Pump.
ENTCS 99, 2004, 245-266.
- S. Tini:
Timed CCP compositionally embeds Argos and Lustre.
Formal Aspects of Computing 16(3): 292-312 (2004).
- S. Tini, A. Maggiolo-Schettini:
Compositional synthesis of generalized Mealy machines.
Fundamenta Informaticae 60(1-4): 367-382 (2004).
- R. Lanotte, A. Maggiolo-Schettini, S. Tini:
Epsilon-transitions in concurrent timed automata.
Information Processing Letters 89(1): 1-7 (2004)
- R. Gorrieri, R. Lanotte, A. Maggiolo-Schettini, F. Martinelli, S. Tini, E. Tronci:
Automated analysis of timed security: a case study on web privacy.
International Journal of Information Security 2(3-4): 168-186 (2004).
- S. Tini:
Rule formats for compositional non-interference properties.
The Journal of Logic and Algebraic Programming 60-61: 353-400 (2004).
- S. Tini:
Rule Formats for Non Interference.
ESOP 2003, LNCS 2618, 129-143.
- R. Lanotte, A. Maggiolo-Schettini, A. Peron, S. Tini:
Dynamic Hierarchical Machines.
Fundamenta Informaticae 54(2-3): 237-252 (2003).
- S. Tini:
An axiomatic semantics for the synchronous language Gentzen.
Journal of Computer and System Sciences 66(2): 316-348 (2003).
- A. Maggiolo-Schettini, A. Peron, S. Tini:
A comparison of Statecharts step semantics.
Theoretical Computer Science 290(1): 465-498 (2003).
- R. Lanotte, A. Maggiolo-Schettini, S. Tini:
Concurrency in timed automata.
Theoretical Computer Science 309(1-3): 503-527 (2003).
- A. Maggiolo-Schettini, S. Tini:
On disjunction of literals in triggers of statecharts transitions.
Information Processing Letters 84(6): 305-310 (2002).
- R. Lanotte, A. Maggiolo-Schettini, S. Tini:
Privacy in Real-Time Systems.
MTCS 2001, ENTCS 52(3), 295-305.
- R. Focardi, R. Gorrieri, R. Lanotte, A. Maggiolo-Schettini, F. Martinelli, S. Tini, E. Tronci:
Formal models of timing attacks on web privacy.
ENTCS 62, 2001, 229-243.

- R. Lanotte, A. Maggiolo-Schettini, S. Tini, A. Peron:
Transformations of timed cooperating automata.
Fundamenta Informaticae 47(3-4): 271-282 (2001).
- S. Tini:
An axiomatic semantics for Esterel.
Theoretical Computer Science 269(1-2): 231-282 (2001).
- R. Lanotte, A. Maggiolo-Schettini, S. Tini:
Concurrency in timed automata.
FCT 2001, LNCS 2138, 240-251.
- S. Tini:
An Axiomatic Semantics for the synchronous language Gentzen.
FoSSaCS 2001, LNCS 2030, 394-409.
- S. Tini, A. Maggiolo-Schettini:
A causal semantics for Timed Default Concurrent Constraint Programming.
AMAST 2000, LNCS 1816, 228-242.
- A. Maggiolo-Schettini, S. Tini:
Applying techniques of asynchronous concurrency to synchronous languages.
Fundamenta Informaticae 40(2-3): 221-250 (1999).
- S. Tini:
On the expressiveness of Timed Concurrent Constraint Programming.
EXPRESS 1999, ENTCS 27, 3-17.
- S. Tini, Andrea Maggiolo-Schettini:
A truly concurrent semantics for Timed Default Concurrent Constraint Programming.
ECOOP Workshops 1999, LNCS 1743, 256-257.
- S. Tini, A. Maggiolo-Schettini:
Two semantics for Timed Default Concurrent Constraint Programming.
COTIC 1998, ENTCS 16(1), 24-41.
- A. Maggiolo-Schettini, S. Tini:
Projectable Semantics for Statecharts.
MFCS 98 Workshop on Concurrency, ENTCS 18, 134-146.
- A. Maggiolo-Schettini, A. Peron, S. Tini:
Equivalences of Statecharts.
CONCUR 1996, LNCS 1119, 687-702.

PROFESSIONAL ACTIVITY

Member of Program Committee

- SLAP 2004, 3rd Workshop on Synchronous Languages, Applications, and Programming. Barcelona, Spain, March 2004.
- SOS 2004, Int. Workshop on Structural Operational Semantics. London, UK, August 2004.
- SOS 2005, 2nd Int. Workshop on Structural Operational Semantics. Lisbon, Portugal, July 2005.
- SLA++P 2007, Int. Workshop on Model-driven High-level Programming of Embedded Systems. Braga, Portugal, 2007.
- SOS 2007, 4th Int. Workshop on Structural Operational Semantics. Wrocław, Poland, July 2007.
- SOS 2008, 5th Int. Workshop on Structural Operational Semantics. Reykjavik, Iceland, July 2008.
- EXPRESS/SOS 2016, Combined 23rd Int. Workshop on Expressiveness in Concurrency and 13th Workshop on Structural Operational Semantics. Québec City, Canada, August 2016.

- ICTCS 2018, 19th Italian Conference on Theoretical Computer Science. Urbino, Italy, September 2018.
- CONCUR 2019, 30th Int. Conference on Concurrency Theory. Amsterdam, The Netherlands, August 2019.
- SEFM 2020, 18th Int. Conference on Software Engineering and Formal Methods. Amsterdam, The Netherlands, September 2020.
- FORTE 2021, 41st Int. Conference on Formal Techniques for Distributed Objects, Components, and Systems. Valletta, Malta, June 2021.
- ICTCS 2023, 24th Italian Conference on Theoretical Computer Science. Palermo, Italy, September 2023.
- FORTE 2024, 44th Int. Conference on Formal Techniques for Distributed Objects, Components, and Systems. Groningen, The Netherlands, June 2024.
- DATAMOD 2024, 12 Int. Symposium From Data To Models and Back. Aveiro, Portugal, November 2024.

Program Chair

- Co-chair of EXPRESS/SOS 2017, Combined 24th Int. Workshop on Expressiveness in Concurrency and 14th Workshop on Structural Operational Semantics, EXPRESS/SOS 2017. Berlin, Germany, August 2017.
- Co-chair of EXPRESS/SOS 2018, Combined 25th Int. Workshop on Expressiveness in Concurrency and 15th Workshop on Structural Operational Semantics, EXPRESS/SOS 2018. Beijing, China, August 2018.
- Co-chair of ICTCS 2019, 20th Italian Conference on Theoretical Computer Science, ICTCS 2019. Como, Italy, September 2019.

Invited talk

- DATAMOD 2017, 6th Int. Symposium From Data to Models and Back. Trento, Italy, September 2016.
- OPCT 2019, Open Problems in Concurrency Theory. Lisbon, Portugal, January 2019.
- OPCT 2023, Open Problems in Concurrency Theory. Bertinoro, Italy, June 2023.
- TRENDS 2024, 13th IFIP WG 1.8 Workshop on Trends in Concurrency Theory. Calgary, Canada, September 2024.

Journal Editorial Board

- Scientific Annals in Computer Science.
- Science of Computer Programming.

Journal Special Issues

- K. Peters and S. Tini, Eds., *Acta Informatica* 57(6) (2020), Special Issue dedicated to EXPRESS/SOS 2016 and EXPRESS/SOS 2017.
- J. Perez and S. Tini, Eds., *Information and Computation* 281 (2021), Special Issue dedicated to EXPRESS/SOS 2018.
- A. Cherubini, N. Sabatini, S. Tini, Eds., *Theoretical Computer Science* 864 (2021), Special Issue dedicated to ICTCS 2019.

Membership

- Member of IFIP Working Group 1.8 “Concurrency Theory”.

Projects

- ESPRIT BRA Project 8130 “Logical and Operational Methods in the Analysis of Programs and Systems” (LOMAPS), funded by EU.
- MURST “Formal Techniques for the Specification, the Analysis, the Verification and the Transformation of Software System”. Funded by Italian Ministry MURST.
- ESPRIT WG Project 23677 “Concurrent Constraint Programming for Time Critical Applications” (COTIC). Funded by EU.
- MURST Project “Theory of Concurrency, Higher Order Languages and Types” (TOSCA). Funded by Italian Ministry MURST.

- MIUR Project “Formal Methods for Security and Time - MEtodi Formali per la Sicurezza ed il TempO” (MEFISTO). Funded by Italian Ministry MIUR.
- MIUR Project “Analysis of Reduction systems through Transition systems” (ART).
- Iceland Resarch Fund Project 228371-051 “Programs in the wild: Uncertainty, adaptabiLiTy and veRificatiON” (ULTRON).
- ”MEDICA: Modelling and vErification of alkaptonuria and multiple sclerosis Driven by biomedICAL data”. Funded by Italian Ministry MIUR.

Students

- V. Castiglioni: Probabilistic Semantics: Metric and Logical Characterizations for Nondeterministic Probabilistic Processes, 2014-2017.
- D. Manicardi: Formal Models for Biological Systems, 2020-2024.

Software

- V. Castiglioni, M. Loreti, S. Tini: STARK, the Software Tool for the Analysis of Robustness in the unKnown environment (<https://github.com/quasylab/jspear/>).
- V. Castiglioni, M. Loreti, S. Tini: Bio-STARK (<https://github.com/stark-tool/Bio-STARK/>).
- V. Castiglioni, M. Loreti, S. Tini: Digital Twin STARK (https://github.com/quasylab/jspear/tree/digital_twins/).