



Federico Mari

Assistant Professor

Education

- 2010 **Ph.D. Computer Science**, *Sapienza Università di Roma*, Prof. Enrico Tronci.
- 2006 **Master Degree Computer Science**, *Sapienza Università di Roma, SCL*.

Appointments

- 2015–now **Assistant Professor**, *Computer Science Department*, Sapienza Università di Roma.
Ricercatore a Tempo Determinato, Tipologia A.
- 2010–2014 **Postdoctoral researcher**, *CS Dept*, Sapienza.
- 2008 **Visiting Ph.D. student**, University of Texas at Austin.

Teaching Activities

- 2014/15–now **Students supervision**, *undergraduate and graduate level*.
- 2012/13–now **Basi di dati**, *professor*, CS Dept, Sapienza.
- 2009/10–now **Metodi formali per il software**, *lecturer*, CS Dept, Sapienza.
 - 2009/10 **Basi di dati**, *professor*, Associazione Centro Elis (Roma).
Tecnico superiore per lo sviluppo del software IFTS (Istruzione Formazione Tecnico Superiore)
 - 2008/09 **Fondamenti di programmazione**, *lecturer*, CS Dept, Sapienza.
 - 2007/08 **Laboratorio di programmazione**, *lecturer*, CS Dept, Sapienza.

Awards and Honours

- ICSEA 2011 **Best paper award**, for [27].

Funding Information

Project budget enclosed. In parenthesis, the grant managed by Sapienza, where F. Mari is involved as investigator, also with **WP or task leading** responsibilities.

- 2013 **PAEON - Model Driven Computation of Treatments for Infertility Related Endocrinological Diseases**, *EC Seventh Framework Programme FP7-ICT-2011-9*, € 2,453,997 (€ 626,382).
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- 2012 **SmartHG - Energy Demand Aware Open Services for Smart Grid Intelligent Automation**, *EC Seventh Framework Programme FP7-ICT-2011-8*, € 3,299,998 (€ 597,378).
smarthg.di.uniroma1.it
- 2010 **ESA-ITI-AO6067 - Verifying Satellite Operational Procedures**, *European Space Agency (ESA) Innovation Triangle Initiative (ITI). ITI Type B*, € 150,000 (€ 45,000).
- 2009 **ULISSE - USOCs KnowLedge Integration and Dissemination for Space Science Experimentation**, *EC Seventh Framework Programme FP7-SPACE-2007-1*, € 4,858,223 (€ 155,460).
- 2008 **SSFRT - System and Software Functional Requirements Technique**, *European Space Agency (ESA) ITT AO5459*, € 200,000 (€ 15,000).

Research Activities

Research Interests

Formal methods (model checking) applied to hybrid systems

Control Software Synthesis In [3, 18, 20, 21, 28] we presented novel algorithms and tools (software **QKS**) that, given a discrete time linear hybrid system model P for a plant, a desirable controllable region and a goal region, returns a correct-by-construction control software K for P , along with a suitable representation for the set of states on which K is guaranteed to work. The output control software K is guaranteed to drive the specified closed loop system towards the desired goal.

System Level Verification In [9, 13, 19] we presented novel algorithms and tools (software **SyLVer**) for the formal verification of system level requirements of hybrid systems. Our approach exploits simulators (SIMSAT, Simulink) as black-box models, in order to automatically generate all possible simulation testing scenarios.

Journal and Conference Refereeing

- 2016–now **TC**, *Transactions on Computers*, journal, IEEE.
- 2015–now **SIMPAT**, *Simulation Modelling Practice and Theory*, journal, Elsevier.
- 2016–now **IPDPS**, *Int. Parallel & Distributed Processing Symposium*, conference, IEEE.
- 2014–now **FORTE**, *Forum for fundamental research on theory, models, tools, and applications for distributed systems*, conference, Springer LNCS.

Peer Reviewed Conference Papers Presented and Invited Talks

- 2012 **Sintesi Logica: Invited Talk**, V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, E. Tronci. *A Parallel Approach to Automatic Synthesis of Control Software*. Ottava Giornata Nazionale di Sintesi Logica, Milano, 4 luglio 2012.
- 2012 **EMSOFT**, Paper [21] at Tampere, Finland, October 7-12, 2012.
- 2009 **SSS**, Paper [30] at Lyon, France, November 3-6, 2009.
- 2007 **HSCC**, Paper [34] at Pisa, Italy, April 3-5, 2007.

Conference Organization

- 2013 **ETAPS**, Member of the Organizing Committee.

Publications

Journal Articles

- [1] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. Anytime system level verification via parallel random exhaustive hardware in the loop simulation. *Microprocessors and Microsystems*, 41:12–28, 2016.
- [2] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. Sylvaas: System level formal verification as a service. *Fundamenta Informaticae*, 149(1-2):101–132, 2016.
- [3] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Model based synthesis of control software from system level formal specifications. *ACM Transactions On Software Engineering And Methodology*, 23(1):Article 6, 2014.
- [4] F. Mari, I. Melatti, E. Tronci, and A. Finzi. A multi-hop advertising discovery and delivering protocol for multi administrative domain manet. *Mobile Information Systems*, 3(9):261–280, 2013.
- [5] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Linear constraints and guarded predicates as a modeling language for discrete time hybrid systems. *International Journal on Advances in Software*, vol. 6, nr 1&2:155–169, 2013.
- [6] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Synthesizing control software from boolean relations. *International Journal on Advances in Software*, vol. 5, nr 3&4:212–223, 2012.

Conference Papers

- [7] V. Alimguzhin, F. Mari, I. Melatti, E. Tronci, E. Ebeid, S.A. Mikkelsen, R.H. Jacobsen, J.K. Gruber, B. Hayes, F. Huerta, and M. Prodanovic. A glimpse of smarthg project test-bed and communication infrastructure. In *Digital System Design (DSD), 2015 Euromicro Conference on*, pages 225–232, 2015.
- [8] R. Ehrig, T. Dierkes, S. Schaefer, S. Roebnitz, E. Tronci, T. Mancini, I. Salvo, V. Alimguzhin, F. Mari, I. Melatti, A. Massini, B. Leeners, T.H.C. Krueger, M. Egli, and F. Ille. An integrative approach for model driven computation of treatments in reproductive medicine. In *Proceedings of the 15th International Symposium on Mathematical and Computational Biology (BIOMAT 2015), Rorkee, India*, 2015.
- [9] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. Sylvaas: System level formal verification as a service. In *Proceedings of the 23rd Euromicro International Conference on Parallel, Distributed and Network-based Processing (PDP 2015), special session on Formal Approaches to Parallel and Distributed Systems (4PAD)*, 2015.
- [10] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. Simulator semantics for system level formal verification. In *Proceedings Sixth International Symposium on Games, Automata, Logics and Formal Verification (GandALF 2015)*, 2015.
- [11] T. Mancini, F. Mari, I. Melatti, I. Salvo, E. Tronci, J.K. Gruber, B. Hayes, M. Prodanovic, and L. Elmegaard. User flexibility aware price policy synthesis for smart grids.

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- In *Digital System Design (DSD), 2015 Euromicro Conference on*, pages 478–485, 2015.
- [12] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. System level formal verification via distributed multi-core hardware in the loop simulation. In *Proc. of the 22nd Euromicro International Conference on Parallel, Distributed and Network-Based Processing*. IEEE Computer Society, 2014.
 - [13] T. Mancini, F. Mari, A. Massini, I. Melatti, and E. Tronci. Anytime system level verification via random exhaustive hardware in the loop simulation. In *In Proceedings of 17th EuroMicro Conference on Digital System Design (DSD 2014)*, 2014.
 - [14] E. Tronci, T. Mancini, F. Mari, I. Melatti, R. H. Jacobsen, E. Ebeid, S. A. Mikkelsen, M. Prodanovic, J. K. Gruber, and B. Hayes. Smarthg: Energy demand aware open services for smart grid intelligent automation. In *Proceedings of the Work in Progress Session of SEAA/DSD 2014*, 2014.
 - [15] E. Tronci, T. Mancini, I. Salvo, F. Mari, I. Melatti, A. Massini, S. Sinisi, F. Davì, T. Dierkes, R. Ehrig, S. Röblitz, B. Leeners, T. Krüger, M. Egli, and F. Ille. Patient-specific models from inter-patient biological models and clinical records. In *Formal Methods in Computer-Aided Design (FMCAD)*, 2014.
 - [16] E. Tronci, T. Mancini, F. Mari, I. Melatti, I. Salvo, M. Prodanovic, J. K. Gruber, B. Hayes, and L. Elmegaard. Demand-aware price policy synthesis and verification services for smart grids. In *Proceedings of Smart Grid Communications (Smart-GridComm), 2014 IEEE International Conference On*, 2014.
 - [17] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. On-the-fly control software synthesis. In *Proc. of International SPIN Symposium on Model Checking of Software (SPIN 2013)*, volume 7976 of *Lecture Notes in Computer Science*, pages 61–80. Springer - Verlag, 2013.
 - [18] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. A map-reduce parallel approach to automatic synthesis of control software. In *Proc. of International SPIN Symposium on Model Checking of Software (SPIN 2013)*, volume 7976 of *Lecture Notes in Computer Science*, pages 43–60. Springer - Verlag, 2013.
 - [19] T. Mancini, F. Mari, A. Massini, I. Melatti, F. Merli, and E. Tronci. System level formal verification via model checking driven simulation. In *Proceedings of the 25th International Conference on Computer Aided Verification. July 13-19, 2013, Saint Petersburg, Russia*, volume 8044 of *Lecture Notes in Computer Science*, pages 296–312. Springer - Verlag, 2013.
 - [20] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. Automatic control software synthesis for quantized discrete time hybrid systems. In *Proceedings of the 51th IEEE Conference on Decision and Control, CDC 2012, December 10-13, 2012, Maui, HI, USA*, pages 6120–6125. IEEE, 2012.
 - [21] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. On model based synthesis of embedded control software. In Ahmed Jerraya, Luca P. Carloni, Florence Maranchi, and John Regehr, editors, *Proceedings of the 12th International Conference on*

Embedded Software, EMSOFT 2012, part of the Eighth Embedded Systems Week, ESWeek 2012, Tampere, Finland, October 7-12, 2012, pages 227–236. ACM, 2012.

- [22] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Linear constraints as a modeling language for discrete time hybrid systems. In *Proceedings of ICSEA 2012, The Seventh International Conference on Software Engineering Advances*, pages 664–671. ThinkMind, 2012.
- [23] F. Mari, I. Melatti, I. Salvo, and E. Tronci. *Theoretical Aspects of Computing – ICTAC 2012*, volume 7521 of *Lecture Notes in Computer Science*, chapter Undecidability of Quantized State Feedback Control for Discrete Time Linear Hybrid Systems, pages 243–258. Springer Berlin Heidelberg, 2012.
- [24] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Control software visualization. In *Proceedings of INFOCOMP 2012, The Second International Conference on Advanced Communications and Computation*, pages 15–20. ThinkMind, 2012.
- [25] G. Verzino, F. Cavaliere, F. Mari, I. Melatti, G. Minei, I. Salvo, Y. Yushtein, and E. Tronci. Model checking driven simulation of sat procedures. In *Proc. of 12th International Conference on Space Operations (SpaceOps 2012)*, 2012.
- [26] F. Cavaliere, F. Mari, I. Melatti, G. Minei, I. Salvo, E. Tronci, G. Verzino, and Y. Yushtein. Model checking satellite operational procedures. In *DATA Systems In Aerospace (DASIA), Org. EuroSpace, Canadian Space Agency, CNES, ESA, EUMETSAT. San Anton, Malta, EuroSpace.*, 2011.
- [27] F. Mari, I. Melatti, I. Salvo, and E. Tronci. From boolean relations to control software. In *Proceedings of ICSEA 2011, The Sixth International Conference on Software Engineering Advances*, pages 528–533. ThinkMind, 2011.
- [28] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Synthesis of quantized feedback control software for discrete time linear hybrid systems. In T. Touili, B. Cook, and P. Jackson, editors, *Computer Aided Verification*, volume 6174 of *Lecture Notes in Computer Science*, pages 180–195. Springer Berlin / Heidelberg, 2010.
- [29] A. Bobbio, E. Ciancamerla, S. Di Blasi, A. Iacomini, F. Mari, I. Melatti, M. Minichino, A. Scarlatti, E. Tronci, R. Terruggia, and E. Zendri. Risk analysis via heterogeneous models of scada interconnecting power grids and telco networks. In *Proceedings of Fourth International Conference on Risks and Security of Internet and Systems (CRiSIS)*, pages 90–97, 2009.
- [30] F. Mari, I. Melatti, I. Salvo, E. Tronci, L. Alvisi, A. Clement, and H. Li. Model checking coalition nash equilibria in mad distributed systems. In R. Guerraoui and F. Petit, editors, *Stabilization, Safety, and Security of Distributed Systems, 11th International Symposium, SSS 2009, Lyon, France, November 3-6, 2009. Proceedings*, volume 5873 of *Lecture Notes in Computer Science*, pages 531–546. Springer, 2009.
- [31] S. Mazzini, S. Puri, F. Mari, I. Melatti, and E. Tronci. Formal verification at system level. In *In: DATA Systems In Aerospace (DASIA), Org. EuroSpace, Canadian Space Agency, CNES, ESA, EUMETSAT. Istanbul, Turkey, EuroSpace*, 2009.

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- [32] F. Chierichetti, S. Lattanzi, F. Mari, and A. Panconesi. On placing skips optimally in expectation. In M. Najork, A.Z. Broder, and S. Chakrabarti, editors, *Web Search and Web Data Mining (WSDM 2008)*, pages 15–24. Acm, 2008.
- [33] F. Mari, I. Melatti, I. Salvo, E. Tronci, L. Alvisi, A. Clement, and H. Li. Model checking nash equilibria in mad distributed systems. In A. Cimatti and R. Jones, editors, *FMCAD '08: Proceedings of the 2008 International Conference on Formal Methods in Computer-Aided Design*, pages 1–8, Piscataway, NJ, USA, 2008. IEEE Press.
- [34] F. Mari and E. Tronci. Cegar based bounded model checking of discrete time hybrid systems. In A. Bemporad, A. Bicchi, and G.C. Buttazzo, editors, *Hybrid Systems: Computation and Control (HSCC 2007)*, volume 4416 of *Lecture Notes in Computer Science*, pages 399–412. Springer, 2007.

Technical Reports (CoRR)

- [35] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Model based synthesis of control software from system level formal specifications. Technical report, 2013.
- [36] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. A map-reduce parallel approach to automatic synthesis of control software. Technical report, 2012.
- [37] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. On model based synthesis of embedded control software. Technical report, 2012.
- [38] V. Alimguzhin, F. Mari, I. Melatti, I. Salvo, and E. Tronci. Automatic control software synthesis for quantized discrete time hybrid systems. Technical report, 2012.
- [39] F. Mari, I. Melatti, I. Salvo, and E. Tronci. From boolean functional equations to control software. Technical report, 2011.
- [40] F. Mari, I. Melatti, I. Salvo, and E. Tronci. Quantized feedback control software synthesis from system level formal specifications for buck dc/dc converters. Technical report, 2011.

Theses

- [41] F. Mari. Ph.D. thesis. verification and synthesis for discrete time linear hybrid systems, 2010.
- [42] F. Mari. Master thesis. automatic hybrid systems verification via satisfiability, 2006.