

# Ana Maria Mainhardt Carpes

## Curriculum Vitae

### Research Interests

Formal Methods, Control Systems, Decentralised and Distributed Supervisory Control, Privacy and Security on Discrete Events Systems, Systems Biology.

### Education

- Late 2020 – present **PhD Candidate**, *Max Planck Institute for Software Systems (MPI-SWS)*, Germany.  
Topic: Decentralised Supervisory Control for Discrete Events Systems, Contract-Negotiation Synthesis of Local Supervisors for Distributed Processes with Private Behaviour  
Supervisor: Dr. Anne-Kathrin Schmuck
- 2012–2015 **Master of Automation and Systems Engineering**, *Federal University of Santa Catarina (UFSC)*, Brazil.  
Thesis: *Study on the Dynamics of Gene Regulatory Networks which Exhibit Circadian Cycles* ([link](#))  
Supervisors: Professor José Eduardo Ribeiro Cury & Fabio Luis Baldissera
- 2006–2012 **Bachelor of Control and Automation Engineering**, *Federal University of Santa Catarina (UFSC)*, Brazil.  
Bachelor Final Thesis: *Properties of LD Programs: Expression and Verification* ([link](#))  
Supervisors: Professor Jean-Marie A. Farines (UFSC) & Professor Xavier Crégut (ENSEEIH)

### Awards and Honours

- 2022 **Best Student Paper Award**.  
16th IFAC Workshop on Discrete Event Systems (WODES'22)
- 2006–2007 **Honours Advanced Mathematics Program**, Federal University of Santa Catarina (UFSC), Department of Mathematics, Florianópolis, Brazil.  
Highly selective four-semester Honours Course on Advanced Calculus and Linear Algebra

### Publications

- 2025 **A. M. Mainhardt** and A. K. Schmuck, *Distributed Contract Negotiation for Decentralised Supervisory Control beyond Two-Component Architectures*, 64th IEEE Conference on Decision and Control, accepted ([preprint](#)).
- 2024 **A. M. Mainhardt**, A. Wintenberg, S. Lafortune and A. K. Schmuck, *Formulating Attacks with Supervisory Control*, 17th IFAC Workshop on Discrete Event Systems ([link](#)).
- 2023 **A. M. Mainhardt** and A. K. Schmuck, *Synthesis of Distributed and Decentralised Supervisory Control via Contract Negotiation*, IEEE Transactions on Automatic Control, under review, conditionally accepted ([preprint](#)).
- 2022 **A. M. Mainhardt** and A. K. Schmuck, *Assume-Guarantee Synthesis of Decentralised Supervisory Control*, 16th IFAC Workshop on Discrete Event Systems ([original](#), [extended version](#)).
- 2011 J. M. A. Farines, M. H. Queiroz, V. G. Rocha, **A. M. M. Carpes**, F. Vernadat and X. Cregut, *A model-driven engineering approach to formal verification of PLC programs*, IEEE 16th Conference on Emerging Technologies & Factory Automation ([link](#)).
- 2011 J. M. A. Farines, M. H. Queiroz, M. F. Souza, **A. M. M. Carpes** and F. Vernadat, *Modeling and Verification of PLC Programs by using FIACRE Tool Chain*, First TOPCASED Days.

Kaiserslautern, Germany

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## Research Experience

- April 2023, April 2024 **University of Michigan DES Group**, Ann Arbor, USA. *Research Collaboration.*  
Attacks on Supervisory Control Systems  
Collaborator: Professor Stéphane Lafortune
- Fall 2011 **Institut de Recherche en Informatique de Toulouse (IRIT), ACADIE Group, and Institut National Polytechnique, ENSEEIHT**, Toulouse, France.  
*Research Intern with 6-Month Scholarship from ENSEEIHT.*  
Properties of LD Programs: Expression and Verification (Bachelor Final Thesis)  
Supervisors: Professor Jean-Marie A. Farines and Professor Xavier Crégut
- 2009–2011 **Federal University of Santa Catarina (UFSC), Automation and Systems Department**, Florianópolis, Brazil.  
*Research Intern with 3-time Annual PIBIC/CNPq Scholarship.*  
Formal Verification of PLC Programs Written in Ladder Diagram  
Supervisor: Professor Jean-Marie A. Farines
- 2008 **Federal University of Santa Catarina (UFSC), Automation and Systems Department**, Florianópolis, Brazil.  
*Research Intern with Annual PIBIC/CNPq Scholarship.*  
Development of Lisp Procedures for Supporting Discrete Event Systems Control Synthesis  
Supervisor: Professor Max Hering de Queiroz

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## Presentations / Events Participation

- 2024 **17th IFAC Workshop on Discrete Event Systems (WODES'24)**, Rio de Janeiro, Brazil.  
Paper presentation and conference attendance
- 2023 **Virtual Talk Series on Discrete Event Systems**, by IEEE CSS TC DES ([recording](#)).  
PhD Forum Invited Talk
- 2023 **MPI-SWS Lightning Tutorial Series**.  
Tutorial talk on Supervisory Control
- 2022 **16th IFAC Workshop on Discrete Event Systems (WODES'22)**, Prague, Czech Republic.  
Paper presentation and conference attendance
- 2022 **DISC Summer School, Security and Resiliency for Cyber-Physical Systems – foundations and recent advances**, Noordwijk, The Netherlands.  
Poster presentation and school attendance
- 2015 **XII Brazilian Symposium on Intelligent Automation (XII SBAI)**, Natal, Brazil.  
Paper presentation and conference attendance

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## Teaching Experience

- 2013 **Graduate Teaching Assistant, Modelling and Control of Automated Systems**, Federal University of Santa Catarina (UFSC), Florianópolis, Brazil.

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## Reviewer

- Journals IEEE Transactions on Automatic Control, Journal Of Discrete Event Dynamic Systems  
Conferences NFM, VMCAI

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## Skills

- Languages English (fluent), Portuguese (mother tongue), French (intermediate), German (basic)  
Programming Java (proficient), Lisp (intermediate), C, Python, R, Matlab (familiar, academic use)  
Languages

Kaiserslautern, Germany

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