Chris Meissen

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Education

2011 – May 2017 **Ph.D. Mechanical Engineering**, *University of California, Berkeley*.
Major: Control Systems
Minors: Mathematics and Optimization

2014 **ELEC Doctoral School**, *Vrije Universiteit Brussels, Belgium*.
Summer course on system identification, modeling, and simulation of linear and nonlinear systems

2007 – 2009 **M.S. Mechanical Engineering**, *Colorado State University*.

2003 – 2007 **B.S. Mechanical Engineering**, *Kansas State University*.

Research

2011 – 2017 **Ph.D. Research**, *University of California, Berkeley*.
Supervised by Professors Andrew Packard, Ph.D., Murat Arcak, Ph.D., and Laurent El Ghaoui, Ph.D.

Performance, Stability, and Safety Certification of Nonlinear Dynamical Systems
- Developed a compositional performance certification framework for nonlinear dynamical systems
- Adapted distributed optimization algorithms to parallelize and efficiently solve
- Certify stability and input-output properties (i.e. bounded L_2-gain, passivity) of large-scale nonlinear systems using sum-of-squares (SOS) programming
- Applied to formation control of quadrotor UAVs cooperatively carrying a suspended load

Uncertainty Quantification for Complex Dynamical Systems
- Employed active subspace discovery methods for model reduction of large chemical reaction models
- Developed software to fit computationally efficient models of complex systems

Optimization Algorithm Analysis with Integral Quadratic Constraints
- Quantify convergence rate and robustness of popular optimization algorithms
- Robustness analysis of model predictive control under disturbances and model uncertainty

2007 – 2009 **M.S. Research**, *Colorado State University*.

Development and Validation of a Physical Model of a Modern Twin Tube Damper
- Developed a coupled fluid-mechanical model to simulate automotive damper performance
- Experimentally tested dampers to correlate and validate model

Professional Experience

2015 – 2017 **Consultant**, *SumUp Analytics*, Berkeley, CA.

Modeling and Feature Identification for Market Data Analysis, *Two Sigma*
- Analyzed stock price data to identify dominant features for buyback algorithms
- Implemented machine learning algorithms and developed a convex model selection process for stock return prediction

Optimization Amenable Modeling of Power Systems, *EDF Energy*
- Created efficient and optimization-amenable models from large-scale multiphysics simulations
- Determined optimal parameters to minimize power consumption

2009 – 2011	**R&D Engineer**, *OptimumG LLC*, Denver, CO.

- Developed vehicle dynamic simulation and tire data analysis software
- Involved in vehicle and tire testing, data acquisition and analysis, test planning and organization
- Developed and taught a 10-day course on vehicle dynamics simulation, programming, and applied mathematics to graduate students at ISMANS University in Le Mans, France
- Consulted on various projects for Dunlop, Oreste Berta SA, APPLUS Idiada, and others

Technical Skills

Languages	MATLAB\Simulink, Julia, Python, C++, C#, VB.NET, LaTeX
Software	Solidworks, Pro\Engineer, Catia, ANSYS, Abaqus, Adams, LabVIEW
Interests	Aerospace, Autonomous Vehicles, Networked Systems, Kalman and Particle Filters, Optimal and Model Predictive Control, Path-Planning, System Identification, Optimization, Sum-of-Squares and Semidefinite Programming, Machine Learning and Data Analytics

Additional Experience

2011, 2013, 2017	**Graduate Student Instructor**, *University of California, Berkeley*.

- Experiential Advanced Control - Taught advanced control, estimation, and navigation techniques; implemented on quadrotor UAVs with students
- Introduction to Computer Programming for Scientists and Engineers - Developed an autograding system allowing students to automatically grade their assignments and receive feedback

2007 – 2008	**Graduate Teaching Assistant**, *Colorado State University*.

- Control Systems and Engineering Design

2003 – 2009	**Formula SAE**, *Kansas State and Colorado State University*.

- Advisor for technical and management aspects of the project (2007 – 2009)
- Suspension and chassis team leader (2006 – 2007)
- Composites team leader (2004 – 2006)

Honors and Awards

Berkeley Graduate Division Block Grant Award

Berkeley Outstanding Graduate Student Instructor Award

Kansas State Presidential Scholarship and Engineering Scholarship

National Merit Scholar Finalist and Scholarship Recipient

Publications

[1] Murat Arcak, Chris Meissen, and Andrew Packard. *Networks of Dissipative Systems: Compositional Certification of Stability, Performance, and Safety*. SpringerBriefs in Control, Automation and Robotics. Springer, 2016.

[2] Chris Meissen, Laurent Lessard, Murat Arcak, and Andrew Packard. Compositional performance certification of interconnected systems using ADMM. *Automatica*, 2015.

[3] Ana Rufino Ferreira, Chris Meissen, Murat Arcak, and Andrew Packard. Symmetry reduction for performance certification of interconnected systems. *IEEE Transactions on Control of Network Systems*, 2016.

[4] Chris Meissen, Kristian Klausen, Murat Arcak, Thor Fossen, and Andrew Packard. Passivity-based formation control for UAVs with a suspended load. *IFAC World Congress*, 2017.

[5] Kristian Klausen, Chris Meissen, Thor Fossen, Murat Arcak, and Tor Arne Johansen. Cooperative control for multirotors transporting an unknown suspended load with environmental disturbances. *IEEE Transactions on Control Systems Technology*, Submitted.

[6] Chris Meissen, Laurent Lessard, Murat Arcak, and Andrew Packard. Performance certification of nonlinear interconnected systems using ADMM. *IEEE Conference on Decision and Control*, 2014.

[7] Chris Meissen, Laurent Lessard, and Andrew Packard. Performance certification of interconnected systems using decomposition techniques. *American Control Conference*, 2014.

[8] Chris Meissen. Development and validation of a physical model for a modern twin tube damper. Master's thesis, Colorado State University, 2009.

[9] Chris Meissen. *Compositional Stability, Performance, and Safety Certification of Interconnected Systems*. PhD thesis, University of California, Berkeley, 2017.