

Alexandre Rodrigues Mesquita

CONTACT

INFORMATION

Dept. de Engenharia Eletrônica, Sala 2600
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RESEARCH INTERESTS

Multi-agent Systems, Networked Control Systems, Stochastic Hybrid Systems, Stochasticity in Biology, System Identification, Bayesian Filtering

EDUCATION

University of California, Santa Barbara, California, USA

Ph.D., Electrical and Computer Engineering, December 2010

- Thesis Title: Exploiting Stochasticity in Multi-agent Systems
- Advisor: Prof. João P. Hespanha
- Area of Study: Control Engineering
- GPA: 4.0/4.0

Instituto Tecnológico de Aeronáutica (ITA), São José dos Campos, Brazil

MSc., Electrical and Computer Engineering, 2005–2006

- Thesis Title: Limit cycle robustness analysis in attitude control systems with time-constrained switching actuators and first order controller
- Advisor: Prof. Karl H. Kienitz
- Area of Study: Control Engineering
- GPA: 9.6/10.0

BSc., Electronics Engineering, 2000 - 2004 (*magna cum laude*)

- GPA: 9.3/10.0

HONORS AND AWARDS

- Capes-Fulbright Fellowship, 2006–2010.
- Dissertation Fellowship, Electrical and Computer Eng. Department, UCSB, Spring 2010.
- Barpal Family Fellowship, UCSB, Fall 2006.
- Instituto de Engenharia Award, Best student of the 2004 Engineering Class at ITA, 2004.
- CREA-SP Professional Formation Award, Best student of the 2004 Electronics Engineering Class at ITA, 2004.
- Prof. Richard Robert Wallauschek Award, from EMBRAER, for academic performance, 2004.
- Ranked 3rd in the entrance exam of Federal University of Minas Gerais, 2000.

TEACHING EXPERIENCE

Assistant Professor, Federal University of Minas Gerais, Belo Horizonte, Brazil, January 2012 – present

- Undergraduate courses in simulation, linear systems, digital control and automation and controls lab. Graduate courses in stochastic processes, system identification and Bayesian filtering. Subcoordinator of the Automation & Control Engineering undergraduate program from 2014 to present.

Teaching Assistant, Federal University of Minas Gerais, Belo Horizonte, Brazil, 2011

- As a postdoc fellow, I was in charge of teaching an undergraduate course in dynamical systems simulation and the second half of the graduate course *Introduction to Stochastic Processes*.

Teaching of Brazilian and Portuguese Literature, CASD Vestibulares, São José dos Campos, Brazil, 2003

- I worked preparing students to the university entrance exam. Despite being a nonprofit, CASD offers high-quality preparation, competing with private preparation courses and being quite selective about teachers.

WORK EXPERIENCE

Assistant Professor, Federal University of Minas Gerais, Belo Horizonte, Brazil, January 2012 – present

- Alongside teaching, I advised students from the undergraduate to doctoral level on projects that included system identification for industrial applications; evaluation of risk in commodities prices; and estimation and filtering in Markov jump systems.

Postdoctoral Fellow, Federal University of Minas Gerais, Belo Horizonte, Brazil, April 2011 – December 2011

- Research on Networked Control Systems
- Supervisor: Prof. Reinaldo M. Palhares

Intern at Casimiro Montenegro Filho Foundation, São José dos Campos, Brazil, 2006

- Programming of hardware-in-the-loop simulations for a flybywire system using Matlab's xPC Target platform.

RESEARCH EXPERIENCE

Graduate Student Researcher, University of California, Santa Barbara, 2006–2010

- Research on bio-inspired multi-agent systems and networked control systems using the mathematical framework of stochastic hybrid systems.
- Supervisor: Prof. João P. Hespanha

Undergraduate Research Fellow, The State of São Paulo Research Foundation (FAPESP), São José dos Campos, Brazil, 2004

- Investigation of persistent motions in an attitude control system with switching actuators subject to time restrictions and delays. Brazilian VLS satellite launcher's roll control system was considered.
- Supervisor: Prof. Karl H. Kienitz

Undergraduate Research Fellow, CNPq, ITA, São José dos Campos, Brazil, 2001–2003

- Evaluation of the potential and flexibility of optimization techniques for digital controllers utilizing xPC Target. I employed online derivativefree parametric optimization techniques to the controller of a magnetic levitation system.
- Supervisor: Prof. Karl H. Kienitz

PUBLICATIONS

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Journal Articles

- [1] W. Eras-Herrera, A. Mesquita, and B. Teixeira. Multiple-model multiple-hypothesis filter with gaussian mixture reduction. *International Journal of Adaptive Control and Signal Processing*, 2017.
- [2] A. Mesquita, J. Hespanha, and G. Nair. Redundant data transmission in control/estimation over lossy networks. *Automatica*, 48(8):1612 – 1620, 2012.
- [3] A. Mesquita and J. Hespanha. Jump control of probability densities with applications to autonomous vehicle motion. *Automatic Control, IEEE Transactions on*, 57(10):2588–2598, 2012.

- [4] A. R. Mesquita, E. L. Rempel, and K. H. Kienitz. Bifurcation analysis of attitude control systems with switching-constrained actuators. *Nonlinear Dynamics*, 51:207–216, 2008.
- [5] A. Mesquita and K. Kienitz. Otimização em tempo de execução de controladores usando hardware computacional na configuração mestre-escravo. *Sba: Controle & Automação Sociedade Brasileira de Automatica*, 16(1):76–83, 2005.

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Conference Papers

- [6] J. H. V. PACOLA, A. R. MESQUITA, and R. R. TORRES. Volatility and risk analysis of low and high-grade iron ore spot price series. In *24th World Mining Congress*, pages 259–270, 2016.
- [7] P. E. O. G. B. ABREU, B. O. S. TEIXEIRA, and A. R. MESQUITA. Estimação recursiva de parâmetros variantes no tempo para sistemas com sinal de entrada com excitação intermitente. In *Congresso Brasileiro de Automática*, pages 1710–1715, 2016.
- [8] P. E. Abreu, B. O. Teixeira, and A. R. Mesquita. Abordagens para atualização de parâmetros no contexto de estimação dual de estados e parâmetros. In *Congresso Brasileiro de Automática*, pages 1722–1727, 2016.
- [9] L. B. COSME, M. F. S. V. DANGELO, W. M. CAMINHAS, M. C. O. CAMARGOS FILHO, A. R. MESQUITA, and R. M. PALHARES. Uma abordagem baseada em filtros de partículas para prognóstico de falhas. In *XII Simpósio Brasileiro de Automação Inteligente*, 2015.
- [10] G. N. Nair, A. R. Mesquita, and J. P. Hespanha. Optimal redundant transmission for state estimation with packet drops. In *Proc. of the 2nd IFAC Workshop on Distributed Estimation and Control in Networked Systems (NecSys'10)*, Sep. 2010.
- [11] A. R. Mesquita and J. P. Hespanha. Construction of Lyapunov Functions for Piecewise-Deterministic Markov Processes. In *Proc. of the 49th Conf. on Dec. and Control*, 2010.
- [12] A. R. Mesquita, J. P. Hespanha, and G. N. Nair. Redundant data transmission in control/estimation over wireless networks. In *Proc. of the 2009 Amer. Contr. Conf.*, June 2009.
- [13] A. R. Mesquita, J. P. Hespanha, and K. J. Åström. Optimotaxis: A stochastic multi-agent optimization procedure with point measurements. In *Hybrid Systems: Computation and Control*, number 4981 in LNCS, pages 358–371. Springer-Verlag, Berlin, Mar. 2008.
- [14] A. Mesquita, K. Kienitz, and E. L. Rempel. Robust limit cycle control in an attitude control system with switching-constrained actuators. In *Proc. of the 47th Conf. on Decision and Contr.*, Dec. 2008.
- [15] A. R. Mesquita and K. H. Kienitz. Persistent motion and chaos in attitude control with switching actuators. In *16th IFAC World Congress*, pages Paper Th–A03–TP/15, Prague, 2005.

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Book Chapters

- [16] J. Hespanha and A. Mesquita. Networked control systems: Estimation and control over lossy networks. In J. Baillieul and T. Samad, editors, *Encyclopedia of Systems and Control*, pages 1–9. Springer London, 2014.

PROFESSIONAL
MEMBERSHIP AND
SERVICE

Reviewer for

- *Automatica*
- *ACM Transactions on Sensor Networks*
- *IET Control Theory & Applications*
- *IEEE Transactions on Automatic Control*
- *SIAM Journal on Control and Optimization*
- *IEEE Transactions on Industrial Electronics*
- *IEEE Transactions on Signal Processing*
- *IEEE Transactions on Control Systems Technology*
- *Journal of Applied Mathematics*
- *IET Systems Biology*
- *Australian Control Conference*
- *Simpósio Brasileiro de Automação Inteligente*
- *IEEE Conference on Decision and Control*
- *American Control Conference*

TECHNICAL SKILLS Julia, L^AT_EX, Matlab, Simulink, C, C++

MATHEMATICAL
EXPERTISE

Probability, Optimization, Measure Theory, Real Analysis, Functional Analysis

ENGINEERING
EXPERTISE

Linear and Nonlinear Systems Theory, Linear and Nonlinear Control, Stochastic Control, System Identification, Robust Control, Cooperative Robotics, Hybrid Systems, Information Theory, Markov Processes in General Spaces, Monte Carlo methods, Particle Filters

LANGUAGES

Fluent in English and Portuguese, Reading proficient in Spanish and French, Basic communication in Russian