Marcos M. Vasconcelos

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Education

- **University of Maryland** — College Park, MD
  Ph.D. Electrical Engineering — 2016
    - Thesis: Optimality of event-based policies for decentralized estimation over shared networks
    - Advisor: Prof. Nuno C. Martins
- **Federal University of Pernambuco** — Recife, Brazil
  M.Sc. Electrical Engineering — 2006
    - Thesis: Iterative decoding of Low-Density Parity-Check codes
    - Advisor: Prof. Valdemar C. da Rocha, Jr.
- **Federal University of Pernambuco** — Recife, Brazil
  B.Sc. Electrical Engineering — 2004
    - Thesis: A Matlab toolbox for signal processing over finite fileds
    - Advisors: Profs. Hélio Magalhães de Oliveira and Ricardo M. Campelo de Souza

Employment

- **Commonwealth Cyber Initiative** — Virginia Tech
  Research Assistant Professor — Jan. 2021 -
- **Dept. of Electrical Engineering** — University of Southern California
  Postdoctoral research associate — Sep. 2016 - Dec. 2020
    - Advisor: Prof. Urbashi Mitra
- **Dept. of Electrical and Computer Engineering** — University of Maryland, College Park
  Research assistant — Jan. 2008 - Aug. 2016
- **Dept. of Electrical and Computer Engineering** — University of Hawaii at Manoa
  Research assistant — Sep. 2006 - Dec. 2007
- **Laboratory of Communication Systems** — Federal University of Pernambuco
  Research assistant — Apr. 2004 - Jul. 2006
- **Laboratory of Devices and Nanostructures** — Federal University of Pernambuco
  Intern — Jan. 2004 - Mar. 2004

Awards & Honors

- **Travel Award to Japan**
  54th IEEE Conference on Decision and Control — 2015
- **Distinguished Teaching Assistant Award**
  U. of Maryland — 2012
- **Fulbright fellowship**
  Fulbright Commission — 2006–2010
- **Distinguished Undergraduate Student Award**
  Federal University of Pernambuco — 1999

Research interests

- Networked decision systems
- Distributed estimation, control and optimization
- Systems Biology
- Machine Learning for control and communication systems

Publications

Journal Articles

6. X. Zhang, **M. M. Vasconcelos**, W. Cui and U. Mitra. "Remote estimation over the collision channel with and without local communication." (**under review**) *IEEE Transactions on Control of Network Systems*, 2020.

5. **M. M. Vasconcelos** and U. Mitra, "Data-driven sensor scheduling for remote estimation in wireless networks," (**under review**) *IEEE Transactions on Control of Network Systems*.

4. **M. M. Vasconcelos**, M. Gagrani, A. Nayyar, and U. Mitra, "Optimal scheduling for networked estimation with energy harvesting," (**accepted**) *IEEE Transactions on Control of Network Systems*.

3. **M. M. Vasconcelos** and U. Mitra. "Observation-driven scheduling for remote estimation of two Gaussian random variables." *IEEE Transactions on Control of Network Systems*, vol. 7, no. 1, pp. 232–244, 2020.

2. **M. M. Vasconcelos** and N. C. Martins. "Optimal remote estimation of discrete random variables over the collision channel," *IEEE Transactions on Automatic Control*, vol. 64, no. 4, pp. 1519–1534, 2019.

1. **M. M. Vasconcelos** and N. C. Martins. "Optimal estimation over the collision channel," *IEEE Transactions on Automatic Control*, vol. 62, no. 1, pp. 321–336, 2017.

Book Chapters

1. **M. M. Vasconcelos** and N. C. Martins. "A survey on remote estimation problems," *Principles of Cyber-physical Systems*, S. Roy and S. Das, Eds., Cambridge University Press, 2020.

Working papers

4. H. lee, **M. M. Vasconcelos**, U. Mitra. "Distributed Bayesian linear regression with privacy guarantees." (**to be submitted**) *IEEE Transactions on Signal Processing*, 2021.

3. **M. M. Vasconcelos**, U. Mitra. "Distributed Wireless Medium Access Control Schemes via Federated Learning." (**to be submitted**) *IEEE Transactions on Control of Network Systems*, 2020.

2. **M. M. Vasconcelos**, U. Mitra, O. Camara and J. Boedicker. "Optimal control of bacterial growth via quorum sensing." (**to be submitted**) *PLOS Computational Biology*, 2020.

1. **M. M. Vasconcelos** and U. Mitra. "Implicit communication over collision networks." (**to be submitted**) *IEEE Transactions on Communications*, 2020.

Conference Proceedings

13. X. Zhang, **M. M. Vasconcelos**, W. Cui and U. Mitra, "An optimal symmetric threshold strategy for remote estimation over the collision channel" *IEEE International Conference on Acoustics, Speech and Signal Processing Systems and Computers*, Barcelona - Spain, 2020.

12. **M. M. Vasconcelos** and U. Mitra, "Optimization for data-driven wireless sensor scheduling" *Asilomar Conference on Signals, Systems and Computers*, Pacific Grove - California, 2019. (**invited**)

11. **M. M. Vasconcelos**, O. Camara, U. Mitra, M. Gangan and J. Boedicker, "A continuous-time decision-making model for bacterial growth via quorum sensing: theory and evidence" *International Conference on Nanoscale Computing and Communication*, Dublin - Ireland, 2019. (**invited**)

10. **M. M. Vasconcelos**, O. Camara, U. Mitra, and J. Boedicker, "A sequential decision making model of bacterial growth via quorum sensing" *Asilomar Conference on Signals, Systems and Computers*, Pacific Grove - California, 2018. (**invited**)

9. M. Gagrani, **M. M. Vasconcelos**, A. Nayyar, "Scheduling and estimation strategy design in a sequential networked estimation problem" *56th Allerton Conference on Communication, Control and Computing*, Monticello - Illinois, 2018.

8. **M. M. Vasconcelos**, U. Mitra, O. Camara, K. P. Silva, and J. Boedicker, "Bacterial quorum sensing as a networked decision system" *IEEE International Conference on Communications*, Kansas City - Missouri, 2018.

7. **M. M. Vasconcelos**, A. Nayyar and U. Mitra. "Optimal sensor scheduling strategies in networked estimation," *IEEE Conference on Decision and Control*, Melbourne - Australia, 2017.

6. **M. M. Vasconcelos** and U. Mitra. "The multiple-access collision channel without feedback: capacity region and a mutual information game," *55th Allerton Conference on Communication, Control and Computing*, Monticello - Illinois, 2017.

5. **M. M. Vasconcelos** and U. Mitra. "Observation-driven sensor scheduling," *IEEE International Conference on Communication*, Paris - France, 2017.

4. **M. M. Vasconcelos** and N. C. Martins. "The structure of optimal communication policies for remote estimation over the collision channel with private and common observations," *55th IEEE Conference on Decision and Control*, Las Vegas - Nevada, 2016.

3. **M. M. Vasconcelos** and N. C. Martins. "Optimal threshold strategies for estimation over the collision channel with communication costs," *54th IEEE Conference on Decision and Control*, Osaka - Japan, 2015.

2. **M. M. Vasconcelos** and N. C. Martins. "Remote estimation games over shared networks," *51st Annual Allerton Conference on Communication, Control, and Computing*, Monticello - Illinois, 2014. (**invited**)

1. **M. M. Vasconcelos** and N. C. Martins. "Estimation over the collision channel: structural results," *50st Annual Allerton Conference on Communication, Control, and Computing*, Monticello - Illinois, 2013. (**invited**)

Invited Talks

- **Optimization and Learning for the Next Generation IoT and CPS** — Arlington - VA
  Commonwealth Cyber Initiative - VAtech — *July 2020*
- **Data-driven sensor scheduling** — Rio de Janeiro - Rio de Janeiro
  Pontifical Catholic University, Rio de Janeiro — *March 2020*
- **Data-driven sensor scheduling for estimation over wireless networks** — San Diego - California
  Information Theory and Applications Workshop — *February 2020*
- **Observation-driven sensor scheduling** — Riverside - California
  University of California, Riverside — *May 2019*

- **Observation-driven sensor scheduling** — Princeton - New Jersey
  Siemens Corporate Technology — *April 2019*
- **Estimation over the collision channel & Observation-driven scheduling** — Sta. Barbara - California
  University of California, Sta. Barbara — *April 2018*
- **Estimation of discrete random variables over the collision channel** — Princeton - New Jersey
  IEEE Conference on Information Sciences and Systems — *March 2018*
- **Estimation over the collision channel & Observation-driven scheduling** — Pittsburgh - Pennsylvania
  Carnegie Mellon University — *March 2018*
- **Optimal sensor scheduling strategies in networked estimation** — San Diego - California
  Information Theory and Applications Workshop — *February 2018*
- **Collaborative estimation over the collision channel** — Las Vegas - Nevada
  Communication Aware Control and Robotics Workshop — *December 2016*
- **Optimal remote estimation over the collision channel**
  CommNetS Seminar (USC) — *September 2016*
- **Optimal remote estimation over the collision channel**
  Prof. George Pappas' Group Meeting (UPenn) — *April 2016*
- **Estimation over the collision channel with minimum probability of error**
  Communication, Control and Signal Processing Seminar (U. of Maryland) — *April 2016*
- **Estimation over the collision channel with communication costs** — YouTube video
  ECEGSA Academic Seminar (U. of Maryland) — *December 2015*
- **Distributed estimation over the collision channel**
  Communication, Control and Signal Processing Seminar (U. of Maryland) — *November 2014*

Research Experience

- **Private and communication efficient algorithms for distributed statistical inference** — USC
  Research Associate — *Fall 2020 –*
    - Design of privacy preserving communication algorithms for distributed machine learning
    - PI: Profs. Urbashi Mitra
- **Modeling of bacterial quorum sensing as a networked decision system** — USC
  Research Associate — *Fall 2016 –*
    - Developement of a mathematical decision-making model, experimental data analysis
    - PI's: Profs. Urbashi Mitra and James Boedicker
- **Energy and delay: network optimization in CPS human sensing systems** — USC
  Research Associate — *Fall 2016 – Fall 2018*
    - Optimal design of observation-driven sensor scheduling policies
    - PI's: Profs. Urbashi Mitra and Ashutosh Nayyar
- **Optimization-based modeling of bat-prey capture dynamics** — UMD/Johns Hopkins U.
  Research Assistant — *Spring 2015 – Summer 2016*
    - Model predictive control in denied sensing areas
    - PI's: Profs. Nuno C. Martins (UMD) and Cindy Moss (JHU)
- **Distributed estimation over shared networks** — UMD
  Research Assistant — *Spring 2012 - Summer 2016*
    - Policy design and optimization algorithms for decentralized estimation
    - PI: Prof. Nuno C. Martins
- **Stochastic teams and optimization** — Queen's University
  Visiting Student — *Summer 2012*
    - Host: Prof. Serdar Yüksel

- **Iterative decoding of low-density parity-check codes** UH
  Research Assistant *Fall 2006 - Fall 2007*
    - Graphical models and the belief propagation algorithm
    - PI: Marc P. C. Fossorier
- **Design, analysis and implementation of low-density parity-check codes** UFPE
  Research Assistant *Spring 2004 - Spring 2006*
    - PI: Prof. Valdemar C. da Rocha, Jr.

Technical Skills

- Mathematical modeling
- Statistical data analysis
- Public speaking
- Programming Languages
    - Matlab, Mathematica, C, R, Python

Participation in Workshops and Conferences

- **NSF Workshop on Biology through Info., Comm. & Coding Theory** Alexandria - Virginia
  Poster *January 2020*
- **9th NSF Cyber-Physical Systems PI Meeting** Alexandria - Virginia
  Poster *November 2018*
- **8th NSF Cyber-Physical Systems PI Meeting** Alexandria - Virginia
  Lightning Talk + Poster *November 2017*
- **Communication Aware Control and Robotics Workshop** Las Vegas - Nevada
  Speaker + round table panelist *November 2016*
- **Workshop on Future Trends in Networks, Optim. and Controls** Los Angeles - California
  Lightning Talk + Poster *December 2014*

Academic Service and Contributions

- Reviewer for the following journals:
    - IEEE Internet of Things Journal
    - IEEE Transactions on Automatic Control
    - SIAM Journal on Controls and Optimization
    - Automatica
    - Systems and Control Letters
    - IEEE Transactions on Wireless Communications
    - IEEE Transactions on Information Theory
    - IEEE Transactions on Communications
    - IEEE Transactions on Control of Network Systems
- Reviewer for the following conferences:
    - Conference on Decision and Control
    - American Control Conference
    - International Symposium on Information Theory

Teaching Experience

- **Signals and Systems (ENEE 322)** UMD
  Teaching Assistant *Spring 2010 – Fall 2011*
    - Instructors: Profs. Anthony Ephremides, Steven A. Tretter, Nuno C. Martins and Carol Espy-Wilson

- **Programming for Engineers (EE 160)** UH
  Teaching Assistant *Fall 2007*
    - Instructor: Prof. David Y. Y. Yun

- **Probability and Statistics (EE 342)** UH
  Teaching Assistant *Fall 2006 – Spring 2007*
    - Instructors: Profs. James Yee and Anthony Kuh

Languages

- Portuguese (native)

- English (fluent)

- Spanish (basic)

References

Prof. Nuno C. Martins (PhD advisor)
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