# CÉSAR A. URIBE
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**RESEARCH INTERESTS:** ● optimization theory ● network science ● statistical learning ● belief systems ● optimal transport

## APPOINTMENTS

**Massachusetts Institute of Technology**                                        Cambridge, MA
  Post Doctoral Associate, Laboratory for Information and Decision Systems (LIDS),          2018-Present
  Host: A. Jadbabaie

**Moscow Institute of Physics, and Technology**                      Moscow, Russian Federation
  Visiting Professor, Phystech School of Applied Mathematics and Informatics,                 2019-2022

## EDUCATION

**University of Illinois at Urbana-Champaign**                                        Urbana, IL
  Ph.D. in Electrical and Computer Engineering (GPA 3.90/4)                              2013-2018
  Thesis: *Efficient and Scalable Algorithms for Distributed Learning, Optimization, and Belief Systems over Networks*
  Committee: A. Nedić, A. Olshevsky, M. Raginsky, R. Srikant, T. Başar (Chair)

  M.Sc. in Applied Mathematics: Optimization and Algorithms                                  2016

**Delft University of Technology**                                        Delft, Netherlands
  M.Sc. in Systems and Control (*Cum Laude*, GPA 8.7/10)                                  2011-2013
  Thesis: *Control of Finite Stochastic Systems with non-Classical Information Patterns*
  Advisers: J. van Schuppen and T. Keviczky

**University of Antioquia**                                        Medellin, Colombia
  B.Sc. in Electronic Engineering (*with Honors*, GPA 4.28/5)                              2005-2010

## SELECTED PUBLICATIONS ( ⋆ denotes alphabetical ordering ) [Google Scholar](Google Scholar)

### Journal Papers and Preprints

[35] ⋆ A. Nedić, A. Olshevsky, and **CAU**, "Graph-theoretic analysis of belief system dynamics under logic constraints," *Scientific Reports*, vol. 9, no. 1, p. 8843, 2019

[34] ⋆ ——, "Fast Convergence Rates for Distributed Non-Bayesian Learning," *IEEE Transactions on Automatic Control*, vol. 62, no. 11, pp. 5538–5553, Nov. 2017

[33] A. Rogozin, **CAU**, A. Gasnikov, N. Malkovsky, and A. Nedić, "Optimal distributed convex optimization on slowly time-varying graphs," *IEEE Transactions on Control of Network Systems*, pp. 1–1, 2019

[32] ⋆ P. Dvurechensky, M. Staudigl, and **CAU**, "Generalized self-concordant Hessian-barrier algorithms," *submitted to Mathematics of Operations Research, arXiv:1911.01522*, 2019

[31] J. Z. Hare, **CAU**, L. Kaplan, and A. Jadbabaie, "Non-Bayesian social learning with uncertain models," *submitted to IEEE Transactions on Signal Processing, arXiv:1909.09228*, 2019

[30] B. Turan, **CAU**, H.-T. Wai, and M. Alizadeh, "Resilient Primal-Dual Optimization Algorithms forDistributed Resource Allocation," *submitted to IEEE Transactions on Control of Network Systems*, 2019

[29] P. Dvurechensky, A. Gasnikov, P. Ostroukhov, **CAU**, and A. Ivanova, "Near-optimal tensor methods for minimizing gradient norm," *arXiv preprint arXiv:1912.03381*, 2019

[28] H.-T. Wai, W. Shi, **CAU**, A. Nedić, and A. Scaglione, "Accelerating incremental gradient optimization with curvature information," *submitted to Computational Optimization and Applications, arXiv:1806.00125*, 2018

[27] **CAU**, S. Lee, A. Gasnikov, and A. Nedić, "A Dual Approach for Optimal Algorithms in Distributed Optimization over Networks," *submitted to Optimization Methods and Software, arXiv 1809.00710*, 2018

[26] ⋆ A. Nedić, A. Olshevsky, and **CAU**, "Distributed learning for cooperative inference," *submitted to IEEE Transactions on Information Theory, arXiv:1704.02718*, 2017

### Machine Learning Conference Papers

[25] A. Gasnikov, P. Dvurechensky, E. Gorbunov, E. Vorontsova, D. Selikhanovych, and **CAU**, "Optimal tensor methods in smooth convex and uniformly convexoptimization," in *Proceedings of the Thirty-Second Conference on Learning Theory*, vol. 99, 2019, pp. 1374–1391

[24] A. Kroshnin, N. Tupitsa, D. Dvinskikh, P. Dvurechensky, A. Gasnikov, and **CAU**, "On the complexity of approximating Wasserstein barycenters," in *Proceedings of the 36th International Conference on Machine Learning*, vol. 97, 2019, pp. 3530–3540

[23] P. Dvurechenskii, D. Dvinskikh, A. Gasnikov, **CAU**, and A. Nedić, "Decentralize and randomize: Faster algorithm for Wasserstein barycenters," in *Advances in Neural Information Processing Systems 31*, 2018, pp. 10 760–10 770 **Spotlight Presentation, Top 4%.**

### Control Theory Conference Papers

[22] J. Z. Hare, **CAU**, L. Kaplan, and A. Jadbabaie, "Non-Bayesian Social Learning with Gaussian Uncertain Models," *submitted to American Contol Conference*, 2020

[21] **CAU**, H. Wai, and M. Alizadeh, "Resilient distributed optimization algorithms for resource allocation," *Accepted to IEEE Control and Decision Conference*, 2019

[20] **CAU**, J. Hare, L. Kaplan, and A. Jadbabaie, "Non-Bayesian social learning with uncertain models over time-varying directed graphs," *Accepted to IEEE Control and Decision Conference*, 2019

[19] D. Ochoa, J. Poveda, **CAU**, and N. Quijano, "Robust optimal resource allocation with momentum," *Accepted to IEEE Control and Decision Conference*, 2019

[18] D. Dvinskikh, E. Gorbunov, A. Gasnikov, P. Dvurechensky, and **CAU**, "On primal and dual approaches for distributed stochastic convex optimization over networks," *Accepted to IEEE Control and Decision Conference*, 2019

[17] J. Zhang, **CAU**, A. Mokhtari, and A. Jadbabaie, "Achieving acceleration in distributed optimization via direct discretization of the Heavy-Ball ODE," in *Americal Control Conference*, 2019, pp. 3408–3413

[16] **CAU** and A. Jadbabaie, "On increasing self-confidence in non-Bayesian social learning over time-varying directed graphs," in *American Control Conference*, 2019, pp. 3532–3537

[15] E. Baron-Prada, **CAU**, and E. Mojica-Nava, "A method for distributed transactive control in power systems based on the projected consensus algorithm," *IFAC-PapersOnLine*, vol. 51, no. 23, pp. 379 – 384, 2018, 7th IFAC Workshop on Distributed Estimation and Control in Networked Systems NECSYS 2018

[14] **CAU**, D. Dvinskikh, P. Dvurechensky, A. Gasnikov, and A. Nedić, "Distributed computation of Wasserstein barycenters over networks," in *IEEE Conference on Decision and Control*, 2018, pp. 6544–6549

[13] ⋆ A. Nedić, A. Olshevsky, W. Shi, and **CAU**, "Geometrically convergent distributed optimization with uncoordinated step-sizes," in *American Control Conference*, 2017, pp. 3950–3955

[12] ⋆ A. Nedić, A. Olshevsky, and **CAU**, "Distributed learning with infinitely many hypotheses," in *IEEE Conference on Decision and Control*, 2016, pp. 6321–6326

[11] ⋆ ——, "A tutorial on distributed (non-Bayesian) learning: Problem, algorithms and results," in *IEEE Conference on Decision and Control*, 2016, pp. 6795–6801

[10] ⋆ ——, "Network independent rates in distributed learning," in *American Control Conference*, 2016, pp. 1072–1077

[9] ⋆ ——, "Nonasymptotic convergence rates for cooperative learning over time-varying directed graphs," in *American Control Conference*, 2015, pp. 5884–5889

[8] **CAU**, T. Keviczky, and J. H. van Schuppen, "Computing optimal control laws for finite stochastic systems with non-classical information patterns," in *American Control Conference*, 2014, pp. 5742–5747

[7] **CAU** and J. H. van Schuppen, "Analysis of signaling in a finite stochastic system motivated by decentralized control," in *IEEE Conference on Decision and Control*, 2013, pp. 5884–5889

**Signal Processing Conference Papers**

[6] J. Z. Hare, **CAU**, L. Kaplan, and A. Jadbabaie, "Communication Constrained Learning with Uncertain Models," *submitted to International Conference on Acoustics, Speech, and Signal Processing, ICASSP*, 2020

[5] ——, "On malicious agents in non-Bayesian social learning theory with uncertain model," *International Conference on Information Fusion*, 2019

[4] ⋆ A. Nedić, A. Olshevsky, and **CAU**, "Distributed Gaussian learning over time-varying directed graphs," in *Asilomar Conference on Signals, Systems and Computers*, 2016, pp. 1710–1714

**Book Chapters**

[3] F. S. Stonyakin, D. Dvinskikh, P. Dvurechensky, A. Kroshnin, O. Kuznetsova, A. Agafonov, A. Gasnikov, A. Tyurin, **CAU**, D. Pasechnyuk, and S. Artamonov, "Gradient methods for problems with inexact model of the objective," in *Mathematical Optimization Theory and Operations Research*. Springer International Publishing, 2019, pp. 97–114

[2] **CAU** and J. H. van Schuppen, "Signaling of information," in *Coordination Control of Distributed Systems*, J. H. van Schuppen and T. Villa, Eds. Springer International Publishing, 2015, pp. 165–172

[1] C. Bedoya, **CAU**, and C. Isaza, "Unsupervised feature selection based on fuzzy clustering for fault detection of the tennessee eastman process," in *Advances in Artificial Intelligence – IBERAMIA 2012*. Berlin, Heidelberg: Springer Berlin Heidelberg, 2012, pp. 350–360

## GRANT EXPERIENCE

- **Co-PI** with Alexander Gasnikov (MIPT): *Acceleration for Data Science and Machine Learning*
  **Yahoo! Research** *–Faculty and Research Engagement Program (FREP)*
- **Co-PI** with Andrés F. Salazar (Open Learning Lab. MIT): *Bringing MIT STEM Education to the East Boston Community*
  **MIT Committee on Race and Diversity** *–CRD Grant*
- **Coauthor**, PIs: Ali Jadbabaie (MIT) & Asuman Ozdaglar (MIT): *Adaptive, robust and collaborative optimization*
  **MIT-IBM Watson AI Lab**, *Core Project*

## AWARDS AND HONORS

- *Best Poster Award*     Midwest Machine Learning Symposium (MMLS), 2018.
- *Best Poster Presentation Award*     7th Midwest Workshop on Control and Game Theory, 2018.
- *Best Talk Award*     Machine Learning Session, CSL Student Conference, 2018.
- *Best Presentation*     Learning and Estimation in Networks Session, American Control Conference, 2016.
- *Outstanding Poster Award*     Stochastic Networks Conference, 2016.
- *Best Talk Award*     Security Session, CSL Student Conference, 2016.
- *Teacher Ranked as Excellent*     (Student selected rank) University of Illinois at Urbana-Champaign, Fall 2016.
- *Best Presentation*     Decentralized Control Session, American Control Conference, 2014.
- *Travel Award*     ACC 2014, ICML 2019, COLT2019

## Teaching, Mentoring and Leadership

- **Teaching Assistant**: ECE534 Random Processes, UIUC-Fall 2016. *Teacher Ranked as Excellent by Students.*
- **Lecturer**: Short course (8-hours) on Distributed Optimization & Learning, Pontificia Universidad Javeriana, Colombia. Fall 2019
- **Guest Lecturer**: Course on Control of Discrete Stochastic Systems, TUDelft-Spring 2017
- **PhD Dissertation Committee**: Wicak Ananduta (adviser: Carlos Ocampo-Martinez), UPC Universitat Politècnica de Catalunya
- **Student Project Mentorship**
  - Daniel Ochoa (Undergraduate at U. de Los Andes, now PhD student at UCBoulder)
    Project: Robust Optimal Resource Allocation with Momentum.
  - Eder Baron-Prada (Undergraduate at U. Nacional, now PhD student at KAUST)
    Project: A Method for Distributed Transactive Control in Power Systems based on the Projected Consensus Algorithm.
  - Jingzhao Zhang (PhD Student at MIT)
    Project: Achieving Acceleration in Distributed Optimization via Direct Discretization of the Heavy-Ball ODE.
  - Darina Dvinskikh (PhD Student at WAIS)
    Project: Distributed Computation of Wasserstein Barycenters.
  - Eduard Gorbunov (PhD Student at MIPT)
    Project: On Primal and Dual Approaches for Distributed Stochastic Convex Optimization over Networks,
  - Alexander Rogozin (Master Student at MIPT)
    Project: Optimal Distributed Optimization on Slowly Time-Varying Graphs.
  - Berkat Turan (PhD Student at UCSB)
    Project: Resilient Distributed Optimization Algorithms for Resource Allocation.
  - Andres Gómez (Undergraduate at U. of Antioquia, now PhD Student at Goethe University Frankfurt)
    Project: Integration methodology of face detection and speech recognition.
  - Carol Bedoya (Undergraduate at U. of Antioquia, now PhD Student at U. of Canterbury)
    Project: Unsupervised feature selection based on fuzzy clustering for fault detection of the Tennessee Eastman process.

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| • **Representative Member** | LIDS-MIT Postdoc Committee | 2018-2019 |
| • **Main Officer** | MIT Colombian Association | 2018-2020 |
| • **Admissions Committee** | MIT React Program | Fall 2018 |
| • **President** | Colombian Student Association at UIUC | 2015-2016 |
| • **Student Representative** | Education Committee, Delft Center for Systems and Control, TUDelft. | 2011-2012 |
| • **Student Mentor** | Delft Center for Systems and Control, TUDelft | 2012 |

## Invited Talks, Posters, and Abstracts

- **On the Complexity of Approximating Wasserstein Barycenters**
  - *INFORMS Annual Meeting* 2019
  - *Invited Seminar at Rensselaer Polytechnic Institute* 2019
  - *23rd International Symposium on Mathematical Programming* ISMP 2018
- **Achieving Acceleration in Distributed Optimization via Direct Discretization of the Heavy-Ball ODE**
  - *Modeling and Optimization; Theory and Applications* MOPTA 2019
  - *International Conference on Continuous Optimization* ICCOPT 2019
- **Accelerated Curvature-aided Incremental Aggregated Gradient Method**
  - *INFORMS Annual Meeting* 2018
  - *23rd International Symposium on Mathematical Programming* ISMP 2018
- **Optimal Algorithms for Distributed Optimization**
  - *5th International Conference on Quasilinear Equations, Inverse Problems and their Applications* QIPA2019
  - *23rd International Symposium on Mathematical Programming* ISMP 2018
  - *INFORMS Optimization Society Conference* 2018
  - *Information Theory and Applications Workshop* ITA 2018
- **A Dual Approach for Optimal Algorithms for Distributed Optimization over Networks**
  - *INFORMS Annual Meeting*, 2018.
  - *Midwest Machine Learning Symposium* MMLS 2018 **Spotlight Presentation**.
  - *7th Midwest Workshop on Control and Game Theory* 2018
  - *CSL Student Conference*, 2018.
- **Distributed Learning for Cooperative Inference**
  - Science Park Informal Probability Meetings, *CWI* 2017
  - DCSC Colloquium, *Delft University of Technology* 2017
  - LCCC Seminar, *Lund University* 2017
  - *SAMSI Workshop on the Interface of Statistics and Optimization* WISO 2017
  - *SIAM Conference on Optimization* 2017
- **Non-asymptotic Rates in Distributed Learning**
  - *International Conference on Continuous Optimization* ICCOPT 2016
  - *SIAM Annual Meeting* 2016
  - *Stochastic Networks Conference* 2016

- *5th Midwest Workshop in Control and Game Theory* 2016
- *CSL Student Conference* 2016
- *IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems* 2015

## Professional Service

- **Session Organizer (SO), Program Committee (PC) & Chair (C):**

| | | |
|---|---|---|
| – (SO) | Convex Optimization and Applications (Submitted) | IFORS, 2020 |
| – (SO) | Optimization Methods in Decision and Control (Submitted) | IFORS, 2020 |
| – (SO) | Recent Advances in non-Convex/non-Smooth optimization (Submitted) | SIAM Opt, 2020 |
| – (SO) | Advances in Optimization Theory for Machine Learning (Submitted) | SIAM Opt, 2020 |
| – (C) | Optimization Session | QIPA, 2019 |
| – (PC) | LatinX in AI Research Workshop | NeurIPS 2019 |
| – (SO&C) | Large-Scale Distributed Optimization and Decentralized Control I&II | IEEE CDC, 2019 |
| –'(SO&C) | Recent Advances in Large-Scale optimization | INFORMS Annual Meeting, 2019 |
| – (SO&C) | Recent Advances in Distributed Optimization | ICCOPT, 2019 |
| – (C) | Statistical Learning Session | ACC, 2019 |
| – (SO&C) | Large-Scale Distributed Optimization and Computation on Graphs | IEEE CDC, 2018 |
| – (C) | Machine Learning and Data Science Session | SIAM Annual Meeting 2016 |
| – (PC) | IEEE Colombian Conference on Automatic Control 2017 & 2019. | CCAC 2017 & 2019. |
| – (SO) | Workshop on Distributed Optimization: From consensus to learning | CCAC2017 |
| – (PC) | VI Colombian Conference at Harvard/MIT/BU | Shaping Colombia: 2019 |

- **Reviewer**
  *International Journals*
  - Automatica
  - ELSEVIER Systems & Control Letters, Journal on Applied Soft Computing, Neural Networks.
  - IEEE/ACM Transactions on Networking.
  - IEEE Control Systems Letters, Intelligent Systems, Transactions on Automatic Control, Transactions on Automation Science and Engineering, Transactions on Control of Network Systems, Transactions on Cybernetics, Transactions on Information Theory, Transactions on Network Science and Engineering, Transactions on Signal Processing, Transactions on Signal and Information Processing over Networks.
  - IET Control Theory & Applications.
  - International Journal of Robust and Nonlinear Control.
  - JMLR Journal of Machine Learning Research.
  - Journal on Optimization Methods and Software.
  - Journal of Global Optimization.

  *International Conferences*
  - ACM/IEEE International Conference on Cyber-Physical Systems ICCPS 2017, 2020.
  - American Control Conference ACC 2014-2020.
  - Conference on Learning Theory COLT 2019.
  - Conference on Neural Information Processing Systems NeurIPS 2019.
  - European Control Conference ECC 2014-2018.
  - IEEE 15th International Conference on Automation Science and Engineering CASE 2019.
  - IEEE Colombian Control Conference 2015, 2017, 2019.
  - IEEE Control and Decision Conference CDC 2011-2019.
  - IEEE Information Theory Workshop 2019.
  - IEEE International Conference on Acoustics, Speech, and Signal Processing, ICASSP 2020
  - IEEE Multi-conference on Systems and Control 2016.
  - IFAC Workshop on Distributed Estimation and Control in Networked Systems NecSys 2016, 2019.
  - International Conference on Machine Learning ICML 2016, 2020.
  - International Symposium on Stabilization, Safety,and Security of Distributed Systems SSS 2016.

  *Others*
  - National Research, Development and Innovation Office of Hungary, panel on Mathematics and Computer Science.
  - Springer Book Series.

## Additional Experience

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|---|---|---|
| Summer 2017 | *Visiting Scholar*, LCCC Focus Period on Large-Scale and Distributed Optimization, Lund University. | |
| Spring 2017 | *Visiting Scholar*, Arizona State University. | |
| August 2013 | *Attendee*, IMSE Summer School on Multi-Agent Networked Systems, University of Illinois Urbana-Champaign. | |
| July 2013 | *Attendee*, 5th HYCON2 PhD School on Control of Networked and Large-Scale Systems. | |
| Summer 2011 | *Visiting Scholar*, Laboratoire d'Analyse et d'Architecture des Systemes (LAAS), France. | |
| Summer 2010 | *Visiting Scholar*, InfoLab, University of Delaware, Delaware, USA. | |