Duván Andrés Téllez Castro

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Universidad Nacional de Colombia

Research Interest

- **Data-Driven control** ● **Distributed control** ● **Applied operator theory**

Appointments

Sep'23–Now **Research Associate**, *Universidad Nacional de Colombia*, Bogotá, Colombia
Host: Alexánder Gómez

Apr'21–Jul'23 **Research Associate**, *Clemson University*, Clemson SC, USA
Host: Umesh Vaidya

Feb'15–Dec'15 **Lecturer**, *Universidad de la Salle*, Bogotá, Colombia

Aug'14–Dec'15 **Full-time Instructor**, *Universidad Manuela Beltran*, Bogotá, Colombia

Jun'13–Aug'14 **Graduate Research Assistant**, Universidad de los Andes, Bogotá, Colombia

Education

Sep'22 **PhD in Electrical Engineering**, *Universidad Nacional de Colombia*, Bogotá, Colombia
Advisor: Eduardo Mojica

Mar'15 **Master in Electronic and Computers Engineering**, *Universidad de los Andes*, Bogotá, Colombia
Advisor: Nicanor Quijano

Sep'12 **Bachelor in Electronic and Telecommunications Engineering**, *Universidad Católica de Colombia*, Bogotá, Colombia

Teaching and Mentoring

Instructor

○ Control systems, UMB, 2015-1, 2015-2

○ Digital control , UMB, 2014-2, 2015-1, 2015-2

○ Control and sensory, Universidad de La Salle, 2015-1

○ Signal analysis, Universidad de La Salle, 2015-2

○ Circuits I, UMB, 2015-1, 2015-2

○ Digital electronic I, UMB, 2015-1, 2015-2

Teaching Assistant:

○ Control systems, Universidad de los Andes, 2012-2, 2013-1

○ Digital electronic I, Universidad de los Andes, 2012-2, 2013-1

Students Advised

○ Nestor Ivan Ospina (Co-Advised with Eduardo Mojica), Master Thesis: Multiagent Control of Autonomous Vehicles in Presence of Non-Cooperative Agents

Graduated Student Project Mentorship

○ Miguel Arevalo, Project: Synchronization of heterogeneous agents for cooperative cruise control, 2019

○ Gustavo Cardona, Project: Cooperative control transportation of a cable-suspended load by multiple quadrotors, 2019

○ Jhojan Rodriguez, Project: Distributed MPC-MHE using ADMM for leader-follower systems, UNAL, 2021

○ Fabian Salazar, Robust control using the Koopman operator for synchronization, 2021

○ Vladimir Toro, Project: Distributed predictive control using Koopman operator applied to Microgrids, 2021

Invited Talks, Posters, and Abstracts

Aug'18 **Stability Analysis of Interconnected Systems Using Koopman Operator Spectrum**, *International Congress of Mathematicians, Rio, Brazil*
Poster

Sep'17 **Control-Oriented Modeling of Large-Scale Networked Systems: A DMD Approach**, *Latin American Conference on Complex Networks, Puebla, Mexico*
Abstract

May'16 **Control decentralizado usando observadores de horizonte rodante**, *Jornada de Ingeniería, Universidad de Cundinamarca, Fusagasuga, Colombia*
Plenary

Professional Service

Reviewer

○ IEEE Trans. on Aerospace and Electronic Systems, Automatica, Applied Energy

○ Control Conferences (CDC, ACC, ECC, ICC, CCAC, CCTA, CNCA, NECSYS, MECC)

Organizer

○ Invited Session, Linear Operator Theoretic Methods for Dynamical System Analysis and Synthesis, MECC 2023

○ Symposium on Smart Grids, UMB, 2015

Additional Experience

2019 (Fall) **Visiting Scholar**, *Department of Mechanical Engineering, Clemson University, Clemson, SC, USA*
Host: Umesh Vaidya

Publications [Google Scholar]

Journal papers (published)

[29] Miguel F Arevalo-Castiblanco, Jaime Pachon, Duvan Tellez-Castro, and Eduardo Mojica-Nava. "Cooperative Cruise Control for Intelligent Connected Vehicles: A Bargaining Game Approach". In: *Sustainability* 15.15 (2023), p. 11898.

[28] Umesh Vaidya and Duvan Tellez-Castro. "Data-Driven Stochastic Optimal Control using Linear Transfer Operators". In: *IEEE Transaction Automatic Control* (2023).

[27] Vladimir Toro, Duvan Tellez-Castro, Eduardo Mojica-Nava, and Naly Rakoto-Ravalontsalama. "Data-driven distributed voltage control for microgrids: A Koopman-based approach". In: *International Journal of Electrical Power & Energy Systems* 145 (2023), p. 108636.

[26] Camilo Garcia-Tenorio, Duvan Tellez-Castro, Eduardo Mojica-Nava, and Alain Vande Wouwer. "Evaluation of the Regions of Attraction of Higher-Dimensional Hyperbolic Systems Using Extended Dynamic Mode Decomposition". In: *Automation* 4.1 (2023), pp. 57–77.

[25] Bhagyashree Umathe, Duvan Tellez-Castro, and Umesh Vaidya. "Reachability Analysis using Spectrum of Koopman Operator". In: *IEEE Control Systems Letters* (2022).

[24] Duvan Tellez-Castro, Camilo Garcia-Tenorio, Eduardo Mojica-Nava, Jorge Sofrony, and Alain Vande Wouwer. "Data-Driven Predictive Control of Interconnected Systems using the Koopman Operator". In: *Actuators* 11.6 (2022), p. 151.

[23] Miguel F Arevalo-Castiblanco, Duvan Tellez-Castro, and Eduardo Mojica-Nava. "Indirect adaptive synchronization for a heterogeneous multiagent network". In: *International Journal of Adaptive Control and Signal Processing* 36.6 (2022), pp. 1326–1339.

[22] Miguel F Arevalo-Castiblanco, Duvan Tellez-Castro, Jorge Sofrony, and Eduardo Mojica-Nava. "Adaptive synchronization of heterogeneous multi-agent systems: A free observer approach". In: *Systems & Control Letters* 146 (2020), p. 104804.

[21] L. García, J. Barreiro-Gomez, E. Escobar, D. Téllez, N. Quijano, and C. Ocampo-Martinez. "Modeling and real-time control of urban drainage systems: A review". In: *Advances in Water Resources* 85 (2015), pp. 120–132.

[20] Eduardo Mojica-Nava, Jimmy Salgado, Duvan Tellez, and Alvaro Lopez. "Optimal control of switching topology networks". In: *Mathematical Problems in Engineering* 2014 (2014), pp. 1–9.

Refereed Conference Proceedings

[19] Sriram SKS Narayanan, Duvan Tellez-Castro, Sarang Sutavani, and Umesh Vaidya. "SE (3) Koopman-MPC: Data-driven Learning and Control of Quadrotor UAVs". In: *Accepted in MECC*. Elsevier. 2023.

[18] Alexander Krolicki, Duvan Tellez-Castro, and Umesh Vaidya. "Nonlinear Dual-Mode Model Predictive Control using Koopman Eigenfunctions". In: *2022 IEEE 61st Conference on Decision and Control (CDC)*. IEEE. 2022, pp. 3074–3079.

[17] Duvan Tellez-Castro, Fadi Abdeljawad, and Umesh Vaidya. "Control-Oriented Modeling using Koopman Operator: An application to the Cahn-Hilliard Coarsening Problem". In: vol. 55. 37. Elsevier, 2022, pp. 187–192.

[16] Vladimir Toro, Duvan Tellez-Castro, Eduardo Mojica-Nava, and Naly Rakoto-Ravalontsalama. "Distributed Koopman-Based Control of Improved Swing Equation". In: *IFAC-PapersOnLine (NecSys)*. Vol. 55. 13. Elsevier, 2022, pp. 97–102.

[15] Hongzhe Yu, Joseph Moyalan, Duvan Tellez-Castro, Umesh Vaidya, and Yongxin Chen. "Convex optimal control synthesis under safety constraints". In: *2021 60th IEEE Conference on Decision and Control (CDC)*. IEEE. 2021, pp. 4615–4621.

[14] Vladimir Toro, Duvan Tellez-Castro, Eduardo Mojica-Nava, and Naly Rakoto-Ravalontsalama. "Data-Driven Voltage Secondary Control for Microgrids". In: *2021 IEEE 5th Colombian Conference on Automatic Control (CCAC)*. IEEE. 2021, pp. 180–185.

[13] JA Rodriguez-Gil, MF Arevalo-Castiblanco, D Tellez-Castro, and E Mojica-Nava. "A Distributed Iterative LQR Approach for a Cart-Pole Network Synchronization". In: *2021 IEEE 5th Colombian Conference on Automatic Control (CCAC)*. IEEE. 2021, pp. 151–156.

[12] Fabian Salazar-Caceres, Duvan Tellez-Castro, and Eduardo Mojica-Nava. "Data-Driven Synchronization of Coupled Heterogeneous Oscillators". In: *2021 IEEE 5th Colombian Conference on Automatic Control (CCAC)*. IEEE. 2021, pp. 222–227.

[11] GA Cardona, D Tellez-Castro, J Calderon, and E Mojica-Nava. "Adaptive Multi-Quadrotor Control for Cooperative Transportation of a Cable-Suspended Load". In: *2021 European Control Conference (ECC)*. IEEE. 2021, pp. 696–701.

[10] GA Cardona, M Arevalo-Castiblanco, D Tellez-Castro, J Calderon, and E Mojica-Nava. "Robust adaptive synchronization of interconnected heterogeneous quadrotors transporting a cable-suspended load". In: *2021 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE. 2021, pp. 31–37.

[9] MF Arevalo-Castiblanco, D Tellez-Castro, E Mojica-Nava, and J Sofrony. "Adaptive Distributed Control for Large-Scale Systems with Unknown Interconnection". In: *IFAC-PapersOnLine, World Congress of the IFAC*. Vol. 53. 2. Elsevier, 2020, pp. 8738–8743.

[8] Miguel F Arevalo-Castiblanco, Duvan Tellez-Castro, Gustavo Andres Cardona, and Eduardo Mojica-Nava. "An Adaptive Optimal Control Modification with Input Uncertainty for Unknown Heterogeneous Agents Synchronization". In: *proceedings of IEEE Conference on Decision and Control (CDC)*. Nice, France, 2019.

[7] GA Cardona, D Tellez-Castro, and E Mojica-Nava. "Cooperative transportation of a cable-suspended load by multiple quadrotors". In: *IFAC-PapersOnLine (NecSys)*. Vol. 52. 20. Elsevier, 2019, pp. 145–150.

[6] F Galarza-Jimenez, D Tellez-Castro, J Sofrony, and E Mojica-Nava. "Cooperative Output Regulation for Multi-Agent Systems with EDMD Leader Approximation". In: *IFAC-PapersOnLine (NecSys)*. Vol. 52. 20. Elsevier, 2019, pp. 91–96.

[5] Camilo Garcia-Tenorio, Duvan Tellez-Castro, Eduardo Mojica-Nava, and Alain Vande Wouwer. "Analysis of a Class of Hyperbolic Systems Via Data-Driven Koopman Operator". In: *proceedings of 23rd International Conference on System Theory, Control and Computing*. Sinaia, Romania, 2019.

[4] Claudia Caro-Ruiz, Duvan Tellez-Castro, and Eduardo Mojica-Nava. "Self-Organization in Networks: A Data-Driven Koopman Approach". In: *proceedings of 3rd IEEE Colombian Conference Automatic Control (CCAC)*. Cartagena, Colombia, 2017.

[3] Fabian Salazar-Caceres, Duvan Tellez-Castro, and Eduardo Mojica-Nava. "Consensus for Multi-agent Nonlinear Systems : A Carleman Approximation Approach". In: *proceedings of 3rd IEEE Colombian Conference Automatic Control (CCAC)*. Cartagena, Colombia, 2017.

[2] Duvan Tellez-Castro, Nicanor Quijano, and Eduardo Mojica-Nava. "Decentralized control for urban drainage systems via moving horizon observer". In: *IEEE Conference on Control Applications (CCA)*. IEEE, 2016, pp. 717–722.

[1] Luis García, Eduardo Escobar, Julián Barreiro, Nicanor Quijano, Carlos Ocampo-Martínez, and Duván Téllez. "On the modeling and real-time control of urban drainage systems: A survey". In: *11th International Conference on Hydroinformatics*. 2014, pp. 1–8.