

Juan Felipe Botero Vega

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Guest Professor, Department of Computer Science, University of Antwerp, Belgium

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I work on the management of programmable networks (SDN, NFV and P4) with mathematical optimization and machine learning, with applications to network cybersecurity and critical infrastructure such as digital power substations and smart grids. I am a Senior Researcher in the Colombian Ministry of Science (Minciencias) classification and a member of the GITA research group.

5,751

citations

Citation metrics from Google Scholar, 12 October 2026.

29

h-index

about 50

journal articles

7

Ph.D. theses

30

research projects

Academic positions

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| 2013– | Faculty member, Universidad de Antioquia (Assistant, Associate and, currently, Full Professor). On sabbatical leave from March 2026 to March 2027, designing the university's new Specialization in Cybersecurity. |
| 2021– | Guest Professor, Department of Computer Science, University of Antwerp. Teaches the master's course <i>Future Internet</i> . |
| 2024–2025 | Coordinator of the M.Sc. in Telecommunications Engineering, Universidad de Antioquia. |
| 2019–2024 | Coordinator of the Ph.D. in Electronic and Computer Engineering, Universidad de Antioquia. |
| until 2017 | Coordinator of the GITA research group, Universidad de Antioquia. |

RESEARCH STAYS

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| 2016 | Postdoctoral stay, University of Antwerp: end-to-end configuration of virtualized network and cloud components with quality of service guarantees. |
| 2011–2012 | Doctoral stay, Chair of Computer Networks and Communications, University of Passau, Germany: evaluation of virtual network embedding algorithms and design of an energy-efficient algorithm. |

Education

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| 2013 | Ph.D. in Telematics Engineering, Universitat Politècnica de Catalunya (UPC), Barcelona. Thesis on algorithms for the virtual network embedding problem, advised by Xavier Hesselbach. <i>Cum laude</i> with international mention. |
| 2008 | M.Sc. in Telematics Engineering, Universitat Politècnica de Catalunya. |
| 2006 | B.Eng. in Systems Engineering, Universidad de Antioquia, Medellín. |

Awards and recognition

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| 2023 | Best Poster Award, LatinX in AI (LXAI) Workshop at ICCV 2023. |
| 2021 | Best Paper Award, IEEE SDS 2021. |
| 2018 | Outstanding and Meritorious Distinctions, Universidad de Antioquia. |
| 2015 | Best Paper Award, ICSNC 2015 (IARIA), for “A novel path computing framework under QoX constraints based on N&PV functions embedding”. |
| 2013 | Ph.D. thesis awarded <i>cum laude</i> with international mention, UPC. |

Supervision

PH.D. THESES

2023–	Paulina Arregocés (ongoing).
2022–2026	Josué Genaro Almaraz-Rivera, co-supervised with Tecnológico de Monterrey.
2020–2025	Paola Soto, co-supervised with the University of Antwerp.
2019–2025	Jaime Vergara.
2015–2019	Alexánder Leal.
2015–2019	Bart Spinnewyn, co-supervised with the University of Antwerp.
2014–2018	Juliver Gil Herrera.
2014–2018	Michael Till Beck, in cooperation with Ludwig-Maximilians-Universität München.

POSTDOCTORAL RESEARCHERS AND MASTER'S THESES

2021–2023	Sergio Armando Gutiérrez, postdoctoral researcher in the project on cybersecurity for the critical infrastructure of the electricity sector. About 17 master's theses, most of them in the M.Sc. in Telecommunications Engineering, Universidad de Antioquia.
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Research projects (selection)

PI: principal investigator. Co-I: co-investigator. Titles of Colombian projects are translated from Spanish.

2026–2029	QC3AI-LA: Developing quantum computing capabilities for cybersecurity and artificial intelligence for Latin America. Erasmus+ Capacity Building in Higher Education, coordinated by Universidad de Castilla-La Mancha. Co-I.
2025–2028	SUCCESS. Erasmus+, with Mälardalen University. Co-I.
2024–2026	LatinAware: an AI-based predictive engine to detect cyberattacks targeting Latin American industry. Fundación Universidad de Antioquia, with Aligo S.A.S. PI.
2024–2025	Attack detection through open datasets and artificial intelligence for cybersecurity applications. LACNIC, with Tecnológico de Monterrey. PI.
2023–2026	Design and implementation of a smart grid for the optimal management of non-conventional renewable energy sources. Minciencias. Co-I.
2021–2024	Strengthening research and development capabilities in cyber-risk management for the critical infrastructure of the electricity sector. Colombian General Royalties System (SGR), with Universidad Nacional de Colombia. PI.
2021–2023	Comprehensive internationalization through digitalization, innovation and global-regional coproduction. STINT (Sweden), with Mälardalen University. Co-I.
2019–2023	Security in next-generation communication networks based on SDN and NFV. CYTED thematic network with partners in Spain, Brazil, Guatemala and Costa Rica. PI and network coordinator.
2019–2021	Technological platform for metering communications and their security in the non-regulated energy market. Minciencias, with Kinnesis Solutions. PI.
2018	SDN-based network management system enabling smart grid technologies for the energy sector. Ruta N. PI.
2008–2014	European projects during the Ph.D. at UPC: Euro-NF (Network of Excellence), MANTICORE, VNREAL, Mantychore and All4Green.

Teaching

UNIVERSIDAD DE ANTIOQUIA

2013–2025	<i>Optimization Techniques</i> (undergraduate, Telecommunications Engineering).
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2024–2025 *Information Security and Computer Networks III* (undergraduate).
 2013–2019 *Network Modeling and Optimization* (graduate, yearly).
 2025 *Future Internet* (graduate).

UNIVERSITY OF ANTWERP

2021– *Future Internet* (master’s programs, Department of Computer Science), every academic year.

Academic service

2020– Associate Editor, *IEEE Transactions on Network and Service Management*.
 2019– Associate Editor, *Journal of Network and Systems Management* (Springer). Guest Editor of the special issue “Security in Next-Generation Communication Networks”.
 2026 Keynote speaker, IEEE ColCom 2026.
 2018–2024 TPC Co-Chair of IEEE ColCom 2018, AnNet 2022 (IEEE/IFIP NOMS), IEEE ANDESCON 2024 and IEEE LATINCOM 2024.
 2015–2024 Tutorials at IEEE ColCom 2015, IEEE LATINCOM 2022 and IEEE/IFIP NOMS 2023 and 2024.
 2020–2024 TPC member of IEEE CNSM (2020 to 2024) and IEEE LATINCOM (2022 to 2024).
 Reviewer for IEEE JSAC, IEEE Communications Magazine, IEEE Network, IEEE Communications Letters, IEEE Transactions on Cloud Computing, Computer Networks, Computer Communications, JNCA and Ad Hoc Networks, among others.
 Led the self-assessment and accreditation processes of the M.Sc. and Ph.D. programs and of the undergraduate program in Telecommunications Engineering, Universidad de Antioquia.

Selected publications

Full list: [Google Scholar](#) and the publications page of the website.

JOURNALS

- S. Ríos-Guiral, A. Lahmadi, **J. F. Botero**, S. A. Gutiérrez. Leveraging reinforcement learning for traffic engineering in programmable networks: a survey. *IEEE Communications Surveys & Tutorials* 28, 1318–1350, 2026. doi:10.1109/COMST.2025.3632870
- S. A. Gutiérrez, **J. F. Botero**, L. Fletscher, L. P. Gaspar, N. Gaviria, E. Jacob, et al. Cybersecurity via programmable networks: are we there yet? *Journal of Network and Systems Management* 33(4), 95, 2025. doi:10.1007/s10922-025-09970-9
- J. G. Almaraz-Rivera, J. A. Cantoral-Ceballos, **J. F. Botero**, F. J. Muñoz, et al. Hyphatia: a card-not-present fraud detection system based on self-supervised tabular learning. *IEEE Open Journal of the Computer Society* 6, 812–821, 2025. doi:10.1109/OJCS.2025.3570600
- C. Garzón, S. Ríos-Guiral, E. Leal, S. A. Gutiérrez, **J. F. Botero**. P4 cybersecurity solutions: taxonomy and open challenges. *IEEE Access* 12, 6376–6399, 2024. doi:10.1109/ACCESS.2023.3347332
- D. Góez, E. A. Beyazit, L. A. Fletscher, **J. F. Botero**, N. Gaviria, S. Latré, et al. Resource-efficient spectrum-based traffic classification on constrained devices. *IEEE Open Journal of the Communications Society* 5, 2024. doi:10.1109/OJCOMS.2024.3396077
- S. A. Gutiérrez, **J. F. Botero**, N. Gaviria, L. A. Fletscher, A. Leal. Next-generation power substation communication networks: IEC 61850 meets programmable networks. *IEEE Power and Energy Magazine* 21(5), 58–67, 2023. doi:10.1109/MPE.2023.3288579
- P. Soto, M. Camelo, D. De Vleeschauwer, Y. De Bock, C. Y. Chang, **J. F. Botero**, S. Latré. Network intelligence for NFV scaling in closed-loop architectures. *IEEE Communications Magazine* 61(6), 66–72, 2023. doi:10.1109/MCOM.001.2200529
- J. G. Almaraz-Rivera, J. A. Pérez-Díaz, J. A. Cantoral-Ceballos, **J. F. Botero**, et al. Toward the protection of IoT networks: introducing the LATAM-DDoS-IoT dataset. *IEEE Access* 10, 106909–106920, 2022. doi:10.1109/ACCESS.2022.3211513

- I. A. Valdovinos, J. A. Pérez-Díaz, K. K. R. Choo, **J. F. Botero**. Emerging DDoS attack detection and mitigation strategies in software-defined networks: taxonomy, challenges and future directions. *Journal of Network and Computer Applications* 187, 103093, 2021. doi:10.1016/j.jnca.2021.103093
- J. C. Correa Chica, J. C. Imbachi, **J. F. Botero**. Security in SDN: a comprehensive survey. *Journal of Network and Computer Applications* 159, 102595, 2020. doi:10.1016/j.jnca.2020.102595
- J. Gil Herrera, **J. F. Botero**. Resource allocation in NFV: a comprehensive survey. *IEEE Transactions on Network and Service Management* 13(3), 518–532, 2016. doi:10.1109/TNSM.2016.2598420
- A. Fischer, **J. F. Botero**, M. T. Beck, H. de Meer, X. Hesselbach. Virtual network embedding: a survey. *IEEE Communications Surveys & Tutorials* 15(4), 1888–1906, 2013. doi:10.1109/SURV.2013.013013.00155

CONFERENCES

- C. Garzón, A. Lahmadi, J. Vergara, A. Leal, **J. F. Botero**. In-band ARP-based man-in-the-middle attack detection using P4 programmable switches. IEEE LATINCOM 2024.
- C. López, S. Ríos-Guiral, J. Vergara, **J. F. Botero**, S. A. Gutiérrez. Network traffic analysis through flows and packets with machine learning. IEEE ANDESCON 2024.
- O. Roa, **J. F. Botero**, S. A. Gutiérrez-Betancur, O. A. Tobar-Rosero. GOOSEAttacker: synthetic attack generation tool for IEC 61850. IEEE LATINCOM 2023.
- S. Gómez Macías, L. P. Gaspar, **J. F. Botero**. ORACLE: an architecture for collaboration of data and control planes to detect DDoS attacks. IFIP/IEEE IM 2021.

Languages

Spanish (native), English (full professional proficiency), Catalan (reading and basic speaking).