

Johnnatan Messias P. Afonso

Research Scientist

Summary

Research Scientist at the Max Planck Institute for Software Systems (MPI-SWS), with prior research experience at Matter Labs (ZKsync Era) and Chainlink Labs. I hold a Ph.D. in Computer Science (Magna Cum Laude) from Saarland University and MPI-SWS. My research focuses on blockchain technologies, decentralized finance (DeFi), and DAO governance in decentralized applications. I am recognized for award-winning research, strong industry collaborations, and leadership in cross-functional projects. My research has accumulated **1,912 citations**, with an **h-index of 16** and an **i10-index of 24** according to Google Scholar.

Education

- 2018 – 2024 **Ph.D. in Computer Science**, *Max Planck Institute for Software Systems (MPI-SWS) & Saarland University*, Germany, *Magna Cum Laude*
 Advisor: Prof. Dr. Krishna P. Gummadi. Research: Fairness in blockchain governance and decentralized finance.
 - Thesis: On Fairness Concerns in the Blockchain Ecosystem
- 2015 – 2017 **M.Sc. in Computer Science**, *Universidade Federal de Minas Gerais*, Brazil
 Advisor: Prof. Dr. Fabrício Benevenuto. Completed two research internships at MPI-SWS, Germany.
 - Thesis: Characterizing Interconnections And Linguistic Patterns In Twitter
- 2009 – 2014 **B.Sc. in Computer Science**, *Universidade Federal de Ouro Preto*, Brazil
 Exchange program at Eötvös Loránd University, Budapest, Hungary (2013–2014) via Science Without Borders.
 - Thesis: Framework para Sistemas de Navegação de Veículos Aéreos não Tripulados

Professional Experience

- Nov 2024 **Research Scientist**, *Max Planck Institute for Software Systems (MPI-SWS)*, Saarbrücken, Germany
 Present
 Lead blockchain research projects focusing on governance fairness, delegation mechanisms, and decentralized finance.
 - Designed methodologies for evaluating decentralization in governance protocols.
 - Delivered invited talks at conferences and institutions including FC, IEEE SMC, TU Munich, Ethereum Zurich, and MPI-SP.
 - Served as a Program Committee (PC) member for FC 2026, WWW 2026, AFT 2025, among others.
- Sep 2023 **Research Scientist**, *Matter Labs*, Remote/Germany
- Oct 2024 Led projects on Sybil resistance, DAO governance, airdrop design, and blockchain data analysis for Ethereum and Layer-2 blockchains.
 - Developed fair airdrop mechanisms and resistance strategies against Sybil attacks.
 - Collaborated with cross-functional teams.
 - Served as a PC member for FC 2025, AFT 2024, and ACM WWW 2024.
- Feb 2022 **Research Intern**, *Chainlink Labs*, Remote
- Aug 2022 Improved quality of Chainlink Price Feeds using time series analysis and econometrics.
 - Designed feed quality scoring models.
 - Built reference price indexing systems to improve reliability.

- Mar 2020 **AI and Scientific Advisor**, *AI Robots*, Remote/Germany
- Jan 2021 Worked voluntarily as a scientific advisor and team leader to help them scale their robotic AI solutions and train their software engineering team. The company was a young Brazilian startup approved for the 2020 Microsoft Program (We Ventures Fund).
- Jun 2017 **Data Scientist and Full Stack Software Engineer**, *Kunumi*, Belo Horizonte, Brazil
- Jul 2018 Built and deployed an automation system for medical appointment requests using AI to address compliance with each patient's insurance plan and medical conditions.
- Awarded Brazil's most innovative health software in 2019 according to IT Forum 365, promoted by PwC and ITMidia.

Skills

- Research Areas Blockchain Technologies, DAO Governance, DeFi, Mechanism Design, Machine Learning, Data Science, and Social Computing.
- Technical Python, Solidity, SQL, Time Series Analysis, Statistical Modeling, Data Visualization, Software Engineering, Node Deployment & Maintenance.
- Soft Skills Scientific and Non-Scientific Presentations, Project Ownership, Teaching & Mentoring, Cross-Functional Leadership, Self-Management, Collaboration in International Teams.
- Languages English (Fluent), Portuguese (Native), German (Basic).

Awards & Honors

- 2025 Selected Participant — Humboldt Foundation Brazilian-German Frontiers of Science and Technology (BRAGFOST) Symposium, 2025.
- 2024 Selected Participant — Humboldt Foundation Indo-German Frontiers of Engineering (INDOGFOE) Symposium, 2024.
- 2024 Best Paper Award — MARBLE 2024 for "Liquid Staking Tokens in Automated Market Makers"
- 2024 Magna Cum Laude distinction — Ph.D. in Computer Science
- 2023 "Busy Beaver" teaching award nomination for Seminar on Blockchains and DeFi seminar — Saarland University
- 2022 Selected Participant — CISP Summer School on Trustworthy Artificial Intelligence: Selected as one of approximately 100 students worldwide.
- 2019 Stipend Award — Swiss Blockchain Winter School: Received a stipend award provided to selected students to participate in the event.
- 2019 Brazil's Most Innovative Health Software — IT Forum 365, promoted by PwC and ITMidia.
- 2015 M.Sc. Research grant — Grant by the Brazilian National Council for Scientific and Technological Development (CNPq) and by the Coordination for the Improvement of Higher Education Personnel CAPES)
- 2013 Scholarship award — Granted a scholarship for academic excellence to study in a European university for 14 months.
- 2013 B.Sc. Research grant — Grant by the Brazilian National Council for Scientific and Technological Development (CNPq).

Service

- PC Member FC 2026, WWW 2026, CAAW 26, AFT 2025, FC 2025, CAAW 2025, FinTeAchIn 2025, AFT 2024, WWW 2024.
- Guest Editor ACM Transactions on the Web — Special Issue on Decentralized Web.

Selected Publications and Technical Reports

My work has been published at top venues in Computer Science, including FC, IMC, WWW, ICWSM, and CSCW. Some of my scientific efforts have also been covered by the news media and specialized blogs, including The New York Times, The Huffington Post, MIT Tech Review, BBC Brasil, and Folha de São Paulo.

For a complete list of publications, kindly check my Google Scholar or DBLP profile.

1. C. Melo, J. Miqueias, **J. Messias**, G. Dias Gonçalves, F. A. Silva, A. Soares, and J. Araujo. *A Stochastic Performance Model for Evaluating Ethereum Layer-2 Rollups*. Future Generation Computer Systems. Elsevier. 2025.
2. **J. Messias** and C. F. Torres. *The Express Lane to Spam and Centralization: An Empirical Analysis of Arbitrum's Timeboost*. arXiv:2509.22143. 2025.
3. **J. Messias** and A. Ide. *Fairness in Token Delegation: Mitigating Voting Power Concentration in DAOs*. arXiv:2510.05830. 2025.
4. C. Melo, **J. Messias**, J. Miqueias, G. D. Gonçalves, F. A. Silva, and A. Soares. *Unrolling the Performance of ZK-Rollups through Stochastic Modeling*. In *Proceedings of the IEEE International Conference on Systems, Man, and Cybernetics (SMC)*, 2025.
5. M. Inês Silva, **J. Messias**, B. Livshits. *A public dataset for the ZKsync rollup*. In *Proceedings of the Financial Cryptography and Data Security: 4th International Workshop on Cryptoasset Analytics (CAAW)*, 2025.
6. **J. Messias**, K. Gogol, M. I. Silva, B. Livshits. *The writing is on the wall: Analyzing the boom of inscriptions and its impact on EVM-compatible blockchains*. In *Proceedings of the Financial Cryptography and Data Security: 4th International Workshop on Cryptoasset Analytics (CAAW)*, 2025.
7. C. A. S. de Melo, J. Miqueias, G. D. Gonçalves, F. A. Silva, A. C. B. Soares, and **J. Messias**. *Indo além da primeira camada: Modelagem e Avaliação de Desempenho de ZK-Rollups na plataforma Ethereum*. In *Simpósio Brasileiro de Redes de Computadores e Sistemas Distribuídos (SBRC)*, 2025.
8. K. Gogol, R. Fritsch, M. Schlosser, **J. Messias**, B. Kraner, C. Tessone. *Liquid staking tokens in automated market makers*. In *Mathematical Research for Blockchain Economy (MARBLE)*, 2024. **Best Paper Award**.
9. K. Gogol, **J. Messias**, D. Miori, C. Tessone, B. Livshits. *Quantifying arbitrage in automated market makers: An empirical study of Ethereum zk rollups*. In *Mathematical Research for Blockchain Economy (MARBLE)*, 2024.
10. K. Gogol, **J. Messias**, D. Miori, C. Tessone, B. Livshits. *Cross-Rollup MEV: Non-Atomic Arbitrage Across L2 Blockchains*, 2024.
11. J.J. Omena, **J. Messias**, A. Cossu, F. Gouveia, A. Falcão, R. Ventura, A. Benedetti, M. Huang, L. Ye. *Digital methods for blockchain research*, 2024.
12. **J. Messias**, V. Pahari, B. Chandrasekaran, K. P. Gummadi, P. Loiseau. *Dissecting Bitcoin and Ethereum transactions: On the lack of transaction contention and prioritization transparency in blockchains*. In *Financial Cryptography and Data Security (FC'23)*, 2023.
13. **J. Messias**, V. Pahari, B. Chandrasekaran, K. P. Gummadi, P. Loiseau. *Understanding blockchain governance: Analyzing decentralized voting to amend DeFi smart contracts*. arXiv:2305.17655, 2023.
14. **J. Messias**, A. Yaish, B. Livshits. *Airdrops: Giving money away is harder than it seems*. arXiv:2312.02752, 2023.
15. **J. Messias**, M. Alzayat, B. Chandrasekaran, K. P. Gummadi, P. Loiseau, A. Mislove. *Selfish & opaque transaction ordering in the Bitcoin blockchain: The case for chain neutrality*. In *Internet Measurement Conference (IMC'21)*, 2021.
16. M. Alzayat, **J. Messias**, B. Chandrasekaran, K. P. Gummadi, P. Loiseau. *Modeling Coordinated vs. P2P Mining: An Analysis of Inefficiency and Inequality in Proof-of-Work Blockchains*. arXiv:2106.02970. 2021.
17. **J. Messias**, M. Alzayat, B. Chandrasekaran, K. P. Gummadi. *On blockchain commit times: An analysis of how miners choose Bitcoin transactions*. In *KDD Workshop on Smart Data for Blockchain and Distributed Ledger (SDBD)*, 2020.
18. G. Resende, P. Melo, H. Sousa, **J. Messias**, M. Vasconcelos, J. Almeida, F. Benevenuto. *(Mis)information dissemination in WhatsApp: Gathering, analyzing, and countermeasures*. In *World Wide Web Conference (WWW'19)*, 2019.
19. P. Melo, **J. Messias**, G. Resende, K. Garimella, J. Almeida, F. Benevenuto. *WhatsApp monitor: A fact-checking system for WhatsApp*. In *AAAI Conference on Web and Social Media (ICWSM'19)*, 2019.
20. J. Kulshrestha, M. Eslami, **J. Messias**, M. B. Zafar, S. Ghosh, K. P. Gummadi, K. Karahalios. *Search bias quantification: Investigating political bias in social media and web search*. *Information Retrieval Journal*, 22(1),

2019.

21. G. Resende, **J. Messias**, M. Silva, J. Almeida, M. Vasconcelos, and F. Benevenuto. *A System for Monitoring Public Political Groups in WhatsApp*. In *Brazilian Symposium on Multimedia and the Web (Webmedia)*, 2018.
22. F. N. Ribeiro, K. Saha, M. Babaei, L. Henrique, **J. Messias**, F. Benevenuto, O. Goga, K. P. Gummadi, and E. M. Redmiles. *On Microtargeting Socially Divisive Ads: A Case Study of Russia-Linked Ad Campaigns on Facebook*. In *ACM Conference on Fairness, Accountability, and Transparency (FACCT*’19)*, 2017.
23. J. Kulshrestha, M. Eslami, **J. Messias**, M. B. Zafar, S. Ghosh, K. P. Gummadi, K. Karahalios. *Quantifying search bias: Investigating sources of bias for political searches in social media*. In *CSCW’17*, 2017.
24. **J. Messias**, P. Vikatos, F. Benevenuto. *White, man, and highly followed: Gender and race inequalities in Twitter*. In *IEEE/WIC/ACM Web Intelligence (WI’17)*, 2017.
25. P. Vikatos, **J. Messias**, M. Miranda, F. Benevenuto. *Linguistic diversities of demographic groups in Twitter*. In *ACM Hypertext and Social Media (HT’17)*, 2017.
26. A. Chakraborty, **J. Messias**, F. Benevenuto, S. Ghosh, N. Ganguly, K. P. Gummadi. *Who makes trends? Understanding demographic biases in crowdsourced recommendations*. In *AAAI Conference on Web and Social Media (ICWSM’17)*, 2017.
27. M. Mondal, **J. Messias**, S. Ghosh, K. P. Gummadi, A. Kate. *Longitudinal privacy management in social media: The need for better controls*. *IEEE Internet Computing*, 21(3):48–55, 2017.
28. M. Mondal, **J. Messias**, S. Ghosh, K. P. Gummadi, A. Kate. *Managing Longitudinal Exposure of Socially Shared Data on the Twitter Social Media*. *International Journal of Advances in Engineering Sciences and Applied Mathematics (Special Issue on Data Sciences)*, 2017.
29. J. C. S. Reis, H. Kwak, J. An, **J. Messias**, and F. Benevenuto. *Demographics of News Sharing in the U.S. Twittersphere*. In *ACM Hypertext and Social Media (HT’17)*, 2017.
30. **J. Messias**, J. P. Diniz, E. Soares, M. Ferreira, M. Araújo, L. Bastos, M. Miranda, and F. Benevenuto. *An Evaluation of Sentiment Analysis for Mobile Devices*. In *Springer Nature Social Network Analysis and Mining (SNAM)*, 2017.
31. M. Mondal, **J. Messias**, S. Ghosh, K. P. Gummadi, A. Kate. *Forgetting in social media: Understanding and controlling longitudinal exposure of socially shared data*. In *Symposium on Usable Privacy and Security (SOUPS)*, 2016.
32. **J. Messias**, J. P. Diniz, E. Soares, M. Ferreira, M. Araújo, L. Bastos, M. Miranda, and F. Benevenuto. *IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM)*, 2016.
33. **J. Messias**, F. Benevenuto, I. Weber, E. Zagheni. *From migration corridors to clusters: The value of Google+ data for migration studies*. In *IEEE/ACM ASONAM*, 2016.
34. **J. Messias**, G. Magno, F. Benevenuto, A. Veloso, and V. Almeida. *Brazil Around the World: Characterizing and Detecting Brazilian Emigrants Using Google+*. In *Brazilian Symposium on Multimedia and the Web (Webmedia)*, 2015.
35. **J. Messias**, L. Schmidt, R. Rabelo, F. Benevenuto. *You followed my bot! Transforming robots into influential users in Twitter*. *First Monday*, 18(7), 2013.

Selected Talks

- 2025: Unrolling the Performance of ZK-Rollups through Stochastic Modeling. IEEE SMC25. Vienna, Austria.
- 2025: Airdrops: Giving Money Away Is Harder Than It Seems. TUM Blockchain Conference. Munich, Germany.
- 2025: Fairness in Token Delegation: Mitigating Voting Power Concentration in Decentralized Autonomous Organizations. 3rd Edition of the TUM Blockchain&Cybersecurity Salon, Munich, Germany.
- 2025: The Writing is on the Wall: Analyzing the Boom of Inscriptions and its Impact on EVM-compatible Blockchains. CAAW, Miyakojima, Japan.
- 2025: A Public Dataset for the ZKsync Rollup. CAAW, Miyakojima, Japan.
- 2025: Fairness Concerns in the Blockchain Ecosystem at the Max Planck Institute for Security and Privacy (MPI-SP), Bochum, Germany.

- 2025: Web3 Is Broken? Airdrops, UX & Ethics Explained by Research Scientist. Decentralized Voices.
- 2025: The Writing is on the Wall: Analyzing the Boom of Inscriptions and its Impact on EVM Blockchains. Ethereum Zürich. Switzerland.
- 2024: Fairness Concerns in the Blockchain Ecosystem. INDOGFOE, Indo-German Frontiers of Engineering Symposium by Alexander von Humboldt Foundation. Mumbai, India.
- 2024: Blockchain Research: Where society becomes decentralized at the Max Planck Institute for Software Systems (MPI-SWS), Kaiserslautern, Germany.
- 2024: Airdrops: Giving Money Away Is Harder Than It Seems. EthCC. Brussels, Belgium.
- 2024: Understanding Blockchain Governance. SBC DAO Workshop. New York City, USA.
- 2023: Dissecting Bitcoin and Ethereum Transactions: On the Lack of Transaction Contention and Prioritization Transparency in Blockchains. Financial Cryptography and Data Security (FC). Bol, Croatia.
- 2021: Selfish & Opaque Transaction Ordering in the Bitcoin Blockchain: The Case for Chain Neutrality. ACM SIGCOMM Internet Measurement Conference (IMC). Virtual Event.

Teaching

- Summer 2023 Organized and taught a summer seminar on Blockchains and Decentralized Finance (DeFi) at Saarland University.
- 2019–2020 Teaching Assistant for Operating Systems at MPI-SWS and Saarland University.
- 2016–2017: Teaching Assistant for Analysis and Algorithm Design at UFMG.
- 2013 Instructor for high school courses (Algorithms, Operating Systems, Hardware Introduction) at Escola Estadual Dom Silvério, Brazil.