Pablo Moriano

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Updated: December 19, 2025

Citizenship: Colombian

Work Authorization: U.S. Lawful Permanent Resident

Research interests:
- Data Science
- Data Mining
- Machine Learning
- Network Science
- Anomaly Detection
- Cybersecurity

Education

Indiana University, Bloomington, IN

Ph.D., Informatics — May 2019
- Dissertation: Anomaly Detection in Real-World Temporal Networks
- Committee: L. Jean Camp, Yong-Yeol Ahn, Filippo Radicchi, Raquel Hill
- Minor in Statistical Science
- GPA: 3.94/4.00

M.S., Informatics — October 2017
- GPA: 3.88/4.00

Pontificia Universidad Javeriana, Colombia

M.S., Electrical Engineering — October 2011
- Master thesis: Heavy-tailed distributions from local decision-making strategies
- Advisor: Jorge Finke
- *Summa cum laude*, with highest distinction
- Ranked top 1%, GPA: 4.74/5.00

B.S., Electrical Engineering — May 2008
- *Summa cum laude*, with highest distinction
- Ranked top 1%, GPA: 4.45/5.00

Highlights

Selected Honors and Awards
- Innovation Award. For "Granted U.S. patent US 12,282,548 B2: "Universally Applicable Signal-Based Controller Area Network (CAN) Intrusion Detection System," Office of Technology Transfer, **Oak Ridge National Laboratory** 2025
- Top Reviewer. For "Providing high-quality and timely reviews," 18th ACM Workshop on Artificial Intelligence and Security (AISec) 2025
- Supplemental Performance Award (SPA). For "Exceeded expectations on project deliverables or performed above normal job duties," **Oak Ridge National Laboratory** 2025
- ACM Senior Member, **ACM** (top 25%) 2025

- Innovation Award. For "Registering commercial software copyright: Using Signal Clustering Similarity for Detecting CAN Masquerade Attacks," Office of Technology Transfer, **Oak Ridge National Laboratory** 2024
- MGB-SIAM Early Career (MSEC) Fellowship, **Mathematically Gifted & Black (MGB) and SIAM**, 2024 – 2026
- Student Mentor MVP Award Finalist, Office of Research Excellence, **Oak Ridge National Laboratory** 2023
- Supplemental Performance Award (SPA). For "Exceeded expectations on project deliverables or performed above normal job duties," **Oak Ridge National Laboratory** 2022
- Best Paper Award, Fourth ISOC NDSS International Workshop on Automotive and Autonomous Vehicle Security **(Autosec)** 2022
- IEEE Senior Member, **IEEE** (top 10%) 2021
- Honorable Mention Poster Award, Network and Distributed Security Symposium **(NDSS)** 2018
- Best Paper Award, 9th ACM CCS International Workshop on Managing Insider Security Threats (**MIST**) 2017
- Honorable Mention Poster Award, Telecommunications Policy Research Conference **(TPRC)** 2016
- Science, Technology, and Innovation Scholar, **Minciencias** 2014
- Graduate Studies Scholarship, **Colfuturo** 2013
- Outstanding Lecturer, Department of Electrical Engineering and Computer Science, **Pontificia Universidad Javeriana** 2013
- Outstanding Young Researcher Award, **Minciencias**, ($10,000) 2010
- Dean's List, Department of Electrical Engineering and Computer Science, **Pontificia Universidad Javeriana** (top 1%) 2003–2007

Research Experience

Oak Ridge National Laboratory, Oak Ridge, TN

Research & Development Staff Member April 2025 to Present

- Led R&D efforts on adversarial anomaly detection and intelligent automation and decision support for U.S. DOE scientific user facilities
- Contributed to R&D efforts on graph adversarial learning and intrusion detection in cyber-physical systems
- Mentored over 10 undergraduate, graduate, postdoctoral, and early career researchers in computer science, statistics, applied mathematics, and mathematics
- Contributed and reviewed scientific proposals for the U.S. DOE
- Refereed dozens of journal papers in top data mining, security, network science, and interdisciplinary journals

Research & Development Associate Staff Member March 2020 to March 2025

- Led a team of three researchers on a $1.5 million research project aimed at designing and developing adaptive anomaly detection algorithms for cyber-physical systems funded by ORNL's Laboratory Directed Research and Development (LDRD) program
- Contributed to R&D efforts on graph adversarial learning, intrusion detection in cyber-physical systems, automatic accident detection in U.S. highways, and just-in-time defect prediction in software codebases
- Published research articles on top peer reviewed journals including Physical Review E, PLOS ONE, IEEE Internet of Things Journal, Computer Networks, Nature Scientific Reports, Computers & Security
- Disclosed over five inventions and filed three patent applications in security analytics

- Mentored over 10 undergraduate and graduate students in computer science, statistics, applied mathematics, and mathematics
- Served on ORNL's SEED proposal review committee
- Contributed and reviewed scientific proposals for the U.S. DOE
- Refereed dozens of journal papers in top data mining, security, network science, and interdisciplinary journals

Indiana University, **Center for Security and Privacy in Informatics, Computing, and Engineering**, Bloomington, IN

Postdoctoral Research Associate May 2019 to March 2020

- Conducted research on analysis of BGP routing updates for early identification of man-in-the-middle (MITM) attacks using statistical analysis and machine learning
- Characterized groups and features of developers more prone to introduce vulnerable commits using network science and machine learning methods
- Analyzed privacy-related survey data to understand differences between samples of individuals using unsupervised learning

Research Assistant June 2015 to April 2019

- Analyzed a dataset of routing anomalies using unsupervised machine learning methods to understand country-based generation of those
- Collected a dataset of BGP routing updates for time series analysis of hijacking events
- Conducted network analysis on BGP updates and proposed a framework of early identification of large-scale network disruptions
- Performed statistical analysis of large-scale computer security surveys to distinguish traits between experts and non-experts security practitioners
- Published 3 first author research articles on data-driven security applied to routing anomaly detection
- Devised projects while teaching and mentoring 1 undergraduate and 3 graduate students

  PI: **L. Jean Camp**

Research Assistant August 2013 to July 2014

- Conducted Twitter data analysis to understand how scientific publications spread online and presented results at an international conference

  PIs: **Filippo Menczer** and **Alessandro Flammini**

Cisco Systems, Inc., Knoxville, TN

Research Intern Summers 2016, 2017, and 2018

- Designed and implemented an anomaly detection method based on temporal network analysis for identifying suspicious commits in Cisco's IOS codebase
- Established collaborations to conduct experiments requiring specific techniques
- Published a first author research article on insider threat event detection in the 9th ACM CCS International Workshop on Managing Insider Security Threats (MIST), which results in best paper award
- Presented results at an international conference attended by more than 500 scientists
- Participated in additional research that lead to an accepted research proposal for investigating vulnerability prediction in Cisco's codebases for over $80,000
- Reported progress at regular meetings with the company SVP

  Mentor: **Steven Rich**

Pontificia Universidad Javeriana, Colombia

Research Assistant February 2009 to July 2013

- Developed software for constructing models of networks that have both heavy-tail degree distributions and high degrees of clustering
- Participated in additional research that lead to an accepted research proposal with Colombian's National Science Department for investigating methods for anomaly detection in networks for $10,000
- Published 3 first author research articles on mechanisms of network formation
- Presented results at 3 international conferences in control systems
  PI: **Jorge Finke**

Teaching Experience

Indiana University, Bloomington, IN

Associate Instructor August 2014 to May 2015

- Assisted in teaching two undergraduate courses ranging in size from 20-80 students on topics including: Discrete mathematics, programming in Python, and statistics
- Led weekly laboratory and/or problem-solving and discussion sections for groups of 5-10 students
- Supervised students in final projects, graded exams and weekly homework

Pontificia Universidad Javeriana, Colombia

Lecturer July 2011 to July 2013

- Recognized as an outstanding lecturer while teaching an undergraduate introduction to programming class of about 30 students
- Prepared course material including laboratory experiments, lectures, exams, homework, and practice problems

Publications

Google Scholar Metrics: citations: 604, h-index: 13, i10-index: 20
(†: equal contribution, ‡: student/postdoc mentee)

Refereed Journal Articles

[J21] Jaidev Goel‡, **Pablo Moriano**, Ramakrishnan Kannan, and Yulia R. Gel. "Community detection robustness of graph neural networks," In Submission, 2025. arXiv:2509.24662 [cs.SI]

[J20] Steven C. Hespeler‡, **Pablo Moriano**, Mingyan Li, and Samuel C. Hollifield, "Temporal cross-validation impacts multivariate time series subsequence anomaly detection evaluation," In Submission, 2025. arXiv:2506.12183 [stat.ML]

[J19] Ratun Rahman, **Pablo Moriano**, Samee U. Khan, and Dinh C. Nguyen, "Electrical Load Forecasting over Multihop Smart Metering Networks with Federated Learning," *IEEE Internet of Things Journal*, vol. 12, no. 18, pp. 38413–38426, 2025. DOI: https://doi.org/10.1109/JIOT.2025.3586115

[J18] **Pablo Moriano**, Steven C. Hespeler†‡, Mingyan Li, and Maria Mahbub, "Adaptive anomaly detection for identifying attacks in cyber-physical systems: A systematic literature review," *Artificial Intelligence Review*, vol. 28, no. 283, 2025. DOI: https://doi.org/10.1007/s10462-025-11292-w

[J17] William Marfo‡, **Pablo Moriano**, Deepak K. Tosh, and Shirley V. Moore, "Detecting Masquerade Attacks in Controller Area Networks Using Graph Machine Learning," *IEEE Transactions on Information Forensics and Security*, vol. 20, pg. 13127–13142,

2025. DOI: https://doi.org/10.1109/TIFS.2025.3636019

[J16] **Pablo Moriano**, Steven C. Hespeler[‡], Mingyan Li, and Robert A. Bridges, "Benchmarking Unsupervised Online IDS for Masquerade Attacks in CAN," In Submission, 2024. arXiv:2406.13778 [cs.CR]

[J15] Andy Berres, **Pablo Moriano**, Haowen Xu, Sarah Tennille, Lee Smith, Jonathan Storey, and Jibonananda Sanyal, "A Traffic Accident Dataset for Chattanooga, Tennessee," *Data in Brief*, vol. 55, 110675, 2024. DOI: https://doi.org/10.1016/j.dib.2024.110675

[J14] Zhi-Feng Wei[‡], **Pablo Moriano**, and Ramakrishnan Kannan, "Robustness of graph embedding methods for community detection," In Submission, 2024. arXiv:2405.00636 [physics.soc-ph]

[J13] Miki E. Verma, Robert. A. Bridges, Michael. D. Iannacone, Samuel C. Hollifield, **Pablo Moriano**, Steven C. Hespeler, Bill Kay, and Frank L. Combs, "A comprehensive guide to CAN IDS data and introduction of the ROAD dataset," *PLOS ONE*, vol. 19, no. 1, e0296879, 2024. DOI: https://doi.org/10.1371/journal.pone.0296879

[J12] **Pablo Moriano**, Andy Berres, Haowen Xu, and Jibonananda Sanyal. "Spatiotemporal features of traffic help reduce automatic accident detection time," *Expert Systems with Applications*, vol. 244, 122813, 2024. DOI: https://doi.org/10.1016/j.eswa.2023.122813

[J11] Moyi Tian[‡] and **Pablo Moriano**. "Robustness of community structure under edge addition," *Physical Review E*, vol. 108, 054302, 2023. DOI: https://doi.org/10.1103/PhysRevE.108.054302

[J10] Md. Hasan Shahriar[‡], Yang Xiao, **Pablo Moriano**, Wenjing Lou, and Y. Thomas Hou. "CANShield: Deep Learning-Based Intrusion Detection Framework for Controller Area Networks at the Signal-Level," *IEEE Internet of Things Journal*, vol. 10, no. 24, pp. 22111–22127, 2023. DOI: https://doi.org/10.1109/JIOT.2023.3303271

[J9] Jonathan Bryan[†‡] and **Pablo Moriano**[†]. "Graph-based machine learning improves just-in-time defect prediction," *PLOS ONE*, vol. 18, no. 4, e0284077, 2023. DOI: https://doi.org/10.1371/journal.pone.0284077

[J8] **Pablo Moriano**, Raquel Hill, and L. Jean Camp. "Using bursty announcements for detecting BGP routing anomalies," *Computer Networks*, vol. 188, p. 107835, 2021. DOI: https://doi.org/10.1016/j.comnet.2021.107835

[J7] **Pablo Moriano**, Jorge Finke, and Yong-Yeol. Ahn. "Community-Based Event Detection in Temporal Networks," *Scientific Reports*, vol. 9, no. 1, p. 4358, 2019. DOI: https://doi.org/10.1038/s41598-019-40137-0

[J6] **Pablo Moriano**, Jared Pendleton, Steven Rich, and L. Jean Camp. "Stopping the Insider at the Gates: Protecting Organizational Assets Through Graph Mining," *Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications*, vol. 9, no. 1, pp. 4–29, 2018. DOI: https://doi.org/10.22667/JOWUA.2018.03.31.004

[J5] **Pablo Moriano**, Soumya Achar, and L. Jean Camp. "Incompetents, criminals, or spies: Macroeconomic analysis of routing anomalies," *Computers & Security*, vol. 70, pp. 319–334, 2017. DOI: https://doi.org/10.1016/j.cose.2017.06.011

[J4] Prashanth Rajivan, **Pablo Moriano**, Timothy Kelley, and L. Jean Camp. "Factors in an end user security expertise instrument," *Information and Computer Security*, vol. 25, no. 2, pp. 190–205, 2017. DOI: https://doi.org/10.1108/ICS-04-2017-0020

[J3] **Pablo Moriano** and Jorge Finke. "On the formation of structure in growing networks," *Journal of Statistical Mechanics: Theory and Experiment*, 2013 (06), P06010. DOI: https://doi.org/10.1088/1742-5468/2013/06/P06010

[J2] **Pablo Moriano** and Jorge Finke. "Power-law weighted networks from local attachments," *Europhysics Letters*, vol. 99, no. 1, p.18002(6), 2012. DOI: https://doi.org/10.1209/0295-5075/99/18002

[J1] **Pablo Moriano** and Freddy Naranjo. "Modelado y control de un nuevo sistema bola viga con levitación magnética," *Revista Iberoamericana de Automática e Informática Industrial*, vol. 9, no. 3, pp. 249–258, 2012. DOI: https://doi.org/10.1016/j.riai.2012.05.008

Refereed Conference Proceedings

[C8] Samuel C. Hollifield, **Pablo Moriano**, William L. Lambert, Joel Asiamah, Isaac Sikkema, and Michael D. Iannacone. "Developing and Deploying Security Applications for In-Vehicle Networks." In Proceedings of the *20th International Symposium on the Packaging and Transportation of Radioactive Materials (PATRAM)*, pp. 055.4–0.55.5, Juan-les-pins, France, June 2023. DOI: https://doi.org/10.48550/arXiv.2306.15588

[C7] Md. Hasan Shahriar[‡], Yang Xiao, **Pablo Moriano**, Wenjing Lou, and Y. Thomas Hou. "CANShield: Signal-based Intrusion Detection for Controller Area Networks." In Proceedings of the *Embedded Security in Cars Conference (ESCAR) USA*, pp. 1–15, Detroit, MI, USA, June 2022. DOI: https://doi.org/10.48550/arXiv.2205.01306

[C6] Jayati Dev[‡], **Pablo Moriano**, and L. Jean Camp. "Lessons Learnt from Comparing WhatsApp Privacy Concerns Across Saudi and Indian Populations." In Proceedings of the *Sixteenth USENIX Symposium on Usable Privacy and Security (SOUPS)*, pp. 81–97, Virtual Conference, August 2020. https://www.usenix.org/system/files/soups2020-dev.pdf

[C5] Prashanth Rajivan, **Pablo Moriano**, Timothy Kelley, and L. Jean Camp. "What Can Johnny Do? – Factors in an End-User Expertise Instrument." In Proceedings of the *Tenth International Symposium on Human Aspects of Information Security & Assurance (HAISA)*, pp. 199–208, Frankfurt, Germany, July 2016. https://dblp.org/rec/conf/haisa/RajivanMKC16.html

[C4] **Pablo Moriano** and Jorge Finke. "Model-based fraud detection in growing networks." In Proceedings of the *IEEE Conference on Decision and Control (CDC)*, pp. 6068–6073, Los Angeles, CA, USA, December 2014. DOI: https://doi.org/10.1109/CDC.2014.7040339

[C3] **Pablo Moriano** and Jorge Finke. "Characterizing the relationship between de-

gree distributions and community structures." In Proceedings of the *American Control Conference (ACC)*, pp. 2383–2388, Portland, OR, USA, June 2014. DOI: https://doi.org/10.1109/ACC.2014.6858882

[C2] **Pablo Moriano** and Jorge Finke. "Structure of growing networks with no preferential attachment." In Proceedings of the *American Control Conference (ACC)*, pp. 1088–1093, Washington, DC, USA, June 2013. DOI: https://doi.org/10.1109/ACC.2013.6579981

[C1] **Pablo Moriano** and Jorge Finke. "Heavy-tailed weighted networks from local attachment strategies." In Proceedings of the *50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC)*, pp. 5211–5216, Orlando, FL, USA, December 2011. DOI: https://doi.org/10.1109/CDC.2011.6161494

Refereed Workshop Publications

[W5] **Pablo Moriano**, Robert A. Bridges, and Michael. D. Iannacone. "Detecting CAN Masquerade Attacks with Signal Clustering Similarity." In Proceedings of the *Fourth ISOC NDSS International Workshop on Automative and Autonomous Vehicle Security Workshop (Autosec)*, 2022. DOI: https://doi.org/10.14722/autosec.2022.23028, (**Best Paper Award**)

[W4] Deborah H. Blevins[†‡], **Pablo Moriano**[†], Robert A. Bridges, Miki E. Verma, Michael D. Iannacone and Samuel C. Hollifield. "Time-Based CAN Intrusion Detection Benchmark." In Proceedings of the *Third ISOC NDSS International Workshop on Automative and Autonomous Vehicle Security Workshop (Autosec)*, 2021. DOI: https://doi.org/10.14722/autosec.2021.23013

[W3] **Pablo Moriano**, Jared Pendleton, Steven Rich, and L. Jean Camp. "Insider Threat Event Detection in User-System Interactions." In Proceedings of the *9th ACM CCS International Workshop on Managing Insider Security Threats (MIST)*, pp. 1–12, Dallas, TX, USA, October 2017. DOI: https://doi.org/10.1145/3139923.3139928, (**Best Paper Award**)

[W2] **Pablo Moriano**, Emilio Ferrara, Alessandro Flammini, and Filippo Menczer. "Dissemination of scholarly literature in social media." In Proceedings of the *ACM Web of Science Conference Workshop Altmetrics*, Bloomington, IN, USA, June 2014. DOI: http://dx.doi.org/10.6084/m9.figshare.1035127

[W1] **Pablo Moriano** and Freddy Naranjo. "Modelado de un nuevo sistema bola viga con levitación magnética." In Proceedings of the *4th IEEE Colombian Workshop on Robotics and Automation*, Cali, Colombia, August 2008

Refereed Abstracts & **Posters**

[A8] Steven C. Hespeler, **Pablo Moriano**, and Mingyan Li. "Data-Driven Evaluation of ML/DL Performance for Timely and Precise Fault Identification in Automotive Cyber-Physical Systems," In SIAM Annual Meeting (AN24), Spokane, WA, July 2024. DOI: https://meetings.siam.org/sess/dsp_talk.cfm?p=138819

[A7] Edmon Begoli, Edmun Meyer, **Pablo Moriano**, Sean Oesch. "Cognitive Cyber

– Dynamic, Adaptive Cyber Defense Systems for Massively Distributed, Autonomous, and Ad-hoc Computing Environments." In *Proceedings of the 17th ACM International Conference on Distributed and Event-based Systems*, Neuchatel, Switzerland, June 2023. DOI: https://doi.org/10.1145/3583678.3603283

[A6] Moyi Tian[‡] and **Pablo Moriano**. "How Robust are Communities in Temporal Networks? A Comparative Analysis Using Community Detection Algorithms." In *SIAM Workshop on Network Science*, Virtual, September 2022. http://dyn.phys.northwestern.edu/ns22_abstracts/NS22_paper_1147.pdf

[A5] **Pablo Moriano**, Jorge Finke, and Yong-Yeol Ahn. "Community-Based Event Detection in Temporal Networks." In *LatinX in AI Workshop at ICML*, Long Beach, CA, USA, June 2019

[A4] **Pablo Moriano**, Raquel Hill, and L. Jean Camp. "Hijacking Network Traffic: Temporal Analysis of Adverse Changes in the Internet Topology." In *Conference on Complex Systems (CCS)*, Thessaloniki, Greece, September 2018

[A3] Clint McElroy[‡], **Pablo Moriano**, and L. Jean Camp. "On Predicting BGP Anomalous Incidents: A Bayesian Approach." In *Network and Distributed Security Symposium (NDSS)*, San Diego, CA, USA, February 2018. https://www.ndss-symposium.org/wp-content/uploads/2018/02/ndss2018posters_paper_11.pdf, (**Honorable Mention**)

[A2] **Pablo Moriano**, Jorge Finke, and Yong-Yeol Ahn. "Community-based anomalous event detection in temporal networks." In *Conference on Complex Systems (CCS)*, Cancún, Mexico, September 2017

[A1] **Pablo Moriano**, Soumya Achar, and L. Jean Camp. "Macroeconomic Analysis of Routing Anomalies." In *Telecommunications Policy Research Conference (TPRC)*, Arlington, VA, USA, October 2016. https://ssrn.com/abstract=2755699, (**Honorable Mention**)

Other Publications

[O2] **Pablo Moriano** and Kalyan Perumalla. "On the Robustness of Network Community Structure Under Addition of Edges." ORNL Technical Report, 2020. DOI: https://doi.org/10.2172/1661212

[O1] **Pablo Moriano**. "Anomaly Detection in Real-World Temporal Networks." Ph.D. Dissertation, Indiana University, 2019. https://hdl.handle.net/2022/23228

Dataset Releases

[D5] Steven C. Hespeler, **Pablo Moriano**, Mingyan Li, and Samuel C. Hollifield. "Multivariate Time Series Intermittent Fault Detection in Controller Area Network (CAN)", July 2024. DOI: https://doi.org/10.5281/zenodo.12807317

[D4] Andy Berres, **Pablo Moriano**, Haowen Xu, Sarah Tennille, Lee Smith, Jonathan Storey, and Jibonananda Sanyal. "A Tagged Traffic Accident Dataset for Machine Learning," May 2023. DOI: https://doi.org/10.5281/zenodo.7964287

[D3] Robert A. Bridges, Kiren E. Verma, Michael D. Iannacone, Samuel C. Holli-

field, **Pablo Moriano**, Steven Hespeler, Bill Kay, and Frank Combs. "Real ORNL Automotive Dynamometer (ROAD) CAN Intrusion Dataset," December 2020. DOI: https://doi.org/10.5281/zenodo.10462795

[D2] **Pablo Moriano**, Raquel Hill, and L. Jean Camp. "Using Bursty Announcements for Detecting BGP Routing Anomalies," February 2020. DOI: https://doi.org/10.5281/zenodo.1321085

[D1] **Pablo Moriano**, Jorge Finke, and Yong-Yeol Ahn. "Community-Based Event Detection in Temporal Networks," July 2018. DOI: https://doi.org/10.5281/zenodo.1321085

Inventions

Patent Applications

[PA5] Robert A. Bridges, Kiren E. Verma, Michael. D. Iannacone, Samuel C. Hollifield, **Pablo Moriano**, and Jordan Sosnowski. "Universally Applicable Signal-Based Controller Area Network (CAN) Intrusion Detection System," U.S. Patent No. 12,282,548, issued on April, 22, 2025

[PA4] William Marfo, **Pablo Moriano**, Deepak K. Tosh, and Shirley V. Moore. "Detecting Masquerade Attacks Using Graph-Based Machine Learning Models," Provisional U.S. Patent Application, Application No. 63/759,414, filed on February, 17, 2025

[PA3] Andy Berres, Haowen Xu, Jibonananda Sanyal, **Pablo Moriano**, Sarah Tennille, and Rajesh Paleti. "Systems and Methods for Training and or Using Machine Learning Models to Detect Traffic Accidents on Roads," U.S. Patent Application, Serial No. 18/985,913, filed on December, 18, 2024

[PA2] Samuel C. Hollifield, **Pablo Moriano**, Robert A. Bridges, Isaac Sikkema, and Joel Asiamah. "Automotive Secure Hijack, Intrusion, and Exploit Detector," Provisional U.S. Patent Application, Application No. 63/658,639, filed on June, 11, 2024

[PA1] **Pablo Moriano** and Jonathan Bryan. "Just-In-Time Defect Prediction Using Graph-Based Machine Learning," Provisional U.S. Patent Application, Application No. 63/413,987, filed on October, 7, 2022

Software Releases

[S3] **Pablo Moriano**. "Benchmarking Unsupervised Online IDS Masquerade Attacks Paper Code," August 2024. DOI: https://doi.org/10.11578/dc.20240823.2

[S2] **Pablo Moriano**. "Using Signal Clustering Similarity for Detecting CAN Masquerade Attacks," July 2024. Copyright Number: 90000299. DOI: https://doi.org/10.11578/dc.20240710.1

[S1] **Pablo Moriano** and Deborah H. Blevins. "Time-Based CAN IDS Paper Results Code," January 2022. DOI: https://doi.org/10.11578/dc.20220112.2

Research Grants

Funded Proposals

- **PI**, Laboratory Directed Research and Development (LDRD) Program: "Next-Generation Security for Interconnected Systems," **Oak Ridge National Laboratory**, (≈ $1.5M)

October 2022–September 2025

- **Co-PI**, Mathematical Multifaceted Integrated Capability Center (MMICC): "Sparsitute: A Mathematical Institute for Sparse Computations in Science and Engineering," Office of Advanced Scientific Computing Research, U.S. Department of Energy, (≈ $4.0M) October 2022–September 2027

- **Co-PI**, Cisco Research: "Understanding Software Quality in Developer-Component Temporal Graphs," **Cisco Systems, Inc.**, ($87,000) 2018–2019

Awards

Association for Computing Machinery (ACM)
- Elevated to the Grade of ACM Senior Member 2024

Mathematically Gifted & Black (MGB) and SIAM
- MGB-SIAM Early Career (MSEC) Fellowship 2024 – 2026

Institute of Electrical and Electronics Engineers (IEEE)
- Elevated to the Grade of IEEE Senior Member 2021

Oak Ridge National Laboratory
- Supplemental Performance Award (SPA). For "Exceeded expectations on project deliverables or performed above normal job duties" 2025
- Innovation Award. For "Registering commercial software copyright: Using Signal Clustering Similarity for Detecting CAN Masquerade Attacks," Office of Technology Transfer 2024
- Student Mentor MVP Award Finalist, Office of Research Excellence 2023
- Supplemental Performance Award (SPA). For "Exceeded expectations on project deliverables or performed above normal job duties" 2022

Best Paper Awards
- Fourth ISOC NDSS International Workshop on Automotive and Autonomous Vehicle Security **(Autosec)** 2022
- 9th ACM CCS International Workshop on Managing Insider Security Threats **(MIST)** 2017

Honorary Mention Poster Awards
- Network and Distributed Security Symposium **(NDSS)** 2018
- Telecommunications Policy Research Conference **(TPRC)** 2016

Travel Grants ($10,100 in total)
- USENIX Enigma (Virtual) ($250) 2021
- International Conference for High Performance Computing, Networking, Storage and Analysis (SC) Early Career Workshop (Virtual) 2020
- CMD-IT Academic Careers Workshop (Virtual) 2020
- ACM Architectural Support for Programming Languages and Operating Systems (ASPLOS) ($1,600) 2020
- ACM-IMS Interdisciplinary Summit on the Foundations of Data Science ($1,100) 2019
- International Conference in Machine Learning (ICML) ($1,250) 2019
- CRA Grad Cohort Workshop for URMD ($1,500) 2019
- Tapia Conference Doctoral Consortium ($1,500) 2018
- IU Graduate and Professional Student Government ($500) 2017

- IEEE Symposium on Security and Privacy (IEEE S&P) ($900) 2017
- GREPSEC III Workshop ($700) 2017
- American Control Conference (ACC) ($800) 2014

Minciencias, Colombia
- Science, Technology, and Innovation Scholar 2014
- Outstanding Young Researcher Award ($10,000) 2010

Colfuturo, Colombia
- Graduate Studies Scholarship 2013

Pontificia Universidad Javeriana, Colombia
- Outstanding Lecturer 2013
- Outstanding Master Thesis 2011
- M.S. Research Scholarship 2009–2011
- Outstanding Undergraduate Thesis 2008
- Dean's List 2003–2007

Talks and events

Invited Talks

- "Rethinking Temporal Cross-Validation in Multivariate Subsequent Anomaly Detection," First ORNL AI4Science Workshop, Oak Ridge National Laboratory April 2025

- "ACM Overview," Nuclear Nonproliferation Division, Oak Ridge National Laboratory March 2025

- "Automotive CAN and Ethernet Partner Perspectives," AI Sweden, Gothenburg, SE February 2025

- "Effective Student Programs for Improving EDI in STEM at Oak Ridge National Laboratory," SIAM Annual Meeting (AN24) on Equity, Diversity, and Inclusion in the Mathematical and Computational Sciences Minisymposia, Spokane, WA July 2024

- "Data Science Approaches to Secure Automotive Networks," Bredesen Center, University of Tennessee, Knoxville November 2023

- "Data Science Approaches to Secure Automotive Networks," Center for Cyber Security/AI Research, University of North Dakota May 2023

- "ORNL Research, Datasets, and Facilities," The Road to Future Automotive Datasets: Challenges and Opportunities, Information Sciences Institute (ISI), University of Southern California November 2022

- "Cyber Threats to Transportation and Innovative Technological Solutions," Caribbean, Central America, and Mexico Regional Transport Security Series, The National Nuclear Security Administration (NNSA) April 2022

- "Using Graphs for Improving Machine Learning: Methods and Applications," Network Science for Fluid Dynamics Seminar Series, University of California, Los Angeles January 2022

- "Cyber Threats to Transportation and Innovative Technological Solutions," South American Regional Transport Security Series, The National Nuclear Security Administration (NNSA) April 2021

- "Next Generation Anomaly Detection," United States Army Research Laboratory, Adelphi, MD September 2019

- "Data and Network Science Methods for Detecting Anomalies in Time-Varying Networked Systems," Computer Science and Mathematics Division, Oak Ridge National Laboratory September 2019

- "Next Generation Anomaly Detection," Information Sciences Institute (ISI), University of Southern California, Los Angeles, CA July 2019

- "Macroeconomic analysis of routing anomalies," Cisco Systems Research Summit, University of Pennsylvania, Philadelphia, PA April 2016

- "Anomaly detection in temporal social networks," Cisco Systems Research Summit, University of Pennsylvania, Philadelphia, PA April 2016

Contributed Talks

- "Improving Research Methods in Cybersecurity Using Tools from Applied Mathematics and Data Science," SIAM Annual Meeting (AN25) MS76, Montreal, Canada July 2025

- "Brainstorming Open Problems on Temporal Higher Order Networks" Mathematical Multifaceted Integrated Capability Centers (MMICC) Sparsitute All Members Meeting, Oak Ridge, TN May 2025

- "Robustness of Graph Embedding Methods for Community Detection in Networks," Mathematical Multifaceted Integrated Capability Centers (MMICC) Sparsitute All Members Meeting, Chicago, IL October 2023

- "Robustness of Community Structure Under Edge Addition," Mathematical Multifaceted Integrated Capability Centers (MMICC) Sparsitute All Members Meeting June 2023

- "Vehicle Cyber Protection," Experience National Security Sciences Event, Oak Ridge National Laboratory September 2022

- "Detecting CAN Masquerade Attacks with Signal Clustering Similarity," The Fourth International Workshop on Automative and Autonomous Vehicle Security Workshop (Autosec) April 2022

- "Using Graphs for Improving Machine Learning: Models and Applications," CCSD Science Research Monthly Meeting Series, Oak Ridge National Laboratory December 2021

- "Time-Based CAN Intrusion Detection Benchmark," The Third International Workshop on Automative and Autonomous Vehicle Security Workshop (Autosec), January 2021

- "Protecting the Routing Cyberinfrastructure Through Machine Learning and Statistical Analysis," NSF Cybersecurity Summit for Large Facilities and Cyberinfrastructure August 2020

- "COVID-relevant Scalable Computational Research Directions and Tools," Information Exchange Seminar. Computer Science and Mathematics Division, Oak Ridge National Laboratory April 2020

- "Hijacking Network Traffic: Temporal Analysis of Adverse Changes in the Internet Topology," Conference on Complex Systems (CCS), Thessaloniki, Greece September 2018

- "Insider Threat Event Detection in User-System Interactions", 9th ACM CCS International Workshop on Managing Insider Security Threats (MIST), Dallas, TX October 2017

- "Community-based anomalous event detection in temporal networks," Conference on Complex Systems (CCS), Cancun, Mexico September 2017

- "Characterizing the relationship between degree distributions and community structures," American Control Conference (ACC), Portland, OR June 2014

- "Dissemination of scholarly literature in social media," ACM Web of Science Conference Workshop Altmetrics, Bloomington, IN June 2014

- "Structure of growing networks with no preferential attachment," American Control Conference (ACC), Washington, DC June 2013

- "Heavy-tailed weighted networks from local attachment strategies," 50th IEEE Conference on Decision and Control and European Control Conference (CDC-ECC), Orlando, FL December 2011

Panels

- SIAM Annual Meeting (AN25) Industry Panel, Montreal, Canada July 2025

- SIAM Annual Meeting (AN24) on Equity, Diversity, and Inclusion in the Mathematical and Computational Sciences Minisymposia, Spokane, WA July 2024

- DOE Office of Science Graduate Student Research (SCGSR) Application Assistance Workshop October 2023

Professional Society Affilitations

Memberships

- **Senior Member**. Institute of Electrical and Electronics Engineering (IEEE). Member of the IEEE Computer Society Since 2011
- **Senior Member**. Association for Computing Machinery (ACM). Member of the Special Interest Group on Security, Audit, and Control (SIGSAC) Since 2019
- **Member**. Society for Industrial and Applied Mathematics (SIAM). Member of SIAM Activity Group in Data Science (SIAG/DATA) Since 2021

Professional service

([†]: From a demographic under-represented in STEM fields)

Mentoring and Advising Postdocs
- Steven Hespeler, Ph.D. in Industrial Engineering, New Mexico State University 2023–

Mentoring and Advising Students
- Dalya Manatova, Graduate Research at ORNL (GRO) Program, Ph.D. in Informatics, Indiana University 2025–
- Nehal Ameen[†], DOE Omni Technology Alliance Internship Program, Ph.D. in Computer Science, Virginia Commonwealth University 2024–
- Jaidev Goel, Graduate Research at ORNL (GRO) Program, Ph.D. in Statistics, Virginia Polytechnic Institute and State University 2024–
- William Marfo[†], Sustainable Research Pathways (SRP) Program, Ph.D. in Computer Science, University of Texas El Paso 2023–2025
- Zhifeng Wei, National Science Foundation (NSF) Mathematical Sciences Graduate Internship (MSGI), Ph.D. in Mathematics, Indiana University 2023–
- Moyi Tian[†], National Science Foundation (NSF) Mathematical Sciences Graduate Internship (MSGI), Ph.D. in Applied Mathematics, Brown University 2022–2023
- Jonathan Bryan, Science Undergraduate Laboratory Internships (SULI), B.S. in Computer Science, University of Tennessee Knoxville 2021–2022
- DongInn Kim, Ph.D. in Computer Science, Indiana University 2020
- Jayati Dev[†], Ph.D. in Informatics, Indiana University 2019–2020
- Clint McElroy, B.S. in Informatics, Indiana University 2017–2018
- Srivatsan Iyer, M.S. in Computer Science, Indiana University 2015–2017
- Soumya Achar[†], M.S. in Computer Science, Indiana University 2015–2016

Ph.D. Thesis Committee
- Nehal Ameen[†], Ph.D. in Computer Science, Virginia Commonwealth University 2025–

- William Marfo[†], Ph.D. in Computer Science, University of Texas El Paso 2023–2024
- Katerine Guerrero[†], Ph.D. in Engineering, Universidad del Valle, Colombia 2021

Master Thesis Committee
- Juan Camilo Campos[†], M.S. in Electrical Engineering, Pontificia Universidad Javeriana, Colombia 2018

Workforce Development
- Member of the Computing and Computational Sciences Directory (CCSD) Workforce Development Committee, Oak Ridge National Laboratory 2024—

Conference/Workshop Organization
- Organizer: SIAM Annual Meeting (AN25) on Applied Mathematics and Data Science for Cybersecurity Minisymposium, Montreal, Canada July 2025
- Co-organizer: SIAM Annual Meeting (AN24) on Equity, Diversity, and Inclusion in the Mathematical and Computational Sciences Minisymposium, Spokane, WA July 2024

Reviewing

Journal Referee
- ACM Transactions on Reconfigurable Technology and Systems
- IEEE Transactions on Network and Service Management
- IEEE Transactions on Parallel and Distributed Systems

- IEEE Transactions on Cognitive Communications and Networking
- IEEE Transactions on Reliability
- IEEE Transactions on Signal and Information Processing over Networks
- ACM Computing Surveys
- Reliability Engineering & System Safety
- Journal of Traffic and Transportation Engineering
- IEEE Transactions on Industrial Informatics
- ACM Transactions on Software Engineering and Methodology
- IEEE Network
- IEEE Transactions on Cybernetics
- Expert Systems with Applications
- IEEE Transactions on Dependable and Secure Computing
- IEEE Transactions on Intelligent Transportation Systems
- Ad Hoc Networks
- IEEE Transactions on Information Forensics and Security
- IEEE Transactions on Network Science and Engineering
- Social Networks Analysis and Mining
- Journal of Information Security and Applications
- Intelligent Systems with Applications
- International Journal of Wireless Information Networks
- Computer Networks
- Chaos: An Interdisciplinary Journal of Nonlinear Science
- Recent Advances in Computer Science and Communications
- Computers & Security
- PLOS One
- IEEE Transactions on Knowledge and Data Engineering
- IEEE Access
- ACM Transactions on Information and System Security (TISSEC)

Technical Program Committees

- 18th ACM Workshop on Artificial Intelligence and Security co-located with the 32nd ACM Conference on Computer and Communications Security (CCS) 2025
- 17th ACM Workshop on Artificial Intelligence and Security co-located with the 31st ACM Conference on Computer and Communications Security (CCS) 2024
- The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC) 2021
- Society for Advancement of Chicanos/Hispanics & Native Americans in Science (SACNAS) Conference 2019
- ICML Latin in AI Workshop 2019
- ACM Internet Measurement Conference (Shadow PC 2017)
- Federation of Automatic Control (IFAC) Technical Committee Member for Technology, Culture, and International Stability

Grant Proposal Reviewer

- National Science Centre Poland, 2024
- Laboratory Directed Research and Development (LDRD) Seed Review Committee, Oak Ridge National Laboratory, 2023–2025
- DOE/ASCR Continuation of Solicitation for the Office of Science Financial Assistance Program, 2022
- Internal Reviewer for DOE Grant Proposals, 2020

Skills

Programming Languages

- Frequent user of Python for data analysis using NumPy, Pandas, Scikit-learn, Mat-

plotlib, seaborn, Keras, JupyterLab
- Experience with TensorFlow, PyTorch, NVIDIA RAPIDS, R, MATLAB, Mathematica, C/C++
- Familiar with HTML, CSS, JS for frontend
- Used SQLite, NoSQL (MongoDB)

Spoken Langauges
- English (fluent), Spanish (native)