VISHRANT TRIPATHI

Assistant Professor, Elmore School of Electrical and Computer Engineering, Purdue University
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RESEARCH INTERESTS

Communication Networks, Robotics, Next-Generation Wireless Systems, Cyber-Physical Systems, Machine Learning, and Optimization

EDUCATION

MIT *Aug 2017 - Aug 2023*
PhD, *Electrical Engineering and Computer Science*
Thesis Title: "**Information Freshness for Monitoring and Control over Wireless Networks**"
Minor in Economics & Policy
Advisor: **Prof. Eytan Modiano**

MIT *Aug 2017 - May 2019*
SM, *Electrical Engineering and Computer Science* GPA: **5.0**/5.0
Thesis Title: "**Age of Information and Mobility**"
Advisor: **Prof. Eytan Modiano**

IIT-Bombay *Jul 2013 - Jun 2017*
B.Tech., *Electrical Engineering* GPA: **9.63**/10.0
Minor in Computer Science
Advisor: **Prof. Sharayu Moharir**

PRESS COVERAGE

MIT News, AeroAstro MIT, Schwarzman College of Computing, Institute for Data Systems and Society MIT, Wireless Communications Alliance, AI Magazine, Hackster.io, TechXplore, Autonomous Vehicle International, and Quadricottero.

AWARDS AND HONORS

Elmore Scholar of Excellence, Purdue University, *Aug 2024 - Aug 2028*
Award for research excellence and future potential to new faculty.

Research Profile, ACM SIGMETRICS Performance Review *Jan 2024*
selected for a special issue on job market candidates.

Best Presentation Award, LIDS Student Conference *Feb 2023*
for a talk titled *WiSwarm: Wireless Networking for Multi-Agent Robotics.*

Best Paper Runner-Up, ACM MobiHoc 2022 *Oct 2022*
for a paper titled *Optimizing Age of Information with Correlated Sources.*

Best Presentation Runner-Up, LIDS Student Conference *Feb 2019*
for a talk titled *Age Optimal Information Gathering and Dissemination on Graphs.*

Institute Academic Prize, IIT-Bombay *2015-16*
for exceptional academic performance, given to 10 students among 880.

All India Rank 126, Joint Entrance Examination (JEE) *2013*
Top 0.01 percentile among 1.3 million candidates

Young Scientist Fellowship, KVPY, Govt. of India *2011-13*
Awarded to the most promising high-school students in STEM in India

PROFESSIONAL EXPERIENCE

Assistant Professor, Purdue University, West Lafayette *Aug 2024 - Present*
Elmore Family School of Electrical and Computer Engineering.

Software Engineer, NetInfra, Google, Sunnyvale *Aug 2023 - Aug 2024*

- Work on the DataCenter Network Interconnection (DCNI) layer
- Use software defined networking (SDN) for routing and topology optimization in real-time

Research Assistant, Communications and Networking Research Group, MIT *Aug 2017 - Aug 2023*

- Used tools from probability, optimization, and learning to formulate and solve problems in networking and robotics
- Designed new network control policies to achieve timely information delivery in wireless networks
- Applied our fundamental theory results to robotics, edge computing, and cloud systems

Software Engineer Intern, TechInfra, Google, NYC *May 2022 - Sep 2022*

- Worked on Sinapse2 - a real-time observed networked modeling system for traffic management in Google's network
- Designed and built an input replayer for this system for debugging, recreating network behavior during past events and improving fail-static policies

Research Scientist Intern, Capacity Engineering, Meta, Menlo Park *May 2021 - Sep 2021*

- Worked on a large scale mixed-integer linear programming (MILP) solver, used for long term network capacity planning
- Added detailed constraint tracking and sensitivity analysis to provide deeper insights and interpretability for this solver
- Proposed an efficient way to perform sensitivity analysis for multiple groups of constraints in a MILP

PUBLICATIONS

Journals

[J1]: *Scheduling Policies for Age Minimization in Wireless Networks with Mixed Update Sizes.*
Z. Zhao, **VT**, and I. Kadota; **under review at** IEEE Transactions on Networking, 2025.

[J2]: *Buffer Management for Timely Reconstruction: Lower Bounds and Near-Optimal Policies.*
S. Kang, **VT**, and C. G. Brinton; **under review at** IEEE Transactions on Network Science and Engineering, 2025.

[J3]: *Timely Trajectory Reconstruction in Finite Buffer Remote Tracking Systems.*
S. Kang, **VT**, and C. G. Brinton; **under review at** IEEE Transactions on Networking, 2025.

[J4]: *AoI-based Scheduling of Correlated Sources for Timely Inference.*
M. K. C. Shisher, **VT**, M. Chiang, C. G. Brinton; IEEE Transactions on Networking, 2025.

[J5]: *Monitoring Correlated Sources: AoI-based Scheduling is Nearly Optimal.*
R. V. Ramakanth, **VT**, E. Modiano; IEEE Transactions on Mobile Computing, 2024.

[J6]: *A Whittle Index Approach to Minimizing Functions of Age of Information.*
VT, E. Modiano; IEEE/ACM Transactions on Networking 2024.

[J7]: *Optimizing Age of Information with Correlated Sources.*
VT, E. Modiano; IEEE/ACM Transactions on Networking 2024.

[J8]: *Fresh-CSMA: A Distributed Protocol for Minimizing Age of Information.*
VT, N. Jones, E. Modiano; IEEE Journal of Communications and Networks 2023.

[J9]: *Information Freshness in Multi-Hop Wireless Networks.*
VT, E. Modiano; IEEE/ACM Transactions on Networking 2022.

[J10]: *Age Optimal Information Gathering and Dissemination on Graphs.*
VT, R. Talak, E. Modiano; IEEE Transactions on Mobile Computing 2021.

Conference Proceedings

[C1]: *SyndromeCode: Feedback-Assisted Concatenated Coding based on Transformer.*
J. Jang, H. Nam, **VT**, and D. J. Love, Asilomar, 2025.

[C2]: *Communication-Efficient Cooperative Localization: A Graph Neural Network Approach.*
Y. Zou, C. G. Brinton, and **VT**, IFIP WiOpt, 2025.

[C3]: *Optimizing Age of Information in Networks with Large and Small Updates.*
Z. Zhao, **VT**, and I. Kadota, IFIP WiOpt, 2025.

[C4]: *Timely Trajectory Reconstruction in Finite Buffer Remote Tracking Systems.*
S. Kang, **VT**, and C. G. Brinton, IFIP WiOpt, 2025.

[C5]: *AoI-based Scheduling of Correlated Sources for Timely Inference.*
M. K. C. Shisher, **VT**, M. Chiang and C. G. Brinton, IEEE ICC, 2025.

[C6]: *Monitoring Correlated Sources: AoI-based Scheduling is Nearly Optimal.*
R. V. Ramakanth, **VT**, E. Modiano, IEEE INFOCOM, 2024.

[C7]: *WiSwarm: Age-of-Information-based Wireless Networking for Collaborative Teams of UAVs.*
VT, I. Kadota, E. Tal, M. S. Rehman, A. Warren, S. Karaman, E. Modiano; IEEE INFOCOM 2023.

[C8]: *Fresh-CSMA: A Distributed Protocol for Minimizing Age of Information.*
VT, N. Jones, E. Modiano; IEEE INFOCOM 2023.

[C9]: *Optimizing Age of Information with Correlated Sources.*
VT, E. Modiano; ACM Mobihoc 2022, **Best Paper Runner Up Award.**

[C10]: *An Online Learning Approach to Optimizing Time-Varying Costs of AoI.*
VT, E. Modiano; ACM MobiHoc 2021.

[C11]: *Computation and Communication Co-Design for Real-Time Monitoring and Control in Multi-Agent Systems.*
VT, L. Ballotta, L. Carlone, E. Modiano; IFIP WiOpt 2021.

[C12]: *A Whittle Index Approach to Minimizing Functions of Age of Information.*
VT, E. Modiano; Allerton, 2019.

[C13]: *Age Optimal Information Gathering and Dissemination on Graphs*
VT, R. Talak, E. Modiano; IEEE INFOCOM 2019.

[C14]: *Age of Information in Multi-Source Systems.*
VT, S. Moharir; IEEE GlobeCom 2017.

Theses

[T1]: *Information Freshness for Monitoring and Control over Wireless Networks.*
VT; PhD Thesis, MIT, 2023.

[T2]: *Age of Information and Mobility.*
VT; SM Thesis, MIT, 2019.

Tech Reports, Workshops and Preprints

[R1]: *Using Age of Information for Throughput Optimal Spectrum Sharing.*
H. Nam, **VT**, D. J. Love; arXiv:2509.18465, 2025.

[R2]: *Online Learning of Whittle Indices for Restless Bandits with Non-Stationary Transition Kernels.*
M. K. C. Shisher, **VT**, M. Chiang, C. G. Brinton; arXiv:2506.18186, 2025.

[R3]: *Age Debt: A General Framework for Minimizing Age of Information.*
VT, E. Modiano, IEEE INFOCOM AoI Workshop, 2021.

[R4]: *Age of Information for Discrete Time Queues.*
VT, R. Talak, E. Modiano; arXiv:1901.10463, 2019.

FUNDING

As PI/Lead at Purdue

- *Multi-Scale Communication-Computation-Power Co-Design in AI-Native Networked Infrastructure.* ($1,500,000), under review at NSF VINES Track 1, with co-PIs at Purdue ECE (Junjie Qin, David Love, Chris Brinton).
- *SEA-NET: Scalable Edge Analytics and Networking for Autonomous Maritime Emergency Response.* ($1,034,096), under review at NSF VINES Track 2, collaborative submission led by Stevens Institute of Technology and Spectronn, Inc.
- *Enabling Real-Time Applications through Semantic-Aware Design.* ($150,000), under review at Sony, Inc.
- *Learning and Scheduling for Cooperative ISAC.* ($100,000), under review at RTX, Inc. with co-PIs (Chris Brinton and David Love).

As co-PI

- *Automated Vehicle Generative AI-Based Evaluation and Connectivity-Based Enhancement in Inclement Weather.* ($150,000), with PI Lingxi Li, under review at the Center for Connected and Automated Transportation (CCAT), University of Michigan.

TEACHING EXPERIENCE

Lead Instructor, ECE 302 Probabilistic Methods in ECE, Purdue *Fall '24, Spring '25, Fall '25*

- Teach introductory probability to about 125 juniors and seniors in ECE each semester, rated **4.6**/5.0.
- Designed course material - problem sets, recitations, lecture notes and exams

Teaching Assistant, 16.09 Probability and Statistics, MIT *Feb 2023 - May 2023*

- Taught introductory probability to sophomores in AeroAstro, rated **6.7**/7.0.
- Designed course material - problem sets, recitations, lecture notes and exams

Teaching Assistant, 6.7700 Fundamentals of Probability, MIT *Sep 2022 - Dec 2022*

- Taught recitations on measure theoretic probability to graduate students in EECS, rated **6.8**/7.0.
- Delivered an in-class lecture on mixing in Markov chains
- Designed problem sets and exams

Kaufman Teaching Certificate Program, MIT *Sep 2021 - Dec 2021*

- Participated in workshops covering a wide-range of topics such as course design, creating inclusive classes, engaging students to facilitate learning, and how to provide meaningful feedback to students.
- Learned about the art and practice of teaching at the university level through the program, including current research on teaching methodologies.

Teaching Assistant, 16.36 Comm. Systems and Networks, MIT *Feb 2020/21 - May 2020/21*

- Helped design a new software defined radio (SDR) lab for the course with experiments on sampling, modulation and practical aspects of wireless communication
- Converted the lab to a *remotely controlled* setup and ran successful lab sessions over zoom during the pandemic, rated **7.0**/7.0

MENTORING AND VOLUNTEERING

PhD Students (Current)

- Hongjae Nam (co-advised)

- Yinan Zou (co-advised)
- Utso Majumder
- Jiahui Ni

MS Students (Current)

- Ananth Rajagopalan

Undergraduates

- Calar Dong (current)
- Surya Turaga (current)
- Pranesh Monda (now at KPMG)
- Disha Maheshwari (now at Amazon)

Prior Experience (at MIT)

- Mentored MIT undergraduates M. Shahir Rehman (co-author on **[C2]**), currently a graduate student at Stanford, and Alexander Warren (co-author on **[C2]**), currently a software engineer at Google.
- Mentored MIT graduate students Nicholas Jones (co-author on **[J3]** and **[C3]**) and R. Vallabh Ramakanth (co-author on **[C1]**).
- Served as a mentor for the MIT EECS *Graduate Application Assistance Program* (GAAP) to help under-represented students prepare their graduate school applications.
- Served as an international student mentor for the *International Students Office* (ISO) at MIT.
- Volunteer and organizer for the *Indian Graduate Students Association* (Sangam) at MIT.
- Served as an English language tutor for undergraduates from rural backgrounds at IIT-Bombay.

SERVICE

- Session Chair for the Distributed Learning session at IFIP WiOpt 2025
- Member of the TPC at ACM MobiHoc 2025
- Member of the TPC at IFIP WiOpt 2025
- Member of the TPC at COMSNETS 2023-2025
- Member of the Travel Grant Committee at IEEE DySPAN 2025
- Member of the Doctoral Symposium Committee at ACM ICDCN 2025
- Co-Chair for the LIDS Student Conference 2020
  - Session Chair for the student session on Control and Robotics
  - Organizer for panel titled *From LIDS@80 to LIDS@100 - Discussing the Future of Research in LIDS*
- Organizing member of the LIDS & Stats Tea Talk Committee (2018-2020)
- Organizing volunteer for IFIP WiOpt 2021
- Session Chair at Allerton 2019 for the session on Wireless Communication Systems
- Reviewer for the following conferences
  - IEEE ISIT 2019, 2020, 2023, 2024, 2025
  - IFIP WiOpt 2023, 2024, 2025
  - COMSNETS 2023, 2024, 2025
  - IEEE GlobeCom 2022
  - IEEE Information Theory Workshop (ITW) 2021
  - IEEE INFOCOM AoI Workshop 2019
- Reviewer for the following journals
  - IEEE/ACM Transactions on Networking

– IEEE Transactions on Mobile Computing
– IEEE Transactions on Neural Networks and Learning Systems
– IEEE Transactions on Information Theory
– IEEE Transactions on Communications
– IEEE Transactions on Wireless Communications
– IEEE Transactions on Vehicular Technology
– IEEE Journal on Selected Areas in Information Theory
– IEEE Journal on Selected Areas in Communications
– IEEE Communications Letters
– IEEE Open Journal of the Communications Society (*Exemplary Reviewer Award*)
– IEEE Internet of Things Journal
– INFORMS Operations Research

TALKS

Scheduling for AoI: Distributed Protocols, Correlated Sources, and Non-Uniform Update Sizes

- Invited Talk, ECE, Indian Institute of Science (IISc) Bangalore, *July 2025*
- Invited Talk, Electrical Engineering, IIT-Bombay, *July 2025*
- Invited Talk, Tata Institute of Fundamental Research (TIFR), Mumbai, *July 2025*

Information Freshness for Monitoring and Control over Wireless Networks

- Invited Talk, Electrical Engineering, University of Maryland, *March 2024*
- Invited Talk, Electrical Engineering, University of Hawaii, *March 2024*
- Invited Talk, Electrical and Computer Engineering, Purdue University, *March 2024*
- Invited Talk, Electrical and Computer Engineering, CU Denver, *March 2024*
- PhD Thesis Defense, MIT *Aug 2023*
- Invited Talk, Computer Science, Tata Institute of Fundamental Research, Mumbai *Dec 2022*
- Invited Talk, Electrical Engineering, IIT-Bombay *Dec 2022*
- Invited Talk, Nokia Bell Labs, NJ *Dec 2022*
- LIDS/RLE Communication + Information Theory Seminar, MIT *Apr 2022*

Information Freshness with Correlated Sources and Distributed Protocols, *Sep 2023*
Invited Talk, ECE, Rensselaer Polytechnic Institute, Troy, NY.
WiSwarm: AoI-based Wireless Networking for Collaborative Teams of UAVs, *May 2023*
IEEE INFOCOM, NY.
Fresh-CSMA: A Distributed Protocol for Minimizing Age of Information, *May 2023*
IEEE INFOCOM, NY.
WiSwarm: Wireless Networking for Multi-Agent Robotics, *Feb 2023*
LIDS Student Conference, MIT, *Best Presentation Award.*
Optimizing Age of Information with Correlated Sources, *Oct 2022*
ACM MobiHoc 2022, *Best Paper Runner-Up Award.*
An Online Learning Approach to Optimizing Time-Varying Costs of AoI, *Oct 2021*
ACM MobiHoc 2021, *Online.*
Computation and Communication Co-Design for Real-Time Monitoring and Control in Multi-Agent Systems, *Oct 2021*

IFIP WiOpt 2021, *Online*.

Age Debt: A General Framework For Minimizing Age of Information,

- LIDS and Stats Tea Talk, MIT. *Apr 2021*
- IEEE INFOCOM AoI Workshop, *Online* *May 2021*

Online Learning for Restless Multi-Armed Bandits, *Jan 2021*
LIDS Student Conference, MIT.

A Whittle Index Approach to Minimizing Functions of Age of Information, *Sep 2019*
Allerton Conference on Communication, Control and Computing, UIUC.

Age Optimal Information Gathering and Dissemination on Graphs,

- IEEE INFOCOM, Paris. *May 2019*
- LIDS Student Conference, MIT, *Best Presentation Runner-Up.* *Feb 2019*