Vishrant Tripathi

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Education

Ongoing **PhD**, *Electrical Engineering and Computer Science*,
Massachusetts Institute of Technology (MIT)
Laboratory for Information and Decision Systems (LIDS)
Advisor: **Prof. Eytan Modiano**.

2017 to 2019 **SM**, *Electrical Engineering and Computer Science*,
Massachusetts Institute of Technology (MIT)
GPA - **5.0**/5.0, Thesis title - "Age of Information & Mobility"
Advisor: **Prof. Eytan Modiano**.

2013 to 2017 **Bachelors of Technology (B.Tech.)**, *Electrical Engineering*,
Indian Institute of Technology, Bombay (IIT-B)
GPA - **9.63**/10.0, Minor in Computer Science
Advisor: **Prof. Sharayu Moharir**.

Interests

Communication Networks, Control and Optimization, Machine Learning, Information Theory.

Publications and Preprints

- "**Computation and communication co-design for real-time monitoring and control in multi-agent systems**" - V. Tripathi, L. Ballotta, L. Carlone, E. Modiano; WiOpt 2021.
- "**Age Debt: A general framework for minimizing age of information**" - V. Tripathi, E. Modiano; IEEE Infocom AoI Workshop 2021.
- "**An online learning approach to optimizing time-varying costs of AoI**" - V. Tripathi, E. Modiano; ACM MobiHoc 2021.
- "**A Whittle index approach to minimizing functions of age of information**" - V. Tripathi, E. Modiano; Allerton Conference on Communication, Control, and Computing, 2019
- "**Age optimal information gathering and dissemination on graphs**" - V. Tripathi, R. Talak, E. Modiano; IEEE Infocom 2019
- "**Age of information for discrete time queues**" - V. Tripathi, R. Talak, E. Modiano; Technical Report, 2018.
- "**Age of information in multi-source systems**" - V. Tripathi, S. Moharir; IEEE GlobeCom 2017.

Experience

Fall'17 to Present **Research Assistant**, *Communications and Networking Research Group, LIDS*, MIT.
- Use tools from probability, optimization, and learning to formulate and solve problems in networking and control
- Design new network control policies to achieve timely information delivery in wireless networks for real-time applications
- Apply our fundamental theory results to IoT, robotics, edge computing and cloud systems

Summer'21 **Research Engineering Intern**, *Capacity Engineering and Analysis*, Facebook, Menlo Park (Remote).
- Worked on a large scale mixed-integer linear programming (MILP) solver, used for long term 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

Spring'19,21 **Teaching Assistant**, *16.36 - Communication Systems and Networks*, MIT.
- Ran a Software Defined Radio (SDR) lab with experiments covering sampling, modulation, interference and practical aspects of wireless communication
- Converted the entire lab to a virtual format so that students could control lab radio equipment from home, rated 7.0/7.0 during subject evaluations

Summer'16 **Internship**, *Second Order Risk Group, Global Markets, Deutsche Bank*, Mumbai.
- Built an analytical and reporting tool to help understand the funding costs of new regulations, which affect the exchange of initial margins on derivatives

Fall'15 **Teaching Assistant**, *Quantum Physics and its Applications*, IIT-B.
- Taught introductory Quantum Physics to a class of 40 freshmen

Summer'15 **Research Assistant**, *Embedded Systems Lab, Prof. M. Shojaei*, IIT-B.
- Worked on a custom embedded system for bio-medical signal acquisition and processing
- Implemented algorithms for noise cancellation and motion artifact reduction of ECG and EEG signals

Relevant Coursework

At MIT
- **Probability/Stats** - Fundamentals of Probability, Advanced Stochastic Processes, Inference and Information, High-dimensional Statistics.
- **Optimization/ML** - Math. Programming, Algebraic & Semidefinite optimization, Machine Learning.
- **Networks/Control** - Data Networks (Theory), Computer Networks (Systems), Dynamic Systems and Control
- **Others** - Algorithmic Game Theory, Foundations of Development Policy, Collective Choice and Political Economy (Fall'21), Kaufman Teaching Certificate Program (Fall'21).

At IIT-B
- Information Theory, Optimization Algorithms, Queuing Theory, Reinforcement Learning, Geometric Algorithms, Introduction to Game Theory, Microeconomics.

Programming Skills

Languages **Proficient**: Python, MATLAB, C/C++, LaTeX **Familiar**: SQL, Verilog, Javascript, CSS.

Platforms Labview/Simulink, GNURadio.

Fellowships and Awards

- **All India Rank 126** in the Join Entrance Exam (JEE) Advanced 2013, amongst 1.3 million candidates
- **Institute Academic Prize**, IIT-Bombay (given to 10 students among 880) for 2015-16
- **Kishore Vaigyanik Protsahan Yojana (KVPY)** fellowship with an **All India Rank of 30**
- Invited by the Govt. of India to view the 62^{nd} **Republic Day Parade** for excellent academic performance at the high school level
- **National Talent Search Examination (NTSE)** scholar

Professional Service

- Co-chair for the LIDS Student Conference, MIT, 2020
- Reviewer for the following IEEE journals
  - Transactions on Networking (ToN),
  - Transactions on Mobile Computing (TMC),
  - Transactions on Communications (TCOM),
  - Internet of Things Journal (IoT),
  - Journal on Selected Areas in Communications (JSAC), and
  - Transactions on Wireless Communications (TWC)
- Reviewer for IEEE International Symposium on Information Theory (ISIT) 2019 & 2020
- Reviewer for IEEE INFOCOM Workshop on Age of Information, 2019
- Co-organizer of LIDS & Stats Tea Talks at MIT, 2019
- Treasurer of the MIT Cricket Club