

# Abhishek Sinha

## Resume

CONTACT ADDRESS	Department of Electrical Engg., IIT Madras Office: ESB-212A, Chennai 600036, India	<a href="mailto:abhishek.sinha@ee.iitm.ac.in">abhishek.sinha@ee.iitm.ac.in</a> <a href="mailto:abhishek.sinha.iisc@gmail.com">abhishek.sinha.iisc@gmail.com</a>  <a href="https://home.iitm.ac.in/abhishek.sinha/">https://home.iitm.ac.in/abhishek.sinha/</a>
TITLE	Assistant Professor Department of Electrical Engineering <b>Indian Institute of Technology Madras</b>	Nov 2018 - Present
EDUCATION	<ul style="list-style-type: none"><li>• DOCTOR OF PHILOSOPHY Laboratory for Information and Decision Systems (LIDS), <b>Massachusetts Institute of Technology</b>, Cambridge, MA Advisor: <b>Prof. Eytan Modiano</b> Committee: Eytan Modiano, Leandros Tassiulas, David Gamarnik Cumulative GPA : <b>5.0 out of 5.0</b></li><li>• MASTER OF TELECOMMUNICATION ENGINEERING Dept. of Electrical Communication Engineering (ECE), <b>Indian Institute of Science</b>, Bangalore, India Advisor: <b>Prof. Anurag Kumar</b> Cumulative GPA : <b>7.6 out of 8.0</b></li><li>• BACHELOR OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING Dept. of Electronics and Telecommunication Engineering (ETCE), <b>Jadavpur University</b>, Kolkata, India Thesis Advisor: <b>Prof. Swagatam Das</b> Cumulative GPA : <b>9.36 out of 10.0</b></li></ul>	September 2012 - June 2017          August 2010 - August 2012       August 2006 - July 2010
WORK EXPERIENCE	<ul style="list-style-type: none"><li>• <b>Qualcomm Research, San Diego, CA</b> Senior Engineer, Wireless R&amp;D</li><li>• <b>Nokia Bell Labs, Murray Hill, NJ</b> Summer Intern, Fixed Networks and the Mathematics of Networks group</li><li>• <b>Microsoft, Redmond, WA</b> Summer Intern, Microsoft Azure and Microsoft Research</li></ul>	Oct 2017 - Oct 2018   June 2016 - August 2016   June 2014 - August 2014
RESEARCH INTERESTS	<ul style="list-style-type: none"><li>• LEARNING, OPTIMIZATION, AND DECISION THEORY: Online learning, Online Convex Optimization, Applied Probability.</li><li>• NETWORKING AND COMMUNICATION: Queueing Theory, Network Control, Information Theory.</li></ul>	

### Journal Preprints/ Under Review

1. **A. Sinha**, R. Bhattacharjee, OPTIMIZING THE AGE-OF-INFORMATION FOR MOBILE USERS IN ADVERSARIAL AND STOCHASTIC ENVIRONMENTS, **arXiv preprint arXiv:2011.05563**, *Under submission in IEEE Transactions on Information Theory* (minor revision).

### Journal Papers

1. J. Zhang, **A. Sinha**, J. Llorca, A. Tulino, E. Modiano, "OPTIMAL CONTROL OF DISTRIBUTED COMPUTING NETWORKS WITH MIXED-CAST TRAFFIC FLOWS", accepted in **IEEE/ACM Transactions on Networking**.
2. R. Bhattacharjee, S. Banerjee, **A. Sinha**, FUNDAMENTAL LIMITS ON THE REGRET OF ONLINE NETWORK-CACHING, **Proceedings of the ACM on Measurement and Analysis of Computing Systems (POMACS)**, Vol. 4, No. 2, Article 25. Publication date: June 2020.
3. **A. Sinha**, E. Modiano, "THROUGHPUT-OPTIMAL BROADCAST IN WIRELESS NETWORKS WITH POINT-TO-MULTIPOINT TRANSMISSIONS", **IEEE Transactions on Mobile Computing**, September 2019.
4. I. Kadota, **A. Sinha**, E. Modiano, "SCHEDULING ALGORITHMS FOR OPTIMIZING AGE OF INFORMATION IN WIRELESS NETWORKS WITH THROUGHPUT CONSTRAINTS", **IEEE/ACM Transactions on Networking**, May 2019.
5. I. Kadota, **A. Sinha**, E. Uysal-Biyikoglu, R. Singh, E. Modiano, "SCHEDULING POLICIES FOR MINIMIZING AGE OF INFORMATION IN BROADCAST WIRELESS NETWORKS", **IEEE/ACM Transactions on Networking**, September 2018.
6. **A. Sinha**, L. Tassiulas, E. Modiano, "THROUGHPUT-OPTIMAL BROADCAST IN WIRELESS NETWORKS WITH DYNAMIC TOPOLOGY", **IEEE Transactions on Mobile Computing**.
7. **A. Sinha**, E. Modiano, "OPTIMAL CONTROL FOR GENERALIZED NETWORK FLOW PROBLEMS", **IEEE/ACM Transactions on Networking**, pp 1-14, issue 99, Dec 2017.
8. **A. Sinha**, G. Paschos, E. Modiano, "THROUGHPUT-OPTIMAL MULTI-HOP BROADCAST ALGORITHMS", **IEEE/ACM Transactions on Networking**, 25.5 (2017): 3088-3101.
9. **A. Sinha**, P. Mani, J. Liu, A. Flavel, D. Maltz, "DISTRIBUTED LOAD MANAGEMENT ALGORITHMS IN ANYCAST-BASED CDNS", **Computer Networks, Elsevier**, 2017.
10. **A. Sinha**, G. Paschos, C.P. Li, E. Modiano, "THROUGHPUT-OPTIMAL MULTIHOP BROADCAST ON DIRECTED ACYCLIC WIRELESS NETWORKS", in **IEEE/ACM Transactions on Networking**, no. 99, pp. 1-15, 2017.
11. A. Chattopadhyay, **A. Sinha**, M. Coupechoux, A. Kumar, "DEPLOY-AS-YOU-GO WIRELESS RELAY PLACEMENT: AN OPTIMAL SEQUENTIAL DECISION APPROACH USING THE MULTI-RELAY CHANNEL MODEL", **IEEE Transactions On Mobile Computing**, 2017.
12. **A. Sinha**, A. Chattopadhyay, K.P. Naveen, P. Mondal, M. Coupechoux, A. Kumar, "OPTIMAL SEQUENTIAL WIRELESS RELAY PLACEMENT ON A RANDOM LATTICE PATH", **Ad Hoc Networks, Elsevier**, vol. 21, pp. 1-17, 2014.
13. **A. Sinha**, S. Das, B.K. Panigrahi, "A LINEAR STATE-SPACE ANALYSIS OF THE MIGRATION MODEL IN AN ISLAND BIOGEOGRAPHY SYSTEM", **IEEE Transactions on Systems, Man and Cybernetics Part-A**, vol. 41, no. 2, pp. 331-337, 2011.

## Refereed Conference Papers

1. S. Mukhopadhyay, S. Sahoo, **A. Sinha**,  $k$ -EXPERTS - ONLINE POLICIES AND FUNDAMENTAL LIMITS, **AISTATS 2022**
2. D. Paria, **A. Sinha**, LEADCACHE: REGRET-OPTIMAL CACHING IN NETWORKS, **NeurIPS 2021**
3. Vishnu B, **A. Sinha**, FAST AND SECURE ROUTING ALGORITHMS FOR QUANTUM KEY DISTRIBUTION NETWORKS, **COMSNETS 2022**, Bangalore, India.
4. A. Mandal, R. Bhattacharjee, **A. Sinha**, OPTIMIZING AGE-OF-INFORMATION IN ADVERSARIAL ENVIRONMENTS WITH CHANNEL STATE INFORMATION, **COMSNETS 2022**, Bangalore, India.
5. **S. Mukhopadhyay**, **A. Sinha**, ONLINE CACHING WITH OPTIMAL SWITCHING REGREER, International Symposium on Information Theory (**ISIT 2021**), Melbourne, Australia.
6. R. Bhattacharjee and **A. Sinha**, COMPETITIVE ALGORITHMS FOR MINIMIZING THE MAXIMUM AGE-OF-INFORMATION, Mathematical performance Modeling and Analysis Workshop (**MAMA 2020**), Boston, MA, USA (held in conjunction with SIGMETRICS 2020).
7. R. Bhattacharjee, S. Banerjee, **A. Sinha**, FUNDAMENTAL LIMITS ON THE REGRET OF ONLINE NETWORK-CACHING, Proceedings of ACM **SIGMETRICS 2020**, Boston, MA, USA.
8. S. Banerjee, R. Bhattacharjee, **A. Sinha**, FUNDAMENTAL LIMITS OF AGE-OF-INFORMATION IN STATIONARY AND NON-STATIONARY ENVIRONMENTS, Proceedings of IEEE International Symposium on Information Theory (**ISIT**) 2020, LA, USA.
9. A. Srivastava, **A. Sinha**, K. Jagannathan, ON MINIMIZING THE MAXIMUM AGE-OF-INFORMATION FOR WIRELESS ERASURE CHANNELS, Proceedings of **RAWNET 2019**, Avignon, France.
10. **A. Sinha**, M. Andrews, P. Ananth, SCHEDULING ALGORITHMS FOR 5G NETWORKS WITH MID-HAUL CAPACITY CONSTRAINTS, Proceedings of **WiOpt 2019**, Avignon, France.
11. **A. Sinha**, E. Modiano, NETWORK UTILITY MAXIMIZATION WITH HETEROGENEOUS TRAFFIC FLOWS, Proceedings of **WiOpt 2018**, Shanghai, China.
12. I. Kadota, **A. Sinha**, E. Modiano, "OPTIMIZING AGE OF INFORMATION IN WIRELESS NETWORKS WITH THROUGHPUT CONSTRAINTS", Proceedings of IEEE **INFOCOM 2018**, Honolulu, HI, USA (**Best Paper Award**).
13. J. Zhang, **A. Sinha**, J. Llorca, A. Tulino, E. Modiano, "OPTIMAL CONTROL OF DISTRIBUTED COMPUTING NETWORKS WITH MIXED-CAST TRAFFIC FLOWS", Proceedings of IEEE **INFOCOM 2018**, Honolulu, HI, USA.
14. **A. Sinha**, E. Modiano, "THROUGHPUT-OPTIMAL BROADCAST IN WIRELESS NETWORKS WITH POINT-TO-MULTIPOINT TRANSMISSIONS", *Proceedings of the 18th ACM International Symposium on Mobile Ad Hoc Networking and Computing*, (**MobiHoc**) 2017, Chennai, India.
15. **A. Sinha**, E. Modiano, "OPTIMAL CONTROL FOR GENERALIZED NETWORK-FLOW PROBLEMS", Proceedings of IEEE **INFOCOM 2017**, Atlanta, GA.
16. **A. Sinha**, L. Tassiulas, E. Modiano, "THROUGHPUT-OPTIMAL BROADCAST IN WIRELESS NETWORKS WITH DYNAMIC TOPOLOGY", *Proceedings of the 17th ACM International Symposium on Mobile Ad Hoc Networking and Computing*, (**MobiHoc**) 2016, Paderborn, Germany (**Best Paper Award**).
17. **A. Sinha**, G. Paschos, E. Modiano, "THROUGHPUT-OPTIMAL MULTI-HOP BROADCAST ALGORITHMS", Proceedings of the 17th ACM International Symposium on Mobile Ad Hoc Networking and Computing, (**MobiHoc**) 2016, Paderborn, Germany.
18. **A. Sinha**, G. Paschos, C.P. Li, E. Modiano, "THROUGHPUT-OPTIMAL BROADCAST ON DIRECTED ACYCLIC GRAPHS", IEEE **INFOCOM 2015**, Hong Kong, PRC.

19. **A. Sinha**, P. Mani, J. Liu, A. Flavel, D. Maltz, “DISTRIBUTED LOAD MANAGEMENT IN ANYCAST-BASED CDNS”, *53rd Annual Allerton Conference on Communication, Control, and Computing (Allerton)* 2015, Monticello, IL, USA.
20. A. Chattopadhyay, **A. Sinha**, M. Coupechoux, A. Kumar, “OPTIMAL CAPACITY RELAY NODE PLACEMENT IN A MULTI-HOP NETWORK ON A LINE”, *10th International Symposium on Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks, WiOpt* 2012, Paderborn, Germany.

#### PATENTS/IDFS

- “**Integrated Scheduler for Scheduling with X-Haul Capacity Constraints.**”, M. Andrews, P. Ananth, **A. Sinha**, Invention submission # 81991 at Nokia Bell Labs. US Patent No: US20180376489A1.
- “**Physical Uplink Control Channel Reliability Enhancements**”, A. Sinha et al., US Patent application.
- “**Uplink Control Channel Beam Switch Procedure**”, A. Sinha et al., US Patent application.
- “**TCI Indication Procedure for UL Control**”, Qualcomm IDF #182761IDF, March 2018. Inventors: M.P.J. Wilson, S. Akkarakaran, T. Luo, Y. Zhou, X.F. Wang, W. Nam, **A. Sinha**.
- “**PUCCH Reliability Enhancements**”, Qualcomm IDF #182660IDF, March 2018. Inventors: X.F. Wang, T. Luo, S. Akkarakaran, M.P.J. Wilson, Y. Zhou, W. Nam, **A. Sinha**, J. Montojo.

#### AWARDS AND HONORS

- Recipient of the **INSA Medal for Young Scientists (2021)**, awarded by the Indian National Science Academy, New Delhi, India
- Recipient of the **Best Paper Award** in **IEEE INFOCOM 2018**, Honolulu, HI, USA
- Recipient of the **Best Paper Award** in *Proceedings of the 17th ACM International Symposium on Mobile Ad Hoc Networking and Computing, ACM MobiHoc 2016*, Paderborn, Germany
- Recipient of Prof. Jnansaran Chatterjee Memorial **Gold Medal** and T.P. Saha Memorial **Gold Centered Silver Medal** from Jadavpur University, Kolkata in the year 2010
- Recipient of *Senior Jagadis Bose National Science Talent Search (JBNSTS)* scholarship, 2007 (awarded to approximately 20 students annually among all branches of science and engineering in the state of West Bengal, India)

#### MAJOR ACADEMIC ACHIEVEMENTS

- Secured **All India Rank 2** (out of approximately 1,00,000 students) in the *Graduate Aptitude Test in Engineering (GATE)* 2010, in Electronics and Communication Engineering.
- Ranked **2<sup>nd</sup>** in the department (ETCE) at **Jadavpur University**, Kolkata
- Secured **All India Rank - 16** in *West Bengal Joint Entrance Examination (WBJEE 2006)* in the Engineering entrance test (out of approximately 80,000 students)

#### TEACHING

- **Spring 2022**: Topics in Random Processes and Concentrations (EE6112)
- **Fall 2021**: Probability Foundations for Electrical Engineers (EE5110)
- **Spring 2021**: Topics in Random Processes and Concentrations (EE 6112)
- **Fall 2020**: Advanced Topics in Artificial Intelligence (EE 6180)
- **Spring 2020**: Topics in Random Processes and Concentrations (EE 6112)
- **Fall 2019**: Advanced Topics in Artificial Intelligence (EE 6180)
- **Spring 2019**: Topics in Random Processes and Concentrations (EE 6112)

STUDENT ADVISING  
& MENTORING

- **Post Doc**

1. Samrat Mukhopadhyay\* (currently an Assistant Professor at the dept. of Electronics Engg. at IIT (ISM) Dhanbad)

- **PhD**

1. Krishnakumar

- **MS**

1. Debjit Paria (student at CMI)
2. Shilajeet Banerjee
3. Nithin V (co-advised with Dr. Avhishek Chatterjee)
4. Subhankar Banerjee\*<sup>1</sup> (co-advised with Dr. K. Giridhar)

- **Undergraduate/ Dual-degree**

1. Sourav Sahoo
2. Abhijeet Vyas\* (currently a PhD student at Purdue University)
3. Arunabh Srivastava\* (currently a PhD student at the University of Maryland, College Park)
4. Vishnu B\* (currently at Oracle)
5. Bodagala Viswa Chaitanya\* (currently at Qualcomm)

- **Project Associate**

1. Ativ Joshi (from CMI)
2. Shahbaz Akhtar (IIT Patna)
3. Sarvagya Gupta\* (from NYU)
4. Rajarshi Bhattacharjee\* (now a PhD student at U. Mass. Amherst)
5. Avijit Mandal\* (now a PhD student at Duke University)

GRANTS

- Founder and Principal Investigator for the IoE sponsored potential Center of Excellence (CoE) INTELLIGENT NETWORKS, IIT Madras.
- Principal Investigator for the Qualcomm (USA) sponsored project on “Low latency beam management for 5G NR”, September 2019.

ACADEMIC VISITS

- **Yale Institute of Network Science**

Summer 2015

- Worked with Prof. Leandros Tassiulas on Throughput-Optimal Broadcasting in time-varying networks.

INVITED TALKS

Workshop on Stochastic Models, IIT Bombay (March 2021), ISI Kolkata (July 2019), JTG Summer School, IIT Madras (June 2019), Huawei Mathematical and Algorithmic Research Lab, Paris (June 2019), IISc Bangalore (Jan 2018, Jan 2016), IIT Bombay (Jan 2018), IIT Kanpur (Jan 2018), IIT Kharagpur (Jan 2018), IIT Madras (Nov 2017), IIT Delhi (Nov 2017), Renaissance Technologies (Rentec, May 2017), Qualcomm Research (March 2017), UC San Diego (Feb 2017), Tata Institute of Fundamental Research (Jan, 2017), Nokia Bell Labs (June 2016), Yale Institute of Network Science (June 2015).

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<sup>1</sup>\*=graduated

PROFESSIONAL/  
VOLUNTARY  
SERVICES

- Member of Project Review and Steering Group (PRSG) for a Ministry of Electronics & Information Technology sanctioned project carried out in SAMEER, Chennai
- TPC member of COMSNETS 2021, WIOPT 2020, SPCOM 2020, WIOPT 2021.
- **Served as an anonymous reviewer** for journals including IEEE/ACM TRANSACTIONS ON NETWORKING, IEEE TRANS. ON INFORMATION THEORY, IEEE TRANS. ON MOBILE COMPUTING, IEEE TRANS. ON WIRELESS COMMUNICATIONS, PERFORMANCE EVALUATION, IEEE TRANS. ON CONTROL OF NETWORK SYSTEMS.
- Served on the executive board of **Sangam** (the Indian student association at MIT) as the webmaster during the academic year 2015-2016.