Abhishek Sinha — Resume

Contact Address

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Education

- Doctor of Philosophy

  Laboratory for Information and Decision Systems (LIDS), **Massachusetts Institute of Technology**, Cambridge, MA
  United States of America
  Cumulative GPA : **5.0 out of 5.0**
  September 2012 - Present

- Master Of Telecommunication Engineering

  Dept. of Electrical Communication Engineering (ECE), **Indian Institute of Science**, Bangalore, India
  Cumulative GPA : **7.6 out of 8.0**
  August 2010 - August 2012

- Bachelor Of Electronics And Telecommunication Engineering

  Dept. of Electonics and Telecommunication Engineering (ETCE), **Jadavpur University**, Kolkata, India
  Cumulative GPA : **9.36 out of 10.0**
  August 2006 - July 2010

Work Experience

- **Nokia Bell Labs, Murray Hill, NJ** — June 2016 - August 2016
  Summer Intern,
  Wired Communications and Mathematics of Networks

- **Microsoft Corp., Redmond, WA** — June 2014 - August 2014
  Summer Intern,
  Windows Azure and Microsoft Research

Research Interests

- Networks: Resource allocation, Network Control, Generalized Back-Pressure Algorithms, Network Science, Optimal Deployments
- Algorithms and Discrete Structures: Combinatorial Algorithms, Graph Theory, Randomized Algorithms, Theory of Computing
- Information Theory: Shannon Theory, Network Coding, Network Information Theory, Statistical Physics
- Optimization and Stochastic Processes: Convex Optimization, Queuing Theory, Markov Decision Processes, Evolutionary Computing

Graduate Research Works

- **Topic** : Throughput Optimal Algorithms for General Network Flow Problems
  - **Advisor** : **Prof. Eytan Modiano** — September 2012 - Present
  - **Description** : In my ongoing doctoral work I have developed a class of decentralized, dynamic, throughput optimal algorithms for general network flow problems, including unicast, broadcast, multicast and anycast. This solves many of the classical problems in the field of data networks.

– **Publications** :

1. **A. Sinha**, G. Paschos, C.P. Li, Eytan Modiano, Throughput-Optimal Multihop Broadcast on Directed Acyclic Wireless Networks, *To appear* in **IEEE/ACM Trans. on Networking.**
2. **A. Sinha**, G. Paschos, C.P. Li, Eytan Modiano, Throughput-Optimal Broadcast on Directed Acyclic Graphs, **INFOCOM, 2015.**
3. **A. Sinha**, L. Tassiulas, E. Modiano, Throughput-Optimal Broadcast in Wireless Networks with Dynamic Topology, **MobiHoc, 2016 (Best Paper Award).**
4. **A. Sinha**, G. Paschos, E. Modiano, Throughput-Optimal Multi-hop Broadcast Algorithms, **MobiHoc, 2016.**

- **Topic** : Distributed Load Management Algorithms for **Bing**^{TM} Networks
  - **Description** : As a research intern at Microsoft, I worked on the problem of online distributed load balancing for the Bing servers. I developed effective load balancing algorithms for the anycast architecture using tools from convex optimization and analyzed their performance using dynamical systems theory.
  - **Publications** :
    1. **A. Sinha**, P. Mani, J. Liu, A. Flavel, D. Maltz, Distributed Load Management in Anycast-based CDNs, **Allerton, 2015**
    2. **A. Sinha**, P. Mani, J. Liu, A. Flavel, D. Maltz, Distributed Load Management Algorithms in Anycast-based CDNs, *submitted* to **Computer Networks, Elsevier**.
- **Topic** : Optimal Impromptu Deployment Of A Wireless Sensor Network Along A Random Lattice Path
  - **Advisor** : **Prof. Anurag Kumar** May 2011 - May 2012
  - **Description** : In this work, I characterized the Optimal Relay node deployment policy for sequential deployment of a limited number of wireless relays along a random lattice path of unknown length, using methods of Markov Decision Processes.
  - **Publication** :
    1. **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, 2014**.
- **Topic** : Optimal Capacity Relay Node Placement in a Multi-hop Network on a Line
  - **Advisor** : **Prof. Anurag Kumar**
  - **Publications** :
    1. A. Chattopadhyay, **A. Sinha**, M. Coupechoux, A. Kumar, Optimal Capacity Relay Node Placement in a Multi-hop Wireless Network on a Line, **IEEE Trans. On Mobile Computing, 2016**.
    2. A. Chattopadhyay, A. Sinha, M. Coupechoux, A. Kumar, Optimal Capacity Relay Node Placement in a Multi-hop Network on a Line, **WiOpt, 2012**.

Under Graduate Research Works

- **Topic** : Convergence and Stability Analysis of Certain Bio-inspired Evolutionary Optimization Algorithms
  - **Advisor** : **Prof. Swagatam Das**
  - **Description** : In this work, I proved the convergence of a bio-inspired optimization algorithm called BBO, using Perron-Frobenius theory.
  - **Publication** :
    1. **A. Sinha**, S. Das, B.K. Panigrahi, A Linear State-Space Analysis of the Migration Model in an Island Biogeography System, **IEEE Trans. on Systems, Man and Cybernetics Part-A, 2011**.

Talks

- **Topic** : Throughput-Optimal Packet Broadcast in Wireless DAGs
  `Presented` at
  - Nokia Bell Labs, June, 2016
  - Indian Institute of Science (IISc), Bangalore January 2016
  - Yale Institute of Network Science, Yale University June 2015
  - IEEE INFOCOM, Hong Kong April 2015
  - LIDS Student Conference, MIT January 2014

Major Academic Achievements

- Secured **All India Rank 2** (out of approximately 1,00,000 students) in *Graduate Aptitude Test in Engineering* (**GATE**), 2010 in Electronics and Communication Engineering.
- Secured **class rank 2** (out of 27 students in the class) in Master's studies in *Indian Institute of Science* in M.E. Telecom.
- Secured overall **class rank 2** in under-graduate studies (out of 56 students in the class) in *Bachelor of Electronics and Telecommunication Examination*, 2010 at Jadavpur University.
- Secured **All India Rank 16** in *West Bengal Joint Entrance Examination* (**WBJEE, 2006**) in Engineering Stream (out of approximately 80,000 students).
- Secured **projected rank 11** (out of approximately 4,50,000 students) in the *Higher-Secondary Examination, 2006* (pre-university), with **97.3%** marks.
- Secured **projected rank 25** (out of approximately 5,50,000 students) in the *Secondary Examination, 2004* (school-leaving), with **93.5%** marks.

Awards and Honors

- Recipient of the **Best Paper Award** in **Mobihoc, 2016**.
- Recipient of the prestigious *Senior Jagadis Bose National Science Talent Search* **(JBNSTS)** scholarship (awarded to approximately 10-20 students annually among all branches of science in the State of West Bengal, India).(`http://jbnsts.org/`)
- Recipient of **Gold Centred Silver Medal** for securing the *highest total aggregate marks in theoretical papers in under-graduate* in Bachelor of Electronics and Telecommunication Engineering Examination, 2010 at Jadavpur University.
- Recipient of **Gold Medal** for securing the *highest aggregate marks* in *Electromagnetic Theory*

and Antenna and *Propagation of Electromagnetic Waves and Radar Engineering* taken together at the Bachelor of Electronics and Telecommunication Engineering Examination, 2010.

- School-level certificates of merit from *All India Science Teachers' Association*, 2003; *Academic Science Culture and Promotion Society*, 2002, 2003; *Bongiyo Bhugol Mancha* (Geography Contest), 2003; *Kalyan Tirtha*, 2002, 2003.

Semester Grade Point Averages (GPA)

- **Graduate Courses** (MIT, USA) 2012 - Present
  - Overall CGPA : **5.0 out of 5.0**

- **Graduate Courses** (IISc, Bangalore, India) 2010 - 2011
  - Overall CGPA : **7.6 out of 8.0**
  - Rank in the graduating class (M.E. Telecom.) : **2nd**

- **Under-Graduate Courses** (Jadavpur University, Kolkata, India) 2006 - 2010
  - Overall CGPA : **9.36 out of 10.0**
  - Rank in the graduating class (ETCE) : **2nd**

Courses taken at the Graduate Level (MIT)

- **1st Year, 1st Semester** Fall 2012
  - 6.255 Optimization Methods
  - 6.263 Data Communication Networks
- **1st Year, 2nd Semester** Spring 2013
  - 6.262 Discrete Stochastic Processes
  - 6.268 Network Science and Models
- **2nd Year, 1st Semester** Fall 2013
  - 6.265 Advanced Stochastic Processes
- **2nd Year, 2nd Semester** Spring 2014
  - 6.253 Convex Analysis and Optimization
- **3rd Year, 1st Semester** Fall 2014
  - 9.520 Statistical Learning Theory
- **3rd Year, 2nd Semester** Spring 2015
  - 6.891 Advanced Topics in Theoretical Computer Science
- **4th Year, 1st Semester** Fall 2015
  - 6.231 Dynamic Programming and Stochastic Control
- **4th Year, 2nd Semester** Spring 2016
  - 6.441 Information Theory

Courses taken at the Graduate Level (IISc)

- **1st Year, 1st Semester** Fall 2010
  - Information Theory
  - Error Control Codes
  - Random Processes
  - Communication Networks
  - Digital Communications

- **1st Year, 2nd Semester** Spring 2011
  - Stochastic Processes and Queuing Theory

- Wireless Communications
- Wireless Networks
- Detection and Estimation Theory
- Game Theory

- **2nd Year, 1st Semester** Fall 2011
  - Matrix Theory
  - Next-Generation Wireless Systems

Lab Visits

- **Yale Institute of Network Science** Summer 2015
  - Collaborated with Prof. Leandros Tassiulas on Throughput-Optimal Broadcasting in time-varying networks.

Summer Schools And Workshops

- Participated in The Summer School On Security And Privacy, 2011 organized by **Microsoft Research**.
- Participated in the school and workshop on Introduction to Network Sciences, August, 2011 organized by **IISc Mathematics Initiative (IMI)**.

Technical Qualifications

- **Served as an anonymous reviewer** of the following journals and conferences: IEEE Transactions on Networking (IEEE-TON), IEEE Transactions on Mobile Computing (IEEE-TMC), IEEE Transactions on Wireless Communications (IEEE-TWC), ACM Transactions on Autonomous And Adaptive Systems (ACM-TAAS), Journal of Network and Computer Applications (JNCA), Elsevier, International Symposium on Information Theory (ISIT).
- **Programming Languages Known** : C, Python
- **Other Tools/ Softwares Known** : Matlab.

Extra Curricular Activities And Hobbies

- I was on the executive board of **Sangam** (the Indian student association at MIT) and served as its webmaster.
- Participated in online algorithmic programming contests like SPOJ (`http://www.spoj.pl`). Regular problem solver in Brilliant (`https://brilliant.org/`).
- Participated in sports since childhood and won accolades several times.

References

Available on request.