

Siddharth Jain

CONTACT INFORMATION

Department of Electrical Engineering (EE)
Caltech
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RESEARCH INTERESTS

Information and Coding Theory, Statistics, Combinatorics, Machine Learning, Signal Processing and Bioinformatics.

EDUCATION

California Institute of Technology
PhD Candidate, Electrical Engineering ; GPA 4.1/4

Advisor: Prof. Jehoshua Bruck
Sept. 2013 - present

Indian Institute of Technology Kanpur
B. Tech and M. Tech in Electrical Engineering
GPA: B. Tech 9.9/10, M. Tech 10/10
Erdős Number: 2.

Advisor: Prof. R. K. Bansal
2008 - 2013

PUBLICATIONS

Journal (Accepted/Published)

1. **Siddharth Jain**, Farzad Farnoud, Jehoshua Bruck
Capacity and Expressiveness of Genomic Tandem Duplication.
IEEE Transactions on Information Theory, vol 63, no 10, pp. 1629-1638, October 2017.
2. **Siddharth Jain**, Farzad Farnoud, Moshe Schwartz, Jehoshua Bruck
Duplication Correcting Codes for Data Storage in the DNA of a living organism
IEEE Transactions on Information Theory, vol 63, no 8, pp. 4996-5010, August 2017.
3. Noga Alon*, Jehoshua Bruck*, Farzad Farnoud*, **Siddharth Jain***
Duplication Distance to the root for binary sequences.
IEEE Transactions on Information Theory, vol 63, no 12, pp. 7793-7803, December 2017
(*author list in alphabetical order).
4. **Siddharth Jain**, R. K. Bansal
On Match Lengths, Zero Entropy and Large Deviations - with Application to Sliding Window Lempel-Ziv Algorithm.
IEEE Transactions on Information Theory, vol. 61, no. 1, pp. 120-132, January 2015.
5. Paul Bogdan, **Siddharth Jain**, Radu Marculescu
Pacemaker Control of Heart Rate Variability: A CPS Perspective.
ACM Transactions on Embedded and Computing Systems (TECS), vol. 12, no. 1s, article 50, March 2013.
6. Paul Bogdan, Radu Marculescu, **Siddharth Jain**
Dynamic Power Management for Multi-domain Processor Systems-on-Chip Platforms: An Optimal Control Approach.
ACM Transactions on Design Automation of Electronic Systems (TODAES), vol. 18, no. 4, article 46, October 2013.

Journal (in preparation)

1. **Siddharth Jain**, Netanel Raviv, Bijan Mazaheri, Jehoshua Bruck
On the onset probability of cancer using mutation rate and copy number in DNA.

Conference

1. **Siddharth Jain**, Netanel Raviv, Jehoshua Bruck
Attaining the 2nd Chargaff Rule by Tandem Duplications
accepted in 2018 IEEE International Symposium on Information Theory (ISIT).
2. **Siddharth Jain**, F. Farnoud, M. Schwartz, J. Bruck
Noise and Uncertainty in String-Duplication Systems
in Proceedings of IEEE International Symposium on Information Theory (ISIT), pp. 3120-3124, Aachen, Germany, June 2017.
3. **Siddharth Jain**, F. Farnoud, M. Schwartz, J. Bruck
Duplication Correcting Codes for DNA Storage in DNA of living organism
in Proceedings of IEEE International Symposium on Information Theory (ISIT), pp. 1028-1032, Barcelona, Spain, July 2016.
4. Noga Alon*, J. Bruck*, F. Farnoud*, **Siddharth Jain***
On the Duplication Distance of Binary Strings
in Proceedings of IEEE International Symposium on Information Theory (ISIT), pp. 260-264, Barcelona, Spain, July 2016 (*author list in alphabetical order).
5. **Siddharth Jain**, F. Farnoud, J. Bruck
Capacity and Expressiveness of Genomic Tandem Duplication.
in Proceedings of 2015 IEEE International Symposium on Information Theory (ISIT), pp. 1946-1950, Hong Kong, July 2015.
6. **Siddharth Jain**, R. K. Bansal
On Match Lengths and Asymptotic Behavior of Sliding Window Lempel-Ziv Algorithm for Zero Entropy Sequences.
IEEE International Symposium on Information Theory (ISIT), pp. 2885-2889, Istanbul, Turkey, Jul 2013.
7. **Siddharth Jain**, R. K. Bansal
On Large Deviation Property of Recurrence Times.
IEEE International Symposium on Information Theory (ISIT), pp. 2880-2884, Istanbul, Turkey, Jul 2013.
8. Paul Bogdan, Radu Marculescu, **Siddharth Jain**, Rafael Tornero
Optimal Power Management of Multidomain Multiprocessor Platforms under Highly Variable Workloads.
Proceedings of the 6th ACM/IEEE International Symposium on Networks-on-Chip (NOCS), pp. 35-42, Copenhagen, Denmark, May 2012 (**Best Paper Award**)
9. Paul Bogdan, **Siddharth Jain**, Kartikeya Goyal, Radu Marculescu
Implantable Pacemakers Control and Optimization via Fractional Calculus Approaches: A Cyber-Physical Systems Perspective.
Proceedings of the ACM/IEEE 3rd International Conference on Cyber-Physical Systems (IC-CPS), pp. 23-32, Beijing, China, April 2012.

Invited Talks

1. *Decoding the Past.*
Molecular Programming Project (MPP) Workshop, Boston, Massachusetts, December 2016.
2. *Biological Information Channel.*
IPAM Computational Genomics Summer Institute (CGSI), UCLA, July 2016.
3. *Duplication Correcting Codes for DNA Storage.*
Molecular Programming Project (MPP) Workshop, Seattle, Washington, January 2016.

Posters

1. **Siddharth Jain**, F. Farnoud, M. Schwartz, Jehoshua Bruck
Capacity and Diversity of Tandem Duplication.

Molecular Programming Project (MPP) Workshop, Jan 9-11, 2015, San Francisco California.
[Invited]

ACADEMIC
ACHIEVEMENTS

- PhD fellowships from Caltech, Cornell, USC, UCSD, CMU.
- **Best paper award** at 6th ACM/IEEE International Symposium on Networks-on-Chip (NOCS), 2012
- Ranked **first** out of 97 EE UG and dual degree students and **first** out of 221 five year course students at IIT Kanpur.
- **Academic Excellence Award** (awarded to top 5%) for all academic years at IIT Kanpur
- Selected for **CSSI REU-Internship at Carnegie Mellon University** given to 5 students all over India, 2011
- Selected among top 2 undergraduate students of IIT Kanpur for **Indo German Winter Academy, 2010** to attend a course on Semiconductor Processes and Devices
- Ranked Amongst top 0.2% students in India writing the **Indian Institute of Technology Joint Entrance Exam (JEE)** 2008
- **Certificate of merit** in Chemistry (awarded to top 0.1% in the country) in All India Senior Secondary Certificate Examination 2008

PROFESSIONAL
ACTIVITIES

Reviewer for IEEE Transactions on Information Theory, IEEE Communication Letters, ACM Transactions on Algorithms.

RELEVANT COURSES Combinatorics, Communication Theory (A), Statistical Inference, Information Theory (A,B), Learning Systems, Machine Learning and Data Mining (Audit), Error Correcting Codes, Theory of Computation, Data Structures and Algorithms, Randomized Algorithms, Signals, Systems and Networks, Digital Signal Processing, Image Processing, Wavelet Transforms for Signal and Image Processing, Probability (A,B), Stochastic Processes, Markov Chains, Real and Complex Analysis, Differential Equations, Control System Analysis, Linear Estimation.

COMPUTER SKILLS **Languages:** C, C++, Python, L^AT_EX, Matlab, HTML

POSITION OF
RESPONSIBILITY

Treasurer of the Caltech Cricket Club (Sept 2015 - present)

Head TA for IST4 (Spring 2015, 2016, 2017)

- An Information and Logic class offered to undergraduates at Caltech

Treasurer of the Indian Subcontinent Organization at Caltech (Sept 2014-Aug 2015)

TA- Representation and Analysis of Random Signals at IIT Kanpur (Aug 2012-Nov 2012)

Link Student, Counselling Service, IIT Kanpur

Mentor at National Service Scheme (NSS), India

REFERENCES

Prof. Jeshoshua Bruck

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Computation and Neural Systems & Electrical Engineering
Caltech, MC 136-93, Pasadena, CA 91125
Office: Moore Building, room 331
Phone: (626) 395-4852
Email: bruck@caltech.edu

Prof. P. P. Vaidyanathan

Professor of Electrical Engineering
Caltech, MC 136-93, Pasadena, CA 91125
Email: ppvnath@systems.caltech.edu

Prof. Moshe Schwartz

Associate Professor
Department of Electrical and Computer Engineering
Ben-Gurion University
Beer Sheva 8410501
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