Siddharth Jain

CONTACT INFORMATION

Department of Electrical Engineering (EE)
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RESEARCH INTERESTS

Genome, Disease Prediction, Information and Coding Theory, Bioinformatics, Machine Learning.

EDUCATION

California Institute of Technology — Advisor: Prof. Jehoshua Bruck
PhD Candidate, Electrical Engineering ; GPA 4.1/4 — *Sept. 2013 - present*
PhD Thesis Title: Decoding the Past

Indian Institute of Technology Kanpur — Advisor: Prof. R. K. Bansal
B. Tech and M. Tech in Electrical Engineering — *2008 - 2013*
GPA: B. Tech 9.9/10, M. Tech 10/10
Erdös Number: 2

PATENT

Siddharth Jain, Bijan Mazaheri, Netanel Raviv, Jehoshua Bruck
Disease Risk Estimation from Mutation Profile of the Genome
Provisional Patent filed June 2018.

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**, Bijan Mazaheri, Netanel Raviv, Jehoshua Bruck
   Cancer Risk Estimation from Mutation Profile of the Genome.
   to be submitted, will also appear on bioRxiv shortly

Preprints

1. **Siddharth Jain**, Bijan Mazaheri, Netanel Raviv, Jehoshua Bruck
   Short Tandem Repeat Information in TCGA is biased! (on bioRxiv shortly)

Conference

1. **Siddharth Jain**, Netanel Raviv, Jehoshua Bruck
   Attaining the 2nd Chargaff Rule by Tandem Duplications
   in Proceedings of IEEE International Symposium on Information Theory (ISIT), pp. 2241-2245, Vail, Colorado, June 2018.
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

- **General Proficiency Medal** for the best academic performance in EE department at IIT Kanpur.
- PhD fellowships from Caltech, Cornell, USC, UCSD, CMU.
- **Best paper award** at 6th ACM/IEEE International Symposium on Networks-on-Chip (NOCS), 2012.
- **Academic Excellence Award** (awarded to top 5% undergraduates) for all the academic years at IIT Kanpur. (2008-2012)
- Selected for **CSSI REU-Internship at Carnegie Mellon University** given to 5 students all over India, 2011.
- 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, Frontiers in Physiology, International Symposium on Information Theory.

Computer Skills

Programming Languages: C++, Python, Shell, Matlab
Bioinformatics Tools: Samtools, GATK, hipSTR
Machine Learning Libraries: xgboost, sklearn, Keras
Genome Databases: The Cancer Genome Atlas (TCGA), ICGC, 1000 Genome Project
Cloud Services: AWS, hpc cluster.

Position of Responsibility

1. Head TA for IST4 (Spring 2015, 2016, 2017, 2018)
   - An Information and Logic class offered to undergraduates at Caltech by Prof. Shuki Bruck
2. TA for EE111 (Fall 2018)
   - Signal Processing class offered to undergraduates at Caltech by Prof. P. P. Vaidyanthan
3. TA for EE621 (Aug 2012 - Nov 2012)
   - Stochastic Processes and Measure Theory class offered to graduate students at IIT Kanpur by Prof. R. K. Bansal
4. Treasurer of the Caltech Cricket Club (Sept 2015-present) and the Indian Subcontinent Organization at Caltech (Sept 2014-Aug 2015)
5. Link Student, Counselling Service, IIT Kanpur - Help students who are not doing so well academically at IIT Kanpur.
6. Mentor at National Service Scheme (NSS), India - Tutoring 6th-8th grade students in villages of India.

References

Available upon request.