Debarnab Mitra — Curriculum Vitae

Contact Information

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Education

University of California Los Angeles — *Jun '20 - Present*
Ph.D. in Electrical and Computer Engineering — GPA: 4/4
Interests: Coding techniques for blockchain and data storage systems
Information Theory, Wireless communication, Optimization
- Research Assistant in Laboratory for Robust Information Systems, UCLA
- Advancement to candidacy: March 1st, 2021

University of California Los Angeles — *Sept '18 - Jun '20*
M.S. in Electrical and Computer Engineering — GPA: 4/4
- Recipient of the 2019-2020 Distinguished Masters Thesis Award in Signals and Systems

Indian Institute of Technology Bombay — *Jul '14 - Apr '18*
Bachelor of Technology (with Honors) in Electrical Engineering — CGPA: 9.15/10
- Minor degree in Computer Science and Engineering

Publications

Journal

- **Debarnab Mitra**, Lev Tauz, and Lara Dolecek, "Overcoming Data Availability Attacks in Blockchain Systems: Short Code-Length LDPC Code Design for Coded Merkle Tree", *IEEE Transactions on Communications, vol. 70, no. 9, 2022.*
[Paper Link]

Conference

- **Debarnab Mitra**, Lev Tauz, and Lara Dolecek, "Polar Coded Merkle Tree: Improved Detection of Data Availability Attacks in Blockchain Systems", *IEEE International Symposium on Information Theory (ISIT) 2022.*
[Paper Link]
- **Debarnab Mitra**, Lev Tauz, and Lara Dolecek, "Communication-Efficient LDPC Code Design for Data Availability Oracle in Side Blockchains", *IEEE Information Theory Workshop (ITW), pp. 1-6, May 2021.*
[Paper Link]
- **Debarnab Mitra**, Lev Tauz, and Lara Dolecek, "Concentrated Stopping Set Design for Coded Merkle Tree: Improving Security Against Data Availability Attacks in Blockchain Systems", *2020 IEEE Information Theory Workshop (ITW), pp. 1-5, Apr. 2021.*
[Paper Link]
- **Debarnab Mitra** and Lara Dolecek, "Patterned Erasure Correcting Codes for Low Storage-Overhead Blockchain Systems", *IEEE Asilomar Conference on Signals, Systems, and Computers (ACSSC), pp. 1734-1738, Nov. 2019.*
[Paper Link]
- **Debarnab Mitra**, Himanshu Asnani, Sibi Raj B. Pillai, "On the Sum-capacity of Compound MAC Models with Distributed CSI and Unknown Fading Statistics", *Annual Conference on Information Sciences and Systems (CISS), pp. 1-6. Mar. 2019.*
[Paper Link]

Patents

Patent Applications Filed

- **Debarnab Mitra**, Zion S. Kwok, and Ravi H. Motwani, "Dynamic Self-Correction of Message Reliability in LDPC Codes," *US Patent App. 17/171430, filed Feb. 9, 2021.*
[Application]
- **Debarnab Mitra** and Santhosh K. Vanaparthy, "Hybrid LDPC Decoder with Mixed Precision Components," *US Patent App. 17/183223, filed Feb. 23, 2021.*
[Application]

Experience

Graduate Student Researcher, LORIS Lab, UCLA — *Sept '19 - Present*
Guide: Prof. Lara Dolecek, UCLA
- Project: Channel coding for blockchain systems and non-volatile memories

Qualcomm Technologies, San Diego, CA *Summer '22*
Modem Systems Engineer Intern

- Research on 5G-NR LDPC decoders.

Intel Corporation, Santa Clara, CA *Summer '20*
ECC Design Intern, Non Volatile Memory Solutions Group

- Proposed low cost techniques to improve the performance of NB-LDPC decoders tailored for 3DXP and 3D NAND products. The work resulted in filing two patents applications.

Intel Corporation, Santa Clara, CA *Summer '19*
ECC Design Intern, Non Volatile Memory Solutions Group

- Identified potential solutions to improve the FER of existing LDPC decoders from literature
- Worked on deep learning based methods to improve FER performance (especially in the error floor region) of Min-Sum decoders using Tensorflow

Undergraduate Student Researcher, IIT Bombay, India *Jul '17 - Jun '18*
Guide: Prof. Sibi Raj B Pillai, IIT Bombay
Project: Sum capacity of Compound-MACs with distributed CSI

- Derived the sum-capacity for symmetric Compound-MACs with distributed CSI at encoders
- Designed an algorithm to find the optimal single-user power control law in this channel

Schneider Electric, Bangalore, IN *Summer '17*
Systems Engineering Intern, APS group

- Developed loss model for a TOPSwitch flyback AC-DC converter (98% accuracy)
- Designed a multiple output AC-DC converter with features like line over voltage /under voltage (OV/UV) protection, output over voltage protection (OVP) and snubber circuit

Equipminds Solutions, Mumbai, IN *Summer '16*

- Designed and implemented algorithms for a plan engine to generate adaptive study plans for students preparing for various engineering examinations in India

Honors and Awards

Fellowships and Academic awards

- **Best Poster Award** *Jun '21*
  Poster titled "Concentrated Stopping Set Design for Coded Merkle Tree: Improving Security Against Data Availability Attacks in Blockchain Systems" won the best poster award at the IEEE North American School of Information Theory.
- **Distinguished Masters Thesis Award** *2019-2020*
  I am the recipient of the 2019-2020 Distinguished Masters Thesis Award in Signals and Systems from the Electrical and Computer Engineering Department at UCLA.
- **Guru Krupa Fellowship** *2019-20, 2020-21*
  I am the recipient of the Guru Krupa Fellowship by the Electrical and Computer Engineering Department at UCLA.
- **Honorarium Award** *Apr '16*
  I received an honorarium award from IIT Bombay for exemplary work done towards the project titled *"Non Linear Junction Detector"*.
- All India Rank 168 in JEE Advanced '14 *(out of 126,000 candidates)* *2014*
  All India Rank 272 in JEE Mains '14 *(out of 1,400,000 candidates)* *2014*
- **Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship** *2013*
  I am a recipient of the Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship by the Department of Science and Technology, Govt. of India.

Olympiads

- **Gold medalist** in Regional Mathematics Olympiad '12 (RMO), Odisha, conducted by Homi Bhabha Centre for Science Education (HBSCE), India *2012*
- Among top 75 students in India in Indian National Mathematical Olympiad '14 conducted by Homi Bhabha Centre for Science Education (HBSCE), India *2014*

Teaching

Teaching Assistant

ECE 131A: Probability and Statistics, UCLA *Winter 2022, Winter 2021, Winter 2020*
Instructor: Prof. Lara Dolecek, UCLA

ECE 131A MS Online: Probability and Statistics, UCLA *Fall 2022, Fall 2021*
Instructor: Prof. Lara Dolecek, UCLA

ECE 230B: Digital Communication Systems, UCLA *Spring 2020*
Instructor: Prof. Greg Pottie, UCLA

Mentoring

Instructor: Module of Graph Theory and Social Networks *Summer 2022, 2021*
Los Angeles Computing Circle (LACC)

Professional Service

Journal reviewing: IEEE Transactions on Information Forensics and Security
Conference reviewing: IEEE International Symposium on Information Theory (ISIT) 2022
IEEE Information Theory Workshop (ITW) 2022

Relevant Courses

UCLA

- Mathematical Foundations of Data Storage Systems (**A+**), Linear Programming (**A+**), Information Theory, Convex Optimization (**A+**), Digital Speech Processing (**A+**), Optimization methods for Large scale systems, Wireless Communications System Design (**A+**), Computational Imaging, Advanced Speech Processing, Large Sample Theory (**A+**), Combinatorial Theory, Reinforement Learning Theory and Applications (audit)

IIT Bombay

- **EE:** Error Correcting Codes, Wireless and Mobile Communication, Digital Communications, Communication Systems, Digital Signal Processing, Signals and Systems, Network Theory
- **CS:** Foundations of Machine Learning, Computer Networks, Computer and Network security, Data & Structures Algorithms, Design & Analysis of Algorithms, Operating Systems
- **MA:** Probability and Random Processes, Number Theory and Cryptography, Linear Algebra, Discrete Structures, Complex Analysis, Calculus, Differential Equations

Technical Skills

Languages: Python, C++, Bash, Embedded C, PHP, SQL, VHDL, ASSEMBLY
Tools and packages: MATLAB, Tensorflow, Anaconda, Scilab, Android Studio, SAGEMATH
Simulation & Design: GNURadio, Keil IDE, Altera Quartus, Modelsim, Vivado HLS