Berkeley, CA
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Justin Singh Kang

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Education

Ph.D. in Electrical Engineering and Computer Science, *The University of California, Berkeley*. Aug 2021 — Present
Advisor: Kannan Ramchandran. GPA: 4.0

M.A.Sc. in Electrical and Computer Engineering, *The University of Toronto*. Sept 2019 — Aug 2021
Advisor: Wei Yu. GPA: 4.0. Thesis: Scheduling for Massive Random Access.

B.A.Sc. in Engineering Physics *The University of British Columbia*. Sept 2014 — Aug 2019
Graduated with distinction and cooperative program certificate. GPA: 91.1%

Skills

Tools and Languages Python, Git, LaTeX, MATLAB, SystemVerilog, UVM
Quantitative Research Privacy in Learning (DP), Information Theory, Random Processes, Statistics, Communication Systems

Publications, Preprints and Patents

Learning a 1-Layer Conditional Generative Model in Total Variation
Ajil Jalal, **Justin Singh Kang**, Ananya Uppal, Kannan Ramchandran, Eric Price. NeurIPS Dec. 2023.

The Fair Value of Data Under Heterogeneous Privacy Constraints in Federated Learning
Justin Singh Kang, Ramtin Pedarsani and K. Ramchandran. arxiv.2301.13336, NeurIPS FL@FM Oral Dec. 2023, TMLR (Accepted).

Efficiently Computing Sparse Fourier Transforms of q-ary Functions
Justin Singh Kang, Y. E. Erginbas, A. Aghazadeh and K. Ramchandran. arxiv.2301.06200, IEEE ISIT Jun. 2023.

Scheduling versus Contention for Massive Random Access in Massive MIMO Systems
Justin Singh Kang and Wei Yu. IEEE Transactions on Communications, Sept. 2022. Presented in part at SPAWC Talks, 2021.

Minimum Feedback for Collision-Free Scheduling in Massive Random Access
Justin Singh Kang and Wei Yu. IEEE Transactions on Information Theory, Dec. 2021. Presented in part at IEEE ISIT, 2020.
This and the above work were presented together at the **2021 IEEE North American Information Theory School**.

Techniques to use intrinsic information for a bit-flipping error correction control decoder
Aman Bhatia, Zion S. Kwok, **Justin Singh Kang**, Poovaiah M Palangappa, Santhosh Kumar Vanaparthy. US Patent 11,146,289, Granted Oct. 2021.

Work Experience

Research and Development Engineering Intern **May 2017 — Aug 2018**
Intel Corporation *Vancouver, Canada*

- Design and optimization of BCH decoders. Timing analysis, improving parallelism, making use of algebraic identities to reduce area and power, while improving throughput.
- Novel augmentations to belief propagation algorithms for high-throughput, low code-rate LDPC decoders, enabling next generation of NAND memories at higher bit error rates. Use of Machine Learning techniques to optimize decoders.
- Developing novel decoding algorithms to take advantage of knowledge of expected failure mechanisms derived from experimental analysis of Intel Optane storage.

Projects

Efficient Machine Unlearning (Meta-BAIR Program) **Aug 2023 — Present**

- Developing new tools for unlearning algorithms, which are used to remove traces of data that was originally in the training set.
- Exploiting embedding geometry to understand which points are more or less important to unlearn.

Fitness Tracking Using Machine Vision (Entrepreneurial Project) **Jan 2018 — Apr 2019**

- Training an artificial neural network model to classify with 30+ hours of video to classify 11 different exercises.
- Applying statistical tools such as principal component analysis and Fourier transforms to count repetitions.

Awards

Meta AI-BAIR Grant Recipient (https://bcommons.berkeley.edu/data-curation-web-scale-datasets) Fall 2023
Berkeley Graduate Fellowship Fall 2021
NSERC Canadian Graduate Scholarship - Masters/Doctoral (3rd nationally in area) Fall 2020/2021
Bycast Award For Entrepreneurship Fall 2018
Donald J. Evans Scholarship in Engineering (Awarded Twice) Fall 2017/2018