Udit Gupta

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Education

Harvard University, Ph.D. — Cambridge, MA
Computer Science — 2016-Present
Advisors: David Brooks, Gu-Yeon Wei
GPA: 3.87

- **Research Interests:** Computer architecture, machine learning, deep neural networks, hardware accelerators.
- Received Harvard Smith Family Fellowship
- Relevant coursework: Advanced Machine Learning, Algorithms at the End of the Wire

Cornell University, Bachelor of Science — Ithaca, NY
Electrical & Computer Engineering, Computer Science — 2012-2016
Advisor: Professor Zhiru Zhang
GPA: 4.00, Dean's List (All semesters)

- *summa cum laude*, Eta Kappa Nu (HKN, electrical engineering honor society), IEEE student chapter
- Awarded National Science Foundation GRFP honorable mention
- Presented at Design Automation Conference's student forum with Richard A. Newton Young Fellows Scholarship
- Received Cornell ECE Early Research Career Scholarship
- Relevant coursework: Computer Architecture, Complex Digital ASIC Design, Embedded Systems

Research and Technical Experience

Harvard University — Cambridge, MA
Graduate Researcher — 2016-Present

- Designed and integrated, using high-level synthesis, neural network accelerators with mobile SoCs. Collaborated with 6 other graduate students and post-docs, to tape out chip in 16nm technology with ARM A53 CPU coherent with 4 accelerator blocks, and 3MB of on-chip memory.
- Helped develop techniques to lossily compress neural networks by up to 500× using probabilistic data structures.
- Investigated reliability in deep learning, for various neural networks, with a large scale empirical study.
- Mentored 2 summer undergraduate student projects in deep learning on low power IoT devices.
- Established long term collaborations with Harvard's natural language processing research group.

Cornell University — Ithaca, NY
Undergraduate Researcher — 2012-2016

- Studied productive and efficient hardware acceleration on FPGAs using high-level synthesis.
- Evaluated optimizations for high-level synthesis including scheduling and mapping techniques, and irregular memory access patterns. Resulted in 2 co-authored publications.
- Led 5 undergraduate students to build an application level benchmark suite for high-level synthesis.

Algo-Logic Systems — Santa Clara, CA
Hardware Design and Verification Engineering Intern — Summer 2015

- Leveraged experience in high-level synthesis to build an OpenCL board support package for clients to interface software kernels with existing low latency network IP on FPGAs.
- Devised software API for configuring OpenCL based FPGA financial data parsers.

Publications

Conference Publications

- Brandon Reagen, **Udit Gupta**, Robert Adolf, Michael Mitzenmacher, Alexander Rush, Gu-Yeon Wei, David Brooks.
  Weightless: Lossy Weight Encoding for Deep Neural Network Compression.
  https://arxiv.org/abs/1711.04686

- Yuan Zhou, **Udit Gupta**, Steve Dai, Ritchie Zhao, Nitish Srivastava, Hanchen Jin, Joseph Featherston, Yi-Hsiang Lai, Gai Liu, Gustavo Velasquez, Wenping Wang and Zhiru Zhang.
  Rosetta: A Realistic Benchmark Suite for Software Programmable FPGAs.
  To appear in 26^{th} ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2018)

- Steve Dai, Ritchie Zhao, Gai Liu, Shreesha Srinath, **Udit Gupta**, Christopher Batten, Zhiru Zhang.
  Dynamic Hazard Resolution for Pipelining Irregular Loops in High-Level Synthesis.
  25^{th} ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2017)

- Mingxing Tan, Steve Dai, **Udit Gupta** and Zhiru Zhang.
  Mapping-Aware Constrained Scheduling for LUT-Based FPGAs.
  23^{rd} ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA 2015)

Workshop Publications

- **Udit Gupta**, Steve Dai, Zhiru Zhang.
  Rosetta: A Realistic Benchmark Suite for Software Programmable FPGAs.
  Suite of Embedded Applications and Kernels (SEAK 2015, co-located with DAC 2015)

Technical Articles

- **Udit Gupta**
  Software Programmable FPGAs.
  Circuit Cellar ("Tech the Future" series, July 2017)

Leadership Experience

Cornell University — Ithaca, NY
Undergraduate Teaching Assistant — 4 semesters

- Conducted office hours and proctored labs, of 30 students, for introductory hardware and software classes.
- Organized tutorial to familiarize incoming computer engineering students with Verilog.
- Collaborated in designing assignments and labs for an online (EdX) course, *"The Computing Inside Your Smart Phone"*.

IEEE Student Chapter — Ithaca, NY
President and Corporate Director — 2013-2016

- Recruited and led 28 undergraduate and graduate students to organize corporate, social, and outreach events.
- Arranged, with administration, recruiting session with 8 companies and over 300 students, and celebratory ECE day.

HKN Electrical Engineering Honor Society — Ithaca, NY
Executive Board Member — 2013-2016

- Led 5 students to administer a *Cornell Splash!* class, *"Computers Don't Byte"*, to de-mystify computers to 24 high school students. Class was offered over multiple semesters and aimed to promote interest in STEM education.

Skills

- Programming: Python, C/C++, Verilog, OpenCL, Java
- CAD Tools: Catapult High-Level Synthesis, Xilinx Vivado Design Suite, Altera Quartus
- Machine Learning Libraries: Keras, PyTorch