

# Neil Adit

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## RESEARCH INTERESTS EDUCATION

Computer Architecture, Deep Learning, Neural Network Hardware Accelerators

**Cornell University** (August 2018- till date)

PhD in Computer Engineering

- Awarded **Eastman Fellowship** support for the first semester

**Indian Institute of Technology, Bombay** (July, 2013- June, 2018)

B.Tech + M.Tech in Electrical Engineering

- **Masters** in Microelectronics, **Minor** in Computer Science
- CGPA: 9.05/10

## RESEARCH EXPERIENCE

**Approximate Computing in Computer Vision** (August, 2018- till date)

Computer Systems Lab, Cornell University

Guide: [Prof. Adrian Sampson](#) | *Research project*

- Exploring activation sparsity in frequency domain for depthwise separable CNNs
- Implementing fast kernels in PyTorch to achieve wall clock speedups on CPU and GPU

**Accelerating 1x1 Convolutions using Systolic Arrays** (October, 2018- December, 2018)

Computer Systems Lab, Cornell University

Guide: [Prof. Zhiru Zhang](#) | *Research project*

- Implemented pointwise convolutions in MobileNets on Zynq ZC-706 using systolic arrays
- Optimized streaming of input activations using quantization, bit packing and padding
- Designed an efficient Dataflow architecture to minimize overhead read/write computations
- Achieved close to ideal, 215x speedup using 16x16 parallel PEs for systolic array architecture

**Parallel Sparse Matrix Solution on FPGA** (July, 2017- June, 2018)

High Performance Computing Lab, IIT Bombay, India

Guide: [Prof. Sachin Patkar](#) | *Master's Thesis*

- Accelerating sparse matrix solvers for performance improvements in SPICE circuit simulators
- Designing a stack based processor with pipelined FPU to process LU expressions parallelly
- Implemented Gilbert-Peierls LU decomposition on ZedBoard using SDSoC and Vivado HLS
- Achieved upto 6x speedup using parallel hardware directives, optimizing off-chip memory access and minimizing arithmetic operations

**Person Re-Identification using Deep Learning** (July, 2017- Dec, 2017)

Vision and Image Processing Lab, IIT Bombay, India

Guide: [Prof. Subhasis Chaudhuri](#) | *Research Project*

- Developing a model to spot person of interest across cameras for surveillance applications
- Modelled a Recurrent Neural Network (temporal features) and CNN (spatial features) based Siamese network for video-based re-identification in Torch
- Applied pose detection to fine-tune model parameters to conduct pose based matching
- Achieved rank-1 accuracy 60% comparable to state-of-the-art with smaller test image sequence

**INDUSTRY  
EXPERIENCE**

**Graduate Research Intern**

(May- Aug, 2019)

[Intel Labs](#), Santa Clara, California, USA

Guide: [Fabrizio Petrini](#) | *Summer Internship*

- Designed and implemented high performance computing algorithms for Intel's breakthrough research architecture

**Kidney Segmentation in CT Images**

(May- Jul, 2016)

[SIEMENS](#) Research, Bangalore, India

Guide: [Dr. Amit Kale](#) and [Prabhu Teja](#) | *Summer Internship*

- Designed and demonstrated Kidney segmentation using Laplacian Mesh Deformation
- Generated a deformable Kidney mean model from annotated dataset models using Coherent Point Drift and Procrustes analysis for proper alignment, in MATLAB
- Applied Random Forest training to a spectral clustered part of Kidney using HOG feature
- Achieved Dice Coefficient of 0.85 on incorporating Active Shape Models (ASM)

**ACADEMIC  
ACHIEVEMENTS**

- Secured All India Rank of 242 among 150,000 candidates in [JEE Advanced](#), 2013
- Awarded [KVPY Scholarship](#) by Govt. of India, ranked 115 among 200,000 candidates, 2012
- Among top 1% in NCT Delhi in [National Physics Olympiad](#), 2012
- Among top 900 in India to compete in [INMO](#) (Indian National Mathematical Olympiad) by securing 20<sup>th</sup> rank in NCT Delhi region, 2011

**FORMULA  
STUDENT TEAM**

**Design Engineer**

(Sep,2014- Apr, 2016)

[IIT Bombay Racing Team](#)

Guide: [Prof. Ramesh Singh](#)

A team of 70 students building India's fastest electric racecar for Formula Student UK, an international race car design competition. Won FS Award for 2 consecutive years worth £3000 (2 out of 48 non-UK teams) for major design improvements

*Data Acquisition:*

- Headed a team of 5 Engineers to design Data acquisition & Controller Area Network (CAN)
- Designed onboard data logging and real-time remote wireless data monitoring GUI system
- Implemented team's first CAN protocol to improve reliability and reduce wiring harness

*Electronic Differential:*

- Implemented Electronic Differential and Regenerative Braking for the 1<sup>st</sup> time within team
- Used dynamic feedback from sensors to improve handling, giving differential output to motors

*System Integration:*

- Achieved 2x reduction in size and weight of PCB enclosure by optimized routing in boards
- Designed and manufactured the wiring harness of car ensuring light weight and color coding