Archit Gupta

Personal Data

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Education

August 2015 -Present	**University of California**, Berkeley, CA PhD candidate, EECS Department	GPA: 3.85/4.0 Detailed list of Courses
July 2011 -April 2015	**Indian Institute of Technology**, Mumbai, India B.Tech (Honors) in Electrical Engineering Minor: Computer Science and Engineering	GPA: 9.55/10.0 Detailed List of Courses

Work Experience

May - June 2014 — SoC Design and Optimization at SAMSUNG DMC RnD Center, Suwon South Korea | Guide: Dr. Dongjin Lee

Designed a controller for Samsung's Temperature Sensing analog IP. Integrated and synthesized the controller along with other peripherals into an SoC. Developed a glitch free mechanishm to switch clocks using Clock Gating Cells. Optimized the design for power consumption (improving gating efficiency) and empirically evaluated the energy complexity of algorithms on the aforementioned SoC

Jan 2013 - May 2014 — Teaching Assistant at Indian Institute of Technology, Bombay

MA 106	Linear Algebra	Prof. Neela Natraj	Jan - Mar 2013
MA 108	Differential Equations	Prof. U. K. Anandvardhanan	Mar - May 2013
MA 106	Linear Algebra	Prof. Murali K. Srinivasan	Jan - Mar 2014

Research

Music and Brain: Perception of Rhythm — Prof. Bipin Rajendran
Neuromorphic Engineering — Autumn 2014-2015

- Neurons, for computational simplicity, are usually modelled as Integrators. However, several properties of the biological neuron, like resonance and ion-channel dynamics, cannot be expressed by a simple integrator model.
- We demonstrated that perception of music is closely associated with these properties by using a Resonate and Fire model(Izhikevich [2001]) for beat tracking. Our results closely matched the response of human subjects who were asked to tap along with the music.

Load analysis and energy efficient operation of Cellular Networks — July 2014 - Dec. 2014
InfoNet Laboratory — Prof. Abhay Karandikar

- Base Stations (BS) are set up to meet the peak Quality of Service (QoS) demands in a locality. However, operational costs can be drastically cut down by reorganizing the network dynamically. We developed a model to predict the network state (Voice traffic at each BS) by analytically modeling the traffic data of one of India's leading telecom operators.
- We also demonstrated the feasibility of saving operational cost using a simple ON/OFF scheme, where we determine the optimal number of BSs required to maintain coverage. Our paper has been accepted at the National Conference on Communications, 2015.

Projects

Analyzing control dependent inefficiencies in a Gpu — Prof. Krste Asanovic
Computer Architecture — Fall-2015

- Fung et al. [2007] propsed a mechanism for dynamic warp formation in GPGPUs in order to handle control divergence. The scheduling policies have so far been motivated by intution. We are exploring hardware-based scheduling algorithms, which are aided by the compiler to optimally group the threads into warps in GPGPUs to minimize control divergence
- We are also looking at a ping-pong architecture for register files with aggressive pre-fetching to solve the problem of lane allotment for threads in SIMD execution

Single Image Super resolution — Prof. Ajit Rajwade
Image processing — Autumn 2013-14

- Natural images tend to have significant amount of redundancy both within and across scales. The latter can be used to generate images with larger resolution by mapping recurrent patches on smaller scales with their high-resolution counterparts in the original image
- We made use of example based super-resolution to build a database of High and Low resolution vectors across the scales of a single image and utilized it to generate the higher-resolution image. This was based on the work by Glasner et al. (2009) titles, Super-resolution from a Single Image.

High Performace Circuit-Simulation using Stack-based processors — May-July, 2013
High Perfromance Computing Lab, IIT Bombay — Prof. Sachin Patkar

- SIMD architectures have demonstrated significantly high throughputs for a large class of parallel programs. However, programs like circuit simulation, which have immense parallelizability, but are inherently MIMD, do not benifit much from them. We designed lightweight stack-based MIMD cores to simulate circuits using BReMICS, a point relaxation method.
- We made use of Gauss-Seidel method for parallelization and Newton-Raphson Linearization for efficient memory reuse on the bandwidth starved CPU-FPGA assembly. The stack architecture allows efficient reuse of data, especially in complex equations involving floating point where explicitly recording intermediate values is unnecessary.

Academic Achievements

- Awarded the Best Internship Project at Samsung Global Research HQ for SoC design and optimization, suwon, South Korea — June 2014
- Indian delegate at the annual Winter School organized by the Institute of Theoritical Computer Science and Communications, CUHK, Hong Kong — Jan 2014

- Gold Medalist at Indian National Physics Olympiads (INPhO) and Indian National Chemistry Olympiads (INChO). Qualified for Orientation Cum Selection Camp for the International Physics and Chemistry olympiads (IChO, IPhO), held at BARC, India — July 2011
- Secured All India Rank 14 in the Joint Entrance Examination for Indian Institutes of Technology (IIT-JEE). Ranked 1st in Kanpur Zone — Apr 2011

- All India Rank 3 in the National Science Olympiads and All India Rank 04 in the International Mathematics Olympiads organized by Science Olympiad Foundation — Mar 2010

- Felicitated by former President of India, Dr. A. P. J. Abdul Kalam for excellence in Academics at Rashtriya Indian Military College, Dehradun, India — Apr 2009

Extra-Curricular Activities

Sports

- Silver Medalist in Hockey at Inter IIT Sports Meet held at IIT Kharagpur (Dec 2012). Represented IIT Bombay at the Inter IIT Sports Meets (2011, 2013) as well as the annual league tournament organized by Mumbai Hockey Association in Division C.
- Awarded Institute Special Mention, for contribution to sports at IIT Bombay in 2012-2013
- Silver Medalist at Inter-Section Boxing Championships at Rashtriya Indian Militar College, March 2008

Cultural

- As the band's drummer, performed at various events both within and outside the institute (Surbahar, Battle of the Bands, Acoustic Dusk, Umang - NM College, Mumbai).
- Winner of the Freshmen musical contest in both the Indian and Western genres.
- Best Speaker at TV 99 and Leela Hotels English Debate 2010, Lady Lennel Hindi Debates (Welham Girls' School) 2008 and Kashi Naresh Hindi Debates (Rashtriya Indian Military College) 2009. Participated in several other hindi and english debates in and around Dehradun, India.

Positions Held

Institute Hockey Secretary (2013-14): I was a member of the Institute Sports Council at IIT Bombay and responsible for organizing and conducting Inter-Hostel hockey championships, trials and selection of Institute teams as well as acquiring and managing equipment and infrastructure.