

Shubho Sengupta

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Education

- 2012–2013 **MS, Mathematical Finance**, *Stanford University*, Stanford, CA.
GPA 3.8/4.00
- 2006–2010 **Ph.D, Computer Science**, *University of California*, Davis, CA.
GPA 4.00/4.00
- 1996–1998 **MSc, Mathematics**, *Indian Institute of Technology*, Kharagpur, India.
GPA 8.3/10.00
- 1993–1996 **BSc, Mathematics**, *Indian Institute of Technology*, Kharagpur, India.
GPA 8.18/10.00

Objective

I have a strong background in audio search, parallel algorithms on graphics processors (GPUs), performance modeling and a strong interest in statistics and machine learning. I also have considerable experience at all levels of the software stack, from developing novel algorithms to low-level optimization on CPUs and GPUs. I am looking for a role that allows me to work across that spectrum.

Experience

Professional

- 2013–2014 **Principal Engineer–Recognition Group**, *Shazam Corporation*, Menlo Park, CA.
I work in the recognition team where I improve the recognition rate of Shazam’s core audio recognition algorithm. Over the past year I worked on extracting new features that are orthogonal to our core algorithm. I have also worked on developing probabilistic models to better characterize our acceptance/rejection criteria. This has greatly helped our recognition rate, especially in noisy settings and also helped reduce our false positive rate.
- 2010–2013 **Research Scientist—Parallel Computing Lab**, *Intel Labs*, Santa Clara, CA.
I developed parallel algorithms for high-performance computing, that influenced the design of future Intel chips to efficiently solve compute intensive problems. I have worked on diverse problems like parallel median finding, BigDFT algorithm for chemical simulation, collaborative filtering algorithms like stochastic gradient descent and alternating least squares. In each case I worked on all levels from algorithm design to optimizing code at the assembly level to get the best possible performance. I was the resident GPU expert for the group, in which capacity I analyzed the performance of various algorithms on GPUs and develop various microbenchmarks to measure GPU performance, with the goal of influencing future Intel CPU design.
- Summer 2008 **Research Intern**, *Microsoft Research*, Redmond, WA.
Developed tree based data structures on GPUs.
- 2007–2008 **Research Intern**, *NVIDIA Research*, Santa Clara, CA.
Developed innovative algorithms to build spatial hierarchies and segmented scan algorithms on the GPU. This work resulted in four patent filings.
- Summer 2006 **Research Intern**, *Pixar Animation Studios*, Emeryville, CA.
Developed rendering algorithms to enhance the shading quality of Pixar’s realtime hardware rendering pipeline to closely match the quality of photorealistic cinematic rendering.

- 2000–2004 **Software Engineer**, *Sun Microsystems*, Bangalore, India.
Member of the development team that developed the SunONE Application Server.
- 1998–2000 **Software Engineer**, *HCL Technologies*, Delhi (India), Broomfield (US), Tokyo (Japan).
Member of the development team at StorageTek in Broomfield, CO working on tape library management software for enterprise storage. Member of the system design team at NTT Data in Japan working on a large betting system.

Academic—Computer Science

- 2006–2010 **Research Assistant**, *University of California*, Davis, CA.
Made fundamental contributions to the field of parallel algorithms and programming models for highly parallel processors called Graphics Processing Units (GPUs). These include the following.
- **Algorithms**—Developed the first efficient algorithms for scan, segmented scan, quicksort, radixsort, Sparse Matrix-Dense Vector (SpMV) Multiply on the GPU. Developed the first algorithm to build spatial hierarchy (Bounding Volume Hierarchy) and hash table on the GPU. These are fundamental algorithms for general purpose parallel computation on the GPU and their importance is measured by the approximately 500 citations that the papers have received so far.
 - **Programming Model**—Delivered the first library of reusable components for data-parallel programming on GPUs, the CUDA Data Parallel Primitives (CUDPP) library. This was a culmination of 4 years of research and a huge undertaking that broke new ground for general purpose programming on GPUs.

Academic—Stats/Finance

- 2011–2013 **Graduate Student**, *Stanford University*, Stanford, CA.
Lead the following research projects as part of graduate program.
- **Portfolio Optimization**—Develop minimum variance portfolios using Ledoit Shrinkage, build 130/30 portfolio using the Barra US Equity Risk model based on CSFB Alpha factors.
 - **Trading Strategies**—Measure statistical significance of various popular technical patterns, evaluate Engelberg and Gao's pairs trading strategy, develop EACD and WACD duration models for intra-day trading data, implement GLARMA based models to predict intra-day price movement.
 - **Pricing**—Use various time-series based and non-parametric regression techniques to accurately price options. Examine whether liquidity can be modeled as a factor to price stocks using a factor based model.
 - **Risk Quantification**—measure the default probability of banks using logistic regression and Generalized Linear Mixed Models, measure the effectiveness of various VaR algorithms like CONDEVT, CAViaR, HS-GARCH, HS-GARCH-t and GO-GARCH on major indices over 2000-2010

Publications

Papers 11 Publications at top-tier conferences like SIGGRAPH, SIGGRAPH Asia, Eurographics, High Performance Graphics and top-tier peer reviewed journals like ACM Transactions on Graphics (TOG). ACM TOG is the most cited software journal according to journal impact factor analysis done by Thomson Scientific. One of my papers has won the Best Paper Award at High Performance Graphics conference and is one of highest cited papers in the field with more than 300 citations. Other papers are highly cited as well and my research continues to have a significant impact on parallel algorithms for GPUs. Details at <http://shubho.github.io/>.

Book 3 book chapters, 2 of them in the very popular GPU Gems and GPU Computing Gems
 Chapters

Patents

8,243,083 System, method, and computer program product for converting a scan algorithm to a segmented scan algorithm in an operator-independent manner

8,321,492 System, method, and computer program product for converting a reduction algorithm to a segmented reduction algorithm
Two more patents filed

Computer skills

Languages C, C++, R, OpenCL, CUDA, x86 Assembly
Open Source Lead developer of CUDPP project
Special Skills Extensive experience in writing highly optimal code

Fellowships and Awards

Best Graduate Student Researcher Award, Department of Computer Science, UCDavis
Best Paper Award, High Performance Graphics 2007
NVIDIA Fellowship, 2007-2008 and 2008-2009. This is the most sought after fellowship in computer graphics and I was the first recipient in UC Davis history.
Outstanding Achievement Award, Sun Microsystems, 2001 and 2002

Work Authorization

US Permanent Resident as Outstanding Researcher