Devangi N. Parikh

Department of Computer Science
The University of Texas at Austin
dnp@cs.utexas.edu

Education

Georgia Institute of Technology, Atlanta GA
PhD in Electrical and Computer Engineering (GPA:3.75) **December 2012**
Advisor: Dr. David V. Anderson
Thesis: Improving the quality of speech in noisy environments
MS in Electrical and Computer Engineering (GPA:3.72) **May 2008**

Nirma Institute of Technology, Gujarat University, India
BE in Electronics and Communication Engineering **Jun 2006**

Research Interests

High performance computing, Numerical software, Digital signal processing for speech and audio enhancement, Algorithm-architecture co-design

Appointments

Assistant Professor of Instruction **January 2020—Present**
Department of Computer Science
The University of Texas, Austin, TX

Research Fellow **March 2017—Present**
Oden Institute of Computational Engineering and Sciences
The University of Texas, Austin, TX

System Engineer **November 2013—Feburary 2017**
Machine Learning Lab, Texas Instruments, Dallas, TX
High-Performance Computational Libraries

- Developing computational libraries for TI Multi-core DSP devices (Keystone II devices). TI's Keystone II devices is a multi-core SOC that contains 4 ARM A-15 cores, and 8 C6678 cores. These libraries are released to the customer as part of the software development kit (SDK).
- Optimizing the OpenCV computational kernels for the TI Keystone II devices.
- Developed and released the TI Dense Linear Algebra library (DLA) as a part of the Multi-Core SDK (MCSDK). The DLA library is based on BLIS (BLAS-like Library Instantiation Software Framework) and is optimized

to run on all 4 ARM cores or all 8 DSP cores using OpenCL and OpenMP. The TI-optimized BLAS library achieves 70% of peak GFLOPS available.

Lecturer   **August 2015—May 2016**
University of Texas, Dallas
Instructor for EE3350 Communications Systems

System Engineer   **September 2012—November 2013**
Speech and Audio Lab, Texas Instruments, Dallas, TX
Low-MIPS Audio

- Developed Keyword Recognition application for TI MCU MSP 430 devices.

Graduate Research Assistant   **Jan 2007—August 2012**
Georgia Tech, Atlanta, GA (Advisor: Dr. David V. Anderson)
Perceptual-based Speech Enhancement and Noise Suppression

- Developed a noise suppression algorithm that is based on the dynamic range control of the human auditory perceptual system.
- Understand the perceptual artifacts that are generated due to modulation and control the noise suppression gain such that these modulations are imperceptible.

Blind Source Separation

- Implemented a blind source separation algorithm based on Info-Max method in real-time on a TI DSP 6713.
- Developed a blind source separation post-processing algorithm based on the perceptual dynamic range control noise-suppression algorithm.
- Developing a blind source separation algorithm to separate signals based on the human perception of sound localization.

Systems and Applications R&D Center Intern May 2011—Aug 2011
Texas Instruments
Blind Source Separation Post Processing

- Optimized the perceptual-based blind source separation post-processing algorithm for the $\Sigma - \Delta$ Convertors for cell-phone applications.
- Collected audio data in different noise environments to validate the performance of the post-processing algorithm.

Systems and Applications R&D Center Intern May 2009—Aug 2009
Texas Instruments, Dallas, TX
Blind Source Separation

- Optimized a blind source separation algorithm so that it could be implemented on the next generation $\Sigma - \Delta$ Convertor for cell-phone applications.

- Conducted extensive experiments under different noise and acoustic conditions to find the optimal placement of the microphones on a cell-phone.

Systems and Applications R&D Center Intern May 2008—Aug 2008
Texas Instruments, Dallas, TX
Active Noise Cancellation

- Implemented an active noise-cancellation algorithm based on the FXLMS filter on an AIC3254 ($\Sigma - \Delta$ Convertor) that outperformed analog-based noise-canceling headsets.

DSP Consultant   **Oct 2007—May 2008**
Personics Holdings Inc.

- Research and development of smart earphones for the use with personal audio devices

Engineering Intern   **May 2007—Aug 2007**
Digital Receiver Technology (DRT), Inc.

- Developed automated testing tool in MATLAB for the Super General Purpose Receiver (SGPR) Test Plan

Publications

2022   **Devangi N. Parikh**, Robert A. van de Geijn, Greg Henry, "Cascading GEMM: High Precision from Low Precision" *ACM Transactions on Mathematical Software, (Under review)*

2022   Jay A. Acosta, Tze Meng Low, **Devangi N. Parikh**, "Families of Butterfly Counting Algorithms for Bipartite Graphs," *2022 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW-GrAPL)*, Virtual, 2022.

2021   Field G. Van Zee, **Devangi N. Parikh**, Robert A. van de Geijn, "Supporting Mixed-domain Mixed-precision Matrix Multiplication within the BLIS Framework," *ACM Transactions on Mathematical Software,* 47, 2, Article 12 (April 2021), 26 pages.

2019   Doru Thom Popovici, **Devangi N. Parikh**, Daniele G. Spampinato and Tze Meng Low, "Exploiting Symmetries of Small Prime-Sized DFTs", 13th International Conference on Parallel Processing and Applied Mathematics (PPAM 2019), Warsaw, Poland, 2019.

2018   **Devangi N. Parikh**, Maggie E. Myers, Richard Vuduc, Robert A. van de Geijn, "A Simple Methodology for Computing Families of Algorithms," *FLAME Working Note #87,* The University of Texas at Austin, Department of Computer Sciences. Technical Report TR-17-06. 2018

2018   **D. N. Parikh**, J. Huang, M. E. Myers and R. A. van de Geijn, "Learning from Optimizing Matrix-Matrix Multiplication," *2018 IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW)*, Vancouver, BC, 2018, pp. 332-339.

2017   Robert A. van de Geijn, Jianyu Huang, Margaret E. Myers, **Devangi N. Parikh**, Tyler M. Smith, "Lowering Barriers into HPC through Open Education," *Workshop on Education for High Performance Computing (EduHPC)*, co-located with SC17, Denver, CO, 2017.

2017   **Devangi N. Parikh,** Margaret E. Myers, Robert A. van de Geijn, "Deriving Correct High-Performance Algorithms," *FLAME Working Note #86,* The University of Texas at Austin, Department of Computer Sciences. Technical Report TR-17-07. 2017

2012   J. I. Marin-Hurtado, **D. N. Parikh,** D. V. Anderson, "Perceptually-inspired noise-reduction method for binaural hearing aids," *IEEE Transactions on Audio, Speech and Language Processing,* vol. 20, no. 4, pp. 1372-1382, May 2012.

2011   J. I. Marin-Hurtado, **D. N. Parikh,** D. V. Anderson, "Binaural noise-reduction method based on blind source separation and perceptual post processing," *Interpseech 2011,* Aug 2011.

2011   **D. N. Parikh,** D. V. Anderson, "Blind source separation with perceptual post processing," *IEEE Digital Signal Processing and Signal Processing Education Workshop (DSP/SPE), ,* Sedona, AZ, 2011, pp. 321-325.

2010   **D. N. Parikh,** D. V. Anderson, "Perceptual artifacts in speech noise suppression," *Asilomar Conference on Signals, Systems and Computers,* Pacific Grove, CA, 2010, pp. 99-103.

2010   **D. N. Parikh,** M. Ikram, D. V. Anderson, "Implementation of blind source separation and a post-processing algorithm for noise suppression in cell-phone applications," *IEEE International Conference on Acoustics Speech and Signal Processing (ICASSP),* Dallas, TX, 2010, pp. 1634-1637.

2009   **D. N. Parikh,** S. Ravindran, D. V. Anderson, "Gain Adaptation based on Signal-to-Noise Ratio for Noise Suppression," *IEEE Workshop on Applications of Signal Processing to Audio and Acoustics (WASPAA),* New Paltz, NY, 2009, pp. 185-188.

Workshops

2018   "Programming for High Performance" *Workshop for the Moncrief Scholars* at the Oden Institute of Computational Engineering and Sciences at The University of Texas at Austin.

2018   "Programming for High Performance" *Workshop for the Students of Department of Statistics & Data Science* at The University of Texas at Austin.

Invited Talks

2022   "BLIS: Mixing, Matching, and Extending Precision," *Featured Minisymposium: Understanding and Exploiting Mixed-Precision Accelerators for High-Performance Computing, SIAM Conference on Parallel Processing for Scientific Computing (SIAM PP22)*, Virtual, February 23-26, 2022

2019   "BLIS: A case study on performance and portability," *Featured Minisymposium: Performance Portability and Numerical Libraries: Challenges and Opportunities for Sustainable Science, SIAM Conference on Computational Science and Engineering (CSE19)*, Spokane, February 2019.

Teaching

- Discrete Mathematics for Computer Science (CS311) (UT-Austin)
  Spring 2020, Fall 2020, Spring 2021, Fall 2021, Spring 2022

- Programming for Correctness and Performance (CS378) (UT-Austin)
  Fall 2019, Spring 2020, Fall 2020, Spring 2021, Spring 2022

- Algorithms (EE 360C) (UT-Austin)
  Summer 2019

- Communications Systems (EE3350) (UT-Dallas)
  Fall 2015, Spring 2016

Professional Service

Program committee member

2022   **Array 2022:** Eighth ACM SIGPLAN International Workshop on Libraries, Languages, and Compilers for Array Programming

2018   **EduHPC-18:** Workshop on Education for High-Performance Computing, Co-located with SC18, 2018

2018   **SCEC18** Second Workshop on Software Challenges to Exascale Computing, 2018

2019   **PPoPP'19 AE** Principles and Practice of Parallel Programming 2019 Artifact Evaluation, 2019

| 2019 | **EduHPC-19:** Workshop on Education for High-Performance Computing, Co-located with SC19, 2019 |
| 2019 | **EduHiPC-2019:** Workshop on Education for High-Performance Computing, Co-located with HiPC-19, 2019 |

Journal Reviewing

2022-2023	ACM TOMS
2022-2019	Journal of Supercomputing
2022	IEEE Micro

Technical Skills

Simulation with MATLAB, Simulink Programming Languages—C, Assembly language (DSP C66x, ARM armv8, and x86_64)

Extra Curricular Activities

Volunteers as a Pace Leader for the Austin Runners Club and Twenty-Six Point Two Marathon club	**2017-current**
Volunteers as a Pace Leader for Half-Marathon/Marathon Training Program at the Dallas Running Club	**2014-2017**
National Roller Skating Champion of India	**1990-1999**
Represented India at the 4th Junior World Roller Skating Championship, Gold Coast, Australia	**Oct 1999**
Awarded the Purusharth Gaurav for excellence in Roller Skating	**1999**