

# ABANTI BASAK

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**INFORMATION** Phone: (609) 937-5747  
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**EDUCATION** **University of California, Santa Barbara** Sep 2016-present  
**Ph.D. Candidate** in Electrical and Computer Engineering  
Advisors: Yuan Xie and Yufei Ding  
Research Area: Benchmarking, performance analysis, and hardware/software optimization techniques for graph processing workloads

**Princeton University** Sep 2012-Jun 2016  
**B.S.E.** in Electrical Engineering (overall GPA: 3.70/4.00)  
*Magna Cum Laude, Sigma Xi, Award of Excellence in Optical Engineering*

**PUBLICATIONS** **SAGA-Bench: Software and Hardware Characterization of Streaming Graph Analytics Workloads**  
**Abanti Basak**, Jilan Lin, Ryan Lorica, Xinfeng Xie, Zeshan Chishti, Alaa Alameldeen, Yuan Xie  
*IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, 2020

**Alleviating Irregularity in Graph Analytics Acceleration: a Hardware/Software Co-Design Approach**  
Mingyu Yan, Xing Hu, Shuangchen Li, **Abanti Basak**, Han Li, Xin Ma, Itir Akgun, Yujing Feng, Peng Gu, Lei Deng, Xiaochun Ye, Zhimin Zhang, Dongrui Fan, Yuan Xie  
*52nd IEEE/ACM International Symposium on Microarchitecture (MICRO-52)*, 2019

**Analysis and Optimization of the Memory Hierarchy for Graph Processing Workloads**  
**Abanti Basak**, Shuangchen Li, Xing Hu, Sang Min Oh, Xinfeng Xie, Xiaowei Jiang, Li Zhao, and Yuan Xie  
*25th IEEE International Symposium on High-Performance Computer Architecture (HPCA-25)*, 2019

**Exploring Core and Cache Hierarchy Bottlenecks in Graph Processing Workloads**  
**Abanti Basak**, Xing Hu, Shuangchen Li, Sang Min Oh, and Yuan Xie  
*IEEE Computer Architecture Letters (CAL)*, 2018

**Persistence Parallelism Optimization: A Holistic Approach from Memory Bus to RDMA Network**  
Xing Hu, Matheus Ogleari, Jishen Zhao, Shuangchen Li, **Abanti Basak**, and Yuan Xie  
*51st IEEE/ACM International Symposium on Microarchitecture (MICRO-51)*, 2018

**EXPERIENCE** **Research Assistant, University of California, Santa Barbara** Sep 2016-Present

- Ongoing research: analysis and optimization of streaming graph analytics.
- Developed an open-source software (SAGA-Bench) for streaming graph analytics that simultaneously provides 1) a performance analysis platform for software studies and 2) a benchmark for architecture studies.
- Characterized streaming graph analytics workloads at software and architecture levels. Provided insights on 1) performance trade-offs of various data structures and compute models; 2) latency breakdown of different computation phases; 3) parallelism bottlenecks; and 4) on-chip cache utilization.
- Designed an application-specific prefetcher (with performance improvement of 19%-102%) to solve the memory access bottleneck in CPU-based static graph analytics.
- Characterized static graph processing systems on server architecture to provide in-depth insights on memory-level parallelism and on-chip cache utilization.

<b>Graduate Research Intern, <i>Intel Labs</i></b> , Hillsboro, USA	Summer 2019
Manager: Patrick Stolt    Mentors: Alaa Alameldeen, Zeshan Chishti	
Led a benchmark development project for streaming graph analytics.	
<b>Graduate Research Intern, <i>Alibaba Group</i></b> , Sunnyvale, USA	Summer 2018
Manager: Yuan Xie    Mentor: Li Zhao	
Profiled in-house graph processing workloads to identify architecture-level bottlenecks.	
<b>Graduate Research Intern, <i>Intel Labs</i></b> , Hillsboro, USA	Summer 2017
Manager: Patrick Stolt    Mentor: Wei Wu	
Developed a fully automated simulator in C++ and Verilog for adjacent error correcting codes in caches and main memory.	

## SKILLS AND TOOLS

- **Developed Software:** SAGA-Bench, an open-source benchmark for streaming graph analytics workloads (<https://github.com/abasak24/SAGA-Bench>)
- **Architecture Simulators:** SniperSim, Gem5, NVMain
- **Profiling Tools:** Intel Processor Counter Monitor, Linux Perf, Intel VTune
- **Programming Languages:** C/C++, Python, Verilog
- **Graph Processing Systems:** Apache Spark (GraphX library), GAP Benchmark Suite, Stinger, GreyCat, Naiad
- **Circuit Simulators:** NVSim, CACTI, Cadence, HSPICE

## HONORS AND AWARDS

*Magna Cum Laude*, Princeton University (2016)  
Award of Excellence in Optical Engineering, Department of Electrical Engineering, Princeton University (2016)  
Osborn Award for Summer Research, Princeton University (2013)  
Honorable Mention and Best Newcomer at International Physics Olympiad, Thailand (2011)

## RESEARCH MENTORING

I have mentored the following undergraduate students at University of California, Santa Barbara. I met with them weekly to discuss their research progress and provided advice on research directions, experiments, methodology, and technical presentations.

- **Sang Min Oh:** Sep 2017-Aug 2018
- **Ryan Lorica:** Jan-Jun 2019