# Saman Ashkiani

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## DOCTORAL RESEARCH

**"Parallel Algorithms and Dynamic Data Structures on the Graphics Processing Unit: a warp-centric approach"**

My study was focused on design and analysis of parallel algorithms and data structures that can be efficiently implemented on Graphics Processing Units (GPUs). More specifically, various dynamic and mutable data structures for the GPU (LSM tree, hash table, and b-tree), and various primitive algorithms on the GPU (multisplit, radix sort, and string matching).

## WORK EXPERIENCE

CURRENT, FROM MAY 2018  (FT)

### OmniSci, Inc.
*Backend Engineer*

Working on the backend query engine of OmniSci-core, a GPU-accelerated relational database management system (RDBMS) primarily designed on the idea of just-in-time (JIT) compilation of SQL queries into GPU-friendly and optimized LLVM bitcodes.

JAN 2018 – MAY 2018  (FT)

### University of California, Davis
*Postdoctoral Scholar*

Working on the design and analysis of dynamic data structures to be used for sparse data representation, and more specifically in the context of dynamic graph storage and an eventual efficient processing. This work involved C++ and CUDA developments.

JUNE 2016 – SEP 2016  (FT)

### Adobe Research, Adobe Systems, Inc.
*Data Scientist Intern*

Exploring the possibility of GPU acceleration for certain analytic operations on the Apache Spark framework. This work involved implementing proper infrastructure using Scala, and then utilizing available GPUs in each core by Java binder of CUDA (JCUDA).

## EDUCATION

| | | |
|---|---|---|
| 2011 – 2017 | **Doctor of Philosophy** Electrical and Computer Engineering *University of California, Davis* | |
| 2015 | **Master of Science** Electrical and Computer Engineering *University of California, Davis* | |
| 2006 – 2011 | **Bachelor of Physics** Electrical Engineering *Sharif University of Technology* | |

## AWARDS

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|---|---|
| 2016 | **NVIDIA Graduate Fellowship** |
| 2017 | **Dissertation Writing Fellowship** *University of California, Davis* |

## COMPUTER SKILLS

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| EXPERT | C/C++, LLVM CUDA, OpenMP, MPI, SQL, MATLAB, R |
| INTERMEDIATE | Python, Java, Scala, Apache Spark |
| BEGINNER | Haskell, Vulkan, OpenGL |

## OPEN-SOURCE INVOLVEMENTS

OmniSci Core
https://github.com/omnisci/mapd-core

CUDA Data Parallel Primitive Library (CUDPP)
https://github.com/cudpp/cudpp

GPU Multisplit
https://github.com/owensgroup/GpuMultisplit

## SELECTED PUBLICATIONS

**Saman Ashkiani**, Martin Farach-Colton, John D. Owens, "A Dynamic Hash Table for the GPU", Proceedings of the 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS 2018).

**Saman Ashkiani**, Shengren Li, Martin Farach-Colton, Nina Amenta, John D. Owens, "GPU LSM: A Dynamic Dictionary Data Structure for the GPU", Proceedings of the 32nd IEEE International Parallel and Distributed Processing Symposium (IPDPS 2018).

**Saman Ashkiani**, Andrew Davidson, Ulrich Meyer, John D. Owens, "GPU Multisplit: an extended study of a parallel algorithm", ACM Transactions on Parallel Computing (TOPC 2017).

**Saman Ashkiani**, Andrew Davidson, Ulrich Meyer, John D. Owens, "GPU Multisplit", Proceedings of the 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2016).

**Saman Ashkiani**, Nina Amenta, John D. Owens, "Parallel Approaches to the String Matching Problem on the GPU", In Proceedings of the 28th ACM Symposium on Parallelism in Algorithms and Architectures (SPAA 2016).

Muhammad Awad, **Saman Ashkiani**, Rob Johnson, Martin Farach-Colton, John Owens, "Engineering a High-Performance GPU B-Tree", Proceedings of the 24th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP 2019).