

## EXPERIENCE

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### University of Illinois at Urbana-Champaign

#### **UI Team Lead, Research Project Lead, Research Assistant**

2014 – 2021

Designed and implemented innovative mechanisms to optimize code on GPUs and CPUs, bridging the gap between fully automated and fully manual approaches to high performance code optimization and improving developer efficiency.

- Presented research in [publications](#), at [conferences](#), and at [10+ seminar talks](#).
- Built and led a team of 5 developers in creating a browser-based [user interface](#) that streamlined program construction, transformation, analysis, and optimization.
- Created a [framework](#) for constructing customizable, architecture-independent analytical performance [models](#) for parallel computations, providing a key building block for automated performance tuning, and with it created models that predicted execution times on GPUs with high accuracy.
- Enabled accuracy verification for automatically generated parallel programs by developing and implementing [novel mechanisms](#) to formally represent, and automate reasoning about, program statement ordering, mathematical dependency satisfaction, and computation statistics.
- Secured research funding by proposing research projects in successful NSF grant proposal.
- Reviewed scientific papers for publication and composed detailed reports to inform review committee decisions.

#### **President, Vice President, Activity Coordinator of SIAM chapter** (*Society for Industrial & Applied Mathematics*) 2016 – 2021

Led a team of officers in successfully creating a well-rounded and engaging experience for over 300 members of the UIUC SIAM chapter; organized monthly academic talks, tutorials, research lab tours, and social events.

- Promoted SIAM and its mission, achieving significant increase in chapter membership from ~240 to ~340 members.
- Represented chapter at SIAM Annual Meeting, building and maintaining positive relationships with key stakeholders and enhancing the reputation of the organization.
- Recognized for outstanding leadership and exceptional results with SIAM Student Chapter Certificate of Recognition.

### Department of Defense | Oklahoma City Air Logistics Complex

#### **Project Lead, Computer Scientist** – *High Performance Computing & Simulation Lab*

2011 – 2014

Spearheaded technical innovation and strategy for HPC team by conducting in-depth research on GPU computing. Designed and executed successful experiments to evaluate the benefits of GPU acceleration.

- Presented findings at two major industry [conferences](#) and at senior leadership meetings.
- Accelerated parallel computations with GPUs and Nvidia's CUDA, boosting throughput for a weather simulation code from 3.5 to 250 GFLOP/s, and a radar simulation code from 1.5 to 32.1 GFLOP/s, enabling faster modeling results.
- Integrated complex numerical weather model output into flight simulator radar display and flight dynamics, significantly enhancing simulator realism and immersive user experience.
- Helped build low-cost parallel computing cluster by collecting and connecting >200 decommissioned workstations.
- Designed and delivered a comprehensive tutorial on GPU programming; mentored teams of interns as they learned key concepts in parallel programming.

#### **President, Vice President, Social Chair** of TESLA (*Tinker Engineer and Scientist Leadership Association*)

2011 – 2014

Led officer team in expanding the impact of TESLA, a professional organization dedicated to career development.

- Improved communication between senior leadership and entry-/mid-level engineers and scientists in order to strategized about and enact productivity improvements; successfully negotiated creation of 5 new tech leadership positions to more effectively utilize highly skilled scientists.
- Organized and led professional development events, guest speaker talks, monthly meetings, and social activities.
- Effectively promoted TESLA at large events, generating surge in membership from ~150 to ~260 members.
- Recognized for valuable contributions to TESLA with Certificate of Appreciation.

## Sandia National Labs

### Research & Development Grad. Intern – Scalable Algorithms 2016

Contributed new functionality to [Kokkos](#), an architecture-independent shared-memory parallel programming system.

- Informed and guided performance-critical design decisions for Kokkos by conducting execution profiling experiments.
- Implemented collective operations for parallel thread teams in C++ (OpenMP, CUDA).

## Washington University Media and Machines Lab

### Research Assistant (Advisor: William Smart) 2009

Built algorithms enabling autonomous robot functionality.

- Enabled autonomous obstacle avoidance using a laser range finder.
- Implemented photo-op-finding algorithms for [Lewis, a wedding photographer robot](#).

## TEACHING EXPERIENCE

### University of Illinois at Urbana Champaign

#### Teaching Assistant CS450: Numerical Analysis (online) (x2) 2019 CS555: Numerical Partial Differential Equations 2017 CS450: Numerical Analysis 2015

Provided an engaging, educational experience for graduate-level computer science and applied math courses, both in person and online.

- Designed and presented lectures, e.g., introducing the discontinuous Galerkin class of numerical methods.
- Enhanced automated grading system for code solutions by implementing more extensive feedback that adapted to different problem-solving approaches.
- Built in-class demonstrations illustrating numerical techniques.
- Strengthened student understanding by providing guidance and further insight on mathematical concepts during office hours; managed course webpage and online discussion forum.

### Washington University in St. Louis

#### Engineering Tutor, Course Assistant 2007 – 2011

Mentored and tutored students in physics, calculus, and computer science in individual and group sessions, resulting in improved academic performance.

- Created physics help desk, which more efficiently engaged larger numbers of students seeking assistance with a popular, challenging course.
- Taught engineering students valuable teamwork skills via collaborative problem-solving exercises.
- Consistently received very positive review comments from pupils.

#### Student Technology Coordinator

2008 – 2009

Coordinated and presented >6 technology-related educational workshops, e.g., Computer Construction, and Techniques for Speeding up Your Slow Computer, and provided computer technical support to students.

## PUBLICATIONS & TALKS

SELECTED, SEE [jamesdstevens.com/media](http://jamesdstevens.com/media)

### Papers

[Program Transformation and Code Generation for Developing, Modeling, and Optimizing GPU Programs](#)

Stevens J., Diss., Univ. of Illinois at Urbana-Champaign, 2021; [slides](#), [vid](#)

[A Mechanism for Balancing Accuracy and Scope in Cross-Machine, Black-Box, GPU Performance Modeling](#)

Stevens J. & Klöckner A., International Journal for HPC Applications, 2020

### Conference Presentations

[Model-based Performance Optimization for GPU DG-FEM](#)

Stevens J., SIAM Conf. on Computational Science & Engineering (CSE17), 2017

[Accelerating Finite Difference Computations Using General Purpose GPU Computing](#)

Stevens J., Physics-Based Modeling in Design & Development for US Defense Conf., 2012

### Seminar Talks

See [jamesdstevens.com/seminar\\_talks](http://jamesdstevens.com/seminar_talks)

### Conf. Poster Presentations

[Black-Box Kernel-Level Performance Modeling for Tuning DG on GPUs](#)

Stevens J. & Klöckner A., SIAM Annual Meeting (AN17), 2017

[Black-Box Kernel-Level Performance Modeling for GPUs](#)

Stevens J. and Klöckner A., International Conf. for High Performance Computing, Networking, Storage & Analysis, 2016

## AWARDS AND DISTINCTIONS

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- **SIAM Student Chapter Certificate of Recognition** 2017  
For outstanding efforts and accomplishments on behalf of the UIUC SIAM chapter.
- **Certificate of Recognition for Academic Excellence** 2017  
Given by UIUC computer science department for notable publications, awards, and/or other achievements.
- **SURGE Fellowship** 2014 – 2019  
Five-year fellowship from UIUC to recognize outstanding students in under-represented groups in engineering.
- **Certificate of Appreciation in Recognition of Valuable Contributions to TESLA** 2012  
Given by senior leadership of DoD software group for helping launch a professional development organization.
- **DoD Science Mathematics and Research for Transformation (SMART) Fellowship** 2008 – 2011  
Department of Defense fellowship program to attract outstanding scientists and engineers to DoD laboratories.
- **Tau Beta Pi, Washington University Chapter** 2009 – 2010  
Engineering honor society that recognizes academic achievement & personal integrity.
- **Dean's Honorary Scholarship** 2006 – 2010  
Four-year partial-tuition scholarship presented by the Washington University School of Engineering.
- **Missouri Higher Education Academic Scholarship** 2006 – 2010  
Merit-based program encouraging top-ranked students to attend approved Missouri postsecondary schools.
- **Graduate of Washington University LeaderShape Institute** 2008  
Accepted to and completed program building leadership, teamwork, and mission-focused goal-setting skills.
- **Outstanding Sophomore Award, Computer Science and Engineering** 2008  
Presented by the Washington University CS department to one sophomore per year.
- **Eagle Scout (with 6 Eagle Palms)** 2004  
Highest rank in the Boy Scouts of America.

## EDUCATION

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### **Doctor of Philosophy, Computer Science** 2021

University of Illinois at Urbana-Champaign | College of Engineering

Focus: Scientific Computing, Numerical Analysis, Applied Mathematics  
High Performance Computing (Frameworks) on GPUs

Advisor: Andreas Klöckner

### **Master of Science, Computer Science** 2011

Washington University in St. Louis | School of Engineering and Applied Science

Focus: Mobile Robotics

### **Bachelor of Science, Computer Science, Applied Mathematics** 2010

Washington University in St. Louis | School of Engineering and Applied Science

Minor: Philosophy-Neuroscience-Psychology  
Study Abroad: French Summer Language Institute