John R. Emmons

Curriculum vitae
March 29, 2017

353 Serra Street   jemmons@stanford.edu
Stanford, CA 94305   johnemmons.com

EDUCATION

PhD	**Computer Science** (focus: machine learning + systems)	Stanford University	2016 -
MS	**Computer Science** (with certificate in machine learning)	Washington University	2014 - 2016
BS	**Computer Engineering**	Washington University	2014 - 2016
BS	**Electrical Engineering**	Washington University	2014 - 2016
BS	**Computer Science, Physics, and Math** (triple major)	Drake University	2011 - 2014

RESEARCH EXPERIENCE

Stanford University — 2016 -
Advisor: Keith Winstein

- Topic area: computer vision and large scale systems.
- Goal: change the way people search visual data by building systems that either: provide at least $1000\times$ performance improvements and/or enable previously impossible questions to be answered.
- Keywords: TensorFlow, Keras, SIMD and GPU parallelization, machine learning, computer vision, nonlinear optimization, and computer systems.

Washington University — 2015 - 2016
Advisor: Jeremy Buhler

- Implemented an expectation maximization (EM) based DNA motif finding algorithm.
- Used Nvidia GPUs to accelerate the computation (CUDA, C/C++, Cub).

California Institute of Technology — 2015
Advisor: Oscar Bruno

- Used numerical partial differential equation (PDE) methods from computational physics to simulate EM-fields propagating along an open dielectric waveguide with ultra high precision.
- Implemented a high order sovler for these simulations (C++, Fortran, Matlab).

Carnegie Mellon University — 2014
Advisor: Onur Mutlu

- Implemented a generic, SMID-parallel DNA sequence alignment filter using Intel SSE3.
- Achieved a 3x speedup over the best previous algorithm using bit-vector approach (C, SSE3).

Drake University — 2013 - 2014
Advisor: Klaus Bartschat

- Simulated ultrafast, high-intensity UV laser pulses (attosecond timescale) on hydrogen atoms.
- Parallelized simulations to run on the TACC Stampede supercomputer (Fortran, MPI, OpenMP).

University of California, Berkeley — 2013
Advisor: Allison Andrews

- Implemented a massively scalable file system backup algorithm at NERSC.
- Used Hadoop to perform distributed computing in a cluster environment (Hadoop, Python).

Professional Experience

Summer research and development intern, Honeywell · 2016
Advisor: Soumitri Kolavennu
- Developed voice recognition engine for detecting phrases from a grammar.
- Deployed an AWS cloud infrastructure to connect voice engine to IOT devices.
- Used IFTTT to trigger actions for commands spoken to the system (AWS, C#, .NET, MongoDB).

Teaching Experience

Teaching Assistant, Signals and Systems (ESE 351), Washington University · 2015
Teaching Assistant, Parallel and Sequential Algorithms (CSE 341), Washington University · 2014

Grants and Fellowships

NSF Graduate Student Research Fellowship (GRSF) · 2016
Washington University Harold Brown Fellowship (full-tuition scholarship) · 2014
Drake University Physics Prize (full-tuition scholarship) · 2011

Awards and Honors

Washington University Ernest Weiss top senior award for computer science/engineering ($500) · 2016
Washington University David Levy top senior award for electrical engineering ($500) · 2016
Upsilon Pi Epsilon Executive Scholarship ($2,500) · 2015
Drake Outstanding Mathematics Student · 2014
Drake DUCURS Best Oral Presentation · 2014
ACM Richard Tapia Scholarship ($1,000) · 2013
Barry Goldwater Scholarship ($15,000) · 2013
Drake STAR Award ($2,000) · 2012

Professional Memberships/Affiliations

Tau Beta Pi (TBP) · 2015
Eta Kappa Nu (HKN) · 2015
Upsilon Pi Epsilon (UPE) · 2014
Institute of Electrical and Electronics Engineers (IEEE) · 2014
Association for Computing Machinery (ACM) · 2013
American Physical Society (APS) · 2013

Conference Activity/Participation

Networked Systems Design and Implementation (NSDI) · 2017
ACM Richard Tapia Celebration of Diversity in Computing Conference · 2014
Midwest Instruction and Computing Symposium (MICS) · 2013
Drake University Conference on Undergraduate Research in the Sciences (DUCURS) · 2014

Frontiers in Optics: 97th OSA/APS Annual Meeting	2013
Midwest Instruction and Computing Symposium (MICS)	2013
Drake University Conference on Undergraduate Research in the Sciences (DUCURS)	2013
Great Plains Regional Annual Symposium On Protein & Biomolecular NMR (GRASP)	2012

REFERENCES

Jeremy Buhler
Washington University in St. Louis
1 Brookings Drive
St. Louis, Missouri, USA, 63130
+1 (314) 935-6180
jbuhler@wustl.edu

Onur Mutlu
ETH Zürich
Rämistrasse 101
8092 Zürich, Switzerland
+1 (412) 268-1186
omutlu@gmail.com

Oscar Bruno
California Institute of Technology
1200 E. California boulevard
Pasadena, California, USA, 91125
+1 (626) 395-4548
obruno@caltech.edu

Klaus Barschat
Drake University
2507 University Avenue
Des Moines, Iowa, USA, 50311
+1 (515) 271-3750
klaus.bartschat@drake.edu

PUBLICATIONS

[1] H. Xin, S. Nahar, R. Zhu, J. Emmons, G. Pekhimenko, C. Kingsford, C. Alkan, and O. Mutlu, "Optimal Seed Solver: Optimizing Seed Selection in Read Mapping," *Oxford bioinformatics*, Nov. 2015, [pdf].

[2] H. Xin, J. Greth, J. Emmons, G. Pekhimenko, C. Kingsford, C. Alkan, and O. Mutlu, "Shifted Hamming Distance: A Fast and Accurate SIMD-Friendly Filter for Local Alignment in Read Mapping," *Oxford bioinformatics*, Dec. 2014, [pdf].

[3] I. A. Ivanov, A. S. Kheifets, K. Bartschat, J. Emmons, S. M. Buczek, E. V. Gryzlova, and A. N. Grum-Grzhimailo, "Displacement effect in strong-field atomic ionization by an XUV pulse," *Physical review a*, Oct. 2014, [pdf].

[4] J. Venzke, P. Johnson, R. Davis, J. Emmons, K. Roth, D. Mascharka, L. Robinson, T. Urness, and A. Kilpatrick, "Accelerating Biomolecular Nuclear Magnetic Resonance Assignment with A*," Apr. 2014.

[5] J. Emmons, K. Powell, M. Andrews, and J. Hick, "Parallel Graph Reduce Algorithm for Scalable File System Structure Determination," Feb. 2014.

[6] J. Emmons, A. Howes, A. Kramer, K. Bartschat, and J. Grout, "Parallelizable Algorithms for Describing the Effects of Strong Time-Dependent Electromagnetic Fields on the Hydrogen Atom," Oct. 2013.

[7] J. Emmons, S. Johnson, T. Urness, and A. Kilpatrick, "Automated Assignment of Backbone NMR Data using Artificial Intelligence," Apr. 2013.

[8] J. Emmons and A. Kilpatrick, "Structural Studies of a Calmodulin Mutant with Defective Regulation of Muscle Contraction," Nov. 2012.