David Eriksson

Curriculum Vitæ

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Education

2014 – Present **Cornell University**
- Ph.D. in Applied mathematics, expected May 2019
- TA award in Computer Science, Spring 2016
- Overall TA rating: 4.8/5.0
- GPA: 4.22/4.0 (current)

2012 – 2014 **Chalmers University of Technology**
- M.Sc. in Engineering Mathematics and Computational Science
- Graduated top of class
- GPA: 5.0/5.0

2008 – 2011 **Chalmers University of Technology**
- B.Sc. in Mathematics
- Graduated top of class
- GPA: 4.92/5.0

Research Interests

Surrogate Optimization, Numerical Linear Algebra, Scientific Computing, High-Performance Computing, Scientific Software, Machine Learning, Numerical Analysis.

Current Research

Asynchrony and elasticity in surrogate optimization
- Designing flexible and fault tolerant asynchronous surrogate optimization algorithms.
- Future work is to use elasticity in modern cloud platforms.

Global optimization with additional information
- Constructing algorithms with provable convergence rates for global optimization problems with additional information.

Structured solvers
- Fast solvers in surrogate optimization and machine learning.
- Kronecker product structure.

Software packages
- Developing asynchronous surrogate optimization software:
  - `pySOT` (github.com/dme65/pySOT)
  - `SOT` (github.com/dme65/SOT)

Awards

2016 **Teaching assistant award in Computer Science**
Cornell University

2014 **Richard & Alice Netter Fellowship**
Cornell University

2014 **Fritz O Fernstroms Scholarship**
Sverige-Amerika Stiftelsen

2014 **Anna Whitlock Scholarship**
Anna Whitlocks Minnesfond

Work Experience

Fraunhofer – Chalmers Centre Mar. 2014 – July 2014
Applied Researcher Gothenburg, Sweden
Point Cloud Visualization
- Developed algorithms for visualizing point clouds with billions of points.
- Used these algorithms to design visualization software in C++ capable of rendering 50+ FPS with unlimited detail on a standard graphics card.

Fraunhofer – Chalmers Centre Sept. 2012 – Mar. 2014
Contracted Student Gothenburg, Sweden
Computational Geometry
- Constructed out-of-core algorithms for shortest distance computations between a point cloud having billions of points and a geometric object.
- Heavy memory requirements imply that only a small subset of the point cloud can reside in memory at a given time.
- Derived sharp criteria for when a specific subset of the point cloud can contain the point closest to the geometric object.

NASA Goddard Space Flight Center June 2013 – Sept. 2013
Data Analyst Greenbelt, MD
Tropospheric Delay Ray Tracing
- Worked on computation of tropospheric delays directly from numerical weather models.
- Numerically solved Maxwell's equations through the model data.
- The troposphere is the main contributor to the error budget of VLBI, a geodetic technique striving for millimeter precision.
- Showed a substantial improvement in baseline length and estimates of station positions.

NASA Goddard Space Flight Center June 2011 – June 2012
Data Analyst Greenbelt, MD
Mass Loading, Tropospheric Delay Ray Tracing
- Worked on mass loading displacements due to changes in water mass and ocean bottom pressure.
- Convolved a loading Green's function with the global mass loading field.
- Found significant improvements in baseline lengths and estimates of station positions.
- Started working on the tropospheric delay project that I finished during my second internship.

Extracurricular Activity

2016 **Argonne training program on extreme-scale computing (ATPESC)**
Argonne National Labs
July 31 – Aug 12

2016 – Present **President of the Scientific Software Club**
Cornell University
cornell-ssw.github.io

Computer Skills

MATLAB, C++, C, UNIX, LaTeX, Git, Python, OpenMP, MPI, CUDA.

Journal Publications

March 2016 **Fast exact shortest distance queries for massive point clouds**
Graphical Models
Vol. 84, pages 28-37
(with E. Shellshear)

Dec. 2014 **Tropospheric delay raytracing applied in VLBI analysis**
Journal of Geophysical Research
Vol. 119, Issue 12, pages 9156–9170
(with D. S. MacMillan and J. M. Gipson)

July 2014 **Continental hydrology loading observed by VLBI measurements**
Journal of Geodesy
Vol. 88, Issue 7, pages 675-690
(with D. S. MacMillan)

Conference Proceedings

Sept. 2014 **Approximate distance queries for path-planning in massive point clouds**
11th International Conference on Informatics in Control, Automation and Robotics (ICINCO)
Vol. 2, pages 20-28, IEEE, Vienna, Austria
(with E. Shellshear)

Aug. 2013 **Nontidal ocean loading observed by VLBI measurements**
21st Meeting of the European VLBI Group for Geodesy and Astronomy
Vol. 1, pages 135-140, Espoo, Finland
(with D. S. MacMillan)

Mar. 2012 **Continental hydrology loading observed by VLBI measurements**
IVS 2012 General Meeting Proceedings
pages 415-419, Madrid, Spain
(with D. S. MacMillan)

Presentations

June. 2016 **Asynchronous surrogate optimization in Python (pySOT + POAP)**
Computational Methods in Water Resources, 2016
Toronto, Canada

Aug. 2013 **Atmospheric ray tracing and its impact in VLBI analysis**
NASA Goddard Space Flight Center, Greenbelt, MD
(with D. S. MacMillan and J. M. Gipson)

Dec. 2012 **Explaining the VLBI estimated degree-1 load variation via atmospheric, oceanic, and hydrological mass variations**
American Geophysical Union, Fall Meeting 2012
San Francisco, CA
(with D. S. MacMillan)

Nov. 2011 **Mass loading in VLBI analysis**
NASA Goddard Space Flight Center, Greenbelt, MD
(with D. S. MacMillan)