Tyler H. Chang – CV

Numerical Optimization and Scientific Machine Learning, Senior Research Engineer

Mountain View, CA, USA
https://thchang.github.io https://github.com/thchang

Summary

I am a Senior Researcher and Engineer with 9 years of experience (5 post-PhD) in numerical optimization, scientific machine learning / AI for science, and high-performance computing research. I have published 28 peer-reviewed articles, raised nearly $500k in research funding, led 3 open-source numerical software projects, and made significant contributions to 3 others.

Ask me about using first-order methods for optimization and machine learning – or about designing user-friendly numerical software!

Recent Experience

Jun 2024 - Present. **Senior Research Engineer: Siemens Digital Industry Software**, EDA / HAV Division

- I research & develop high-performance numerical optimization software and algorithms for EDA / CAD applications
- As the senior engineer on an internal start-up project, I contribute to product planning, software design, implementation, and benchmarking

Jun 2020 - May 2024. **Postdoctoral appointee: Argonne National Laboratory**, MCS Division

- Provided computational expertise to a variety of scientific research projects including neural architecture search, material discovery, and particle accelerator design
- Designed and implemented an open-source framework for building and deploying parallel multiobjective simulation optimization solvers (ParMOO, see below)

Aug 2016 - May 2020. **Research fellow: Virginia Tech**, Dept. of Computer Science

- Researching novel methods for error-bounded scientific machine learning and numerical optimization
- Designed parallel algorithms and software for machine learning, blackbox optimization, and computational geometry
- Collaborated with scientists working in HPC performance tuning and environmental modeling

Feb 2016 - Aug 2016. **Research assistant: Old Dominion University**, Dept. of Computer Science

- Aided in parallelizing NASA's FUN3D CFD kernel on NVIDIA GPUs using CUDA and MPI

Technical Skills

Programming languages:	Python (10+ yoe), Fortran (9 yoe), C++ (2 yoe), C (2 yoe), Java (for teaching), Matlab (for 1-off scripts)
Mathematical focus:	numerical optimization, scientific machine learning, approximation theory, computational geometry
Computing focus:	high-performance computing, open source software design, data structures & algorithms
Computing libraries:	BLAS, LAPACK, OpenMP, numpy, scipy, jax, CvxPy, CUDA, MPI
Other libraries:	matplotlib, pandas, plotly/dash, scikit-learn, pytorch, keras
Tools/Workflow:	PBS, qsub, slurm, kernprof, perf, git, GitFlow, GitHub Actions, pytest, sphinx, GNU make, bazel

Education

Ph.D., May 2020, Computer Science, Virginia Polytechnic Institute & State University (Virginia Tech)

B.S., May 2016, Computer Science & Mathematics (double-major), Virginia Wesleyan University , *summa cum laude*

Selected Open Source Software

2. 2022 (latest release 2024). ParMOO: Python library for parallel multiobjective simulation optimization. Release: 0.4.1
   Devs: **T. H. Chang** (lead), S. M. Wild, and H. Dickinson[1] Primary Prog. Lang: `Python 3`
   `git:` https://github.com/parmoo/parmoo
1. 2020 (latest release 2024). DelaunaySparse: Interpolation via a sparse subset of the Delaunay triangulation.
   Devs: **T. H. Chang** (lead), T. C. H. Lux, and L. T. Watson Primary Prog. Lang: `Fortran 2003`
   `git:` https://github.com/vtopt/DelaunaySparse

[1]= DOE SULI (undergraduate intern) at Argonne in my supervision

Selected Publications (from 28 peer-reviewed works)

5. 2025. **T. H. Chang** and S. M. Wild. Designing a framework for solving multiobjective simulation optimization problems. *To appear in INFORMS Journal on Computing*, 33 pages. Preprint: https://arxiv.org/abs/2304.06881.
4. 2025. **T. H. Chang**, A. K. Gillette, and R. Maulik. Leveraging interpolation models and error bounds for verifiable scientific machine learning. *Journal of Computational Physics* 524, Article 113726, 23 pages. **doi:** 10.1016/j.jcp.2025.113726
3. 2023. **T. H. Chang** and S. M. Wild. ParMOO: a Python library for parallel multiobjective simulation optimization. *Journal of Open Source Software* 8(82), Article 4468, 5 pages. **doi:** 10.21105/joss.04468
2. 2022. **T. H. Chang**, L. T. Watson, J. Larson, N. Neveu, W. I. Thacker, S. Deshpande, and T. C. H. Lux. Algorithm 1028: VTMOP: Solver for blackbox multiobjective optimization problems. *ACM Transactions on Mathematical Software* 48(3), Article 36, 34 pages. **doi:** 10.1145/3529258
1. 2020. **T. H. Chang**, L. T. Watson, T. C. H. Lux, A. R. Butt, K. W. Cameron, and Y. Hong. Algorithm 1012: DELAUNAYSPARSE: Interpolation via a sparse subset of the Delaunay triangulation in medium to high dimensions. *ACM Transactions on Mathematical Software* 46(4), Article 38, 20 pages. **doi:** 10.1145/3422818

Funding and Awards

Research Funding Raised

3. Declined for FY 2024. **Key contributor**, $400K/y for 1 year. *High performance computing for development of critical thermodynamic inputs for next generation thermal barrier coatings*, external grant
2. Mar 2023 - Sep 2023. **Co-PI**, $50K/y for 1 year. *A Scalable Multi-Physics Optimization Framework for Particle Accelerator Design*, institutional seed funding (LDRD 2023-0246)
1. Jun 2019 - Dec 2019. **Primary awardee**, $3K/mo for 6 months. *An Adaptive Weighting Scheme for Multiobjective Optimization*, DOE award for PhD students (DE-SC0014664)

Research Fellowships Awarded

5. Aug 2016 - May 2020. Cunningham Doctoral Fellowship, Virginia Tech, Graduate School, guaranteed research funding
4. Aug 2019 - May 2020. Davenport Leadership Fellowship, Virginia Tech, College of Engineering, $4k supplemental award
3. Aug 2018 - May 2019. Pratt Fellowship, Virginia Tech, College of Engineering, $4k supplemental award
2. Aug 2017 - May 2018. Pratt Fellowship, Virginia Tech, College of Engineering, $4k supplemental award
1. Aug 2016 - May 2017. Davenport Leadership Fellowship, Virginia Tech, College of Engineering, $4k supplemental award

Misc. Awards and Accomplishments

4. Jan 2021. Nominee for Outstanding Dissertation Award, Virginia Tech, Graduate School
3. Apr 2016. Outstanding Student in Computer Science & Mathematics, Virginia Wesleyan University
2. Feb 2016. ACM International Collegiate Programming Competition (ICPC), winning team for CNU site, VA, USA
1. Feb 2015. ACM International Collegiate Programming Competition (ICPC), winning team for CNU site, VA, USA

Leadership and Service

Interns Advised

Jun 2022 - Aug 2022.	Manisha Garg (UIUC), NSF MSGI (PhD student intern) at Argonne
Jun 2022 - Aug 2022.	Hyrum Dickinson (UIUC), DOE SULI (undergraduate intern) at Argonne

Teaching

Jan 2022 - Feb 2024.	**Adjunct Professor: College of DuPage**, Dept. of Computer and Info. Science (Intro to Python)
Jan 2020 - May 2020.	**Instructor of Record: Virginia Tech**, Dept. of Computer Science (Data structures and algorithms)

Journal / Conference Referee

Journal of Open Source Software (2025–Present); Optimization Methods and Software (2025–Present); Journal of Supercomputing (2024–Present); INFORMS Journal on Computing (2023–Present); ACM Transactions on Mathematical Software (2021–Present); Quantum Information Processing (2021–Present); The Visual Computer Journal (2021); MDPI: Mathematical and Computer Applications (2021); Journal of Machine Learning Research (2019); ICIAM (2023); Supercomputing (2021); IEEE SoutheastCon (2018–2020)

Minisymposium Organizer

Multiobjective Optimization Software track in SIAM Conference on Optimization (2021); Geometric Methods for Machine Learning track in SIAM Conference on Computational Science and Engineering (2021)