Tyler H. Chang

Argonne National Laboratory
Mathematics & Computer Science (MCS) Division
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E-mail: tchang@anl.gov
Website: `https://thchang.github.io`
GitHub: `https://github.com/thchang`

Technical Skills

Programming Langs: Python, Fortran, C/C++, Java, Matlab

Operating Systems: MacOS, Unix/Linux

Markup Languages: HTML/CSS, Markdown, reStructuredText, YAML, LaTeX, plain TeX

Tools + Frameworks: numpy, pandas, scipy, matplotlib, tensorflow.keras, sklearn, PIL, OpenCV, pytest, sphinx, PyPI/pip, conda-forge, MPI, OpenMP, CUDA, Slurm, BLAS, LAPACK, git, GitHub Actions, GitFlow

Relevant Experience

Jun 2020 - Present. **Postdoctoral appointee: Argonne National Laboratory**, MCS Division
- Designed and implemented a Python framework for building and deploying multiobjective optimization solvers
- Deployed optimization solvers for accelerator design, material manufacturing, and inverse problems
- Advised graduate and undergraduate interns and contributed to research proposals

Aug 2016 - May 2020. **Cunningham fellow: Virginia Tech**, Dept. of Computer Science
- Designed parallel algorithms and software for multivariate interpolation and blackbox optimization
- Applied solvers to problems in HPC performance modeling and tuning
- Conducted fundamental research in approximation theory and computational geometry

Jun 2019 - Dec 2019. **SCGSR awardee: Argonne National Laboratory**, MCS Division
- Conducting research in multiobjective optimization software via DOE SCGSR program (see awards)

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

Dec 2015 - Jan 2016. **Intern: US Army Research Labs**, Computational Science Division
May 2015 - Aug 2015. **Intern: US Army Research Labs**, Computational Science Division
- Accelerating software for real-time optimal control (summer) & using AR technology for info viz (winter)

Dec 2014 - Jan 2015. **Intern: US Army Research Labs**, Guidance Technology Branch
May 2014 - Aug 2014. **Intern: US Army Research Labs**, Guidance Technology Branch
- Using OpenCV for real-time sensing (summer) & developing software for embedded systems (winter)

Education

Ph.D., May 2020, Computer Science, Virginia Polytechnic Institute & State University (Virginia Tech)
- *Thesis: Math. Softw. for Multiobjective Optimization Problems; Outstanding Dissertation Award nominee*

B.S., May 2016, Computer Science & Mathematics (double-major), Virginia Wesleyan University
- *Summa cum laude; 2x ACM ICPC site champion; 8x Dean's list; 4x all-ODAC (conference) for varsity tennis*

Awards

2021. **Nominee for Outstanding Dissertation Award: Virginia Tech**, Graduate School

2019. **Davenport Leadership Fellowship: Virginia Tech**, College of Engineering

2018. **SCGSR Award: DOE Office of Science**, Graduate Student Research (SCGSR) Program

2018. **Pratt Fellowship: Virginia Tech**, College of Engineering

2017. **Pratt Fellowship: Virginia Tech**, College of Engineering

2016. **Cunningham Doctoral Fellowship: Virginia Tech**, Graduate School

2016. **Davenport Leadership Fellowship: Virginia Tech**, College of Engineering

2016. **Outstanding Student in Computer Science & Mathematics: Virginia Wesleyan University**

Publicly Available Software

2022. **ParMOO**: Python library for parallel multiobjective simulation optimization. Release: 0.1.0
Devs: **T. H. Chang** (lead), S. M. Wild, and H. Dickinson Primary Prog. Lang: `Python 3`
`git: https://github.com/parmoo/parmoo`

2022. **VTMOP**: Solver for blackbox multiobjective optimization problems.
Devs: **T. H. Chang** (sole) Primary Prog. Lang: `Fortran 2008`
`git: https://github.com/vtopt/VTMOP`

2020. **DelaunaySparse**: Interpolation via a sparse subset of the Delaunay triangulation.
Devs: **T. H. Chang** (lead) and T. C. H. Lux Primary Prog. Lang: `Fortran 2003`
`git: https://github.com/vtopt/DelaunaySparse`

2019. **QAML**: Quantum annealing math library.
Devs: T. C. H. Lux (lead), **T. H. Chang**, and S. S. Tipirneni Primary Prog. Lang: `Python 3`
`git: https://github.com/tchlux/qaml`

Leadership Activities

Students Advised

Jun 2022 - Aug 2022. Manisha Garg (PhD student at UIUC), intern at Argonne via NSF MSGI program

Jun 2022 - Aug 2022. Hyrum Dickinson (undergrad at UIUC), intern at Argonne via DOE SULI program

Minisymposia Organized

- SIAM Conference on Optimization (2021)
- SIAM Conference on Computational Science and Engineering (2021)

Institutional Service

Nov 2022 - Present. **Organizing Committee: FASTMath Institute Seminar Series**

Nov 2022. **Technical Reviewer: Sustainable Research Pathways**

Aug 2017 - May 2020. **Founding Member: Virginia Tech, Computer Science Graduate Counsel**

Mar 2019. **Primary Student Organizer: Virginia Tech, Comp. Sci. Graduate Preview Weekend**