Leila Ghaffari

Curriculum Vitae

August 2021

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Google Scholar : https://scholar.google.com/citations?user=gW-Ve9sAAAAJ

Education

- **University of Colorado Boulder** — Boulder, CO
  PhD in Computer Science — *Aug. 2019 – Present*
- **Sharif University of Technology** — Tehran, Iran
  M.Sc in Chemical Engineering — *Sep. 2013 – Jan. 2016*
- **University of Tehran** — Tehran, Iran
  B.Sc in Chemical Engineering — *Sep. 2006 – Jan. 2011*

Experience

- **University of Colorado Boulder** — Boulder, CO
  Graduate Research Assistant — *Apr. 2020 - Present*

  Contributing to the development of libCEED, a new open-source mathematical software library for High-Performance Scientific Computing under the supervision of Jed Brown within the Center for Efficient Exascale Discretizations (CEED) of the Exascale Computing Project (ECP).

- **The National Center for Atmospheric Research (NCAR)** — Boulder, CO
  SIParCS Intern — *May 2021 - Jul. 2021*

  Ported the Shallow Water Model mini-app with DPC++, ran it on an Intel Xeon Skylake CPU and an Intel-Xe GPU with different problem sizes, and studied the performance of the ported code (Performance Portability of Shallow Water Model with DPC++).

- **University of Colorado Boulder** — Boulder, CO
  Collaborating Researcher — *Apr. 2019 - Apr. 2020*

  Using PETSc, expanded a Navier-Stokes solver mini-app for compressible gas dynamics in a three-dimensional geometry in libCEED in collaboration with Kenneth Jansen.

- **Universite d'Avignon et des Pays du Vaucluse** — Avignon, France
  Intern — *Jan. 2017 - Jun. 2017*

  Developed environmental-friendly chemical processes.

- **Sharif University of Technology** — Tehran, Iran
  Graduate Research Assistant — *Feb. 2014 - Jan. 2016*

  Designed a bioreactor for Sulfate reducing processes and studied the experimental consistency of the observations with theory.

- **Tehran Oil Refinery Company** — Tehran, Iran
  Intern — *Jun. 2009 - Sep. 2009*

  Studied the Health, Safety and Environment (HSE) management of the Tehran Oil Refinery Company.

Technical Skills

- **Programming Languages**: C/C++, Python, R, MATLAB
- **Software and Tools**: Git, Make, Snakemake, Travis CI, Linux Bash, Valgrind, GNU Debugger, LaTeX, AutoCAD, SOLIDWORKS, ChemCAD, Aspen HYSYS
- **High-Performance Computing**: Intel Advisor, DPC++, MPI, MPI I/O, OpenMP, Slurm

Publications

- Jed Brown, Valeria Barra, Natalie Beams, **Leila Ghaffari**, Matthew Knepley, William Moses, Rezgar Shakeri, Karen Stengel, Jeremy L. Thompson, and Junchao Zhang. 2022. Performance Portable Solid Mechanics via Matrix-Free p-Multigrid. doi:10.48550/arXiv.2204.01722
- Jed Brown, Ahmad Abdelfattah, Valeria Barra , Natalie Beams, Jean-Sylvain Camier, Veselin Dobrev, Yohann Dudouit, **Leila Ghaffari**, Tzanio Kolev, David Medina, Will Pazner, Thilina Rathnayake, Jeremy Thompson, Stan Tomov, *libCEED: Fast algebra for high-order element-based discretizations*, Journal of Open Source Software, 6(63), 2945, doi:10.21105/joss.02945
- Boublenza I, Lazouni HA, **Ghaffari L**, Ruiz K, Fabiano-Tixier AS, Chemat F, *Influence of roasting on sensory, antioxidant, aromas, and physicochemical properties of carob pod powder (Ceratonia siliqua L.)*, J Food Qual 2017:1-10. doi:10.1155/2017/4193672

Technical Reports

- Kolev, Tzanio, Fischer, Paul, Abdelfattah, Ahmad, Beams, Natalie, Brown, Jed, Camier, Jean-Sylvain, Carson, Robert, Chalmers, Noel, Dobrev, Veselin, Dudouit, Yohann, **Ghaffari, Leila**, Joshi, Aditya Y., Kerkemeier, Stefan, Lan, Yu-Hsiang, McDougall, Damon, Medina, David, Min, Misun, Mishra, Abhishek, Pazner, Will, ... Warburton, Tim. (2022). *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for more robust exascale applications.* Zenodo. doi:10.5281/zenodo.6514857
- Kolev, Tzanio, Fischer, Paul, Austin, Anthony P., Barker, Andrew T., Beams, Natalie, Brown, Jed, Camier, Jean-Sylvain, Chalmers, Noel, Dobrev, Veselin, Dudouit, Yohann, **Ghaffari, Leila**, Kerkemeier, Stefan, Lan, Yu-Hsiang, Merzari, Elia, Min, Misun, Pazner, Will, Ratnayaka, Thilina, Shephard, Mark S., Siboni, Morteza H., Warburton, Tim. (2021). *CEED ECP Milestone Report: High-order algorithmic developments and optimizations for large-scale GPU-accelerated simulations.* Zenodo. doi:10.5281/zenodo.4672664
- Abdelfattah A., Barra V., Beams N., Brown J., Camier J. S., Dobrev V., Dudouit Y., **Ghaffari L.**, Kolev T., Medina D., Rathnayake T., Thompson J. L., Tomov S., *libCEED User Manual*, Version 0.7, Zenodo, September 2020. doi:10.5281/zenodo.4302737

Invited Talks

- **World and Asian Pacific Congresses on Computational Mechanics** Yokohama-Online
  WCCM-APCOM 2022 *Jul. 2022*

  On Performance portability of physical problems using libCEED

  Leila Ghaffari, Valeria Barra, Jeremy Thompson, James Wright, and Jed Brown

- **SIAM Conference on Parallel Processing for Scientific Computing** Online
  PP22 *Feb. 2022*

  On Portability and Performance Versatility in Nonlinear Solid and Fluid Mechanics Using libCEED and PETSc

  Leila Ghaffari, Jeremy Thompson, Valeria Barra, Rezgar Shakeri, Karen Stengel, and Jed Brown

- **SIParCS 2021** Online
  The National Center for Atmospheric Research (NCAR) *Jul. 2021*

  Performance Portability of Shallow Water Model with DPC++

  Leila Ghanffari and Zephaniah Connell

- **SIAM Conference on Computational Science and Engineering** Online
  CSE21 *Mar. 2021*

  Advances in LibCEED with Applications to Fluid and Solid Mechanics

  Leila Ghaffari, Jeremy Thompson, Valeria Barra, and Jed Brown

Contributed Talks

- **European Seminar on Computing** Pilsen, Czech Republic
  ESCO 2020 *Jun. 2020*

  Towards Exascale Computing: Vectorized Operator Evaluations on Heterogeneous Architectures with libCEED

  Valeria Barra, Jeremy Thompson, **Leila Ghaffari**, Yohann Dudouit, and Jed Brown

Posters

- **SIParCS 2021** Online
  The National Center for Atmospheric Research (NCAR) *Jul. 2021*

  Performance Portability of Shallow Water Model with DPC++

  Leila Ghanffari and Zephaniah Connell

- **Exascale Computing Project Annual Meeting** Online
  2021 ECP Annual Meeting *Apr. 2021*

  LibCEED 0.8: Concepts and mini-apps

  Valeria Barra, Natalie Beams, Jed Brown, Yohann Dudouit, **Leila Ghaffari**, Arash Mehraban, Will Pazner, Rezgar Shakeri, and Jeremy Thompson

- **SIAM Conference on Computational Science and Engineering** Online
  CSE21 *Mar. 2021*

  LibCEED – The Finite Elements Library without Elements

  Valeria Barra, Jeremy Thompson, **Leila Ghaffari**, and Jed Brown

- **AGU Fall Meeting** Online
  AGU2020 *Dec. 2020*

  Efficient implementations for matrix-free solutions of PDEs with libCEED

  Valeria Barra, Jed Brown, Jeremy Thompson, **Leila Ghaffari**, Yohann Dudouit, and Natalie Beams

- **Women in High Performance Computing Summit** Vancouver, Canada
  WHPC *Apr. 2020*

  An open-source library for high-performance computing on heterogeneous architectures: libCEED

  Valeria Barra, Jed Brown, Yohann Dudouit, **Leila Ghaffari**, and Jeremy Thompson

Honors and Awards

- **Clive Baillie Memorial Fellowship ($1000)** Boulder, CO
  Computer Science Department at CU Boulder *Oct. 2020*

  Awarded from the Department of Computer Science at CU Boulder to attend the 2021 SIAM Conference on Computational Science and Engineering (CSE2021).

Teaching Experience

- **University of Tehran** — Tehran, Iran
  Process Design with HYSYS — *Jan. 2011 - May 2011*

  Teaching assistant for **Computer Aided Process Design and Simulation with Aspen HYSYS**, a chemical process simulator used to mathematically model chemical processes, at the Chemical Engineering Department.

Mentoring Experience

- **Summer Program for Undergraduate Research (SPUR)** — Boulder, CO
  University of Colorado Boulder — *May 2022 - Aug. 2022*

  Kellen Davis Martin (B. Sc. in Aerospace Engineering, University of Colorado Boulder)

- **Summer Program for Undergraduate Research (SPUR)** — Boulder, CO
  University of Colorado Boulder — *Jun. 2021 - Aug. 2021*

  David Reeder (B. Sc. in Mechanical Engineering, University of Colorado Boulder)