Nicole **Brewer**

Research Software Engineer | Graduate Research Assistant

Arizona State University, Tempe, AZ

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Education

Arizona State University — *Tempe, AZ*

PhD Computational History and Philosophy of Science — *Expected May 2027*

Purdue Univeristy — *West Lafayette, IN*

BS Mathematics with Computer Science — *December 2018*

Publications

1. Brewer, N., Campbell, R., Kalyanam, R., Luk, K. I., Song, C. X., & Zhao, L. (2022). Benefits and limitations of jupyter-based scientific web applications. *2022 IEEE 18th International Conference on eScience (eScience)*. https://doi.org/10.1109/eScience55777.2022.00094
2. Brewer, N., Kim, H., Li, C., Anderson, H., Lanum, J., Cheoh, J., Hillery, B., & Overmyer, T. (2019). Student cluster competition 2018, team ada six of purdue university: Reproducing extreme scale multi-physics simulations of tsunamigenic 2004 sumatra megathrust earthquake on intel skylake architecture. *Parallel Computing*, *90*, 102565. https://doi.org/10.1016/j.parco.2019.102565

Honors and Awards

2022 **Outstanding Mentorship Award** ($750), ASU Graduate and Professional Student Association

2022 **GPSA Individual Travel Award** ($950), ASU Graduate and Professional Student Association

2021 **UPSS Delegate** ($500), Philosophy of Science Biennial Meeting

2020 **Young Professional of the Year Award** ($500), Science Gateways Community Institute

2018 **Phil Andrews Award for Most Transformative Contribution**, Practice and Experience in Advanced Research Computing Conference

Grants and Fellowships

Jan 2023 **Better Scientific Software Fellowship** (Up to $25,000), Exascale Computing Project (DOE/NSF), Awardee.

Aug 2022 **School of Life Science Fellowship** ($2,500), Arizona State University, Awardee.

Posters and Presentations

Mar 2022 **Scientific Web Applications Template** (presenter) — *Mini Gateways 2022*

July 2021 **Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (abstract) (video) — *Gateways 2021*

June 2018 **Classification of Periodicity in Subtraction Game Sequences** (poster) — *PEARC18*

Professional Experience

ITaP Research Computing — *Purdue University*

Research Software Engineer — *Feb 2019 - Apr 2022*

- Implemented a highly interactive, Jupyter-based, GUI wrapper for power analysis software in order to expand the audience and ease of use of a rich set of computational functions via a user-friendly interface
- Facilitated software design, the implementation of best practices, and internal tool development, and lab documentation to improve the overall sustainability of lab software
- Transform disparate data acquisition and processing scripts into modular classes to be reused for scientific workflows

Aptiv — *West Lafayette, IN*

Software Verification Engineer — *Nov 2017 – Nov 2018*

- Developed comprehensive Unit Test projects that utilized CAN bus protocol communications to verify automotive controller hardware

Research Experience

Graduate Research Assistant

Complex Adaptive Systems, Arizona State University — *Aug 2022 - Present*

- Advisor: Manfred Laubichler
- Using natural language processing, machine learning, network analysis, high performance computing, and mixed \newline social science methods to model the evolution of scientific standards through time
- Documenting and adapting code and data from prior projects for reuse

Student Cluster Competition, Reproducibility Challenge

Research Computing, Purdue University — *June 2018 - Dec 2018*

- Advisors: Betsy Hillery
- Built a small cluster and applied optimization techniques in a non-stop, 48-hour challenge at the SC18 conference
- Compiled a scienfitic application from an accepted paper from the prior year's Technical Program and interacted directly with the paper's authors to reproduce specific results and conclusions from the paper

CSoI Channels Scholar REU

Center for Science of Information, NSF STC — *Jan 2016 - June 2017*

- Advisor: Mark Daniel Ward
- Utilized HPC clusters to efficiently create large data sets pertaining to combinatorial game theory
- Analyzed batching strategies of parallel computation to efficiently detect an unknown length of repeating sequences in long strings
- Developed a command line interface and file managment system in Python to prevent human error and enhance the usability of codebase

Conference Activity

Oct 2023	**Co-Chair**, Student Program, US-RSE Conference.
Nov 2022	**Booth Event Coordinator**, United States Research Software Engineering Association, SC22.
Nov 2022	**Committee Member**, Reproducibility Challenge, SC22.
Oct 2022	**Invited Panelist**, Software Engineering Topics Relevant to eScience, eScience22.
Oct 2021	**Invited Panelist**, How to Recruit and Sustain a Diverse and Inclusive Workforce: A Case Study, Int'l RSE Day. (slides)

Service

Steering Committee Member — *United States*

Research Software Engineering Association — *Jan 2022 - Present*

- Committed at least five hours per week to steering committee and other meetings including the Diversity, Equity, and Inclusion (DEI), Outreach, and Code of Conduct and Moderation working groups
- Established the DEI Speaker Series and DEI Media Meetings.

Co-Chair — *Purdue University*

Women in High Performance Computing — *Jan 2020 - May 2022*

- Organized and served as the host for invited talks where members shared their work or research
- Created and maintained a formal newsletter featuring opportunities and events for members
- Submitted annual reports and participated in conference events for the international umberella orgainzation

Certifications and Training

SDSC Summer Institute — *Virtual*

San Diego Supercomputer Center — *May 2020*

- Machine learning in R, big data with Spark, parallel programming with Python, and scientific visualization

Applied Management Principles — *West Lafayette, IN*

Krannert Executive Education — *July 2019*

- Purdue's "mini-MBA" covering accounting, finance, strategy, marketing, negotiations & problem solving, and \newline entrepreneurial skills essential to effective laboratory and research project managment

Teaching Experience

Object-Oriented Programming *Purdue Univeristy*

Undergraduate Teaching Assistant *Aug 2015 - May 2016*

Open Source Education and Training Materials

Sep 2022 **HPC Unplugged: A lesson plan for teaching parallel and distributed computing** (booklet)

Mar 2020 **R for Research Scientists** (booklet)

Mentorship and Outreach

Mentor–Protégé Matching *SC22*

Mentor *Oct - Nov 2022*

- Provided career and educational advise and helped extend the professional network of an undergraduate mentee \newline at the Supercomputing conference

Student Cluster Competition *SC19*

Staff Advisor *Aug - Nov 2019*

- Mentored students taking a weekly, two credit hour course in preparation for a competition that I had participated in \newline the year prior

Science Gateways Community Institute Hackathon *PEARC19*

Mentor *June 2019*

- Answered students code-related questions over the course of an intensive, three day conference hackathon

Discover Park Undergraduate Research Internship *Purdue University*

Staff Mentor *Aug 2018 - May 2019*

- Defined the scope of a small project related to our ongoing research projects and met with each student bi-weekly \newline during the course of the semester to help them set achievable short-term goals and guide \newline them through roadblocks they encountered

Mentors for Aspiring Girls in Computing *Purdue University*

Near-Peer Mentor *Aug - Dec 2018*

- Led hands-on activities to teach computer science concepts to local middle and high school students in order to \newline improve the recruitment and retention of young women in technology careers

Science Communication and Broader Impacts

Jan 2023 **Host**, Reproducibility Initiative at SC22, *Long Tales of Science*. (episode)

May 2022 **Host**, Trial by Fire, *Long Tales of Science*. (episode)

Apr 2022 **Interviewee**, Research Software Engineering, *Hello PhD*. (episode)

Feb 2022 **Co-Author**, A kind-of brief shared early history of US-RSE, *US-RSE*. (post)

Dec 2021 **Host**, Call 1-800-HLP-DESK, *Long Tales of Science*. (epidode)

Oct 2020 **Host**, Models and Simulations Run on the Cluster and in the Family, *Long Tales of Science*. (episode)

Extracurricular Leadership

Aug 2016 **Vice President**, Purdue University Triathlon Club

Aug 2015 **Social Media Manager**, Purdue University Triathlon Club

Extracurricular Activity

Music Theory and Piano Lessons *Jan 2023 - May 2023*

Private lessons from ASU faculty associate Cathy Bates

Vocalist and Keyboardist *Aug 2022 - Dec 2022*

ASU Psychodelic Rock Band, RuQe

Major Endurance Sport Events

Apr 2019 **USA Triathlon Collegiate Club National Championships**, Tempe, AZ
Oct 2018 **Chicago Marathon**, Chicago, IL
Aug 2018 **Ironman 70.3 Steelhead Triathlon**, Benton Harbor, MI
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Apr 2017 **USA Triathlon Collegiate Club National Championships**, Tuscaloosa, AL
Nov 2016 **Monumental Marathon**, Indianapolis, IN
Aug 2016 **Ironman 70.3 Steelhead Triathlon**, Benton Harbor, MI
Apr 2016 **USA Triathlon Collegiate Club National Championships**, Clemson, SC
Jan 2016 **Disney World Marathon**, Orlando, FL