Miranda Mundt

505 412 3812 miranda.r.mundt@gmail.com mrmundt mrmundt.github.io

SUMMARY

Senior Research Software Engineer with experience spanning open-source, research-driven software and internal, security-sensitive systems with real operational risk. Expertise includes distributed system development and complex web applications, as well as scientific software developed in experimental, evolving environments. Known for applying rigorous engineering practices to make complex systems reliable, reproducible, and sustainable across a wide range of contexts.

EDUCATION

Arizona State University | *MS in Software Engineering* 2022 – 2025
- Graduated *summa cum laude*
- Extensive coursework in Software Engineering, Research Methods, Cybersecurity

University of New Mexico | *BS in Applied Mathematics* 2012 – 2014
- Minor: Economics, *summa cum laude*
- Extensive coursework in Scientific Computing, Numerical Computation

EXPERIENCE

Sandia National Laboratories Albuquerque, NM
Senior Member of Technical Staff / Research Software Engineer 2019 – Present
- Led architecture and long-term modernization of **Pyomo**, a globally used open-source optimization package, improving stability, contributor scalability, and maintainability across a large, distributed developer community
- Designed and operated **distributed CI/CD systems** for large scientific codebases, addressing automation bottlenecks through improved concurrency, test partitioning, and workflow orchestration using GitHub Actions and heterogeneous execution environments
- Developed **secure, internal web-based systems** to support shared modeling infrastructure, contributing to API design, distributed service integration, containerized deployment (Docker), and user-facing interfaces under strict security and operational constraints
- Built and maintained **complex data-processing and experimentation pipelines**, integrating automated validation, anomaly detection, and performance monitoring to improve early detection of failure modes and regressions
- Contributed to **DevSecOps infrastructure design** spanning HPC systems, cloud tooling, and developer workstations, balancing security requirements with developer usability in multi-platform environments
- Worked across **backend, API, and frontend concerns**, collaborating with domain scientists and engineers to translate modeling needs into usable, sustainable software interfaces and workflows
- Served as a technical mentor and reviewer for senior engineers and researchers, providing guidance on system design, code quality, testing strategy, and sustainable engineering practices
- Applied evidence-based software engineering and participatory action research methods to identify institutional barriers to sustainable software development, translating practitioner experience into actionable technical and process improvements

- Founded and led an organization-wide **Research Software Engineering Community of Practice**, establishing shared engineering standards, improving cross-project knowledge transfer, and strengthening long-term software stewardship

Year-Round Technical Intern 2014 – 2015

- Supported research computing projects and scientific software development
- Assisted in automation and testing for internal tools

SAIC Albuquerque, NM

IT Service Management Specialist 2019

- Applied **ITIL Foundation principles** across Knowledge Management, Incident Management, Change Management, and Major Incident processes in a large, multi-team IT environment
- Developed and delivered **training materials and process documentation** to support consistent adoption of ITSM practices across operational teams
- Participated as a cross-team contributor within **Scrum-based workflows**, supporting continuous improvement initiatives and iterative refinement of service management processes
- Collaborated with multiple ITSM functional groups to improve **operational alignment**, handoffs, and shared understanding of roles and escalation paths
- Built strong operational understanding of **institution-scale IT service delivery**, including the practical tradeoffs between process rigor, responsiveness, and human workload

Belcan Government Services Albuquerque, NM

Service, Quality, and Innovation Trainer 2017 – 2019

- Led **onboarding programs** for IT analysts, delivering structured training that covered both Belcan organizational processes and client-specific (Sandia National Laboratories) operational requirements in a high-security environment
- Designed and maintained a **mixed-mode training ecosystem**, including in-person sessions, on-demand knowledge base articles, and instructional videos to support both timely updates and long-term knowledge retention
- Acted as a **liaison between service desk, escalation teams, and specialized IT groups**, ensuring shared understanding of ticket lifecycles, escalation criteria, and inter-team dependencies
- Supported **quality improvement and process standardization initiatives**, using analyst feedback and operational observations to refine training content and service workflows
- Developed deep familiarity with **enterprise IT operations at scale**, including incident handling, escalation paths, and the human factors that affect service reliability and user experience

TECHNICAL SKILLS

Languages Python, C++, Java, TypeScript, SQL

Software Platforms and APIs API design and integration, service-oriented architectures, backend systems, user-facing application workflows

Web and Application Development Secure web applications, frontend/backend coordination, UI/UX considerations for technical users, authentication and authorization concepts

Automation, CI/CD, and DevSecOps GitHub Actions, GitLab CI/CD, Jenkins, Docker, reproducible environments, security-aware automation, multi-stage testing pipelines

Distributed Systems Distributed system design, heterogeneous computing environments, workload orchestration, high-performance computing (HPC), distributed pipelines

Systems and Infrastructure Linux/Unix environments, SSH, networking fundamentals, remote and restricted-access systems

Data, Validation, and Observability FAIR(ER) data practices, metadata design, validation pipelines, anomaly detection, performance benchmarking, telemetry, and monitoring concepts

Software Architecture Secure-by-design architectures, system modernization, backward compatibility strategies, platform evolution, and long-term maintainability

Engineering Operations and Collaboration Jira, Confluence, GitHub, GitLab, documentation platforms, cross-team workflow design, requirements translation across organizational boundaries

Engineering Focus Reliability engineering, developer productivity, sustainability, risk-aware system design, evidence-based engineering decisions

Leadership and Mentorship Technical mentoring, community building, cross-organizational coordination, engineering practice development

CERTIFICATIONS AND TRAINING

CITI Human Subjects Training (Sandia and ASU) 2022, 2024

ITIL Foundation Training 2019

SELECTED PUBLICATIONS

1. Zakariya, P., Babushka, T., Mundt, M., Henriksen, A. "Developing open data for anomaly detection on nanoindentation curves." [Manuscript submitted for publication in 2025].
2. Dunlavy, M., Mundt, M., Henriksen, A. "Lost at sea: The reproducibility crisis in AIS anomaly detection." [Manuscript submitted for publication in 2025].
3. Drum, C., Dunlavy, M., Mundt, M., et al. "Keeping anomaly rules above board: A study on overspeed for maritime surveillance." [Manuscript submitted for publication in 2025].
4. Mundt, M. et al. "Pyomo: Accidentally Outrunning the Bear." *Patterns*, 2025.
5. Henriksen, A., Mundt, M. "Sharing is Caring: A Practical Guide to FAIR(ER) Open Data Release." 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining, 2024.
6. Milewicz, R., Bisila, J., Mundt, M. et al. "DevOps Pragmatic Practices and Potential Perils in Scientific Software Development." Eighth International Congress on Information and Communication Technology, 2023.
7. Mundt, M. et al. "For the Public Good: Connecting, Retaining, and Recognizing Current and Future RSEs at U.S. National Research Laboratories and Agencies." *IEEE Computing in Science and Engineering*, 2023.
8. Gilbertson, C., Mundt, M. et al. "Towards Evidence-Based Software Quality Practices for Reproducibility: Practices and Aligned Software Qualities." 2nd ACM Conference on Reproducibility and Replicability, 2024.
9. Mundt, M. et al. "Challenges and Strategies for Testing Automation Practices at Sandia." US-RSE Conference, 2023.
10. Mundt, M., Milewicz, R. "A Tiered Approach to Scientific Software Quality Practices." Improving Scientific Software Conference, 2022.

LEADERSHIP AND SERVICE

United States Research Software Engineer Association 2021 – Present

- Elected Steering Committee Member (2023–2024, 2025–2026)
- General Chair, US-RSE Conference 2024
- Contribute to long-term strategy, community growth, and the formalization of research software as a profession

IEEE Computing in Science and Engineering Magazine 2025 – Present

- Invited Editor, Research Software Engineering Department
- Create or request regular content for quarterly department submissions, focusing on the evolving profession and practice of research software engineering in computational science and engineering

Lab-Directed Research and Development Grant 2022 – 2023

- Co-Principal Investigator on federally funded project addressing reproducibility and software quality
- Led case study design, coordination, and data curation for multi-team research effort

Research Software Engineering Community of Practice 2022 – Present

- Founding member and administrator at Sandia National Laboratories
- Create mission statement, code of conduct, and onboarding resources
- Organize monthly meetings and community initiatives

AWARDS

2020 RandD 100 Award – Institute for the Design of Advanced Energy Systems

2021 Noteworthy Practice Award – QA Independent Assessment Program

2020 – 2023 Sandia Employee Recognition Awards – multiple categories