ARJUN EARTHPERSON

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Computational risk scientist and software engineer with 8+ years of experience building high-performance, open-source probabilistic risk assessment tools. Specializes in GPU-accelerated Monte Carlo methods, reliability analysis, and developing scalable web platforms.

EDUCATION

North Carolina State University, Raleigh, NC — Aug 2020 — Aug 2025
Ph.D. Nuclear Engineering
Dissertation: A Data-Parallel, Hardware-Accelerated Monte Carlo Framework for Quantifying Risk using Probabilistic Circuits

North Carolina State University, Raleigh, NC — Aug 2020 — Aug 2023
M.S. Nuclear Engineering
Thesis: Integrating Dual Error Propagation into Dynamic Event Trees to Support Fission Battery Probabilistic Risk Assessments (PRA)

University of California Los Angeles, Los Angeles, CA — Sep 2014 — Dec 2017
B.S. Electrical Engineering
Capstone: Integer Hardware Optimizations on TI-C6000 DSPs for Low-Power IoT Applications

EMPLOYMENT

North Carolina State University, Raleigh, NC — Aug 2020 — Aug 2025
Graduate Research Assistant, Part-Time

- Led the development of OpenPRA, a distributed web-based PRA platform, under a DOE NEUP grant.
- Authored mcSCRAM, an open-source GPU Monte Carlo PRA solver, delivering ≈ 1 trillion events/s on L40s.
- Developed SuPRA, a probabilistic supply-chain shortage risk assessment tool for the FDA.

Aalo Atomics Inc. & NCSU PRA Group, Raleigh, NC — Sep 2023 — Sep 2024
PRA Analyst, Part-Time

- Developed a limited-scope PRA for the Aalo-1 pre-conceptual design, following RG 1.233 technical elements under NEI 18-04's RIPB framework. Work included initiating-event, source-term analyses, event sequence quantification, and F–C curve characterization.

Idaho National Laboratory, Idaho Falls, ID — Summer 2021
Research Intern, Full-Time

- Integrated OpenEPL, a model-checking tool for common-cause failure analysis, into INL's EMRALD platform.

The B. John Garrick Institute for the Risk Sciences, Los Angeles, CA — May 2018 — Jul 2020
Software Engineer, Full-Time

- Lead the development of risk and reliability tools, managing a team of 10+ developers.

Embedded & Re-configurable Systems Lab, UCLA, Los Angeles, CA — Sep 2014 — Sep 2017
Research Assistant, Part-Time

- Developed smartwatch-based, on-device ML algorithms for time-series patient data analysis.

RELEVANT PROJECTS

mcSCRAM github.com/a-earthperson/mcSCRAM
GPU-based PRA solver, built for quantifying models with millions of events.

OpenPRA Initiative github.com/openpra-org
Codebase maintainer for OpenPRA from 2020 through 2025.

inverse-canopy github.com/a-earthperson/inverse-canopy
Tool for back-fitting/finding optimal system unavailabilities based on end-state frequency targets.

PATENTS & COPYRIGHTS

Copyright (Case No. 2023-088): *"Phoenix Human Reliability Analysis Tool"*, M. A. Ramos, A. Mosleh, M. A. Diaconeasa, **A. Earthperson**, W. Chalgham, J. Colin

PCT/US2016/037398: *"Subject assessment using localization, activity recognition and a smart questionnaire"*, A.Naeim, R. Ramezani, **Arjun**, B. Moatamed, M. Sarrafzadeh

HONORS & AWARDS

Graduate Merit Award - Summer 2025, College of Engineering, NCSU

1st Place Graduate Student Winner, ASME SERAD Student Safety Innovation Challenge, 2023
Paper: Introducing OpenPRA, A Web-Based Framework for Collaborative Probabilistic Risk Assessment.

JOURNAL ARTICLES

[1] [Accepted], Egemen M. Aras, Arjun Earthperson, and Mihai A. Diaconeasa. "A Systematic Diagnostics and Enhancement Framework for Advancing Probabilistic Risk Assessment Tools". In: *Nuclear Technology* (2025).

[2] Priyanka Pandit, Arjun Earthperson, and Mihai A. Diaconeasa. "The Development and Demonstration of a Supply Chain Probabilistic Risk Assessment Tool". In: *Logistics* (2025). Submitted; Preprint available at Preprints.org, ID: preprints-172274. URL: https://www.preprints.org/manuscript/202508.1227/v1.

[3] Arjun Earthperson and Mihai A. Diaconeasa. "Integrating Commercial-Off-The-Shelf Components into Radiation-Hardened Drone Designs for Nuclear-Contaminated Search and Rescue Missions". en. In: *Drones* 7.8 (2023). Number: 8 Publisher: Multidisciplinary Digital Publishing Institute, p. 528. ISSN: 2504-446X. DOI: 10.3390/drones7080528. URL: https://www.mdpi.com/2504-446X/7/8/528.

[4] Arjun Earthperson, Courtney M. Otani, Daniel Nevius, Steven R. Prescott, and Mihai A. Diaconeasa. "A combined strategy for dynamic probabilistic risk assessment of fission battery designs using EMRALD and DEPM". en. In: *Progress in Nuclear Energy* 160 (2023), p. 104673. ISSN: 0149-1970. DOI: 10.1016/j.pnucene.2023.104673. URL: https://www.sciencedirect.com/science/article/pii/S0149197023001087.

[5] Ramin Ramezani, Minh Cao, Arjun Earthperson, and Arash Naeim. "Developing a Smartwatch-Based Healthcare Application: Notes to Consider". en. In: *Sensors* 23.15 (2023), p. 6652. ISSN: 1424-8220. DOI: 10.3390/s23156652. URL: https://www.mdpi.com/1424-8220/23/15/6652.

[6] Elaheh Rabiei, Lixian Huang, Hao-Yu Chien, Arjun Earthperson, Mihai A Diaconeasa, Jason Woo, Subramanian Iyer, Mark White, and Ali Mosleh. "Method and software platform for electronic COTS parts reliability estimation in space applications". en. In: *Proceedings of the Institution of Mechanical Engineers, Part O: Journal of Risk and Reliability* (2021), p. 1748006X2199823. ISSN: 1748-006X, 1748-0078. DOI: 10.1177/1748006X21998231. URL: http://journals.sagepub.com/doi/10.1177/1748006X21998231.

CONFERENCE PROCEEDINGS

[7] Egemen M Aras, Arjun Earthperson, Hasibul H Rasheeq, Stephen T Wood, Jordan T Boyce, and Mihai A Diaconeasa. "Facilitating PRA Model Accessibility: Model Converter Utility from SAPHIRE to Open-PSA". en. In: *19th International Probabilistic Safety Assessment and Analysis (PSA 2025)*. Chicago, IL: American Nuclear Society, 2025.

[8] Egemen M Aras, Arjun Earthperson, Hasibul H Rasheeq, Stephen T Wood, Jordan T Boyce, and Mihai A Diaconeasa. "Synthetical Model Generator for Probabilistic Risk Assessment Tools: Enhancing Testing, Verifying and Learning". en. In: *19th International Probabilistic Safety Assessment and Analysis (PSA 2025)*. Chicago, IL: American Nuclear Society, 2025.

[9] Arjun Earthperson, Hasibul Rasheeq, Egemen Aras, Kirill Shumilov, Jordan Boyce, Stephen Wood, and Mihai Diaconeasa. "Probability Estimation using Monte Carlo Simulation of Boolean Logic on Hardware-Accelerated Platforms". en. In: *19th International Probabilistic Safety Assessment and Analysis (PSA 2025)*. Chicago, IL: American Nuclear Society, 2025.

[10] Hasibul H Rasheeq, Egemen M Aras, Arjun Earthperson, and Mihai A Diaconeasa. "Automated OpenPSA Model Generation from Reliability Diagrams Using Agentic Retrieval-Augmented Generation: A Case Study on MHTGR". en. In: *19th International Probabilistic Safety Assessment and Analysis (PSA 2025)*. Chicago, IL: American Nuclear Society, 2025.

[11] Hasibul H Rasheeq, Arjun Earthperson, Egemen M Aras, and Mihai A Diaconeasa. "Design and Implementation of a Distributed Queueing System for OpenPRA". en. In: *19th International Probabilistic Safety Assessment and Analysis (PSA 2025)*. Chicago, IL: American Nuclear Society, 2025.

[12] Egemen Aras, Arjun Earthperson, Hasibul Rasheeq, Asmaa Salem Farag, Stephen Wood, Jordan Boyce, and Mihai Diaconeasa. "Introducing OpenPRA's Quantification Engine: Exploring Capabilities, Recognizing Limitations, and Charting the Path to Enhancement". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: doi.org/10.13182/T130-43362.

[13] Arjun Earthperson, Egemen Aras, Asmaa Salem Farag, and Mihai Diaconeasa. "Towards a Deep-Learning based Heuristic for Optimal Variable Ordering in Binary Decision Diagrams to Support Fault Tree Analysis". In: American Nuclear Society, 2024, pp. 400–409. DOI: 10.13182/T130-43397.

[14] Arjun Earthperson, Priyanka Pandit, and Mihai Diaconeasa. "Implementing Multiple Control Paths in the Dual Error Propagation Graph for Stochastic Failure Analysis of Digital Instrumentation and Control Systems". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: doi.org/10.13182/T130-43400. URL: https://epubs.ans.org/?a=56419.

[15] Arjun Earthperson, Priyanka Pandit, and Mihai Diaconeasa. "Quantifying Safety System Unavailability Margins via Inverse Estimation of Event Sequence Frequencies". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: 10.13182/t130-43399.

[16] Priyanka Pandit, Arjun Earthperson, and Mihai Diaconeasa. "Laying the Foundations for the Development of a Probabilistic Model Checking Method to Quantify Common Cause Failure Parameters in Digital Instrumentation and Control". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: doi.org/10.13182/T130-43603.

[17] Priyanka Pandit, Arjun Earthperson, and Mihai Diaconeasa. "Leveraging Inverse Uncertainty Quantification to Enhance the Resilience of Nuclear Power Plant Construction Duration Estimation". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: doi.org/10.13182/T130-43602.

[18] Asmaa Salem Farag, Amir Afzali, Yasir Arafat, Matt Loszak, Arjun Earthperson, and Mihai Diaconeasa. "Aalo Atomics' High Level Licensing Strategy". In: Las Vegas, NV: American Nuclear Society, 2024.

[19] Asmaa Salem Farag, S Wood, Arjun Earthperson, Egemen Aras, Jordan Boyce, and Mihai Diaconeasa. "Evaluating PRA Tools for Accurate and Efficient Quantifications: A Follow-Up Benchmarking Study Including FTREX". In: Las Vegas, NV: American Nuclear Society, 2024. DOI: doi.org/10.13182/T130-43377.

[20] Egemen Aras, Asmaa Farag, Arjun Earthperson, and Mihai Diaconeasa. "Method of Developing a SCRAM Parallel Engine for Efficient Quantification of Probabilistic Risk Assessment Models". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 134–140. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41054. URL: https://www.ans.org/pubs/proceedings/article-53973/.

[21] Egemen Aras, Asmaa Farag, Arjun Earthperson, and Mihai Diaconeasa. "Methodology and Demonstration for Performance Analysis of a Probabilistic Risk Assessment Quantification Engine: SCRAM". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 452–459. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41053. URL: https://www.ans.org/pubs/proceedings/article-54005/.

[22] Arjun Earthperson, Egemen M. Aras, Asmaa S. Farag, and Mihai A. Diaconeasa. "Introducing OpenPRA: A Web-Based Framework for Collaborative Probabilistic Risk Assessment". In: *Volume 13: Research Posters; Safety Engineering, Risk and Reliability Analysis*. New Orleans, Louisiana, USA: American Society of Mechanical Engineers, 2023, V013T15A014. ISBN: 978-0-7918-8770-7. DOI: 10.1115/IMECE2023-111708. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2023/87707/V013T15A014/1196307.

[23] Arjun Earthperson, Priyanka Pandit, and Mihai Diaconeasa. "Introducing Multiple Control Paths in the Dual Error Propagation Graph for Stochastic Failure Analysis of Digital Instrumentation and Control Systems". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 209–218. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41248. URL: https://www.ans.org/pubs/proceedings/article-53981/.

[24] Asmaa Farag, Egemen Aras, Arjun Earthperson, S. Wood, Jordan Boyce, and Mihai Diaconeasa. "Preliminary Benchmarking of SAPHSOLVE, XFTA, and SCRAM Using Synthetically Generated Fault Trees with Common Cause Failures". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 40–49. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41031. URL: https://www.ans.org/pubs/proceedings/article-53964/.

[25] Priyanka Pandit, Arjun Earthperson, Han Bao, and Mihai Diaconeasa. "Analyzing Hardware and Software Common Cause Failures in Digital Instrumentation and Control Systems Using Dual Error Propagation Method". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 12–21. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41062. URL: https://www.ans.org/pubs/proceedings/article-53961/.

[26] Priyanka Pandit, Arjun Earthperson, Daniel Nevius, and Mihai Diaconeasa. "Quantifying the Likelihood of Nuclear Supply Chain Shortage Risk". en. In: *18th International Probabilistic Safety Assessment and Analysis (PSA 2023)*. Knoxville, TN: American Nuclear Society, 2023, pp. 668–674. ISBN: 978-0-89448-792-7. DOI: 10.13182/PSA23-41229. URL: https://www.ans.org/pubs/proceedings/article-54029/.

[27] Molly Prins, Thomas M. O'Connell, Arjun Earthperson, Yahya A. Alzahrani, and Mihai A. Diaconeasa. "Leveraging Probabilistic Risk Assessment and Machine Learning for Safety and Cost Optimization in HAZMAT Transportation". In: *Volume 13: Research Posters; Safety Engineering, Risk and Reliability Analysis*. New Orleans, Louisiana, USA: American Society of Mechanical Engineers, 2023, V013T15A012. ISBN: 978-0-7918-8770-7. DOI: 10.1115/IMECE2023-114273. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2023/87707/V013T15A012/1196286.

[28] Egemen M. Aras, Asmaa S. Farag, Arjun Earthperson, and Mihai A. Diaconeasa. "Benchmark Study of XFTA and SCRAM Fault Tree Solvers Using Synthetically Generated Fault Trees Models". In: *Volume 9: Mechanics of Solids, Structures, and Fluids; Micro- and Nano-Systems Engineering and Packaging; Safety Engineering, Risk, and Reliability Analysis; Research Posters*. Columbus, Ohio, USA: American Society of Mechanical Engineers, 2022, V009T14A016. ISBN: 978-0-7918-8671-7. DOI: 10.1115/IMECE2022-95783. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2022/86717/V009T14A016/1157443.

[29] Bineh Ndefru, Karthik Sankaran, Theresa Stewart, Ali Mosleh, Arjun Earthperson, and Natalie Zawalick. "Risk-Informed Decision-Making Tool for Covid-19 Community Behavior and Intervention Scenario Assessment". English. In: *Proceedings of the 16th International Conference on Probabilistic Safety Assessment and Management (PSAM)*. Vol. 3. Honolulu, Hawaii, USA: Curran Associates, Inc., 2022. ISBN: 978-1-71386-375-5. URL: https://www.iapsam.org/PSAM16/papers/KS45-PSAM16.pdf.

[30] Courtney Mariko Yang Hui Otani, Robby Christian, Steven R Prescott, Mihai Diaconeasa, and Arjun Earthperson. "Probabilistic Methods for Cyclical and Coupled Systems with Changing Failure Rates". English. In: *Report Number: INL/CON-22-66839-Rev000*. Research Org.: Idaho National Lab. (INL), Idaho Falls, ID (United States), 2022. URL: https://www.osti.gov/biblio/1885929.

[31] Arjun Earthperson and Mihai A. Diaconeasa. "Verification Study of the Nuclear PRA for the Mars 2020 Mission Following Accidental Orbital Re-Entry". In: *Volume 13: Safety Engineering, Risk, and Reliability Analysis; Research Posters*. Virtual, Online: American Society of Mechanical Engineers, 2021, V013T14A019. ISBN: 978-0-7918-8569-7. DOI: 10.1115/IMECE2021-71359. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2021/85697/V013T14A019/1133290.

[32] Priyanka Pandit, Arjun Earthperson, Alp Tezbasaran, and Mihai A. Diaconeasa. "A Quantitative Approach to Assess the Likelihood of Supply Chain Shortages". In: *Volume 13: Safety Engineering, Risk, and Reliability Analysis; Research Posters*. Virtual, Online: American Society of Mechanical Engineers, 2021, V013T14A023. ISBN: 978-0-7918-8569-7. DOI: 10.1115/IMECE2021-73696. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2021/85697/V013T14A023/1133260.

[33] Priyanka Pandit, Alp Tezbasaran, Arjun Earthperson, and Mihai A. Diaconeasa. "Evaluating the Implementation of Distributed Ledger Technology for the Licensing and Regulation of Nuclear Power Plants". In: *Volume 8B: Energy*. Virtual, Online: American Society of Mechanical Engineers, 2021, V08BT08A016. ISBN: 978-0-7918-8564-2. DOI: 10.1115/IMECE2021-71730. URL: https://asmedigitalcollection.asme.org/IMECE/proceedings/IMECE2021/85642/V08BT08A016/1132953.