

## EDUCATION

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|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2024–Present | Ph.D. in Computer Science at <b>University of Virginia</b><br><i>Advisor:</i> Geoffrey C. Fox<br><i>Research Interests:</i> AI for Science, Generative Models, Differentiable Simulation, Inverse Problems<br><i>Expected Graduation:</i> May 2029 |
| 2024–2025    | Master of Computer Science at <b>University of Virginia</b><br><i>GPA:</i> 3.97/4.0                                                                                                                                                                |
| 2022–2023    | Bachelor of Information Technology at <b>Queensland University of Technology</b>                                                                                                                                                                   |
| 2019–2022    | Bachelor of Software Engineering at <b>Jinling Institute of Technology</b><br><i>Cumulative Undergraduate GPA:</i> 4.0/4.0 (WES Verified, 182 Total Credits)                                                                                       |
| 2021–2023    | MicroMasters in Statistics and Data Science at <b>MITx on edX</b>                                                                                                                                                                                  |

## HONORS & AWARDS

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|--------------------------------------------------------------------------|------|
| <b>UVA Institutional Nominee</b> (1 of $\leq 4$ ), Google PhD Fellowship | 2026 |
| <b>NVIDIA Academic Grant Program Award</b>                               | 2024 |
| <b>QUT Executive Dean's Commendation for Academic Excellence</b>         | 2023 |
| <b>China National Scholarship</b> (Top 0.2% of undergraduates)           | 2022 |
| <b>QUT International Merit Scholarship</b>                               | 2022 |

## RESEARCH EXPERIENCE

**ScatterPrism: Generative Model for Particle & Nuclear Physics** VA, USA, 2024–Present

- Developed a **Conditional Flow Matching** generative surrogate that replaces slow Monte Carlo simulation of particle collisions and inverts it to infer physics from detector measurements; validated on Jefferson Lab scattering data
- Showed that low training loss does not guarantee physically correct outputs, and built a **multi-metric diagnostic protocol** to verify kinematic accuracy without memorization, motivated by the upcoming Electron-Ion Collider (EIC)

**PyTorchFire: Differentiable Wildfire Simulation** VA, USA, 2024–Present

- Architected a **GPU-accelerated, differentiable** wildfire Cellular Automata simulator that runs orders of magnitude faster than CPU-based simulators on real-world-scale, high-resolution fires
- Enabled **real-time parameter calibration** via gradient descent to match observed fire spread, with stronger generalization than supervised surrogates; now extending to wildland-urban interface (WUI) scenarios

**Cosmo3DFlow: Generative Early Universe Reconstruction** VA, USA, 2026

- Co-designed a generative framework that reconstructs the early universe from present-day cosmic structure, using the **3D Discrete Wavelet Transform (DWT)** with flow matching to compress the sparse, mostly-empty 3D volume into a spectral form
- Achieved **up to 46× faster sampling** than diffusion models on  $128^3$  N-body simulations, cutting early-universe initial-condition generation from minutes to seconds via stable large-step ODE solvers

**DT-SegNet: Deep Learning for Materials Science** QLD, Australia, 2023

- Built an end-to-end **two-stage pipeline** (YOLOv5 detection + SegFormer segmentation) for automated precipitate identification and measurement in electron-microscopy images of chromium-based superalloys
- **Outperformed established tools** (Weka, ilastik) across accuracy, precision, recall, and F1, enabling high-throughput microstructural analysis for alloy development

### OreFox: Geospatial Data Platform

QLD, Australia, 2023

- Built ExploreDB, a **centralized geological-data platform** with a spatial-query API and integrated AI for scalable geospatial analytics

## PUBLICATIONS

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Islam, Md Khairul et al. (Aug. 2026). “Cosmo3DFlow: Wavelet Flow Matching for Spatial-to-Spectral Compression in Reconstructing the Early Universe”. English. In: *Proceedings of the 32nd ACM SIGKDD Conference on Knowledge Discovery and Data Mining V.2 (KDD 2026)*. To appear. Jeju Island, Republic of Korea: ACM. ISBN: 979-8-4007-2259-2. DOI: [10.1145/3770855.3818994](https://doi.org/10.1145/3770855.3818994). arXiv: [2602.10172](https://arxiv.org/abs/2602.10172) [[astro-ph.IM](#)].

Xia, Zeyu, Lexie Chen, et al. (Aug. 2026). “FireDataForge: A Unified Framework for Multi-Source Wildfire Data Retrieval and Integration”. English. In: *2026 IEEE International Conference on Information Reuse and Integration for Data Science (IEEE IRI 2026)*. To appear. Seattle, WA, USA: IEEE. arXiv: [2606.21198](https://arxiv.org/abs/2606.21198) [[cs.CE](#)].

Xia, Zeyu, Tyler Kim, et al. (July 2026). “ScatterPrism: convergence for generative simulation and inverse problems in particle and nuclear physics”. English. In: *Journal of Instrumentation* 21.07, p. C07012. ISSN: 1748-0221. DOI: [10.1088/1748-0221/21/07/C07012](https://doi.org/10.1088/1748-0221/21/07/C07012). arXiv: [2604.01313](https://arxiv.org/abs/2604.01313) [[cs.LG](#)].

Xia, Zeyu and Sibor Cheng (Apr. 2025). “PyTorchFire: A GPU-accelerated wildfire simulator with Differentiable Cellular Automata”. English. In: *Environmental Modelling & Software* 188, p. 106401. ISSN: 1364-8152. DOI: [10.1016/j.envsoft.2025.106401](https://doi.org/10.1016/j.envsoft.2025.106401). arXiv: [2502.18738](https://arxiv.org/abs/2502.18738) [[cs.CE](#)].

Xia, Zeyu, Kan Ma, et al. (2023). “Accurate identification and measurement of the precipitate area by two-stage deep neural networks in novel chromium-based alloys”. English. In: *Physical Chemistry Chemical Physics* 25.23, pp. 15970–15987. ISSN: 1463-9084. DOI: [10.1039/d3cp00402c](https://doi.org/10.1039/d3cp00402c). arXiv: [2606.22112](https://arxiv.org/abs/2606.22112) [[cs.CV](#)].

Gui, Wenming et al. (2022). “Singing Voice Detection Based on a Deeper Convolutional Neural Network”. English. In: *Proceedings of the 3rd International Symposium on Automation, Information and Computing (ISAIC 2022)*. Vol. 1. INSTICC. Online: SCITEPRESS - Science and Technology Publications, pp. 336–341. ISBN: 978-989-758-622-4. DOI: [10.5220/0011924600003612](https://doi.org/10.5220/0011924600003612).

## SELECTED PATENTS

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“A Method and System for Multimodal Quantitative Financial Risk Prediction Based on Artificial Intelligence” (n.d.[a]). Pat. 19/405,194 (United States).

“Cellular Automaton-Based Wildfire Prediction Method with GPU Acceleration and Real-Time Calibration, Computer-Readable Storage Medium, and System” (n.d.[b]). Pat. 19/242,584 (United States).

## TEACHING EXPERIENCE

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Graduate Teaching Assistant

University of Virginia

CS/ECE 4457: Computer Networks  
CS 6888: Software Analysis  
CS 2102: Discrete Mathematics and Theory 1

*Spring 2026*

*Spring 2026*

*Fall 2025*

## ACADEMIC SERVICE

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**Conference Service** KDD 2026 AI for Science Track Reviewer & Artifact Evaluation Committee Member; OSDI 2026 Artifact Evaluation Committee Member; PPOPP 2026 Artifact Evaluation Committee Member

**Journal Reviewer** Environmental Modelling & Software; SoftwareX; The Journal of Open Source Software; Journal of Open Research Software

## TECHNICAL SKILLS

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**Programming** Python, Bash, C/C++, SQL

**ML & Modeling** Flow Matching, Diffusion Models, Computer Vision

**Frameworks** PyTorch, JAX, TensorFlow, Scikit-learn

**Infrastructure** SLURM, Docker, Git, Linux, API & Database Design