

# BRUNO FONKENG

Research Software Engineer | C/C++ Systems | ML Systems & AI Infrastructure

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## PROFESSIONAL SUMMARY

Ph.D. researcher and systems-focused software engineer with experience building reproducible scientific software, synthetic cybersecurity data pipelines, high-performance research workflows, and C/C++ systems projects. Strong foundation in Python, PyTorch, Linux, SLURM, experiment design, testing, debugging, and technical documentation. Seeking Research Software Engineer, Systems Software Engineer, or ML Systems / AI Infrastructure roles, with a long-term specialization in compiler, runtime, and performance engineering.

## TECHNICAL SKILLS

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|----------------------|-----------------------------------------------------------------------------------------------------------------------------|
| Languages            | C, C++, Python, SQL, Bash / shell scripting                                                                                 |
| Systems & Tooling    | Linux, WSL, POSIX concepts, GCC, Make, CMake, Git, GitHub, GDB, Valgrind, sanitizers, Docker                                |
| ML & Research        | PyTorch, NumPy, pandas, scikit-learn, generative models, synthetic data, experiment design, ML metrics, reproducibility     |
| HPC & Infrastructure | SLURM, batch experimentation, artifact tracking, manifests, automated evaluation, resource-aware workflows, JSON, REST APIs |

## PROFESSIONAL & RESEARCH EXPERIENCE

**Ph.D. Researcher | University of North Dakota, Computer Science** | Grand Forks, ND **Aug 2025 - Present**

- Develop GenCyberSynth, a reproducible framework for training, sampling, evaluating, comparing, and auditing synthetic cybersecurity-data generators.
- Compare GAN, VAE, diffusion, autoregressive, restricted Boltzmann, Gaussian-mixture, and related probabilistic approaches under controlled data-generation budgets.
- Evaluate image quality, diversity, and downstream utility using KID, MS-SSIM, balanced accuracy, macro F1, macro AUPRC, and class-level analysis.
- Build HPC workflows with SLURM, fixed seeds, manifests, environment controls, artifact tracking, automated aggregation, figures, and publication-ready reports.
- Investigate when synthetic data improves malware classification and how selective class-aware augmentation policies affect performance.

**Graduate Teaching Assistant | University of North Dakota** | Grand Forks, ND **Multiple Terms**

- Support undergraduate courses in Systems Programming, Computer Architecture, Computer and Network Security, Data Communications, and Cybersecurity and Information Assurance.
- Guide students through C programming, pointers, memory, files, processes, debugging, command-line tools, networking, architecture, and secure-computing concepts.
- Evaluate technical submissions and provide structured feedback on correctness, design, evidence, clarity, and secure engineering practices.

**Research Assistant - TruNorth | John Deere-Supported University Project** **Completed 2025**

- Contributed to an applied ROI-calculation and decision-support initiative through requirements analysis, calculation logic, validation, software design, and technical documentation.
- Translated operational needs into measurable inputs, outputs, and user-facing workflows across an interdisciplinary research team.

**Project Dynamo Contributor | Handshake AI** | Remote **2026**

- Developed and refined AI-evaluation tasks involving Python, Docker, file processing, Apache log analysis, structured JSON outputs, and automated tests.
- Improved specification precision by defining exact paths, schemas, data types, validation rules, and deterministic success criteria for agent-generated solutions.

## SELECTED TECHNICAL PROJECTS

**GenCyberSynth | Python | PyTorch | SLURM | HPC**

Research framework for synthetic malware-image generation, model comparison, controlled experiments, downstream utility evaluation, and paper-grade artifact production.

**MetricForge | C++ | Python Bindings | CMake**

Open-source ML metrics library with a C++ core, Python-facing design, tests, examples, public interfaces, and implementation-first educational documentation.

**C Systems Mastery | C | GCC | Make | GDB | Valgrind**

Structured systems-programming roadmap covering safe input, arrays, pointers, memory, modular interfaces, testing, build systems, data structures, and low-level development.

**C CLI Lab | C | Linux | POSIX | File I/O**

Extensible suite of Unix-inspired command-line tools designed to deepen understanding of streams, files, arguments, processes, text processing, and filesystem behavior.

## EDUCATION

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### Ph.D. in Computer Science | University of North Dakota

Aug 2025 - Present

Research: synthetic cybersecurity data, generative modeling, trustworthy ML evaluation, reproducible experimentation, and high-performance computing.

### M.S. in Computer Science | University of North Dakota

Aug 2023 - May 2025

Graduate focus in machine learning, artificial intelligence, cybersecurity, data engineering, secure applications, and high-performance computing.

### B.S. in Physics | The University of Bamenda, Cameroon

Oct 2017 - Aug 2020

Foundation in mathematics, statistics, scientific modeling, laboratory analysis, quantitative reasoning, and first-principles problem solving.

## SELECTED PUBLICATIONS & PRESENTATIONS

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- **First-author peer-reviewed conference paper** - ISICN 2025 - Accepted; full verified citation available on Google Scholar.
- **IEEE CARS conference presentation** - 2024 - Presented.
- **Research poster presentation** - Red River Valley ACS Research Event, 2024.
- **When Does Synthetic Data Help Malware Classification?** - Active conference and journal manuscript program.
- **Selective Synthetic Data Policies for Malware Classification** - Active conference and journal manuscript program.

## SELECTED GRADUATE COURSEWORK

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High Performance Computing & Paradigms; Machine Learning; Applied Machine Learning; Artificial Intelligence; Predictive Modeling; Security for Cloud Computing; Application Layer Security; Ethical Hacking; Computer Forensics; Data Visualization; Linear Algebra; Dissertation Research.