

Felix Hirwa Nshuti

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Research Interests

Systems for machine learning, compiler design for AI workloads, and hardware-software co-optimization. I am interested in how compilers represent and transform computation graphs, apply tensor-level optimizations, and generate hardware-aware schedules that close the gap between algorithmic intent and architectural execution. My focus is on building efficient, predictable, and scalable infrastructure for next-generation ML systems.

Education

- **Carnegie Mellon University (CMU-Africa)** Kigali, Rwanda
Master of Science in Electrical and Computer Engineering May 2025 – Present
Coursework: Introduction to Machine Learning, Deep Learning, Machine Learning for Signal Processing
- **Pandit Deendayal Energy University** Gujarat, India
Bachelor of Technology in Computer Engineering October 2021 – May 2025
Coursework: Data Structures and Algorithms, Operating Systems, Compiler Design, Computer Architecture, Artificial Intelligence, Machine Learning, Computer Vision

Selected Projects

- **Enhancing Prophet with Question-Aware Captioning for Knowledge-Based VQA** Aug 2025 – Dec 2025
Knowledge-Based Visual Question Answering Python, PyTorch, Transformers, NLP, CV, VQA
 - github.com/fnhirwa/fca
 - Aimed to improve the performance of knowledge-based VQA systems by integrating question-aware captioning techniques into the Prophet framework.
 - Developed a module that generates contextually relevant captions based on the input question, enhancing the model's ability to retrieve and utilize external knowledge effectively.
- **Context-Aware Demand Forecasting in Pittsburgh's Bike Share System** Aug 2025 – Dec 2025
Time Series Forecasting with Contextual Features Python, Pandas, NumPy, XGBoost, CatBoost, statsmodels
 - github.com/fnhirwa/11755-MLSP-Final-Project
 - Developed a context-aware demand forecasting model for Pittsburgh's bike share system, incorporating temporal, weather, and event-based features to enhance prediction accuracy.
 - Employed advanced time series analysis techniques and machine learning algorithms to capture complex patterns in bike usage data.
- **TransISA, a lightweight CISC-to-RISC Transpiler** Dec 2024 – May 2025
Compiler Design and Architecture Translation LLVM, x86, AArch64, C++, IR, CFG
 - github.com/fnhirwa/TransISA
 - Designed and implemented a compiler pipeline using the LLVM C++ API to translate x86 assembly to AArch64 assembly via LLVM IR.
 - Extracted and analyzed Control Flow Graphs (CFGs) of source programs to support instruction-level translation.
- **Scaling Deep learning backends with sktime** May 2024 – Aug 2024
Machine Learning with time Series Python, PyTorch, TensorFlow, Darts, CI/CD
 - fnhirwa.github.io/gsoc2024
 - Added new classification models to sktime using PyTorch (GRU and GRU-FCNN Classifiers).
 - Efficiently migrated the classifier models from legacy sktime-dl to sktime main repository.
 - Implemented the modular interface of darts regression models in sktime.

Teaching Experience

- **Graduate Teaching Assistant** Nov 2025 – Present
Carnegie Mellon University: Introduction to Deep Learning (11785), Spring 2026

Professional Experience

- **Contributor** May 2024 – Aug 2024
Google Summer of Code, sktime Remote, Remote
 - Scaled Deep Learning backends with sktime, mostly worked with Darts and PyTorch.

- Implemented the modular interface of darts regression models in sktime.
- Presented my project progress at weekly mentorship meetings.
- **Machine Learning Engineer** September 2022 – October 2023
Unify London, United Kingdom
 - Carried out the maintenance and development of Ivy, a unified Deep Learning framework, enhancing its functionality and performance.
 - Established a framework for monitoring adherence to Array API standards, identifying key areas for improvement, and engaging with developers in continuous feedback loops to enhance compliance.
 - Teamed up with the community member in the weekly paper reading group.
 - Led development and maintenance of the Numpy Frontend of Ivy.
 - Empowered community development through discussions, github issues and pull request reviews on open-source projects.
- **Apprentice Software Developer** April 2021 – May 2021
Rohde & Schwarz Kigali, Rwanda
 - Developed Cybersecurity test software by using some automation libraries of Python like Selenium.
 - Facilitated team to deliver quality software over time.
 - Presented final product to the customer and delivered the product to production.

Volunteering Experience

- **Community Council Member and Core Developer** Oct 2024 – Aug 2025
Sktime Remote, Remote
 - Facilitating decision making and conflict resolution through mediation on the roadmap planning.
 - Assisting contributors to get started with open-source and provide continuous constructive feedback.
 - Collaborating with external organizations and looking for funds to drive the open-source ecosystem.
 - Engaging with community through discussions, github issues and pull request reviews on open-source projects.
- **Mentor** August 2021 – April 2023
DeepLearning.AI California, United States
 - Mentored Learners taking TensorFlow Developer Professional Certificate on Coursera by providing assistance with issues faced during the course.

Skills

Programming Languages Python, C/C++, CUDA, Assembly

Deep Learning Frameworks: PyTorch, Jax, TensorFlow, PaddlePaddle

Libraries & Tools: NumPy, Pandas, Scikit-learn, OpenCV, Git/GitHub, Docker

Natural Languages: English (fluent), Kinyarwanda (Proficient)