

Muhammad Hamis Haider

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Professional Summary

I design secure and efficient computing architectures for deployable AI systems, with a focus on edge computing and privacy-sensitive applications. My work spans RISC-V systems, FPGA acceleration, and hardware–software co-design, including support for large language models in regulated domains. I work close to the hardware, developing AI accelerators and secure SoCs using near-data and multi-precision computing, with hands-on RTL design in Verilog/SystemVerilog and UVM-based verification.

I emphasize scalable engineering practices by building reusable frameworks and streamlined workflows that improve productivity and enable rapid, high-quality system development.

Experience

Postdoctoral Fellow (ECE)

KoLab, University of Saskatchewan

Saskatoon, SK, Canada

Jan 2026 – present

Postdoctoral research focused on secure, privacy-preserving edge AI systems and RISC-V–based hardware acceleration under the supervision of Dr. Seok-Bum Ko.

- Designed novel edge AI accelerators enabling private and encrypted inference and training for sensitive applications with a ~20% throughput increase.
- Developing RISC-V-based privacy-preserving AI accelerators integrating differential privacy, cryptographic primitives, and hardware–software co-design.
- Investigating homomorphic encryption and compute-in-memory techniques to reduce latency, energy, and memory overhead in secure AI workloads.

Doctoral Researcher, Electrical and Computer Engineering

KoLab, University of Saskatchewan

Saskatoon, SK, Canada

Sept 2021 – Dec 2025

PhD research under Dr. Seok-Bum Ko focused on efficient, reliable, and secure computing architectures for edge AI systems.

- Designed novel approximate and reconfigurable computing architectures for energy-efficient AI acceleration with up to 60% resource consumption reduction.
- Developed hardware–software co-designed systems enabling AI deployment on resource-constrained edge platforms with up to ~50% reduction in LLM computation cost.
- Conducted applied research on reliable and secure AI systems for healthcare applications.
- Nominated for the Best Thesis Defence Award (2026). Awaiting decision.

Research Assistant

National University of Sciences and Technology (NUST)

Islamabad, Pakistan

Jan 2019 – Dec 2019

Early-stage research in computer architecture under the supervision of Dr. Rehan Ahmed.

- Pioneered RISC-V architecture research at NUST.
- Contributed to the design of Pakistan’s first in-house RISC-V microcontroller.
- Supported RTL development and architectural validation for custom processor designs.

Sessional Lecturer & Graduate Teaching Fellow (ECE)

University of Saskatchewan

Saskatoon, SK, Canada

Jan 2023 – Dec 2025

Teaching and curriculum delivery for undergraduate computer architecture and networking courses.

- Lecturer for CME 334: Network Architecture Design (3 credit hours), teaching cohorts of 10–40 students.
- Delivered lectures, designed assessments, and supervised labs covering modern network architectures.
- Graduate Teaching Fellow and Teaching Assistant for CME 433: Computer Architecture Design (40 students).
- Mentored students across three academic years (2022–2024), supporting labs, grading, and project guidance.

Software Engineer

Aug 2018 – present

Freelancer

Selective contract-based software and web engineering projects delivered for external clients. Visit my website for more details.

- Developed a 3D door placement and visualization engine for an online retail platform using ray-traced lighting and shadowing to generate near-photorealistic room previews from user images with ~30% improved loading speed than competitors.
- Contributed across full-stack development and performance optimization, reducing page load times by approximately 30–55% across multiple client websites.
- Consistently exceeded client expectations with early delivery and maintained a 5-star Fiverr rating, with repeat clients and testimonials citing strong communication and problem-solving.

Publication

Power-Efficient and Reconfigurable Compute Unit for Multi-Precision AI Inference at the Edge Jan 2026

Muhammad Hamis Haider, Hao Zhang, Seok-Bum Ko
(IEEE International Symposium on Circuits and Systems (ISCAS))

Memory-Efficient Differential Privacy Accelerator Jan 2025

Muhammad Hamis Haider, Nam J. Kim, Hao Zhang, Jorge Arias-Garcia, Hyun J. Lee, Seok-Bum Ko
(IEEE Asia Pacific Conference on Circuits and Systems (APCCAS))

Exploring Hardware-Driven Privacy Techniques for Trustworthy Machine Learning Jan 2025

Muhammad Hamis Haider, Hao Zhang, S. Deivalaskhmi, G. Lakshmi Narayanan, Seok-Bum Ko
(Springer (Book Chapter))

Optimized Transformer Models: ϵ' BERT with CNN-like Pruning and Quantization Jan 2024

Muhammad Hamis Haider, Sebastian Valarezo-Plaza, S. Muhsin, Hao Zhang, Seok-Bum Ko
(IEEE International Symposium on Circuits and Systems (ISCAS))

Is Neuromorphic Computing the Key to Power-Efficient Neural Networks: A Survey Jan 2024

Muhammad Hamis Haider, Hao Zhang, S. Deivalaskhmi, G. Narayanan, Seok-Bum Ko
(Springer (Book Chapter))

Decoder Reduction Approximation Scheme for Booth Multipliers Jan 2023

Muhammad Hamis Haider, Hao Zhang, Seok-Bum Ko
(IEEE Transactions on Computers)

Booth-Encoding-Based Energy-Efficient Multipliers for Deep Learning Systems Jan 2022

Muhammad Hamis Haider, Hao Zhang, Seok-Bum Ko
(IEEE Transactions on Circuits and Systems II: Express Briefs)

Awards

Best PhD Defense (Nomination) Dec 2025

Nominated by the PhD Defense Committee in recognition of the quality, originality, and technical depth of the doctoral thesis.

University of Saskatchewan

Teacher-Scholar Doctoral Fellowship

June 2024

Competitive fellowship awarded for excellence in teaching and scholarship, supporting instruction of a 3rd-year undergraduate engineering course.

University of Saskatchewan

Graduate Teaching Fellowship

Apr 2023

Selected to serve as a Graduate Teaching Fellow under the supervision of Dr. Seok-Bum Ko, contributing to course delivery and student mentorship.

University of Saskatchewan

Education

University of Saskatchewan

Saskatoon, SK, Canada

PhD in Electrical and Computer Engineering

Sept 2021 – Dec 2025

Field of Research: Computer Architecture Design

- CGPA: 93.167% (3.98/4.00)
- Thesis: Design of Next-Generation Hardware-Accelerated Edge AI Engines for Privacy Preservation
- Supervisor: Dr. Seok-Bum Ko
- Designed approximate Booth-encoded multipliers achieving 30–50% power and area reduction with bounded error, enabling hardware-efficient differential privacy integration.
- Developed runtime-reconfigurable multi-precision compute units supporting dynamic accuracy–energy trade-offs for DP-SGD across approximate and full-precision modes.
- Proposed error-sensitivity-aware transformer pruning, reducing active layers and compute by 25–40% while preserving accuracy under differential privacy constraints.
- Developed an end-to-end DP-enabled AI accelerator with on-chip metastability-based Gaussian noise generation, achieving up to 20% reductions in memory traffic, energy, and training time on ResNet and transformer workloads.

National University of Sciences and Technology (NUST)

Islamabad, Pakistan

Bachelor of Science in Electrical Engineering (Computer Engineering)

Sept 2017 – June 2021

- CGPA: 3.68/4.00
- Final Year Project: Object-Avoiding Autonomous Drone for Humanitarian Operations
- Advisor: Dr. Rehan Ahmed

Skills

Architecture & Hardware Design: Computer architecture, accelerator design, system-on-chip (SoC), RISC-V, approximate computing units, edge AI inference and training

AI & Model Optimization: Differentially private AI models, edge-optimized architectures, training and inference optimization for large language models (GPT, BERT)

Programming Languages: SystemVerilog, Verilog, C++, Python (AI frameworks, Django, web development), JavaScript, ReactJS, NodeJS, OCaml

EDA Tools & Platforms: Intel Quartus, Xilinx Vivado, Synopsys Design Compiler, Power Compiler, VCS

Languages: English (fluent, CELPIP-G[L/R/W/S]: 12/11/12/11), Urdu (native)