

# Muhammad Hamis Haider

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## Professional Summary

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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

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### 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.

### 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.

### 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.

## Education

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### University of Saskatchewan

*PhD in Electrical and Computer Engineering*

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

*Saskatoon, SK, Canada*

*Sept 2021 – Dec 2025*

### National University of Sciences and Technology (NUST)

*Bachelor of Science in Electrical Engineering (Computer Engineering)*

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

*Islamabad, Pakistan*

*Sept 2017 – June 2021*

## Publication

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### 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: $\epsilon$ 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

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### 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

## Skills

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**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)