

SAMUNDRA KARKI

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EDUCATION

Iowa State University of Science and Technology
PhD in Mechanical and Computer Engineering, GPA 4.0

Expected May 2027

Institute of Engineering, Tribhuvan University, Nepal
Bachelor's Degree in Mechanical Engineering, Gold Medal

November 2017 - April 2022

EXPERIENCE

Graduate Research Assistant, CompM Lab

August 2023 - Present

- Developed and benchmarked geometry-aware SciML models; Poseidon model achieved L2 error of 0.006 on a 20TB flow simulation dataset hosted on Hugging Face.
- MPI-based parallelization of Signed Distance Field (SDF) generation for 2D/3D geometries, achieving near-linear scaling.
- Designed and deployed Neural Field Generation pipeline using PyTorch, adaptive sampling, and ONNX-based model quantization.
- Implemented Shifted Boundary Method Linear/Non-Linear Elasticity Solver for complex geometries in massively parallel octree-mesh (C++).
- Developed a CUDA-based FEM solver for Octree Mesh to improve speed and include differentiability (Work In Progress).

Computational Analytics and Software Engineer, Mokshya/Zebec Protocol

November 2021 - August 2023

- Led development of Wapal, an NFT marketplace on the Aptos blockchain, including architecture, smart contract implementation, and integration.
- Developed RESTful APIs and smart contracts in Rust, managing cryptocurrency transactions worth millions of dollars.

SKILLS

Python, C, C++, MATLAB, Rust, TypeScript, React, CUDA, Kubeflow, Docker, Hugging Face, Langchain

RESEARCH PAPERS

Direct Flow Simulations with Implicit Neural Representation of Complex Geometry, 2025.

FlowBench: A Large Scale Geometry-aware SciML Dataset for Transport Phenomena, 2024.

Comparative CFD analysis of Kali-Gandaki "A" Francis runner (IOP Physics), 2022.

INSTRUCTIONAL EXPERIENCE

MLOps — Machine Learning Operations, TRAC, Iowa State University

August 2024 - December 2024

ACHIEVEMENTS

Gold Medal in Mechanical Engineering, Tribhuvan University