

# SAMUNDRA KARKI

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## EDUCATION

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**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

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**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

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

## RESEARCH PAPERS

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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

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MLOps — Machine Learning Operations, TRAC, Iowa State University

*August 2024 - December 2024*

## ACHIEVEMENTS

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**Gold Medal in Mechanical Engineering, Tribhuvan University**