Oscar POUDEL

Ph.D. in Civil Engineering
Specialization in AI and Robotics for Construction Automation

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☰ RESEARCH INTERESTS

> **Human-Robot Interaction for Construction Robotics :** Designing and implementing hardware-software systems to facilitate multimodal interactions between humans and robots, with applications in construction site automation and assistive robotics.

> **Structural Health Monitoring and Inspection :** Development of computer vision–based systems for automated detection, quantification, and analysis of structural conditions, utilizing camera sensors, edge computing, and embedded AI for real-time infrastructure assessment.

> **Artificial Intelligence for Civil and Construction Engineering :** Application of large language models (LLMs), deep learning (DL), and reinforcement learning (RL) for construction automation, predictive modeling, and intelligent decision-making, including the design of agentic systems and autonomous workflows.

> **Intelligent Infrastructure and Ubiquitous Monitoring Systems :** Integration of ubiquitous sensing technologies, wireless sensor networks, and data fusion techniques to enable scalable, adaptive monitoring and predictive maintenance for civil infrastructure.

⚙ TECHNICAL SKILLS

Structural Engineering	ETABS, SAP2000, SAFE, PERFORM3D, Robot Structural Analysis, RCDC, IDEA StatiCa, OPENSEES, Grasshopper
Drafting & BIM Tools	Revit, AutoCAD, SketchUp, Lumion
GIS & Remote Sensing	QGIS, SNAP (ESA), Civil3D
Project Management Tools	Primavera P6, MS Project
Programming Languages	Python, C/C++, MATLAB, JavaScript
AI & GenAI Frameworks	PyTorch, TensorFlow, LangChain, PydanticAI, scikit-learn, OpenCV
Simulation & Robotics Platforms	ROS2, Isaac Sim, Webots, Unity AR/VR, Gazebo, MoveIt, Docker, AWS
Embedded Systems & Hardware	Arduino,PCB design, IOTs(NodeRed,C++), Microcontrollers, Sensor Integration
Professional Skills	Scientific Reporting, Grant Writing, Technical Presentation, Teaching and Mentoring
Operating Systems	Linux, Windows, macOS

💼 PROFESSIONAL EXPERIENCE

Present

September 2023

Research Assistant | AI and Automation Engineer, NEW JERSEY INSTITUTE OF TECHNOLOGY (NJIT), Newark, NJ, USA

> Developed human-robot interaction systems for autonomous construction tasks using ROS2, Isaac Sim, and embedded systems
> Integrated large language models (LLMs), computer vision, and reinforcement learning for construction site automation
> Led the development of an agent-based simulation platform for infrastructure maintenance planning
> Contributed to grant writing and conference papers in robotics, AI, and civil engineering domains

`Python` `PyTorch` `ROS2` `Isaac Sim` `Gazebo` `LangChain` `PydanticAI` `Git` `Arduinos` `Microcontroller Programming`

Summer 2024 & Summer 2025

Construction AI Engineer, URBANTECH CONSULTING ENGINEERING, New York, NY 10004

> Designed and trained transformer-based deep learning models for infrastructure inspection and defect analysis
> Developed multimodal image–LiDAR fusion pipelines for 3D crack segmentation in structural models
> Implemented 3D computer vision workflows for defect detection on mesh and point cloud data
> Integrated trained deep learning models into a user-facing GUI/application to enable practical deployment within the company
> Conducted applied research on advanced segmentation and data fusion techniques to improve model accuracy and robustness

`Pytorch` `ONNX` `Deep Learning` `User Interface` `Computer Vision`

September 2025 September 2023	**Teaching Assistant │ Civil Engineering Department, NJIT, Newark, NJ, USA**

- › Assisted in teaching undergraduate courses including Strength of Materials, Statistics, and Engineering Dynamics
- › Conducted recitation sessions, developed grading rubrics, and supported student engagement and mentoring
- › Coordinated lab assignments and provided technical support during simulation-based instruction

`SolidWorks` `Excel` `LaTeX`

August 2023 November 2022	**Structural Engineer, Hatemalo Engineering & Construction Pvt. Ltd., Kathmandu, Nepal**

- › Performed structural analysis and design of RCC and steel buildings including seismic detailing per NBC/IS codes
- › Conducted site inspections and verification of construction practices aligned with design documents
- › Collaborated with architectural and MEP teams for coordinated BIM workflows

`ETABS` `SAP2000` `Rhino` `AutoCAD` `Revit` `Excel` `SketchUp`

November 2022 August 2022	**Junior Structural Engineer, MRB & Associates, Kathmandu, Nepal**

- › Supported senior engineers in analysis and detailing of multi-storey commercial and residential structures
- › Participated in retrofitting design and strengthening evaluation of vulnerable RC buildings
- › Prepared structural drawings, BOQs, and engineering documentation

`ETABS` `SAP` `SAFE` `AutoCAD` `Excel`

🎓 Education

2023-Present	Ph.D. in Civil Engineering (Construction Automation/ Construction Management), New Jersey Institute of Technology, Newark, NJ GPA : 4.0/4.0
2023-Present	Masters in Artificial Intelligence (MSAI), New Jersey Institute of Technology, Newark, NJ
2017-2022	Bachelor's in Civil Engineering, Institute of Engineering, Pulchowk Campus, Lalitpur, Nepal Percentage : 82%

📄 CERTIFICATION AND LICENSURE

2025	NCEES FE Civil (2571691-1865513-e1a7b26)
2023	Nepal Engineering Council (Category "A" 32803)
2022	ASCE member (000012454689)

💻 Research Publicaitons

Journal Papers (J)

J03. Poudel, O., & Assaad, R. H. (2025). A Real-Time Intelligent Acoustic IoT-Enabled Embedded Construction Site Monitoring and Alert System : Integrating Deep Learning–Based Machine-Listening Algorithms, Edge Computing, and Cloud Computing. Journal of Construction Engineering and Management, 151(7), 04025075.

J02. Assaad, R. H., Mohammadi, M., & Poudel, O. (2025). Developing an intelligent IoT-enabled wearable multimodal biosensing device and cloud-based digital dashboard for real-time and comprehensive health, physiological, emotional, and cognitive monitoring using multi-sensor fusion technologies. Sensors and Actuators A : Physical, 381, 116074.

J01. Poudel, O.,& Shrestha, K. C. (2024). Enhancing earthquake resilience with strategically arranged inclined columns in multis-toried RCC structures. Innovative Infrastructure Solutions, 9(6), 223.

Representative Conference papers (C)

C03. Poudel, O., Assaad, R. H., & Awada, M. (2025, Accepted/In-press). SLAM assisted Transformers-Based TD3 Deep Reinforcement Learning for Adaptive Navigation and Mapping and Dynamic Obstacle Avoidance in Autonomous Construction Robotics. In Computing in Civil Engineering 2025

C02. Poudel, O., Assaad, R. H., & Awada, M. (2025, Accepted/In-press). Integrating Large Language Models (LLMs) with Autonomous Aerial Drone Robotics and Computer Vision for Contextual Adaptive Construction Site Safety Management and Risk Assessment. In Computing in Civil Engineering 2025.

C01. Poudel, O., Assaad, R. H., & Awada, M. (2025, Accepted/In-press). Visio-GEN : A Wireless Gaze-Assisted and Voice-Controlled Generative AI System Leveraging Stable Diffusion for Real-Time Image Generation for Civil Engineering Design and Visualization. In Computing in Civil Engineering 2025