

Bijay Karki

Structural Engineer | BIM and Design Automation | ETABS / Revit API

Kathmandu, Nepal

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Profile

Civil engineer with a master's in earthquake engineering from IOE, with interests across structural engineering, hydropower and engineering automation. I use Python and engineering data to build tools around real engineering workflows, including hydropower site screening, ETABS code-compliance checks and structural optimisation. Recently developed HydroRecon, which combines hydrology, terrain, geology, hazards and infrastructure data for preliminary run-of-river project screening in Nepal. Looking to contribute to hydropower and structural engineering projects while continuing to develop practical engineering software.

Education

Tribhuvan University, Institute of Engineering

Master's in Civil Engineering, Earthquake Engineering

Jul 2025

Kathmandu, Nepal

- Ranked first in the fourth semester with 94%.
- Coursework: engineering seismology, structural dynamics, finite element methods, earthquake-resistant design, geotechnical earthquake engineering, numerical methods, and research methodology.
- Thesis combined finite element analysis, machine learning, and structural optimization. Cut finite-element computational cost by 51.7% while keeping structural feasibility intact.

Tribhuvan University, Institute of Engineering

Bachelor's in Civil Engineering

Nov 2022

Kathmandu, Nepal

- Coursework: hydrology, engineering geology, surveying, geotechnical engineering, reinforced-concrete design, steel design, foundation engineering, and transportation engineering.

Engineering and BIM Projects

HydroRecon – Hydropower Site Screening Platform | *Python, GIS, Hydrology, ECMWF GloFAS, DHM, MERIT* In Progress

- Building a screening tool for run-of-river hydropower projects in Nepal that generates possible intake and powerhouse locations, gross and net head, design flow, installed capacity, annual energy, and plant factor from a selected river reach.
- Combines hydrology, terrain, geology, hazard, glacier, transmission, road-access, protected-area, and licensed-project data from sources including DHM, DoED, ECMWF GloFAS, DMG, BIPAD, ICIMOD, Copernicus, MERIT Hydro, HydroRIVERS, and OpenStreetMap.
- Calculates flow-duration curves, firm power, P50/P90 energy, turbine selection and part-load generation, unit-count sensitivity, PPA-season energy, flood estimates, pondage potential, and alternative project layouts.
- Intake and powerhouse locations remain interactive, so moving either structure or adding a tributary intake automatically recalculates the layout, hydraulics, generation, access, and project constraints.

QuakeLive – Live Earthquake Explorer | *USGS, EMSC, EarthScope, React, JavaScript*

Open Source

- Built a browser-based earthquake explorer that combines live earthquake feeds, technical event products, seismic-station waveforms, and the historical USGS catalogue in a single interface.
- Displays live events from USGS and EMSC, plain-language earthquake summaries, full technical parameters, and focal-mechanism beachballs generated from published moment-tensor solutions.
- Retrieves waveform data from nearby EarthScope stations, including P- and S-wave arrivals and CSV export, and provides access to the USGS earthquake catalogue dating back to 1900.
- Designed with no backend, user account, or API key; the browser connects directly to the original public data sources, keeping the application lightweight and fully open source.

Nepal Building Code Compliance Tool for ETABS Models | *Python, ETABS OAPI, Automated Reporting*

2026

- Connects to a live ETABS model, extracts the model data, and runs more than 26 checks against NBC and IS requirements.
- Checks cover seismic parameters, mass sources, modal participation, storey drift, torsion, load combinations, member capacity, and strong-column weak-beam.
- Produces a PDF report separating what passed, what failed, what data was missing from the model, and what needs an engineer to look at it.
- Built after doing the same checks by hand often enough to want them automated.
- **Project link:** etabs-compliance.vercel.app

Earthquake-Resistant RC Educational Building | *ETABS, SAFE, AutoCAD, NBC and IS Codes*

2022

- Seismic and gravity-load analysis and design of a multi-storey reinforced-concrete school building.
- Modal analysis, storey-drift checks, load combinations, member design, and foundation design to NBC 105, IS 456, IS 1893, and IS 13920.
- Prepared the full set of calculations, structural drawings, and reinforcement detailing.

Surrogate-Assisted Structural Optimization | *Python, FEM, Machine Learning, PSO*

2025 – Present

- Size-optimization framework pairing finite element analysis with machine-learning surrogate models and particle swarm optimization.
- Constraints on member capacity, displacement, stability, and design feasibility; uncertainty thresholds decide when a real FE run is needed instead of a prediction.
- Now extending it with graph neural networks and ensemble models for planar and space trusses.

ReVisualize Studio | *Generative AI, Next.js, FastAPI, APIs*

2025 – 2026

- Web platform that turns architectural sketches, photographs, and 3D model views into rendered images and video.
- Took it from idea to deployment on my own: interface, API integrations, job handling, hosting, and the bug reports that followed. About 330 registered users.

Technical Skills

BIM and CAD: Revit, AutoCAD, Civil 3D, SketchUp, model coordination, drawing production, and reinforcement detailing

Structural Analysis and Design: ETABS, SAP2000, SAFE, STAAD Pro, finite element analysis, seismic analysis, reinforced-concrete and steel design, and code-compliance checking

APIs and Automation: ETABS OAPI, SAP2000 OAPI, Revit API, pyRevit, MCP servers, and automated report generation

Programming: Python, JavaScript, TypeScript, SQL, HTML, and CSS

Python and Data Tools: pandas, NumPy, PyArrow, Pydantic, Jinja2, matplotlib, scikit-learn, and XGBoost

Web and Application Development: Next.js, React, Tailwind CSS, FastAPI, REST APIs, and Vercel

Standards: NBC 105, IS 456, IS 800, IS 1893, and IS 13920

Certifications and Training

- Revit Training Program, Aron Engineering Pvt. Ltd.
- Advanced Structural Modeling with ETABS and SAP2000, Skill Corner, 2021
- Seismic Design Standards, Department of Urban Development and Building Construction, 2024
- Machine Learning Specialization, DeepLearning.AI / Coursera, 2025
- Google Data Analytics Professional Certificate, Google / Coursera, 2025
- Data Science and Machine Learning with Python, Vrit Technologies, 2024

Languages

- Nepali: Native
- English: Fluent