Joshua Panganiban

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Professional Summary

I am a researcher and engineer with expertise in high-performance computing (HPC), mathematical modeling, and computational methods applied to disaster risk analysis and construction technology. Versatile and solution-driven, I thrive on tackling novel multidisciplinary challenges.

Education

The University of Tokyo *Oct. 2021 – Sep. 2023*
M.Eng. in Civil Engineering | Specialization in Computational Science and HPC | MEXT Scholar

University of the Philippines *June. 2013 – June. 2018*
B.Sc. in Civil Engineering, with honors | Focused on machine learning applications in civil engineering

Work Experience

Research Engineer *Tokyo, Japan*
Takeuchi Construction Inc. *Nov. 2023 – Present*

- Spearheaded the development of a particle-based simulation framework for T-BAGS (patented seismic isolation technology), achieving a 75% reduction in laboratory costs
- Led the development of a neural-network enhanced topology optimization method for TNF (patented soil improvement technology), aiming to improve material efficiency by at least 15%
- Developed automation and utility tools using C++, Python, CUDA, and OpenMP, increasing analysis speed by 50× and saving hundreds of engineering hours

Engineer *Metro Manila, Philippines*
JGC Holdings Corporation (Philippine subsidiary office) *Jan. 2019 – July 2021*

- Automated structural analysis and building plan workflows, cutting manual effort by 95%
- Collaborated with multinational teams on multi-billion-dollar engineering projects (e.g., LNG Canada)

Independent Research Projects

Development of HPC-enhanced agent-based model for simulating economies *Oct. 2021 – Present*

- Developed a 1:1 scale agent-based economic simulator modeling 120 million agents, utilizing MPI and OpenMP to simulate agents' decision-making and interactions in under 2 minutes
- Integrated the model with data from 1.4 million Japanese firms, achieving high accuracy in replicating national, industrial, and firm-level production data, and demonstrated tool usage for providing insights to policymakers
- Collaborators: Earthquake Research Institute - The University of Tokyo, Sumitomo Mitsui Construction Co., Ltd.

Climate and Disaster Risk Assessment for Quezon City, Philippines *Mar. 2022 – Dec. 2022*

- Analyzed complex emergency scenarios and shelter needs using spatial statistical modeling and provided actionable recommendations
- Collaborators: Earthquake and Megacities Initiative, Inc., National and Local Government, Private Organizations

Research Publication / Selected Conferences

Development of a Large-scale Agent-based Economic Simulator for High-resolution Simulation of Post-disaster Economies
Journal of Japan Association for Earthquake Engineering, Vol. 25, No. 4, 2025 (peer-reviewed)

Development of an HPC-enhanced Code for Agent-based Simulation of Large Economies in 1:1 scale
Int. Conf. on Computing in Economics and Finance, July 2025 (Santiago, Chile)

Discrete Element Modeling of T-BAGS and Applications to Low-cost Seismic Vibration Reduction in Structures
Int. Conf. on Computational Methods in Structural Dynamics and Earthquake Engineering, Jun. 2025 (Rhodes, Greece)

Towards High-resolution Simulation of Post-Disaster Economies Utilizing Firm-level Data
Int. Conf. on Big Data for Disaster Response and Management in Asia and the Pacific, Feb. 2024 (Sendai, Japan)

Skills

Programming: C++, Python, MPI, OpenMP, CUDA, Git, Bash

Data science: Data analysis, machine learning, time series forecasting, Monte Carlo simulation

Engineering: Numerical analysis, simulation, optimization, engineering design

Languages: English (Business proficiency, IELTS: 7.5/9.0), Japanese (Basic proficiency, JLPT N4)