Gauss Te-Chuan Chang

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EDUCATION

B.S. in Physics & Civil Engineering, National Taiwan University 2020-2025

- Obtained dual bachelor's degrees in Physics and Civil Engineering.

M.S. in Structural Engineering, National Taiwan University 2025-2026

- Thesis:

RESEARCH EXPERIENCES

Seismic Structural Health Monitoring and Analysis 2023–Present
Institute of Earth Sciences, Academia Sinica Advisors: Dr. Kuo-Fong Ma, Dr. Wen-Tzong Liang

- Investigated how seismic events influence the dynamic response and structural integrity of buildings.
- Utilized eigenfrequency analysis, spectral analysis, and deconvolution techniques to detect shifts in building health indicators over time.
- **Submitted to Peer-Reviewed Journal Article: XXXX , volXX BSSA, 202X**

AI-Based Seismic Signal Classification 2023–Present
Institute of Earth Sciences, Academia Sinica Advisors: Dr. Kuo-Fong Ma, Dr. Wen-Tzong Liang

- Trained CNN-based and a Transformer-based deep learning model to distinguish P-waves, S-waves, and non-seismic signals in real-time.
- Optimized the model for deployment on a Raspberry Pi 4B, enabling low-latency, server-independent earthquake detection on a cost-effective edge device.

Validation of Seismic Parameters via Laboratory Seismic Experiments 2024–Present
Division of Structural Engineering, Institute of Civil Engineering, NTU Advisor: Dr. Chun-Yu Ke

- Conducted dm-Scale laboratory earthquake experiments to investigate earthquake energy budgets.
- Conduct **finite element simulation** to estimate the energy release rate in different configurations of seismic experiments under the **LEFM** assumption.
- Processed and interpreted seismic data using C++ and Python, ensuring high accuracy and reproducibility.

Study on Air Drag Force Using High-Speed Camera and Computer Vision Autumn 2021
Department of Physics, NTU Advisor: Dr. Ying-Jer Kao

- Employed a high-speed camera to record the free-fall trajectory of a spherical object of different sizes.
- Applied computer vision techniques to track the object's position frame-by-frame.

N-Body Problem Simulation Research Autumn 2024
Department of Physics & Department of Geosciences, NTU Advisor: Dr. Ying-Jer Kao, Dr. Yih-Min Wu

- Implemented an N-body simulation in Python, C++, and Fortran, ensuring computational accuracy and flexibility.
- Analyzed conservation properties of total energy and angular momentum over time to validate the system's fidelity.
- Integrated the Barnes–Hut algorithm for hierarchical decomposition, significantly improving computational efficiency.

HONORS

Taiwan Farmers' Association Scholarship — Autumn 2023
Conferred to one of the top 300 performing undergraduate students nationwide.

NTU Alumni Excellence Scholarship — Summer 2024
Awarded for exceptional academic achievement at NTU, with a GPA of 4.23/4.3.

Taiwan Farmers' Association Scholarship — Autumn 2024
Conferred again to one of the top 300 performing undergraduate students nationwide.

Taiwan Farmers' Association Scholarship — Autumn 2025
Conferred to one of the top 300 performing graduate students nationwide.

PUBLICATIONS

Peer-Reviewed Journal Publications

[1] Chun-Yu Ke, **Gauss T. Chang**, Gregory C. McLaskey, David S. Kammer, Chris Marone. (2026) *Nonlocal Elastic Unloading as a Mechanism for Breakdown Work Scaling in Laboratory Earthquakes*. **Earth and Planetary Science Letters**, XX, XXXX. doi: doi.url.replace.with.real.one.

[2] The QSIS paper for BSSA

[3] The paper for my FEM.

Selected Conference Abstracts

[1] **Gauss T. Chang**, Chun-Yu Ke. *Secondary Weakening in dm-Scale Laboratory Earthquakes: Frictional Origin or Rigid-Body Artifact?*. JpGU–AGU Joint Meeting 2026, Chiba, Japan, 24–29 May 2026.

[2] **Gauss T. Chang**, Chris Marone, Chun-Yu Ke. *Earthquake Stress-Drop Estimation in Laboratory Experiment with Machine Learning*. the Japan Geoscience Union Meeting 2025, Chiba, Japan, 25–30 May 2025.

[3] **Gauss T. Chang**, Wen-Tzong Liang, Utpal Kumar, Kuo-Fong Ma, Li-Wei Chen. *Orchestrating Structural Safety with QSIS: Vision for Extensible Building Arrays*. Japan Geoscience Union Meeting 2025, Chiba, Japan, 25–30 May 2025.

[4] Chun-Yu Ke, **Gauss T. Chang**, Gregory McLaskey, Chris Marone. *Earthquake Rupture Speed Dependence on Normal Stress in Laboratory Experiments*. EGU General Assembly 2025, Vienna, Austria, 27 April–2 May 2025.

[5] **Gauss T. Chang**, Wen-Tzong Liang, Utpal Kumar, Kuo-Fong Ma, Hung-Jun Chou, Li-Wei Chen. *QSIS: A Scalable and Cost-Effective Solution for Advanced Structural Seismic Monitoring*. AGU24 Annual Meeting, Washington, D.C., 9–13 December 2024.

[6] **Gauss T. Chang**, Chris Marone, Chun-Yu Ke. *Inferring Earthquake Stress Drops with Passive Acoustics in Laboratory Experiments Using Machine Learning*. Taiwan Geosciences Assembly 2025, Nangang, Taipei, Taiwan, 16–19 June 2025.

[7] **Gauss T. Chang**, Wen-Tzong Liang, Utpal Kumar, Kuo-Fong Ma, Hung-Jun Chou, Li-Wei Chen. *Natural Frequencies of Low-Rise Reinforced Concrete Buildings Determined With QSIS*. Taiwan Geosciences Assembly 2025, Nangang, Taiwan, 16–19 June 2025.

[8] **Gauss T. Chang**, Wen-Tzong Liang, Hung-Jun Chou, Utpal Kumar, Kuo-Fong Ma. *Toward Structural Health Monitoring with QSIS Network*. TEC24 Annual Meeting, Tainan, Taiwan, 23–24 October 2024.