Runze GU

gurunze666@gmail.com | (+86) 153-8904-9823 | https://runzegu.github.io/

Education

College of Engineering, University of California, Berkeley Berkeley, CA, USA
- *Berkeley GLOBE Engineering Visiting Student Program* *2024*
- **GPA:** 4.00/4.00 (earned A+ in 2 out of 4 courses)

College of Civil Engineering, Tongji University Shanghai, China
- *Bachelor of Civil Engineering* *2020 – 2024*
- **GPA:** 3.96/4.00 (WES Evaluation) | 4.49/5.00 (Equivalent to 89.89/100 at Tongji)
- Outstanding Student Scholarship Winner (3 times)

Research Experiences

Developing Next-generation Green Cement *Mar 2024 – May 2024*

Advisor: Prof. **Shaofan Li**, Department of Civil and Environmental Engineering, UC Berkeley
- Designed a low-cost heating chamber using concrete blocks and alligator clips, capable of withstanding temperatures close to 1000 Kelvin during high-temperature sintering, producing cement samples within tens of seconds.
- Conducted various heating methods on cement wastes for reactivation and rehardening, generating new phases within the material.
- Collected and categorized synthesized products based on characteristics such as morphology, color, heating methods and time, for subsequent spectroscopic and electron microscopy analysis at Lawrence Berkeley National Laboratory (LBNL).

Regional Seismic Resilience Assessment Using Computer Vision *Jan 2024 – Jul 2024*

Advisor: Prof. **Ying Zhou**, Dean, College of Civil Engineering, Tongji University
- Trained a Mask R-CNN (Region-based CNN) model by using an annotated high-resolution satellite imagery dataset for real-time assessment of damage levels (no damage, minor damage, major damage, and destroyed) across multiple disaster categories, including earthquakes, earthquake-induced fires, landslides, and floods.
- Evaluated seismic resilience by detecting collapse rates and affected areas according to Chinese and American standards, including the FEMA (Federal Emergency Management Agency) P-58 and REDi (Resilience-based Earthquake Design Initiative) frameworks.

Deep Learning-Based Joint Detection Method for Welding Robots *Jul 2023 – Aug 2023*

Advisor: Prof. **Kevin Han** and Dr. **Doyun Lee**, North Carolina State University
- Annotated over 1,200 images of welding joints with different shapes (corner weld, circular, L-shaped, and linear) by using Labelme tool to create a delicate dataset for model training.
- Trained a U-Net model to detect welding joints for robots, using images or videos as input and segmented images with labeled welding joints as output.
- Achieved a loss value of 0.0080 and a mIoU (mean intersection over union) score of 89% after 100 epochs, significantly improving accuracy, as compared to traditional methods.

Nighttime Vehicle Detection Based on Image Translation Algorithm *Mar 2022 – Dec 2023*

Advisor: Prof. **Chao Liu**, College of Civil Engineering, Tongji University

- Published an academic paper, titled *Nighttime Vehicle Detection Algorithm Based on Image Translation Technology* (DOI: 10.3233/JIFS-233899).
- Built a nighttime traffic image dataset by using vehicle images captured in Beijing, Xi'an, and Chongqing, combined with the Berkeley Deep Drive and UA-DETRAC datasets.
- Developed a novel pipeline—using CycleGAN (Generative Adversarial Network) to perform image style transfer—that generates a labeled nighttime vehicle dataset without manual annotation, significantly reducing cost and time, while enhancing detection accuracy in low-light conditions.
- Trained and tested a YOLO-v5 object detection model using the generated dataset, improving precision by 10.4% and F1 score by 9% compared to traditional methods.
- Conducted comparative experiments to determine the optimal number of training set images for achieving superior efficiency and detection accuracy.

Publication

Yixun Wu, Taiyu Wang, **Runze Gu**, Chao Liu, and Boqiang Xu. 2024. "*Nighttime Vehicle Detection Algorithm Based on Image Translation Technology*" Journal of Intelligent & Fuzzy Systems 46 (2): 5377–89. https://doi.org/10.3233/JIFS-233899

Professional Experiences

Vibration Assessment and Isolation Design for a TOD Project in Ningbo *Sep 2024 - present*

- Modeled with ETABS and performed non-consistent load inputs, conducting vibration calculations and evaluation according to national codes.

Core Officer, Department of International Activities and Student Affairs, College of Civil Engineering, Tongji University *Sep 2024 - present*

Assistant Supervision Engineer, China Coal Xi'an Design Engineering Co., Ltd
Jun – Sep 2022 & Jul – Sep 2023

- Conducted on-site drilling inspections to assess the layout of tie bars in masonry structures for the Xi'an Metro project and compiled detailed inspection reports.
- Performed daily inspections and prepared comprehensive reports on project management protocols, safety measures, waterproofing, and overall project progress.

National Student Innovation Training Program (SITP) project *Mar 2022 – Dec 2023*

- Led nationally funded research on "Nighttime Vehicle Detection Based on Image Translation Algorithm", securing project approval, completion, and publication.

Honors and Awards

- First-Class Outstanding Student in 2023 (top 4%), 2022 (top 5%).
- Second-Class Outstanding Student in 2021.
- First Prize in "Sinopharm Cup" Chemistry Competition (top 0.36% of 1,654 participants).
- Scholarship for Social Work in 2021.

Proficiencies and Skills

- **Standardized Tests:** TOEFL: 104 (R28+L28+S23+W25); GRE: V153+Q169+AW3.5
- **Programming and Computer Skills:** Proficient in Python, MATLAB, AutoCAD, Revit, Scheme, and computer vision algorithms