TAO SUN

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Birthday: May 1999 Birthplace: Anhui Province, China

Education

Hunan University (HNU) 2020.09-Present

M.S. in Bridge and Tunnel Engineering

- Supervisor Prof. Lu Deng (Dean of the College of Civil Engineering)
- GPA 3.55 / 4.00

Anhui University of Science and Technology 2016.09-2020.06

B.S. in Civil Engineering

- Average Score 90.1 / 100 (1st / 343 students)

Research Experiences

1. **Crack Inspection for Concrete Structure Based on SLAM and Deep Learning** (Completed in 2022)

This study proposed an automated surface crack inspection framework for structural health assessment, using UAVs or robots carrying binocular cameras to create a 3D model for the structure and carry out accurate crack 3D localization and measurement. This work involved Visual SLAM, deep learning-based semantic segmentation, multi-view stereo geometry, and point cloud processing.
(Responsible for methodology, algorithm development, implementation of the field test, and paper writing [1][2])

2. **Defect Detection for Tunnel Based on Robot Dog and Robot Car** (In progress)

Aims to achieve unmanned defect detection for tunnels with robot dogs, robot cars and UAVs. This study currently involved to object detection, SLAM, and path planning.
(Responsible for algorithm development using Python and deployment using ROS)

3. **Semi-supervised crack image segmentation based on GAN** (Completed in 2021)

Making pixel-level crack datasets is time-consuming and labor-intensive, and this study developed a semi-supervised generative adversarial network (GAN) for crack segmentation. It is able to train an accurate crack detector using only a small number of labeled images and a large number of unlabeled images.

4. **Dynamic Analysis of Continuous Beam Bridge Based on Midas Civil** (B.S. dissertation, Completed in 2020)

Modeling and seismic response analysis for a railroad bridge in the Zhejiang Province of China were carried out using Midas Civil.

5. **Structure Design Based on Bamboo Material** (Academic Competition, Completed in 2018**)**

Designing and constructing a stressed structure to carry specific static and dynamic loads based on Bamboo material. (Responsible for structure designing, making physical models and implementing the static and dynamic load test)

Papers and Patents

[1] Lu Deng (Supervisor), **Tao Sun**, Liang Yang, Ran Cao*, Binocular Video-based 3D Reconstruction and Length Quantification for Cracks of Concrete Structures [J], *Automation in Construction.* (Accepted)

[2] **Tao Sun**, Lu Deng (Supervisor), Ran Cao, Wei Wang, Automated crack detection method based on 3D reconstruction for concrete bridges [C], *IABSE Conference Nanjing 2022*. (Accepted)

[3] Lu Deng (Supervisor), **Tao Sun**, Chao Xiang, Ran Cao, Jingjing Guo. A 3D model-based measurement method for cracks in concrete structures and related devices [P]. (Under Review)

[4] Wei Wang, Zhibo Wu, Lu Deng (Supervisor), An Zhang, **Tao Sun**. Tunnel surface image processing method and system [P]. ZL 2021 1 0788036.0, 2021-07-13.

Awards and Honors

[1] China National Scholarship for Postgraduates (2022, highest scholarship given by Chinese Ministry of Education, top 2%)

[2] Xiubang Construction Scholarship, Hunan University (2021, 6 out of 411 postgraduates)

[3] The First Class Post-graduate Scholarship, Hunan University (2022, 2021, 2020)

[4] Outstanding Student Leader of Hunan University (2022, 2021)

[5] Outstanding Graduate of Anhui Province (2020, top 3%)

[6] China National Encouragement Scholarship (2019, 2018, 2017, top 4%)

[7] The First Prize of the National Structure Design Contest for College Students, Anhui Region (2018)

[8] The Second Prize of Anhui Mechanics Competition for College Students (2018)

On/Out-campus Work

Class President 2020.09-Present

Responsible for the class management of the bridge engineering class including 45 postgraduates at the College of Civil Engineering, Hunan University.

Assistant Engineer of Self-built House Inspection 2022.04-2022.05

Assisting Changsha city government in the safety assessment of self-built houses, involving field testing, structure analysis, and health assessment.

Skills

Program: Python, C++, ROS, VB, HTML; Pytorch, OpenCV, PCL, Numpy

FEM: Midas Civil, Abaqus, Ansys **BIM:** Revit, AutoCAD **Adobe:** Ps, Pr

English: IELTS (Overall 7.0/ Listening 7.5/ Reading 7.0/ Writing 6.5/ Speaking 6.5)

Traits

- Passionate about construction automation, informatics, AI and robots in civil engineering.
- Have deep studies in Computer Vision, including deep learning-based image detection and segmentation, Visual SLAM, image-based 3D reconstruction, and point cloud processing.
- Keen on problem-solving, exploring and creating new knowledge.
- Highly self-motive. Would like to pursue an academic career.
- Have experience in student work and social practice (good interpersonal and communication skills) and enjoy badminton and fitness.