LI ZHENKUN ⓘ, MASTER OF ENGINEERING — CURRICULUM VITAE

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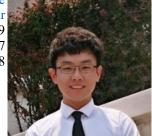Nationality: Chinese
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Interest: structural health monitoring, damage detection, drive-by bridge inspection, model updating, deep learning, Bayesian theory, Gaussian processes, computer vision, engineering optimization;
Strengths: mathematics, computer programming, finite element analysis, signal processing.

DEGREES

10.2021-present	**Doctor of Science (D.Sc.),** Bridge Engineering, GPA: 4.63/5.0. School of Engineering, Aalto University, Espoo, Finland. Thesis: *Automated Inspection for Bridges using Instrumented Moving Vehicles (in preparation).*
09.2017-06.2020	**Master of Engineering (M.Eng.),** Structural Engineering, GPA: 3.76/4.0. Faculty of Infrastructure of Engineering, Dalian University of Technology (DUT), Dalian, China. Thesis: *Additional Virtual Mass Damage Identification Method Based on Narrow Band Frequency Responses* (in Chinese, awarded with distinction).
09.2013-06.2017	**Bachelor of Engineering (B.Eng.),** Civil Engineering, GPA: 3.54/4.0 (WES Evaluation). School of Civil Engineering, Qingdao University of Technology (QUT), Qingdao, China. Diploma thesis: *Architecture and structural design of HOTEL SWAN LAKE at Changdao* (in Chinese).

WORK EXPERIENCE

10.2021-present	**Aalto University, Espoo, Finland. Doctoral Researcher.** My research at Aalto University is related to monitor the health condition of bridges using vibration data of passing vehicles. To automate this process, Artificial Intelligence techniques (such as machine learning and deep learning) are developed to serve the monitoring purpose.
11.2022-12.2022	**Aalto University, Espoo, Finland. Teaching Assistant.** *Fall 2022*: TA for Maintenance and Repair of Structures taught by Prof. Weiwei Lin. I was responsible for project work of students, preparing teaching materials, excursions, exam supervision, etc.
11.2021-12.2021	**Aalto University, Espoo, Finland. Teaching Assistant.** *Fall 2021*: TA for Fundamentals of Structural Design taught by Dr. Markou Athanasios. I was responsible for grading assignments. GeoGebra and MATLAB were used to calculate static responses of structures.
04/2021-08/2021	**Beijing Smartbow Information Technology Co., Ltd., Beijing, China. Structural Algorithm Engineer.** The company's main task is to monitor the health condition of infrastructures (including bridges, wind turbines, tunnels, etc.) online. I am responsible for developing algorithms for outlier data handling, structural modal parameters analysis, and structural dynamic response analysis using Python and MATLAB.
07/2020-03/2021	**TCDRI, Sinoma International Co., Ltd., Tianjin, China, Structural Engineer.** The company's main task is developing smart BIM intelligent platform in cement industry construction, structural design, cement manufacture process design, etc. I am responsible for structural design using PKPM, YJK, Midas and AutoCAD, Revit development (using C#).
09/2017-06/2019	**DUT, Dalian, China, Teaching Assistant.** *Fall 2017, 2018:* TA for the graduate course Prestressed Structures at the Department of Civil Engineering at DUT. I am responsible for Q&A, homework correction and score registration. *Spring 2018, 2019:* TA for the undergraduate course MATLAB in Engineering at the Department of Civil Engineering at DUT. I am responsible for Q&A, program debugging and score registration.
09/2017-06/2019	**DUT, Dalian, China, Research Assistant.** *Fall 2017-Fall 2019:* RA for funded projects of Prof. Jilin Hou. I am responsible for simple steel structure design in Lab, operating machines (e.g. crane), sensor placement, preliminary data processing, etc.

RESEARCH & PROFESSIONAL EXPERIENCES

- Jane and Aatos Erkko Foundation in Finland, Grant number: 210018, Automated Inspection System for Bridges using Drive-By Method and Deep Learning (recipient: Weiwei Lin), 09/2021-08/2024, 346,000 €, ongoing, as main investigator.
- National Natural Science Foundation of China (NSFC), Grant number 51878118, Structural damage identification and experiment study of slab track based on adding virtual physical parameters (recipient: Jilin Hou), 01/2019-12/2022, 680,000 RMB, Completed, as main investigator.

PROFESSIONAL COMPETENCE & CERTIFICATES

- Mastered language: English (C1), Chinese (mother tongue);
- National Computer Rank Examination Certificate of Level 2, 3 (C programming language, Internet technology).
- National 1st Class Certified Structural Engineer.
- National Certificate of BIM Skill Proficiency Test Level 1.
- Main Software: Computing: MATLAB, Octave, Julia, R (tidyverse) | Languages: Python (sklearn+Pytorch) | Numerical simulation: ANSYS, Abaqus | Modeling: SOLIDWORKS, Revit | Text processing: MS Office, LaTeX, HTML5+CSS3 | Figures: OriginLab, Photoshop, Illustrator, CorelDRAW.

JOURNAL PUBLICATIONS

1) **Li, Z.**, Lin, W., & Zhang, Y. (2023). Drive-by bridge damage detection using Mel-frequency cepstral coefficients and support vector machine. *Structural Health Monitoring*, 14759217221150932. DOI: 10.1177/14759217221150932.
2) **Li, Z.**, Lin, W., & Zhang, Y. (2023). Real-time drive-by bridge damage detection using deep auto-encoder. *Structures* 47, 1167-1181. DOI: 10.1016/j.istruc.2022.11.094
3) **Li, Z.**, Lan, Y., & Lin, W. (2023). Investigation of Frequency-Domain Dimension Reduction for A^2M-Based Bridge Damage Detection Using Accelerations of Moving Vehicles. *Materials*, 16(5), 1872. DOI: 10.3390/ma16051872
4) **Li, Z.**, Hou, J., & Jankowski, Ł. (2022). Structural damage identification based on estimated additional virtual masses and Bayesian theory. *Structural and Multidisciplinary Optimization*, 65(2), 45. DOI:10.1007/s00158-021-03156-y
5) Hou, J., **Li, Z.**, Zhang, Q., Jankowski, Ł., & Zhang, H. (2020). Local mass addition and data fusion for structural damage identification using approximate models. *International Journal of Structural Stability and Dynamics*, 20(11), 2050124. DOI: 10.1142/S0219455420501242
6) Hou, J., **Li, Z.**, Jankowski, Ł., & Wang, S. (2020). Estimation of virtual masses for structural damage identification. *Structural Control and Health Monitoring*, 27(8), e2585. DOI: 10.1002/stc.2585
7) Hou, J., **Li, Z.**, Zhang, Q., Zhou, R., & Jankowski, Ł. (2019). Optimal Placement of Virtual Masses for Structural Damage Identification. *Sensors*, 19(2), 340. DOI: 10.3390/s19020340
8) Lan, Y., **Li, Z.**, & Lin, W. (2023). A Time-Domain Signal Processing Algorithm for Data-Driven Drive-by Inspection Methods: An Experimental Study. *Materials*, 16(7), 2624. DOI: 10.3390/ma16072624
9) **Li, Z.**, Lin, W., & Zhang, Y. (2023) Bridge frequency scanning using the contact-point response of an instrumented 3D vehicle: theory and numerical simulation. *Structural Control and Health Monitoring*. 2023, 3924349. DOI: 10.1155/2023/3924349
10) **Li, Z.**, Lan, Y., & Lin, W. Indirect damage detection for bridges using sensing and temporarily parked vehicles. *Engineering Structures*. 291, 116459. DOI: 10.1016/j.engstruct.2023.116459
11) **Li, Z.**, Lan, Y., & Lin, W. Indirect frequency identification of footbridges with pedestrians using the CP response of shared scooters. *Journal of Bridge Engineering*. Under review.

CONFERENCE PUBLICATIONS

1) **Li, Z.**, Lin, W., & Zhang, Y. Drive-by Damage Detection in Bridges using Mel-frequency Cepstral Coefficients and Machine Learning, *8th World Conference on Structural Control and Monitoring (8WCSCM)*, (2022), Florida, U.S.A., June 5-8.
2) Zhang, Y., **Li, Z.**, Hao, R., Lin, W., Li, L., & Su, D. Vibration Data Synthesis by using Finite Element Analysis and Artificial Neural Network, *8th World Conference on Structural Control and Monitoring (8WCSCM)*, (2022), Florida, U.S.A., June 5-8.
3) **Li, Z.**, Lin, W., & Zhang, Y., Indirect bridge damage detection using frequencies identified from vibrations of a single two-axle vehicle, *Eighth International Symposium on Life-Cycle Civil Engineering*, (2023), Milan, Italy. July 2-6.
4) **Li, Z.**, Lan, Y., & Lin, W. Using contact residual responses of a 3-DOF scooter to identify first few frequencies of the footbridge, *Tenth International conference: Experimental Vibration Analysis for Civil Engineering Structures*, (2023), Milan, Italy. Aug 31- Sep.1. Accepted.
5) Lan, Y., **Li, Z.**, Zhang, Y., & Lin, W. Small-scale damage detection of bridges using machine learning techniques and drive-by inspection methods, *Eighth International Symposium on Life-Cycle Civil Engineering*, (2023), Milan, Italy. July 2-6.
6) Lan, Y., **Li, Z.**, & Lin, W. Real-time diagnostic algorithm for bridge health monitoring using raw vehicle acceleration data, *Tenth International conference: Experimental Vibration Analysis for Civil Engineering Structures*, (2023), Milan, Italy. Aug.31- Sep.1. Accepted.

SELECTED AWARDS & HONOURS

Mar. 2022	Incentive grant from Fabian and Jaakko Ahvenainen Foundation	Aalto University
Jun. 2020	Excellent master thesis	DUT
Jun. 2020	Eminent graduate in Liaoning Province	Liaoning Province
Nov. 2019	Scholarship of Chinese Road and Bridge	DUT
Oct. 2018	Eminent postgraduate student	DUT
Oct. 2016	Scholarship from Shandong Province Government (1 out of 508 students)	Shandong Province
Dec. 2015	Second Prize in National Mathematic Modeling Competition	National level
Nov. 2015	Third Prize in the National Advanced Innovated Competition	National level
Jun. 2015	Second Prize in the 14th Challenge Cup Competition in Shandong Province	Shandong Province
Nov. 2014	Scholarships from Principal of QUT (4 out of 508 students)	QUT

COMMUNICATION & CONFERENCE

- Eighth international symposium on life-cycle civil engineering (IALCCE 2023), July 2-6, 2023, Milan, Italy.
- 8th World Conference on Structural Control and Monitoring, June 5-8, 2022, Orlando, Florida, U.S.A.
- 9th Experimental Vibration Analysis for Civil Engineering Structures, Sep. 14-17, 2021, Saitama, Japan.
- 8th Experimental Vibration Analysis for Civil Engineering Structures, Sep. 5-8, 2019, Nanjing, Jiangsu, China.
- 7th World Conference on Structural Control and Monitoring, July 22-25, 2018, Qingdao, Shandong, China.
- Academic communication at Osaka University and Kyoto University on Jan. 7-15, 2020, Osaka, Japan.