

Curriculum Vitae

Zhanxiong Ma, Ph.D.

Postdoctoral researcher

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RESEARCH INTERESTS

Structural Health Monitoring, Structural Displacement Estimation, Cable Tension Force Estimation, Data Fusion, Computer Vision, Signal Processing, Submerged Floating Tunnel, Machine Learning, Image Processing, Earthquake engineering.

EDUCATION

- | | |
|-------------------|---|
| 2017/09 – 2022/08 | Ph.D. , Civil and Environmental Engineering, Korea Advanced Institute of Science and Technology (KAIST), Daejeon, Republic of Korea |
| 2014/09 – 2017/06 | M.S. , Architecture and Civil Engineering, School of Civil Engineering, Chongqing University (CQU), Chongqing, People's Republic of China |
| 2010/09 – 2014/06 | B.S. , Civil Engineering, School of Civil Engineering and Mechanics, Huazhong University of Science and Technology (HUST), Wuhan, People's Republic of China |

DISSERTATION & THESIS

1. **Zhanxiong Ma**, “GNSS-free Structural Displacement Estimation Through Homogeneous Sensor Fusion”, Ph.D. Thesis, Civil and Environmental Engineering, Korea Advanced Institute of Science and Technology (KAIST), June, 2022. (Advisor: Professor Hoon Sohn)
2. **Zhanxiong Ma**, “Wave Theory Based Structural Damage Detection (in Chinese)”, M.S. Thesis, School of Civil Engineering, Chongqing University (CQU), June, 2017. (Advisor: Associate Professor Yingfeng Dong)

JOURNAL PUBLICATIONS

* The corresponding author is underlined

In Preparation:

- J01. Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, Hoon Sohn. Continuous Structural Displacement Monitoring Using Accelerometer, Vision, and IR Cameras, In preparation, 2022.

Under Review:

- J02. Liu Yang, Jack C.P. Cheng, **Zhanxiong Ma**, Ikgeun Jeon, Peipei Liu, Hoon Sohn. Real-time Layer Height Estimation during Multi-Layer Directed Energy Deposition Using Laser Line Scanner, Vision Camera, and Domain Adaptive Neural Networks, submitted to *Additive Manufacturing* (IF: 11.632, JCR Ranking: 1/51 in Engineering, Manufacturing), 2022.
- J03. **Zhanxiong Ma**, Peipei Liu, Jaemook Choi, Hoon Sohn. Structural Displacement Estimation Through The FIR-filter-based Fusion of High-sampled Acceleration and Temporally-aliased Low-sampled Displacement Measurements, submitted to *Mechanical System and Signal Processing* (IF: 8.934, JCR Ranking: 4/137 in Engineering, Mechanical), 2022.
- J04. **Zhanxiong Ma**, Jaemook Choi, Jinho Jang, Ohjun Kwon, Hoon Sohn. Simultaneous Displacement and Mooring Cable Force Estimation for Submerged Floating Tunnel Using Accelerometer and Strain Gauges, submitted to *Structural Control and Health Monitoring* (IF: 6.058, JCR Ranking: 15/138 in Engineering, Civil), 2022.

Published:

- J05. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Structural Displacement Estimation by Fusing FWCW Millimeter-wave Radar and Accelerometer, submitted to *Mechanical System and Signal Processing* (IF: 8.934, JCR Ranking: 4/137 in Engineering, Mechanical), 2022, 182: 109582.
- J06. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Noncontact Cable Tension Force Estimation using a Visual-inertial System, submitted to *Measurement* (IF: 5.131, JCR Ranking: 11/64 in Instruments & Instrumentation), 2022, 199: 111532.
- J07. **Zhanxiong Ma**, Jaemook Choi, Peipei Liu, Hoon Sohn. Structural Displacement Estimation by Fusing Asynchronous Measurements from Camera and Accelerometer Using Hybrid Computer Vision Algorithm and Adaptive Multi-Rate Kalman Filter, *Automation in Construction* (IF: 10.517, JCR Ranking: 1/138 in Engineering, Civil), 2022, 140: 104338.
- J08. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Real-time Estimation of Structural Displacement Estimation by Fusing Asynchronous Acceleration and Computer Vision Measurements, *Computer-aided Civil and Infrastructure Engineering* (IF: 10.066, JCR Ranking: 2/138 in Engineering, Civil), 2022, 37(6): 688-703.
- J09. **Zhanxiong Ma**, Junyeon Chung, Peipei Liu, Hoon Sohn. Bridge Displacement Estimation by Fusing Accelerometer and Strain Gauge Measurements. *Structural Control and Health Monitoring* (IF: 6.058, JCR Ranking: 15/138 in Engineering, Civil), 2021, 28(6): e2733.
- J10. Yingfeng Dong, **Zhanxiong Ma**, Shun Chen, Qiang Zhao. Identification of Soil Liquefaction Using Surface and Borehole Strong Ground Motion. *Journal of Building Structure*. 2016, 37(S1): 362-365. (In Chinese, EI)
- J11. Yingfeng Dong, Qiang Zhao, **Zhanxiong Ma**, Yunhao Li. Seismic Performance Evaluation on Steel Frame Thermal Power Plants Main Building. *Journal of Building Structure*. 2016, 37(S1): 165-169. (In Chinese, EI)

CONFERENCE PROCEEDING & PRESENTATIONS

* The corresponding author is underlined

- C01. **Zhanxiong Ma**, Peipei Liu, Jaemook Choi, Hoon Sohn. Structural displacement estimation using high-sampling acceleration and temporally-aliased low-sampling vision measurements,

SPIE Smart Structures + Nondestructive Evaluation conference (SPIE 2023), California, USA, March 12-16, 2023.

- C02. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Structural displacement estimation using a low-cost sensing system combining millimeter-wave radar and accelerometer, *The 2022 Structures Congress (Structures22)*, Seoul, Korea, August 16-19, 2022 (Presentation only)
- C03. Jaemook Choi, **Zhanxiong Ma**, Hoon Sohn. Continuous Structural Displacement Monitoring Using Accelerometer, Vision, and IR Cameras, *The 2022 Structures Congress (Structures22)*, Seoul, Korea, August 16-19, 2022 (Presentation only)
- C04. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Simultaneous Displacement and Cable Force Estimation for Submerged Floating Tunnel Based on Strain and Acceleration Measurements, *The 11th International Conference on Bridge Maintenance, Safety and Management (IABMAS 2022)*, Barcelona, Spain, July 11-15, 2022.
- C05. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Simultaneous Estimation of Submerged Floating Tunnel Displacement and Mooring Cable Tension Using Accelerometer and Strain Gauge Measurements, *The 10th European Workshop on Structural Health Monitoring (EWSHM 2022)*, Palermo, Italy, July 04-07, 2022. (Presentation only)
- C06. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Structural Displacement Estimation Through The Fusion of FMCW Millimeter Wave Radar and Accelerometer, *the 8th World Conference on Structural Control and Monitoring (8WCSCM)*, Florida, USA, June 5-8, 2022.
- C07. **Zhanxiong Ma**, Jaemook Choi, Hoon Sohn. Millimeter-wave Radar and Accelerometer Based Structural Displacement Estimation, *The 2021 Technical Conference of Korean Institute of Bridge and Structural Engineers (KIBSE 2021)*, Online, November 27, 2021.
- C08. Hoon Sohn, **Zhanxiong Ma**, Jaemook Choi. Structural Displacement Estimation Through Multi-Mode Sensor Fusion Under GNSS-Denied Environments, *The 8th International Conference on Vibration Engineering (ICVE 2021)*, Shanghai, China, July 23-26, 2021. (Plenary presentation only)
- C09. Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, Hoon Sohn. Structural Displacement Estimation Based on Accelerometer and Camera Data. *The 2020 Technical Conference of Korean Institute of Bridge and Structural Engineers (KIBSE 2020)*, Seoul, South Korea, November 27, 2020.
- C10. Jaemook Choi, **Zhanxiong Ma**, Hoon Sohn. Structural Displacement Estimation Fusing Accelerometer and Vision Camera. *The 2020 Structures Congress (Structures20)*, Seoul, Korea, August 25-29, 2020 (Presentation only)
- C11. **Zhanxiong Ma**, Hoon Sohn. FIR Filter Based Bridge Displacement Estimation Using Strain and Acceleration Measurements. *The 32th KKHTCNN Symposium on Civil Engineering*, Daejeon, Korea, October 24-26, 2019 (Presentation only)
- C12. **Zhanxiong Ma**, Hoon Sohn. Structural Displacement Estimation by FIR Filter Based Fusion of Strain and Acceleration Measurements. *The 29th International Ocean and Polar Engineering Conference (ISOPE 2019)*, Honolulu, USA, June 16-21, 2019.
- C13. **Zhanxiong Ma**, Hoon Sohn. Data Fusion Based Structural Displacement Estimation Using Strain and Acceleration Measurements. *The Annual Conference of Earthquake Engineering Society of Korea (EESK 2019)*, Suwon, Korea, Marth 16-21, 2019
- C14. Wenju Liang, Yingfeng Dong, Kaiqi He, **Zhanxiong Ma**. Incremental Dynamic Analysis and

Vulnerability Analysis of Structures. *The 2018 Structures Congress (Structures18)*, Incheon, Korea, August 27-31, 2018

- C15. Hebin Yao, Yingfeng Dong, Kaiqi He, **Zhanxiong Ma**. Selection of Bidirectional Ground Motions for Time History Analysis. *The 2018 Structures Congress (Structures18)*, Incheon, Korea, August 27-31, 2018

PATENTS

- P1. Hoon Sohn, **Zhanxiong Ma**, Jaemook Choi, "Structural Displacement Estimation by Fusing Millimeter-wave FWCW Radar and Accelerometer," KR Patent (Application #: 10-2022-0071762), June, 2022.
- P2. Hoon Sohn, Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, "Method of Estimating Displacement of Structure based on Fusing Asynchronous Acceleration and Vision Measurements Using Natural Target and System for the Same", PCT Patent (Application # PCT/KR2022/003490), March, 2022.
- P3. Hoon Sohn, Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, "Method of Estimating Displacement of Structure based on Fusing Asynchronous Acceleration and Vision Measurements Using Natural Target and System for the Same", US Patent (Application #: TBD, Under evaluation), July, 2021.
- P4. Hoon Sohn, Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, "Method of Estimating Displacement of Structure based on Fusing Asynchronous Acceleration and Vision Measurements Using Natural Target and System for the Same", CN Patent (Application #: TBD, Under evaluation), July, 2021.
- P5. Hoon Sohn, **Zhanxiong Ma**, "A method of estimating displacement of a bridge and an electronic device to estimate displacement of a bridge", PCT Patent (Application # PCT/KR2021/006978), June, 2021.
- P6. Hoon Sohn, Jaemook Choi, **Zhanxiong Ma**, Kiyoun Kim, "Static/dynamic displacement estimation by fusing accelerometer and vision camera with natural targets", KR Patent, (Application # 10-2021-0047367), April, 2021
- P7. Hoon Sohn, **Zhanxiong Ma**, "A method of estimating displacement of a bridge and an electronic device to estimate displacement of a bridge", KR Patent (Application # 10-2020-0072048; Registration # 10-2387166-0000), June, 2020.
- P8. Yingfeng Dong, Kaiqi He, Song Lin, Song Xu, **Zhanxiong Ma**, "Wave selection method for bi-directional earthquake motions," CN Patent (Application # 201710326362.3), May, 2017.

PARTICIPATED PROJECTS

- F1. **Multi-sensor platform and artificial intelligence based 6-DOF broadband displacement estimation technique.** *The Sejong Science Fellowship Program at National Research Foundation of Korea*, Funded: 500,000 USD from 03/01/22 to 02/28/27.
- F2. **Online Nondestructive Evaluation for 3D Printing Process Control: Research Leader Program at National Research Foundation of Korea**, Funded: 4,200,000 USD for 06/01/19 to 02/28/24.
- F3. **Research Center for Smart Submerged Floating Tunnel System**, *The National Research*

Laboratory Program at National Research Foundation of Korea, Funded: 1,090,000 USD out of total 16,345,000 USD from 06/01/17 to 02/29/24.

TECHNOLOGY TRANSFER

- T1. Hoon Sohn, **Zhanxiong Ma**, Jaemook Choi, "Structural Displacement Estimation by Fusing Millimeter-wave FWCW Radar and Accelerometer," Transfer to SQ Engineering Co. Ltd (Transfer fee: 100,000 USD), July, 2022.

HONOURS AND AWARDS

1. **KAIST International Scholarship:** Daejeon, Korea Advanced Institute of Science and Technology, 2017.08.
2. **Provincial Excellent Graduate Student:** Chongqing, Chongqing Education Commission, 2017.04. (only awarded to top 1% students)
3. **Excellent Graduate Student:** Chongqing, Chongqing University, 2017.03.
4. **National Postgraduate Scholarship:** Chongqing, Ministry of Education of the People's Republic of China, 2015.12 & 2016.12. (only awarded to top 2% students).
5. **The First Prize Scholarship:** Chongqing, Chongqing University, 2014.10, 2015.10 & 2016.10.
6. **Excellent Undergraduate Student:** Wuhan, Huazhong University of Science and Technology, 2014. 06.
7. **First-Class People's Scholarship:** Wuhan, Huazhong University of Science and Technology, 2012.10 & 2013.10.
8. **Merit Student:** Wuhan, Huazhong University of Science and Technology, 2012.12.

EDUCATIONAL EXPERIENCES

1. **Teaching Assistant**, CE220, "Structural Mechanics", Fall, 2018, KAIST,