

# Linjun Lu, Ph.D.

Marie Skłodowska-Curie Future Roads Fellow  
Department of Engineering  
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## EDUCATION

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<b>Ph.D.</b> in Civil Engineering, West Virginia University, USA	2023
<b>M.S.</b> in Civil Engineering, Wenzhou University, China	2019
<b>B.S.</b> in Civil Engineering, Wenzhou University, China	2016

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## PROFESSIONAL APPOINTMENTS

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**Postdoctoral Fellow**, Department of Engineering, University of Cambridge, United Kingdom, 2023 – Present

**Technical Consultant**, Omnisight, Charleston, the South Carolina, USA, 2025 – Present

**Cambridge AI Safety Hub (CAISH) Fellow**, University of Cambridge, United Kingdom, 2025 – Present

**Remote Secondment**, Lower Thames Crossing Program, Jacobs, United Kingdom, 2025 – Present

**Secondment**, Digital Twins at the Department for Transport (DfT), United Kingdom, 2024 – Present

**Research/Teaching Assistant**, Wadsworth Department of Civil and Environmental Engineering, West Virginia University, Morgantown, WV, USA, 2019 – 2023

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## RESEARCH AREAS

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- Human Machine Interaction
- Trustworthy Artificial Intelligence for Engineering Applications
- Trustworthy and Ethical Assurance of Digital Twins
- Intelligent Sensing and Construction Automation
- Infrastructure Computer Vision and Machine Learning
- Intelligent Transportation Systems
- Spatial-Temporal Data Modeling and Analytics

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## RESEARCH FUNDING

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1. **EU Marie Skłodowska-Curie Actions (MSCA) COFUND:** Development of A Vision-Based Method for High-Quality Traffic Data Collection in Support of Building Trustworthy Digital Twins of Road Networks. **Principal Investigator and Author**, 06/15/2023-06/14/2026, \$229,067 (Funded).
2. **USDOT-Center for Integrated Asset Management for Multimodal Transportation Infrastructure Systems:** Automated FHWA Vehicle Classification Using Combined Semantic and Geometric Features Collected from Surveillance Videos. **Co-Author**, 11/01/2023, \$257,360 (Funded).
3. **USDOT-Center for Integrated Asset Management for Multimodal Transportation Infrastructure Systems:** Image-Based Vehicle Height Measurement for Prevention of Low Clearance Infrastructure Collisions. **Co-Author**, 11/01/2021, \$256,960 (Funded).
4. **USDOT-Center for Integrated Asset Management for Multimodal Transportation Infrastructure Systems:** Automated Path Tracking and Mapping for Economical, Real-Time, and Knowledge Based Roller Control in Pavement Compaction Operations: Phase II: Prototyping and Validation. **Co-Author**, 03/05/2020, \$257,524 (Funded).

5. **National Cooperative Highway Research Program:** Automated Granular Traffic Data Collection Using Computer Vision, View Geometry and Artificial Intelligence. **Co-Author**, 03/01/2023, \$176,082 (Unfunded).
6. **Minnesota Department of Transportation (MnDOT):** Enhanced Safety of Highway Construction Site Using Low Cost, Wearable Sensor Network. **Co-Author**, 09/13/2022, \$160,011 (Unfunded).
7. **Minnesota Department of Transportation (MnDOT):** Development and Systems-integration of Low-cost Sensors to Track Survivability of Road Signs. **Co-Author**, 09/13/2022, \$160,011 (Unfunded).
8. **Graduate Scientific Research Foundation of Wenzhou University:** Testing the Performance of Photogrammetry for Structural Dynamic Displacement Monitoring. **Principal Investigator and Author**, 09/01/2016-06/30/2019, ¥5,000 (Funded).

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## TEACHING ACTIVITIES

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### Teaching

-**Lab Demonstrator.** Integrated Coursework: Buildings in Earthquakes. Spring 2025 – Present (334 undergraduate students). Duty: Guiding students in conducting experiments, ensuring proper use of equipment, and assisting them in understanding theoretical concepts by comparing experimental results with theoretical predictions.

-**Guest Lecturer.** Fall 2024 – Present (31 master students). Duty: Teach the module “Systems, Data and AI Technologies for Civil Engineering”, at Department of Engineering and Technology, University of Hertfordshire.

-**Course Supervisor.** Mechanics 1A. Fall 2024 – Present (12 undergraduate students). Duty: Provides personalized teaching and guidance to undergraduate students through small group sessions, at Jesus College, University of Cambridge.

-**Teaching Assistant.** CE593E/CE493E Construction Estimating. Fall 2020 (45 undergraduate students). Duty: Graded assignments, team projects, and addressed students' questions in Q&A sessions, at West Virginia University.

-**Teaching Assistant.** CE593E/CE493E Construction Estimating. Fall 2019 (48 undergraduate students). Duty: Graded assignments, team projects, and addressed students' questions in Q&A sessions, at West Virginia University.

### Co-Supervision

-Peihang Luo (Since 2023). Ph.D. Dissertation, University of Cambridge, UK.

-RuiXuan Liao (Since 2024). Ph.D. Dissertation, Southeast University, China.

-Hengda Hong (Since 2021). M.S. Thesis, Zhejiang University of Technology, Hangzhou, Zhejiang, China.

-Sourav Dutta (2021-2023). “Estimating Three Mutually Orthogonal Vanishing Points for Spatial Data Collection in Traffic Scenes”, M.S. Thesis, West Virginia University, Morgantown, USA.

-Aida Da Silva (2020-2023). “A Computer Vision-based Method for Tack Coat Coverage Inspection Using Drone-Collected Images”, M.S. Thesis, West Virginia University, Morgantown, USA.

-Xianhui Jiang (2019-2022). M.S. Thesis, Zhejiang University of Technology, Hangzhou, Zhejiang, China.

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## HONORS AND AWARDS

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1. 3rd Place VIMS/IAARC Datathon, 2022

2. Maurice and JoAnn Wadsworth Graduate Fellowship, West Virginia University, 2022
3. WVU Graduate Travel Award, West Virginia University, 2020
4. Outstanding Graduate Student, Wenzhou University, 2019
5. The First Prize Scholarship of Wenzhou University, 2017
6. Outstanding Undergraduate Student, Wenzhou University, 2016

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## PUBLICATIONS

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*My H-Index is 9 according to Google Scholar<sup>1</sup>.*

### Refereed Journal Papers (As First or Corresponding Authors)

1. **Linjun Lu**, Yuandong Pan, Brian Sheil, Ioannis Brilakis. "Regional Graph-Based Data Quality Assessment in Support of Trustworthy Highway Infrastructure Digital Twins." *Automation in Construction*. (Under Review)
2. **Linjun Lu**, Alix Marie d'Avigneau, Peihang Luo, Yuandong Pan, Zhaojie Sun, Ioannis Brilakis. "Modelling of Heterogeneous Spatial-Temporal Data for Pavement Condition Prediction and Preventive Maintenance in Support of Digital Twin-enabled Highway Management." *Automation in Construction*, 174 (2025): 106134
3. **Linjun Lu**, Mengtian Yin, Yue Xie, Yuandong Pan, Mudan Wang, Ioannis Brilakis. (2025). "Development of A Trustworthy AI-supported Digital Twin Framework for Road Operation and Maintenance." *Journal of Smart Construction*, 2025(1):0001.
4. **Linjun Lu**, and Fei Dai. (2025). "Automated FHWA Vehicle Classification Using Combined Semantic and Geometric Features Extracted from Surveillance Videos." *Journal of Computing in Civil Engineering* 39(3): 04025023
5. **Linjun Lu**, Sourav Dutta, Zhenhua Zhu, Fei Dai. (2024). "Leveraging Traffic Scenes to Estimate Three Mutually Orthogonal Vanishing Points in Support of Automated Vision-based Traffic Data Collection." *KSCE Journal of Civil Engineering*, 100111.
6. **Linjun Lu**, Fei Dai. (2024). "Accurate Road User Localization in Aerial Images Captured by Unmanned Aerial Vehicles." *Automation in Construction*, 158, p.105257.
7. **Linjun Lu**, Fei Dai. (2023). "Digitalization of Traffic Scenes in Support of Intelligent Transportation Applications." *Journal of Computing in Civil Engineering* 37(5): 04023019.
8. **Linjun Lu**, Fei Dai. (2023). "Automated Visual Surveying of Vehicle Heights to Help Measure the Risk of Overheight Collisions Using Deep Learning and View Geometry." *Computer-Aided Civil and Infrastructure Engineering* 38(2): 194-210.
9. **Linjun Lu**, Fei Dai. (2022). "A Unified Normalization Method for Homography Estimation Using Combined Point and Line Correspondences." *Computer-Aided Civil and Infrastructure Engineering* 37: 1010–1026.
10. **Linjun Lu**, Fei Dai, John P. Zaniwski. (2021). "Automatic Roller Path Tracking and Mapping for Pavement Compaction Using Infrared Thermography." *Computer-Aided Civil and Infrastructure Engineering* 36: 1416-1434.
11. **Linjun Lu**, Huafei Zhou, Yiqing Ni, Fei Dai. (2021). "Output-only Modal Analysis for Non-Synchronous Data Using Stochastic Sub-Space Identification." *Engineering Structures* 230: 111702.

### Refereed Journal Papers (As Co-Authors)

1. Yue Xie, Shanshan Li, Yuandong Pan, **Linjun Lu**, and Fumiya Iida. "A Digital Twin-Based Approach for

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<sup>1</sup> <https://scholar.google.com/citations?user=AqLzm1sAAAAJ&hl=en>

- Dynamic Traffic-Aware Routing and Charging of Electric Vehicles.” *IET Intelligent Transport Systems* (Under Review).
2. Mengtian Yin, Ran Wei, Ioannis Brilakis, Varun Reja, Brian Sheil, Federico Perrotta, Alix d'Avigneau, **Linjun Lu**. (2025). “Exploring the Value of Digital Twins for Information Management in Highway Asset Maintenance.” *Developments in the Built Environment* 21:100614.
  3. Yuandong Pan, Mudan Wang, **Linjun Lu**, Ran Wei, Stefano Cavazzi, Matt Peck, Ioannis Brilakis. (2024). “Scan-to-graph: Automatic Generation and Representation of Highway Geometric Digital Twins from Point Cloud Data.” *Automation in Construction* 166, p.105654.
  4. Aida da Silva, **Linjun Lu**, Zhenhua Zhu, Linbing Wang, Fei Dai. (2023). “Uniformity Inspection of Tack Coats Through Measurement Conducted on Drone-Collected Images.” *Canadian Journal of Civil Engineering* 00: 1–10.
  5. Huafei Zhou, Zhaoyi Li, **Linjun Lu**, Yiqing Ni. (2022). “Mitigating Thermal-Induced Image Drift for Videogrammetric Technique in Support of Structural Monitoring Applications.” *Structural Control and Health Monitoring* 29(2): p.e2869.
  6. Huafei Zhou, **Linjun Lu**, Zhaoyi Li, Yiqing Ni. (2020). “Exploration of Temperature Effect on Videogrammetric Technique for Structural Displacement Monitoring.” *Smart Structures and Systems* 25(2): 135-153.
  7. Huafei Zhou, **Linjun Lu**, Zhaoyi Li, Yiqing Ni. (2019). “Performance of Videogrammetric Displacement Monitoring Technique Under Varying Ambient Temperature.” *Advanced in Structural Engineering* 22(16): 1-14.
  8. Ziling Xie, Huafei Zhou, **Linjun Lu**, Zian Chen. (2017). “An Investigation into Fracture Behavior of Geopolymer Concrete with Digital Image Correlation Technique.” *Construction and Building Materials* 155: 371-380.
  9. Huafei Zhou, Jianfang Zheng, Ziling Xie, **Linjun Lu**, Yiqing Ni, Janming Ko. (2017). “Temperature Effects on Vision Measurement System in Long-Term Continuous Monitoring of Displacement.” *Renewable Energy* 114: 968-983.

#### Refereed Conference Papers

1. **Linjun Lu**, Yuandong Pan, Ioannis Brilakis. (2024). “Towards Trustworthy Road Digital Twins: A State-of-the-art Review.” In 2024 ASCE International Conference on Computing in Civil Engineering (i3CE2024), Pittsburgh, Pennsylvania, USA.
2. **Linjun Lu**, Fei Dai. (2024). “Fine-Grained FHWA-13 Vehicle Classification: A Two-Stage Vision-Based Approach Integrating Semantic and Geometric Features with Verification.” In 2024 ASCE International Conference on Computing in Civil Engineering (i3CE2024), Pittsburgh, Pennsylvania, USA.
3. **Linjun Lu**, Fei Dai, Zhenhua Zhu. (2024). “An Investigation on Accurate Road User Location Estimation in Aerial Images Collected by Drones.” In Construction Institute (CI) and Construction Research Congress (CRC) 2024, Des Moines, Iowa, USA.
4. Sourav Dutta, **Linjun Lu**, Fei Dai. (2023). “Estimation of Three Mutually Orthogonal Vanishing Points from Edgelets in Road Scenes.” In 2024 ASCE International Conference on Computing in Civil Engineering (i3CE2023), Corvallis, Oregon, USA.
5. **Linjun Lu**, Fei Dai. (2022). “Road User Localization for Autonomous Vehicle Infrastructure by Leveraging Surveillance Videos.” In 2022 Winter Simulation Conference (WSC), Marina Bay Sands, Singapore.

6. **Linjun Lu**, Fei Dai. (2022). "Visual Surveying of On-Road Vehicle Height for Over-Height Warning Using Deep Learning and View Geometry." In Construction Institute (CI) and Construction Research Congress (CRC) 2022, Arlington, Virginia, USA.
7. **Linjun Lu**, Fei Dai. (2021). "A Unified Normalization Method for Point and Line-Based Homography Estimation." In 2021 ASCE International Conference on Computing in Civil Engineering (i3CE2021), Orlando, Florida, USA.
8. **Linjun Lu**, Fei Dai. (2020). "A Thermal-Based Technology for Roller Path Tracking and Mapping in Pavement Compaction Operations." In 2020 Winter Simulation Conference (WSC), pp. 2460-2469. IEEE, 2020.
9. Huafei Zhou, **Linjun Lu**, Fei Dai. (2019). "Temperature-Induced Error in Long-Term Continuous Monitoring of Displacement with Videogrammetry." In 2019 Winter Simulation Conference (WSC), National Harbor, MD, USA, 2019, pp. 2986-2991.

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#### PATENT

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1. Fei Dai, **Linjun Lu**. (US 2022/0187842 A1). Automatic Roller Path Tracking and Mapping for Pavement Compaction Using Infrared Thermography. Non-provisional application filed.
2. Fei Dai, **Linjun Lu**. (WVU 2022-047). Systems and Methods to Automatically Measure On-Road Vehicle Height from Traffic Scene Video. Provisional application filed.
3. Fei Dai, **Linjun Lu**. (WVU 2024-010). Systems and Methods for Automatic Vehicle Category Classification from Surveillance Videos. Provisional application filed.

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#### RESEARCH SOFTWARE DEVELOPMENT

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1. **Thermal-based Intelligent Compaction:** A software platform for automatic roller path tracking and mapping in pavement construction, being able to maintain a continuous recording of color-coded plots that indicate the number of roller passes and real-time location of the roller. (programming language: Visual C++ and OpenCV)
2. **Homography Estimation:** A software platform that allows for homography estimation with the use of both line and point correspondences (programming language: MATLAB)
3. **Automated Vehicle Height Estimation:** A software platform for automated vehicle height estimation, which can be used to help measure the risk of overheight collisions (programming language: Python and OpenCV)

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#### PRESENTATIONS

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1. Linjun Lu. (2023). Criteria and Measures for Building a Trustworthy Road Digital Twin. In 2023 Ordnance Research Workshop, Southampton, UK. In person. (Invited)
2. Linjun Lu. (2022). Digitalization of Traffic Scenes in Support of Intelligent Transportation Infrastructure Applications. In 2022 Transportation Asset and Infrastructure Management Conference, Boalsburg, PA. In person.
3. Linjun Lu. (2022). Visual Surveying of On-Road Vehicle Height for Over-height Warning Using Deep Learning and View Geometry. Presented at 2022 CI and CRC Joint Conference 2022 (CRC 2022), Arlington, Virginia, USA. In person.
4. Linjun Lu. (2021). A unified normalization method for point and line-based homography estimation. Presented at 2021 ASCE International Conference on Computing in Civil Engineering (i3CE 2021), Orlando, Florida, USA. In person.

5. Linjun Lu. (2020). A thermal-based technology for roller path tracking and mapping in pavement compaction operations. Presented at the 2020 Winter Simulation Conference (WSC 2020). Online.
6. Linjun Lu. (2019). Temperature-induced error in long-term continuous monitoring of displacement with videogrammetry. Presented at the 2019 Winter Simulation Conference (WSC 2019), National Harbor, Maryland, USA. In person.

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#### EDITORIAL ACTIVITIES

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**Youth Editorial Board Member**, Smart Construction, 2024 – Present

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#### PAPER REVIEW ACTIVITIES

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- **Journal Reviewer**

❖ Automation in Construction	Elsevier
❖ Smart Construction	Elsevier
❖ Journal of Computing in Civil Engineering	ASCE
❖ Journal of Construction Engineering and Management	ASCE
❖ Computer-Aided Civil and Infrastructure Engineering	Wiley
❖ CMC-Computers, Materials & Continua	Tech Science Press
❖ Future Transportation	MDPI
❖ Future Internet	MDPI
❖ Applied Sciences	MDPI
❖ Electronics	MDPI
❖ Computers	MDPI
- **Reviewer**, several abstracts and papers for conferences, symposiums, and workshops over the past years including
  - ❖ ASCE International Conference on Computing in Civil Engineering
  - ❖ ASCE Construction Research Congress
  - ❖ IEEE Winder Simulation Conference