Xin Wang

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Website / LinkedIn / Google Scholar / ResearchGate

EDUCATION

01/2020 – present	Ph.D. in Civil Engineering, *University of Wisconsin-Madison* GPA: 4.0 / 4.0
01/2020 – 05/2021	M.S. in Computer Science, *University of Wisconsin-Madison* GPA: 4.0 / 4.0
09/2012 – 06/2019	M.S. and B.S. in Civil Engineering, *Tongji University* GPA: 91.5 / 100 (M.S.), 4.74 / 5.0 (B.S.)

RESEARCH INTERESTS

Computer Vision Technologies; Wearable Sensor Signal Processing; Human-Robot Interaction (e.g. Hand Gesture, Eye Tracking); Construction Automation and Robotics

RESEARCH EXPERIENCE

01/2020 – present   Hand Gesture Recognition for Human-Robot Collaboration, *Wisconsin Alumni Research Foundation*

Advised by Prof. Zhenhua Zhu, UW-Madison

- Proposed a vision-based framework including worker detection and tracking, frame cropping, and hierarchical recognition architecture, to capture and interpret the hand gestures of construction workers.
- Established a wearable sensor-based system including data preprocessing, window sliding and modified FCN gesture classifier, to facilitate the accurate classification of hand gestures.
- Developed a context-aware neural network which integrated eye tracking and gesture recognition for human-robot collaboration in construction.

06/2022 – 07/2022   Transformer-based Segmentation for Recycling Materials, *VIMS/IAARC Datathon 2022 Competition*

Advised by Prof. Yin Li and Prof. Zhenhua Zhu, UW-Madison

- Evaluated three state-of-the-art transformer-based architectures on construction image segmentation tasks.
- Established an ensemble model utilizing the techniques of model averaging and probability weighting for performance improvement.

09/2017 – 12/2019   Application of Information Technologies in Efficient Tunneling Boring Machine (TBM) Construction and Maintenance, *National Basic Research Program of China (973 Program)*

Advised by Prof. Hehua Zhu, Tongji University

- Utilized data mining methods including Long Short-Term Memory (LSTM) and clustering analysis to identify the different degradation patterns and predict the future performance of shield tunnels.
- Proposed an integrated data mining approach including data cleaning, partition of full tunneling cycles, feature extracting, and deep learning models, to perform real-time prediction of critical TBM operational parameters.

SELECTED JOURNAL PUBLICATIONS

Wang, X., Han, W., Mo, S., Cai, T., Gong, Y., Li, Y., Zhu, Z., 2023. Transformer-Based Automated Segmentation of Recycling Materials for Semantic Understanding in Construction. Automation in Construction, DOI: 10.1016/j.autcon.2023.104983.

Wang, X., Han, W., Du, E., Dai, F., Zhu, Z., 2023. An Eye Gaze-Aided Virtual Tape Measure for Smart Construction. Canadian Journal of Civil Engineering, DOI: 10.1139/cjce-2023-0056.

Wang, X., Veeramani, D., Zhu, Z., 2023. Gaze-Aware Hand Gesture Recognition for Intelligent Construction. Engineering Applications of Artificial Intelligence, DOI: 10.1016/j.engappai.2023.106179.

Wang, X., Veeramani, D., Zhu, Z., 2022. Wearable Sensors-Based Hand Gesture Recognition for Human-Robot Collaboration in Construction. IEEE Sensors Journal, DOI: 10.1109/JSEN.2022.3222801.

Wang, X., Zhu, Z., 2021. Vision–Based Framework for Automatic Interpretation of Construction Workers' Hand Gestures. Automation in Construction, DOI: 10.1016/j.autcon.2021.103872.

Wang, X., Zhu, H., Zhu, M., Zhang, L., Ju, JW., 2021. An Integrated Parameter Prediction Framework for Intelligent TBM Excavation in Hard Rock. Tunneling and Underground Space Technology, DOI: 10.1016/j.tust.2021.104196.

Wang, X., Zhu, Z., 2021. Vision-based hand signal recognition in construction: A feasibility study. Automation in Construction, DOI: 10.1016/j.autcon.2021.103625.

Zhu, H., **Wang, X.**, Chen, X., Zhang, L., 2020. Similarity Search and Performance Prediction of Shield Tunnel in Operation Through Time Series Data Mining. Automation in Construction, DOI: 10.1016/j.autcon.2020.103178.

SELECTED CONFERENCE PUBLICATIONS

Wang, X., Han, W., Du, E., Dai, F., Zhu, Z. An Eye Tracking Based Virtual Tape Measure in Construction. In: Transforming Construction with Reality Capture Technologies, Fredericton, New Brunswick, Canada, Aug. 23-25, 2022.

Wang, X., Veeramani, D., Zhu, Z. Integrated Sensor-Based Interface for Human-Robot Collaboration in Construction. In: 39th International Symposium on Automation and Robotics in Construction, Bogotá, Colombia, Jul. 13-15, 2022.

Wang, X., Zhu, Z. Vision-Based Recognition of Construction Worker's Hand Signals. In: CI & CRC Joint Conference, Arlington, Virginia, Mar. 9-12, 2022.

Wang, X., Zhu, Z. Wearable Sensor-based Hand Gesture Recognition of Construction Workers. In: 38th International Symposium on Automation and Robotics in Construction, Dubai, UAE, Nov. 2-4, 2021.

Wang, X., Zhu, M., Shen Y. Prediction of TBM Operational Parameters Using an Integrated Data Mining Framework. In: Proceedings of 11th Asian Rock Mechanics Symposium, Beijing, China, Oct. 21-25, 2021.

Wang, X., Zhu, Z. Hand Signal Recognition of Workers on Construction Sites using Deep Learning Networks. In: International Conference on Computing in Civil Engineering, Orlando, FL., Sep. 12-14, 2021.

ACHIEVEMENTS AND AWARDS

Best Academic Paper Award in TCRC conference (2022). *Canadian Society for Civil Engineering*.

First Place in VIMS/IAARC Datathon 2022 Competition (2022). *American Society of Civil Engineers*.

Scholarship for Student Research Grants Competition - Conference Presentation (2021). *UW-Madison.*

Awards of Outstanding Undergraduate Graduates (2016). *Tongji University*.

National Scholarship for Undergraduate Students (2015). *Chinese Ministry of Education*.

Awards of Outstanding Undergraduate Students (2015). *Tongji University*.

Honorable Mention in American Mathematical Contest in Modeling (2015). *COMAP*.

Second Prize in China Undergraduate Mathematical Contest in Modeling (2014). *Chinese Ministry of Education*.

TEACHING ASSISTANT EXPERIENCE

CS 220/319, Data Programming I (Spring 2022). *UW-Madison.*

SKILLS

Language: Fluent in English and native mandarin.

Software: C/C++, MATLAB, R, Python, SQL, GAMS, AutoCAD, ABAQUS, Revit, Origin.

Technologies: Pytorch, TensorFlow, Keras, Numpy, IPython-SQL