Shuai Li

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EDUCATION

B.S. in Hydraulics and Hydroelectric Engineering	Tianjin University, China	July 2012
B.S. in Project Management	Tianjin University, China	July 2012
M.S. in Construction Engineering & Management	Purdue University, USA	May 2014
M.S. in Industrial Engineering	Purdue University, USA	Dec. 2015
M.S. in Economics	Purdue University, USA	Dec. 2016
Ph.D. in Civil Engineering	Purdue University, USA	Aug. 2017

PROFESSIONAL EXPERIENCE

Associate Professor, Department of Civil and Environmental Engineering, University of Tennessee Knoxville, 2023 – Present.

Joint Faculty, Department of Mechanical, Aerospace, and Biomedical Engineering, University of Tennessee Knoxville, 2022 – Present.

Affiliate Faculty, Institute for a Secure and Sustainable Environment, University of Tennessee Knoxville, 2019 – Present.

Assistant Professor, Department of Civil and Environmental Engineering, University of Tennessee Knoxville, 2017 – 2023.

Research Assistant, Lyles School of Civil Engineering, Purdue University, 2013 – 2017.

Teaching Assistant, Lyles School of Civil Engineering, Purdue University, 2013 – 2017.

AWARDS & HONORS

Chancellor's Professional Promise Award University of Tennessee Knoxville 2023

This award honors faculty members at the University of Tennessee Knoxville who are early in their careers for excellence in research, scholarship, and creative achievement.

David Goodpasture Award University of Tennessee Knoxville 2022

This endowed award is given for a period of four years to recognize research and teaching accomplishments of a faculty member in the Department of Civil and Environmental Engineering at the University of Tennessee Knoxville.

Professional Promise in Research Award University of Tennessee Knoxville 2021

This award recognizes the faculty members in the Tickle College of Engineering at the University of Tennessee Knoxville who have received national and international recognition in their fields and show professional promise in research excellence.

Success in Multidisciplinary Research Award University of Tennessee Knoxville 2021

This award recognizes a team of faculty members from multiple disciplines at the University of Tennessee Knoxville working synergistically and have successfully secured major external resources and obtained recognition for their convergence research.

Best Paper Award Building and Environment 2020

This award recognizes a significant contribution to the state of the art that was selected from 4000 papers submitted to the Journal of Building and Environment through four tiers of evaluation. The award was presented for the paper "Segmenting Areas of Potential Contamination for Adaptive Robotic Disinfection in Built Environments" (Shuai Li is the corresponding author).

Collingwood Prize American Society of Civil Engineers 2018

The Collingwood Prize was instituted and endowed in 1984 by Francis Collingwood, past Secretary of American Society of Civil Engineers (ASCE). This award recognizes major contributions to knowledge in the field of civil engineering through a published paper in an ASCE journal. The award was presented for the paper "Integrating Natural Language Processing and Spatial Reasoning for Utility Compliance Checking" (Shuai Li is the first author).

Outstanding Reviewer Computing in Civil Engineering 2017

This recognition acknowledges the outstanding effort of reviewers for the Journal of Computing in Civil Engineering and was selected based on the review quality and timeliness.

Zimmerman Innovation Award Purdue University 2017

The Mary Ann Zimmerman Purdue Civil Engineering Innovation Award was initiated to recognize, encourage, and promote creative thinking and outreach. It is awarded to an individual to encourage and support civil engineering innovations that further the school's progress through education, research, conferences, or other outreach activities.

Pai Tao Yeh Fellowship Purdue University 2016

This fellowship recognizes the research achievement of a civil engineering student at Purdue University and supports the travel for research presentation at prestigious conferences.

Pai Tao Yeh Fellowship Purdue University 2015

This fellowship recognizes the research achievement of a civil engineering student at Purdue University and supports the travel for research presentation at prestigious conferences.

GRANTS & RESEARCH PROJECTS

External Grants and Contracts

[1]. **Co-PI**, **National Science Foundation**, Elements: A Convergent Physics-based and Data-driven Computing Platform for Building Modeling, 09/01/2023 – 08/31/2026, $584,094.

[2]. **Co-PI**, **National Science Foundation**, SCC-PG: Securing Underserved Communities from Drug Abuse with Drone-Based Smart Medication Delivery, 04/01/2023 – 03/31/2024, $150,000.

[3]. **Co-PI**, **Advanced Research Projects Agency-Energy (ARPA-E)**, **Department of Energy**, Lignin-Derived Carbon Storing Foams for High Performance Insulation, 11/01/2022 – 10/31/2024, $2,707,550.

[4]. **PI**, **National Science Foundation**, FW-HTF-R: Fair4Wise: Future AI and Robots for Women in Smart Engineering, 09/01/2022 – 08/31/2025, $1,807,743. (Shuai Li is the Lead PI for this collaborative project among the University of Tennessee Knoxville, Penn State University, and The University of Texas at San Antonio)

[5]. **PI**, **National Science Foundation**, I-Corps: Artificial Intelligence (AI)-Enabled and Digital Twin Interactive Robots for Facility Hygiene and Human Health, 07/01/2022 – 12/31/2023, $49,971.

[6]. **Senior Personnel**, **Office of Naval Research**, STEM Education and Apprenticeship Liaison (SEAL) for Navy, 05/01/2022 – 04/30/2025, $600,000.

[7]. **PI**, **National Science Foundation**, FW-HTF-R/Collaborative Research: Human-Robot Sensory Transfer for Worker Productivity, Training, and Quality of Life in Remote Undersea Inspection and Construction Tasks, 12/01/2021 – 11/30/2025, $224,999.

[8]. **PI**, **National Science Foundation**, CPS: Medium: Bio-socially Adaptive Control of Robotics-Augmented Building-Human Systems for Infection Prevention by Cybernation of Pathogen Transmission, 01/01/2021 – 12/31/2024, $1,199,129.

[9]. **PI**, **National Science Foundation**, SCC-PG: Toward Disease-Resistant School Communities by Reinventing the Interface among Built Environments, Occupants, and Microbiomes, 10/01/2020 – 4/30/2022, $ 149,998.

[10]. **PI**, **Tennessee Department of Transportation**, Drones and Other Technologies to Assist in Disaster Relief Efforts, 09/01/2020 – 2/28/2022, $149,999.

[11]. **PI**, **Trimble, Inc.**, Smart Design and Operation of Ventilation Systems to Reduce Indoor Pathogen Transmission, 09/01/2020 – 12/31/2020, $9,956.

[12]. **PI**, **National Science Foundation**, RAPID: Impacts of Design and Operation Attributes of Mass-Gathering Civil Infrastructure Systems on Pathogen Transmission and Exposure, 05/01/2020 – 8/31/2022, $199,809.

[13]. **Co-PI**, **United States Geological Survey**, Pollutant Sourcing Identification in Impaired Surface Waters, 03/01/2020 – 02/29/2021, $75,493.

[14]. **PI**, **National Science Foundation**, CRII: CPS: Coupling Subsurface Features with Connected Autonomous Vehicles as Networked Cyber-Physical Systems for Reciprocal Mapping and Localization, 05/01/2019 – 4/30/2022, $175,000.

[15]. **PI**, **Tennessee Department of Transportation**, Concrete Bridge Deck Deterioration Assessment Using Ground Penetrating Radar, 01/17/2019 – 5/31/2021, $149,681.

Internal Funding

[1]. **Co-PI**, **Institute for a Secure & Sustainable Environment**, **University of Tennessee Knoxville**, Toward Precision Environmental Health Risk Management: Feasibility of Personalized Exposome Monitoring, 01/01/2021 – 12/31/2021, $45,000.

[2]. **Co-PI**, **Office of the President, University of Tennessee**, Feasibility of Personalized Monitoring of Environmental Exposomes toward Prevention of Alzheimer's Disease and Related Dementia, 01/01/2021 – 8/31/2021, $5,000.

[3]. **PI, University of Tennessee Oak Ridge Innovation Institute**, Artificial Intelligence Aided 3D Metagenomic Mapping of Built Environments and Humans to Model Pathogen Transmission, 08/01/2020 – 07/31/2022, $149,331.

[4]. **Co-PI**, **Office of the President**, **University of Tennessee**, Pathogen Transmission Pathway Identification by Fomite and Behavior Monitoring, 08/01/2020 – 07/31/2022, $47,000.

[5]. **PI**, **Office of Research, Innovation, and Economic Development**, **University of Tennessee Knoxville**, Trust-Aware Human-Robot Interface for Occluded and Uncertain Space Search, 05/01/2019 – 6/30/2020, $69,962.

[6]. **PI**, **Office of Undergraduate Research**, **University of Tennessee Knoxville**, Visibility Enhancement for Autonomous Construction Machines Based on Prediction, 01/10/2018 – 05/08/2018, $2,000.

PUBLICATIONS & CREATIONS

Journal Papers

[1]. Li, Y., Liu, S., Wang, M., & Li, S. (2023). From Teleoperation to Generalizable Keyframe-Based Imitation Learning for Construction Robots. *Engineering Applications of Artificial Intelligence*, Under Review.

[2]. Cai, J., Gao, Z., Guo, Y., Wibranek, B., & Li, S. (2023). FedHIP: Federated Learning for Privacy-Preserving Human Intention Prediction in Human-Robot Collaborative Assembly Tasks. *Journal of Computing in Civil Engineering*, Under Review.

[3]. Dong, Y., Hu, Y., Li, S., Cai, J., & Han, Z. (2023). BIM and Blockchain-based Automatic Asset Tracking and Delay Propagation Analysis for Prefabricated Construction Projects. *Automation in Construction*, Under Review.

[4]. Xu, Y., Li, S., Zhu, S., Chen, J., & Cai, J. (2023). A GPT-Integrated Smart Building Management and Occupant Interaction System. *Building and Environment*, Under Review.

[5]. Liu, Z., Xu, Y., Jin, M., & Li, S. (2023). Scheduling and Routing Optimization for Disinfection Robots. *Journal of Computing in Civil Engineering*, Under Review.

[6]. Hu, N., Li, S., & Tan, J. (2023). A Rapid and Robust Camera Pose Estimation Method Based on the Parallel Perspective Model. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, Under review.

[7]. Deo, D., Li, J., Niyato, D., Hu, Y., Li, S., & Han, Z. (2023). Harnessing Tullock Contests and Signaling Games: A Novel Weight Assignment Strategy for Ethereum 2.0. Under Review.

[8]. Hu, D. & Li, S. (2023). Multi-classifier information fusion for human activity recognition in healthcare facilities. *Expert Systems with Applications*, Accepted.

[9]. Cai, J., Chen, J., Hu, Y., Li, S., & He, Q. (2023). Digital Twin for Healthy Indoor Environment: A Vision for the Post-Pandemic Era. *Frontiers of Engineering Management*, 10(2), 300–318.

[10]. Cai, J., Du, A., Liang, X., & Li, S. (2023). Prediction-Based Path Planning for Safe and Efficient Human–Robot Collaboration in Construction via Deep Reinforcement Learning. *Journal of Computing in Civil Engineering*, 37(1), 04022046.

[11]. Hu, D., Li, S., Du, J., & Cai, J. (2023). Automating Building Damage Reconnaissance to Optimize Drone Mission Planning for Disaster Response. *Journal of Computing in Civil Engineering*, 37(3), 04023006.

[12]. Hu, D., Li, S., & Wang, M. (2023). Object Detection in Hospital Facilities: A Comprehensive Dataset and Performance Evaluation. *Engineering Applications of Artificial Intelligence*, 123, 106223.

[13]. Wang, M., Hu, D., Chen, J., & Li, S. (2023). Underground Infrastructure Detection and Localization Using Deep Learning Enabled Radargram Inversion and Vision Based Mapping. *Automation in Construction*, 154, 105004.

[14]. Xia, P., Xu, F., Song, Z., Li, S., & Du, J. (2023). Sensory Augmentation for Subsea Robot Teleoperation. *Computers in Industry*, 145, 103836.

[15]. Xu, Y., Chen, J., Cai, J., Li, S., & He, Q. (2023). Simulation-Based Trade-Off Modeling for Indoor Infection Risk of Airborne Diseases, Energy Consumption, and Thermal Comfort. *Journal of Building Engineering*, 107137.

[16]. Cai, J., Li, S., Hu, D., Xu, Y., & He, Q. (2022). Nationwide Assessment of Energy Costs and Policies to Limit Airborne Infection Risks in US Schools. *Journal of Building Engineering*, 45, 103533.

[17]. Chen, J., Li, S., Liu, D., & Lu, W. (2022). Indoor Camera Pose Estimation via Style-Transfer 3D Models. *Computer-Aided Civil and Infrastructure Engineering*, 37(3), 335–353.

[18]. Chen, J., Li, S., & Lu, W. (2022). Align to Locate: Registering Photogrammetric Point Clouds to BIM for Robust Indoor Localization. *Building and Environment*, 209, 108675.

[19]. Hu, D., Chen, J., & Li, S. (2022). Reconstructing Unseen Spaces in Collapsed Structures for Search and Rescue via Deep Learning Based Radargram Inversion. *Automation in*

Construction, 140, 104380.

[20]. Hu, D., Chen, L., Du, J., Cai, J., & Li, S. (2022). Seeing through Disaster Rubble in 3D with Ground-Penetrating Radar and Interactive Augmented Reality for Urban Search and Rescue. *Journal of Computing in Civil Engineering*, 36(5), 04022021.

[21]. Hu, D., & Li, S. (2022). Recognizing Object Surface Materials to Adapt Robotic Disinfection in Infrastructure Facilities. *Computer-Aided Civil and Infrastructure Engineering*, 37(12), 1521–1546.

[22]. Cai, J., Yang, L., Zhang, Y., Li, S., & Cai, H. (2021). Multitask Learning Method for Detecting the Visual Focus of Attention of Construction Workers. *Journal of Construction Engineering and Management*, 147(7), 04021063.

[23]. Cao, L., Yang, L., Swanson, C. S., Li, S., & He, Q. (2021). Comparative Analysis of Impact of Human Occupancy on Indoor Microbiomes. *Frontiers of Environmental Science & Engineering*, 15, 1–10.

[24]. Chen, L., Lu, Q., Li, S., He, W., & Yang, J. (2021). Bayesian Monte Carlo simulation–driven approach for construction schedule risk inference. *Journal of Management in Engineering*, 37(2), 04020115.

[25]. Du, A., Cai, J., & Li, S. (2021). Metamodel-Based State-Dependent Fragility Modeling for Markovian Sequential Seismic Damage Assessment. *Engineering Structures*, 243, 112644.

[26]. Hou, F., Lei, W., Li, S., & Xi, J. (2021). Deep Learning-Based Subsurface Target Detection From GPR Scans. *IEEE Sensors Journal*, 21(6), 8161–8171.

[27]. Li, S., Xu, Y., Cai, J., Hu, D., & He, Q. (2021). Integrated Environment-Occupant-Pathogen Information Modeling to Assess and Communicate Room-Level Outbreak Risks of Infectious Diseases. *Building and Environment*, 187, 107394.

[28]. Li, S., Yang, Z., Hu, D., Cao, L., & He, Q. (2021). Understanding Building-Occupant-Microbiome Interactions Toward Healthy Built Environments: A Review. *Frontiers of Environmental Science & Engineering*, 15, 1–18.

[29]. Liu, D., Xia, X., Chen, J., & Li, S. (2021). Integrating Building Information Model and Augmented Reality for Drone-Based Building Inspection. *Journal of Computing in Civil Engineering*, 35(2), 04020073.

[30]. Shen, X., Ouyang, T., Khajorntraidet, C., Li, Y., Li, S., & Zhuang, J. (2021). Mixture Density Networks-Based Knock Simulator. *IEEE/ASME Transactions on Mechatronics*, 27(1), 159–168.

[31]. Xu, Y., Cai, J., Li, S., He, Q., & Zhu, S. (2021). Airborne Infection Risks of SARS-CoV-2 in US Schools and Impacts of Different Intervention Strategies. *Sustainable Cities and Society*, 74, 103188.

[32]. Yuan, J., Ding, H., Huang, Z., Deng, B., Li, S., & Huang, W. (2021). Influence of Market Structures on Concession Pricing in Public-Private-Partnership Utilities with Asymmetric Information. *Utilities Policy*, 69, 101162.

[33]. Cai, J., Jeon, J., Cai, H., & Li, S. (2020). Fusing Heterogeneous Information for

Underground Utility Map Generation Based on Dempster-Shafer Theory. *Journal of Computing in Civil Engineering*, 34(3), 04020013.

[34]. Cai, J., Zhang, Y., Yang, L., Cai, H., & Li, S. (2020). A Context-Augmented Deep Learning Approach for Worker Trajectory Prediction on Unstructured and Dynamic Construction Sites. *Advanced Engineering Informatics*, 46, 101173.

[35]. Chen, J., Li, S., Liu, D., & Li, X. (2020). AiRobSim: Simulating a Multisensor Aerial Robot for Urban Search and Rescue Operation and Training. *Sensors*, 20(18), 5223.

[36]. Hou, F., Lei, W., Li, S., Xi, J., Xu, M., & Luo, J. (2020). Improved Mask R-CNN with Distance Guided Intersection Over Union for GPR Signature Detection and Segmentation. *Automation in Construction*, 121, 103414.

[37]. Hu, D., Zhong, H., Li, S., Tan, J., & He, Q. (2020). Segmenting Areas of Potential Contamination for Adaptive Robotic Disinfection in Built Environments. *Building and Environment*, 184, 107226.

[38]. Kizito, R., Li, X., Sun, K., & Li, S. (2020). Optimal Distributed Generator Placement in Utility-Based Microgrids During a Large-Scale Grid Disturbance. *IEEE Access*, 8, 21333–21344.

[39]. Li, S., Hu, D., Cai, J., & Cai, H. (2020). Real Option-Based Optimization for Financial Incentive Allocation in Infrastructure Projects under Public-Private Partnerships. *Frontiers of Engineering Management*, 7(3), 413–425.

[40]. Lu, Q., Chen, L., Li, S., & Pitt, M. (2020). Semi-Automatic Geometric Digital Twinning for Existing Buildings Based on Images and CAD Drawings. *Automation in Construction*, 115, 103183.

[41]. Wang, B., Li, S., Wang, Q., & Lin, Z. (2020). Understanding Travelers' Mobility Decisions in Response to Customer Incentives. *Transport Policy*, 97, 113–120.

[42]. Yang, L., Li, J., Kang, A., Li, S., & Feng, P. (2020). The Effect of Nonstationarity in Rainfall on Urban Flooding Based on Coupling SWMM and MIKE21. *Water Resources Management*, 34, 1535–1551.

[43]. Cai, J., Li, S., & Cai, H. (2019). Empirical Analysis of Capital Structure Determinants in Infrastructure Projects under Public–Private Partnerships. *Journal of Construction Engineering and Management*, 145(5), 04019032.

[44]. Chen, J., Liu, D., Li, S., & Hu, D. (2019). Registering Georeferenced Photos to a Building Information Model to Extract Structures of Interest. *Advanced Engineering Informatics*, 42, 100937.

[45]. Hu, D., Li, S., Chen, J., & Kamat, V. R. (2019). Detecting, Locating, and Characterizing Voids in Disaster Rubble for Search and Rescue. *Advanced Engineering Informatics*, 42, 100974.

[46]. Li, S., Cai, J., & Cai, H. (2019). Infrastructure Privatization Analysis: A Public-Private Duopoly Game. *Transport Policy*, 83, 80–87.

[47]. Li, S., Cai, J., Feng, Z., Xu, Y., & Cai, H. (2019). Government Contracting with Monopoly

in Infrastructure Provision: Regulation or Deregulation? *Transportation Research Part E: Logistics and Transportation Review*, 122, 506–523.

[48]. Liu, D., Chen, J., & Li, S. (2019). Collaborative Operation and Real-Time Control of Roller Fleet for Asphalt Pavement Compaction. *Automation in Construction*, 98, 16–29.

[49]. Liu, D., Chen, J., Li, S., & Cui, W. (2018). An integrated Visualization Framework to Support Whole-Process Management of Water Pipeline Safety. *Automation in Construction*, 89, 24–37.

[50]. Yuan, C., Li, S., Cai, H., & Kamat, V. R. (2018). GPR Signature Detection and Decomposition for Mapping Buried Utilities with Complex Spatial Configuration. *Journal of Computing in Civil Engineering*, 32(4), 04018026.

[51]. Cai, H., Kuczek, T., Dunston, P. S., & Li, S. (2017). Correlating Intelligent Compaction Data to In Situ Soil Compaction Quality Measurements. *Journal of Construction Engineering and Management*, 143(8), 04017038.

[52]. Li, S., Abraham, D., & Cai, H. (2017). Infrastructure Financing with Project Bond and Credit Default Swap under Public-Private Partnerships. *International Journal of Project Management*, 35(3), 406–419.

[53]. Li, S., & Cai, H. (2017). Government Incentive Impacts on Private Investment Behaviors under Demand Uncertainty. *Transportation Research Part E: Logistics and Transportation Review*, 101, 115–129.

[54]. Li, S., Cao, Y., & Cai, H. (2017). Automatic Pavement Crack Detection and Segmentation Based on Steerable Matched Filtering and an Active Contour Model. *Journal of Computing in Civil Engineering*, 31(5), 04017045.

[55]. Mao, P., Li, S., Ye, K., & Cai, H. (2017). A Field Theory Based Model for Identifying the Effect of Organizational Structure on the Formation of Organizational Culture in Construction Projects. *KSCE Journal of Civil Engineering*, 21, 45–53.

[56]. Yuan, C., Li, S., & Cai, H. (2017). Vision-Based Excavator Detection and Tracking Using Hybrid Kinematic Shapes and Key Nodes. *Journal of Computing in Civil Engineering*, 31(1), 04016038.

[57]. Li, S., Cai, H., Abraham, D. M., & Mao, P. (2016). Estimating Features of Underground Utilities: Hybrid GPR/GPS Approach. *Journal of Computing in Civil Engineering*, 30(1), 04014108.

[58]. Li, S., Cai, H., & Kamat, V. R. (2016). Integrating Natural Language Processing and Spatial Reasoning for Utility Compliance Checking. *Journal of Construction Engineering and Management*, 142(12), 04016074.

[59]. Li, S., Yuan, C., Liu, D., & Cai, H. (2016). Integrated Processing of Image and GPR Data for Automated Pothole Detection. *Journal of Computing in Civil Engineering*, 30(6), 04016015.

[60]. Liu, D., Lin, M., & Li, S. (2016). Real-time Quality Monitoring and Control of Highway Compaction. *Automation in Construction*, 62, 114–123.

[61]. Liu, D., Wu, Y., Li, S., & Sun, Y. (2016). A Real-Time Monitoring System for Lift-Thickness

Control in Highway Construction. *Automation in Construction*, 63, 27–36.

[62]. Li, S., Cai, H., & Kamat, V. R. (2015). Uncertainty-Aware Geospatial System for Mapping and Visualizing Underground Utilities. *Automation in Construction*, 53, 105–119.

[63]. Liu, D., Xuan, P., Li, S., & Huang, P. (2015). Schedule Risk Analysis for TBM Tunneling Based on Adaptive CYCLONE Simulation in a Geologic Uncertainty–Aware Context. *Journal of Computing in Civil Engineering*, 29(6), 04014103.

[64]. Cai, H., Andoh, A. R., Su, X., & Li, S. (2014). A Boundary Condition Based Algorithm for Locating Construction Site Objects Using RFID and GPS. *Advanced Engineering Informatics*, 28(4), 455–468.

[65]. Su, X., Li, S., Yuan, C., Cai, H., & Kamat, V. R. (2014). Enhanced Boundary Condition–Based Approach for Construction Location Sensing Using RFID and RTK GPS. *Journal of Construction Engineering and Management*, 140(10), 04014048.

Conference Papers

[1]. Zhan, Z., Dong, Y., Doe, D., Hu, Y., Li, S., Gao, S., & Han, Z. (2024). Contract Theory-Based Reward and Penalty Mechanism in the Blockchain for Construction Tendering among Multiple Stakeholders. *IEEE International Conference on Computer Communication (INFOCOME) 2024*, Under Review.

[2]. Wang, M., Li, Y., & Li, S. (2024). Robotic Assembly of Interlocking Blocks for Construction Based on Large Language Models. *Construction Research Congress 2024*, Accepted.

[3]. Hu, D., Wang, M., Guo, R., & Li, S. (2024). Bridge Deck Condition Assessment Using GPR: System Configuration and Defects Characterization. *Construction Research Congress 2024*, Accepted.

[4]. Dong, Y., Hu, Y., Cai, J., Xu, X., & Li, S. (2024). Building Diversity in the Construction Industry: Examining Hiring and Performance Evaluation Practices for Equipment Operators under the Trend of Technology Transformation. *Construction Research Congress 2024*, Accepted.

[5]. Rasheed, U., Cai, J., Xu, X., Hu, Y., & Li, S. (2024). Equipment Teleoperation and Its Impacts on Future Worker and Workforce in Construction: Semi-Structured Interviews. *Construction Research Congress 2024*, Accepted.

[6]. Zhan, Z., Dong, Y., Doe, D., Hu, Y., Li, S., Gao, S., Li, W., & Han, Z. (2023). Mitigate Gender Bias in Construction: Fusion of Deep Reinforcement Learning-Based Contract Theory and Blockchain. *2023 IEEE International Conference on Blockchain*, Accepted.

[7]. Morris, T., Wang, M., Li, Y., Liu, S., Li, S., & Zhao, X. (2023). Awareness and Acceptance of Emerging Technology and Quadruped Robots in Dementia Care: A Survey Study. *The Association for the Advancement of Artificial Intelligence (AAAI) 2023 Fall Symposium Series*, Accepted.

[8]. Hu, D., Wang, M., & Li, S. (2023). 3D Object Detection and Localization within Healthcare Facilities. *2023 Winter Simulation Conference (WSC)*, Accepted.

[9]. Liang, X., Sheng, L., Cai, J., Li, S., & Shi, Y. (2023). Context-Aware Deep Learning Model

for 3D Human Motion Prediction in Human-Robot Collaborative Construction. *i3CE 2023: 2023 ASCE International Conference on Computing in Civil Engineering*, In Press.

[10]. Rasheed, U., Liang, X., Cai, J., Li, S., & Hu, Y. (2023) Motion-Based Control Interface for Intuitive and Efficient Teleoperation of Construction Robots. *i3CE 2023: 2023 ASCE International Conference on Computing in Civil Engineering*, In Press.

[11]. Dong, Y., Hu, Y., Li, S., Cai, J., & Zhu, H. (2023) BIM and Blockchain-based Automatic Asset Tracking in Digital Twin for Modular. *i3CE 2023: 2023 ASCE International Conference on Computing in Civil Engineering*, In Press.

[12]. Cai, J., Li, X., Liang, X., Wei, W., & Li, S. (2022). Construction Worker Ergonomic Assessment via LSTM-Based Multi-Task Learning Framework. *Construction Research Congress 2022*, 215–224.

[13]. Wang, M., Hu, D., Li, S., & Cai, J. (2022). Urban Subsurface Mapping via Deep Learning Based GPR Data Inversion. *2022 Winter Simulation Conference (WSC)*, 2440–2450.

[14]. Xia, P., McSweeney, K., Wen, F., Song, Z., Krieg, M., Li, S., Yu, X., Crippen, K., Adams, J., & Du, E. J. (2022). Virtual Telepresence for the Future of ROV Teleoperations: Opportunities and Challenges. *SNAME Offshore Symposium*, D011S001R001.

[15]. Xu, Y., Li, S., He, Q., Zhu, S., & Cai, J. (2022). Assessing Transmission Risks of SARS-COV-2 Omicron Variant In US School Facilities and Mitigation Measures. *2022 Winter Simulation Conference (WSC)*, 629–640.

[16]. Cai, J., Du, A., & Li, S. (2021). Prediction-Enabled Collision Risk Estimation for Safe Human-Robot Collaboration on Unstructured and Dynamic Construction Sites. In *Computing in civil engineering 2021* (pp. 34–41).

[17]. Chen, J., Li, S., Lu, W., Liu, D., Hu, D., & Tang, M. (2021). Markerless Augmented Reality for Facility Management: Automated Spatial Registration Based on Style Transfer Generative Network. *Proceedings of the 38th International Symposium on Automation and Robotics in Construction (ISARC)*, 467–474.

[18]. Hu, D., Li, S., & Cai, J. (2021). A Machine Learning-Based Framework for Automatic Bridge Deck Condition Assessment Using Ground Penetrating Radar. In *Computing in Civil Engineering 2021* (pp. 74–82).

[19]. Hu, D., Li, S., Du, J., & Cai, J. (2021). Human-in-the-Loop Robot-Augmented Intelligent System for Emergency Reconnaissance. In *Computing in Civil Engineering 2021* (pp. 1409–1416).

[20]. Xu, F., Zhu, Q., Li, S., Song, Z., & Du, J. (2021). VR-Based Haptic Simulator for Subsea Robot Teleoperations. In *Computing in Civil Engineering 2021* (pp. 1024–1032).

[21]. Hu, D., Hou, F., Blakely, J., & Li, S. (2020). Augmented Reality Based Visualization for Concrete Bridge Deck Deterioration Characterized by Ground Penetrating Radar. *Construction Research Congress 2020*, 1156–1164.

[22]. Hou, F., Lei, W., Li, S., & Xi, J. (2020). Underground Multi-Class Objects Identification using Hybrid Task Cascade from GPR Bridge Data. *18th International Conference on Ground Penetrating Radar*, 140–143.

[23]. Hu, D., Hou, F., & Li, S. (2020). Ground-Penetrating Radar-Based Root Architecture Detection and Characterization. *18th International Conference on Ground Penetrating Radar*, 243–246.

[24]. Hu, D., & Li, S. (2020). 3D Reconstruction of Voids in Disaster Rubble Using Ground-Penetrating Radar. *18th International Conference on Ground Penetrating Radar*, 452–455.

[25]. Hu, D., Li, S., Cai, J., & Hu, Y. (2020). Toward Intelligent Workplace: Prediction-Enabled Proactive Planning for Human-Robot Coexistence on Unstructured Construction Sites. *2020 Winter Simulation Conference (WSC)*, 2412–2423.

[26]. Liu, D., Liang, J., Chen, J., Chu, D., & Li, S. (2020). A Cyber-Physical System for Multi-Roller Control in Mega Infrastructure Projects. *Construction Research Congress* 2020, 418–426.

[27]. Cai, J., Li, S., & Cai, H. (2018). Accurate Mapping of Underground Utilities: An Information Fusion Approach Based on Dempster-Shafer Theory. *Construction Research Congress 2018*, 712–721.

[28]. Li, S., & Cai, H. (2017). Risk-Aware Multi-Objective Optimization of Capital Structure for Private Financing in Infrastructure Projects. In *Computing in Civil Engineering 2017* (pp. 18–25).

[29]. Li, S., & Cai, H. (2015). Automated Underground Utility Mapping and Compliance Checking Using NLP-Aided Spatial Reasoning. In *Computing in Civil Engineering 2015* (pp. 419–426).

Patents

[1]. U.S. Serial No. 17/455,898 "Systems and Methods for Environment-Adaptive Robotic Disinfection", Patent application filed by University of Tennessee Research Foundation (UTRF) to the U.S. Patent and Trademark Office, August 2021. (Major inventor with 40% credit and right)

Technical Reports

[1]. Li, S., Moslehy, A., Hu, D., Wang, M., Wierschem, N., Alshibli, K., & Huang, B. (2022). Drones and Other Technologies to Assist in Disaster Relief Efforts, Tennessee Department of Transportation Research Project Report No. RES 2021-05, https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2021-final-reports/RES2021-05_Final_Report_Approved.pdf

[2]. Hu, D., Li, S., Ma, J., & Huang, B. (2021). Concrete Bridge Deck Deterioration Assessment using Ground Penetrating Radar, Tennessee Department of Transportation Research Project Report No. RES 2019-17, https://www.tn.gov/content/dam/tn/tdot/long-range-planning/research/final-reports/res2019-final-reports/RES2019-17_Final_Report_Approved.pdf

[3]. Dunston, P. S., Cai, H., Kuczek, T., & Li, S. (2018). Intelligent Compaction of Soils - Data Interpretation and Role in QC/QA Specifications, Joint Transportation Research

Program Publication No. FHWA/IN/JTRP-2018/02, https://doi.org/10.5703/1288284316645.

Invited Talks and Presentations

[1]. Human-in-the-Loop Robot-Augmented Intelligent Systems for Search and Rescue in Collapsed Structures, Invited Talk, Purdue University, 2022.

[2]. Digital Twin Based Building Environment Health Monitoring, Invited Talk, South China University of Technology, 2022.

[3]. Human-Cyber-Physical Systems for Sustainable Construction and Building Environment, Invited Talk, Georgia Tech, 2022.

[4]. AI-Enabled Augmented Reality for Disaster Reconnaissance, Invited Talk, Tianjin University, 2021.

[5]. Toward Smart, Safe, and Healthy Communities Via AI-Enabled Human-Centric Cyber-Physical Systems, Invited Talk, Vanderbilt University, 2020.

[6]. Autonomous City Subsurface Mapping, Lightning Talk, NSF Cyber-Physical Systems Principal Investigators' Meeting, 2020.

[7]. Bio-socially Adaptive Control of Robots-Augmented Building-Human Systems for Infection Prevention, Lightning Talk, NSF Cyber-Physical Systems Principal Investigators' Meeting, 2020.

[8]. Reinventing Building-Human-Microbiome Interface for Disease-Resistant School Communities, Lightning Talk, NSF Smart and Connected Communities Principal Investigators' Meeting, 2020.

[9]. Connecting Autonomous Vehicles and Urban Infrastructure: One Solution for Two Problems, Lightning Talk, NSF Cyber-Physical Systems Principal Investigators' Meeting, 2019.

[10]. Drones for Civil Engineering, Seminar Series, National Institute for Mathematical and Biological Synthesis (NIMBioS) at University of Tennessee Knoxville, 2019.

[11]. Technology Development and Implementation for Highway Construction Safety and Productivity, Invited Talk, Rodgers Group, Inc., 2019.

[12]. Smart Construction Technologies, Invited Talk, Trimble Inc., 2018.

[13]. Radar-Equipped Unmanned Aerial Vehicles for Search and Rescue in Collapsed Buildings, Invited Talk, Oak Ridge National Laboratory, 2017.

[14]. Transportation Infrastructure Management: from Policy to Technology, Transportation Seminar Series, University of Tennessee Knoxville, 2017.

[15]. Automated Utility Mapping and Compliance Checking for Safe Excavation, Invited Talk, University of Tennessee Knoxville, 2017.

[16]. Utility strikes: A New Way to Avoid Them, Invited Talk, Iowa State University, 2017.

COURSES TAUGHT AT THE UNIVERSITY OF TENNESSEE KNOXVILLE

CE 340 Construction Engineering and Management I: construction industry; project delivery methods; construction contracts, construction planning, basics of construction cost estimating, scheduling, and project control.

CE 581 Construction Estimating: quantity takeoff; productivity assessment and pricing; cost engineering for construction organizations, projects, and operations; financial analysis for construction companies and projects; life-cycle cost analysis; cost control.

CE 582 Construction Scheduling: fundamentals of construction scheduling methods; schedule compression and time-cost trade-off; simulation, and optimization for construction schedule; delay analysis; schedule control.

CE 583 Building Information Modeling: fundamentals of building information modeling (BIM) methods; application of BIM in construction management functions; reality capture methods for as-built documentation in BIM; BIM in facility and asset management; BIM standards and interoperability.

CE 680 Information Technology for Infrastructure Systems: fundamentals of emerging technologies including sensing techniques, artificial intelligence, automation and robotics, and blockchain, and their applications for construction, facility management, and infrastructure systems.

Tabulation of Course Evaluations at The University of Tennessee Knoxville

Course #	Title	Term	Students	Score*
CE 581	Construction Estimating	F-2017	7	4.80
CE 583	Building Information Modeling	S-2018	7	4.80
CE 582	Construction Scheduling	F-2018	25	4.72
CE 340	Construction Engineering and Management	F-2018	53	4.35
CE 340	Construction Engineering and Management	S-2019	46	4.27
CE 582	Construction Scheduling	F-2019	48	4.30
CE 583	Building Information Modeling	S-2020	6	4.94
CE 680	Information Technology for Infrastructure Systems	S-2020	7	4.56
CE 581	Construction Estimating	F-2020	38	4.42
CE 582	Construction Scheduling	S-2021	16	4.26
CE 583	Building Information Modeling	S-2021	11	4.63
CE 582	Construction Scheduling	F-2021	21	4.34
CE 583	Building Information Modeling	S-2022	21	4.41
CE 680	Information Technology for Infrastructure Systems	S-2022	4	4.94
CE 581	Construction Estimating	F-2022	32	4.38
CE 582	Construction Scheduling	F-2023	30	

** The courses are evaluated on a scale of 5.0, and the score is averaged on eight aspects of teaching: contribution, atmosphere, responsiveness, learning environment, feedback, challenging learning, class sessions organized, and course materials.*

STUDENT SUPERVISION

Ph.D. Dissertation Committee Chair

Da Hu, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in August 2022. ***Ph.D. Dissertation***: Deep Learning-Based Robotic Perception for Adaptive Facility Disinfection.

Yifang Xu, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in August 2023. ***Ph.D. Dissertation***: Integrated Modeling and Monitoring for a Healthy and Sustainable Building Environment.

Ning Hu, Department of Mechanical, Aerospace, and Biomedical Engineering, the University of Tennessee Knoxville, Expected to graduate in August 2024. ***Ph.D. Dissertation Topic***: Omnidirectional Drone Design and AI-Based Control for Disaster Response.

Songyang Liu, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Expected to graduate in August 2024. ***Ph.D. Dissertation Topic***: Large-Language Models Enabled Human-Robot Collaborative Manufacturing via Spatial Augmented Reality.

Mengjun Wang, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Expected to graduate in December 2025. ***Ph.D. Dissertation Topic***: Additive Building Manufacturing with AI-Coordinated Human and Robot Teams.

Xu Wu, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Expected to graduate in December 2026. ***Ph.D. Dissertation Topic***: Reconfiguring Airspace and Infrastructure Systems for Advanced Air Mobility.

Yang Meng, Department of Mechanical, Aerospace, and Biomedical Engineering, the University of Tennessee Knoxville, Expected to graduate in August 2027. ***Ph.D. Dissertation Topic***: Robot-Assisted and AI-Augmented Surgical Training.

Michael Han, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Expected to graduate in August 2027. ***Ph.D. Dissertation Topic***: AI-Based Privacy-Preserving and Personalized Interventions for Sustainable and Healthy Building Environments.

Yaxin Wang, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Expected to graduate in August 2028. ***Ph.D. Dissertation topic***: Large-Scale Building-Transportation-Energy System of Systems Modeling and Simulation for Decarbonization under Climate Changes.

Ph.D. Dissertation Committee Member

Ibrahim Salah Abotaleb, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in May 2018. ***Ph.D. Dissertation***: Construction Dispute Mitigation: Quantitative and Qualitative Analytic Approach with a Focus on Bidding, Out-of-Sequence Work, and Contract Analysis.

Yang Cao, School of Building Construction, Georgia Institute of Technology, Graduated in May 2019. ***Ph.D. Dissertation***: Modeling and Predicting the Variation of U.S. Highway Construction Cost.

Bingye Han, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in December 2019. ***Ph.D. Dissertation***: Investigating the reinforcement effect of geogrids in flexible pavements.

Songyi Liu, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in August 2021. ***Ph.D. Dissertation***: Identifying and Assessing Bacterial Contamination in Stormwater Runoff and Receiving Streams.

Numan Ahmad, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in December 2021. ***Ph.D. Dissertation***: Role of Human Factors, Driving Instability, and Roadway Environment in Safety Critical Events: Safe System Approach.

Xi Jiang, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in May 2022. ***Ph.D. Dissertation***: Field Investigation and Accelerated Pavement Testing of Inverted Pavement System.

Yan Li, Department of Mechanical, Aerospace, and Biomedical Engineering, the University of Tennessee Knoxville, Graduated in August 2022. ***Ph.D. Dissertation***: Task-Oriented Manipulation Planning: Teach Robot Manipulators to Learn the Trajectory Tasks.

Zeyu Liu, Department of Industrial and Systems Engineering, the University of Tennessee Knoxville, Graduated in August 2022. ***Ph.D. Dissertation***: Optimizing Strategic Planning with Long-Term Sequential Decision Making under Uncertainty: A Decomposition Approach.

Miaomiao Zhang, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in December 2022. ***Ph.D. Dissertation***: Network-level Pavement Evaluation Utilizing Traffic Speed Deflectometer.

Adam Brooks, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in August 2023. ***Ph.D. Dissertation***: Functional cementitious composites with micro-sized particulate fillers for additive construction and energy-efficient buildings.

Yawen He, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, Graduated in August 2023. ***Ph.D. Dissertation***: Responsive Building Envelope for Grid-Interactive Efficient Buildings – Thermal Performance and Control.

Funded Undergraduate Research Mentoring

Haoyu Li, Min H. Kao Department of Electric Engineering and Computer Science, the University of Tennessee Knoxville, August 2023 – Present. ***Research Topic***: Smart Building Management and Occupant Interaction App Development.

Avah Cherry, Department of Mechanical, Aerospace, and Biomedical Engineering, the University of Tennessee Knoxville, January 2023 – Present. ***Research Topic***: Mechanical Design and Control of Omnidirectional Drone.

Jocelyn Hess, Department of Mechanical, Aerospace, and Biomedical Engineering, the University of Tennessee Knoxville, January 2023 – May 2023. ***Research Topic***: Mechanical Design of Omnidirectional Drone.

Kayla Stevenson, H. Kao Department of Electric Engineering and Computer Science, the University of Tennessee Knoxville, January 2023 – May 2023. ***Research Topic***: Control of Omnidirectional Drone.

Ryan Lei, H. Kao Department of Electric Engineering and Computer Science, the University of Tennessee Knoxville, January 2022 – December 2022. ***Research Topic***: Data Collection and Curation for Deep Learning Based Object Detection Applications.

Jiawei Wu, H. Kao Department of Electric Engineering and Computer Science, the University of Tennessee Knoxville, August 2021 – May 2022. ***Research Topic***: Web-Based Facility Management System Development.

Evan Hamilton, Department of Civil and Environmental Engineering, the University of Tennessee, Knoxville, August 2019 – August 2020. ***Research Topic***: Testing Underwater Robots for Infrastructure Inspection.

Jameion Blakely, Department of Civil and Environmental Engineering, the University of Tennessee, Knoxville, May 2019 – December 2019. ***Research Topic***: Ground Penetrating Radar Data Processing for Bridge Inspection.

Kadee Lynn Klimowicz, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, January 2018 – August 2018. ***Research Topic***: Augmented Reality for Drone Control.

Harrison Oori, Department of Civil and Environmental Engineering, the University of Tennessee Knoxville, January 2018 – May 2018. ***Research Topic***: Construction Site Monitoring using Computer Vision.

POSTDOCT & RESEARCH ASSOCIATE SUPERVISION

Hui Liu, Postdoctoral Researcher, August 2023 – Present. ***Research Topic***: Healthcare Robotics.

Yan Li, Postdoctoral Researcher, March 2022 – Present. ***Research Topic***: Construction Robotics.

Monthir Mohamed, Research Associate, August 2023 – Present. ***Research Topic***: Building Information Modeling and Architectural Design.

Jianjun Xu, Research Associate, August 2023 – Present. ***Research Topic***: Embedded System Design and AI.

Ruichen Guo, Research Associate, January 2022 – December 2022. ***Research Topic:*** Ground Penetrating Radar and Underwater Robots for Infrastructure Inspection.

Bohan Li, Research Associate, March 2021 – May 2022. ***Research Topic***: Deep Reinforcement Learning for Disinfection Robot.

Yuhan Jiang, Research Associate, January 2021 – May 2021. ***Research Topic***: Computer Vision Based Method for Collapsed Structure Detection from Disaster Site Images.

Sayantan Tarafdar, Research Associate, August 2020 – June 2021. ***Research Topic***: Drone-Based Disaster Reconnaissance.

Zhouyang Li, Research Associate, January 2020 – June 2020. ***Research Topic***: Digital Twin Platform for Building Environment Monitoring and Visualization.

Feifei Hou, Research Assistant, October 2019 – October 2020. ***Research Topic***: Deep Learning Based Ground Penetrating Radar Data Processing for Infrastructure Inspection.

Yiyi Xie, Research Associate, August 2019 – July 2020. ***Research Topic***: Simultaneous Localization and Mapping with Indoor Drones.

Junjie Chen, Research Associate, September 2018 – September 2019. ***Research Topic***: BIM-Based Indoor Localization and Camera Pose Estimation.

PROFESSIONAL SERVICE

Journal Reviewer

Automation in Construction

Journal of Cleaner Production

Journal of Computing in Civil Engineering

Journal of Construction Engineering and Management

Advanced Engineering Informatics

Journal of Management in Engineering

Transportation Research Part E: Logistics and Transportation Review

Building and Environment

Pattern Recognition

Transportation Research Part A: Policy and Practice

Journal of Banking and Finance

International Journal of Forecasting

Journal of Infrastructure Systems

Journal of Socio-Economic Planning Sciences

Conference Reviewer

Winter Simulation Conference 2024

Construction Research Congress 2024

The 2023 ASCE International Conference on Computing in Civil Engineering

Winter Simulation Conference 2022

Construction Research Congress 2022

The 2021 ASCE International Conference on Computing in Civil Engineering

Construction Research Congress 2020

The 2019 ASCE International Conference on Computing in Civil Engineering

Construction Research Congress 2018

Editorships

Guest Editor, Journal of Infrastructure Systems, Special Issue "Economics and Finance in Civil Infrastructure Development: New Contexts, Methodologies, and Case Studies".

Proposal Reviewer and Panelist

Panelist, Technology, Innovation, and Partnerships, National Science Foundation, 2023.

Panelist, Advanced Research Projects Agency – Energy, Department of Energy, 2023.
Reviewer, Swiss National Science Foundation, 2022

Reviewer, Research Grants Council of Hong Kong China, 2022.

Panelist, Civic Innovation Challenge Program, National Science Foundation, 2022.

Panelist, Future of Work at the Human-Technology Frontier Program, National Science Foundation, 2022.

Panelist, Leading Engineering for America's Prosperity, Health, and Infrastructure Program, National Science Foundation, 2020

Panelist, Civic Innovation Challenge Program, National Science Foundation, 2020

Reviewer, Cyber-Physical Systems Program, National Science Foundation, 2019.

Members on Professional Committee

ASCE Data Sensing and Analysis Committee, 2017 – Present

ASCE Visualization, Information Modeling, and Simulation Committee, 2017 – Present

Institutional Service

Member of Departmental Assessment Committee, 2023 – Present

Member of Departmental Bylaw Committee, 2020 – Present

Faculty Member of Student Chapter of Associated General Contractors, 2018 – Present

Committee Member for Tenure-Track Faculty Search, 2019 – 2020

OUTREACH & WORKFORCE TRAINING

K-12 Outreach

Outreach Activities at University of Tennessee Knoxville

- Engaged over 400 K-12 students from 2017 to 2023 through interactive activities and hands-on explorations involving cutting-edge technologies such as autonomous and connected vehicles, drones, underwater robots, and mixed reality, all meticulously designed to ignite their curiosity and passion for science, technology, engineering, and mathematics (STEM) fields.

- Supported a student from Farragut High School to conduct research related to drone-based civil infrastructure inspection.

- Involved elementary students to conduct environmental sampling at school facilities, taught them basic science and engineering knowledge regarding environmental health, particularly pathogen transmission in indoor environment, and raised their awareness regarding public health during the pandemic of COVID-19.

Community Engagement

Healthy and Sustainable School Initiative

- Partnered with school communities to understand stakeholders' needs and school management paradigms for possible adaptations toward healthier and more sustainable school environments.

- Civic partners include Knox Education Foundation that serves more than 25,000 students across 16 public schools, Webb School of Knoxville, a private K-12 school with more than 1000 student and 100 teachers, San Antonio Independent School District (SAISD) that serves about 49,000 students across more than 90 schools in a highly racially-ethnically diverse and urban community, United Way of Greater Knoxville (UWGK) that focuses on building healthy communities and improving education, and Green Space that aims to advance sustainability of living, working, and building.

Drug-Free Communities and Construction Sites

- Collaborated with government agencies, local communities, companies, and non-profit organizations to develop a drone-based smart medication delivery system aimed at reducing drug abuse in rural and underserved communities. This initiative leverages the air mobility technologies to address a critical public health issue, ensuring access to necessary medications while minimizing the potential for misuse in vulnerable populations.

- Collaborated with construction companies to develop strategies to reduce substance abuse among construction workers and to improve their mental health.

Future 3D Printing for Affordable Housing at Low-Income Communities

- Partnered with companies and startups to assess future 3D printing and robotic

construction methods for affordable housing.

- Collaborated with Community Housing Partners and projectHomes that manage over 10,000 housing units for low-income residents to understand the needs and requirements for 3D printed houses in low-income communities.

Industry Partnership

Technology Development and Transfer

- Led the technology transfer and commercialization of a patent-pending robotic solution for smart facility applications via the support from the National Science Foundation. The customer discovery, market analysis, industry collaboration, and entrepreneurial learning yielded a rewarding experience for the principal investigator, the engaged postdoctoral researcher, and the graduate and undergraduate students.

- Partnered with Trimble Inc., and KLH Engineers in developing smart building systems for healthy and sustainable indoor environments.

- Partnered with Schneider Electric to test internet of things sensors and develop a digital twin based building management system to reduce energy consumption and improve occupant well-beings.

- Developed innovative drone-based sensing and mapping technologies for the Tennessee Department of Transportation and the Tennessee Emergency Management Agency to enhance disaster response and recovery efforts. These technologies were deployed during the response to the Tennessee tornado disasters in 2020 and 2021, demonstrating their efficacy and were subsequently transferred to the respective agencies for incorporation into their future response strategies.

Workforce Development and Training

- Partnered with Tennessee Department of Transportation to develop training materials for infrastructure inspection, particularly after disasters and extreme events.

- Partnered with local construction companies to facilitate student recruiting and workforce training.

- Partnered with Tennessee Association of Rescue Squad, Tennessee Emergency Management Agency, and Knoxville Fire Department in first responders training for collapsed structure searching and firefighting.

- Collaborated with the National Association of Women in Construction, Associated General Contractors, Project GRAD, and construction companies to leverage artificial intelligence and robots to lower the barrier for women and other underrepresented groups to enter the construction and engineering industry. This Future AI & Robotics for Women in Smart Engineering (FAIR4WISE) initiative is designed to propel significant progress towards creating a more diverse, inclusive, and equitable STEM education and workforce training program with research participation, skill training, career advancement, and future work transformation.