Tianzhi He

School of Civil & Environmental Engineering, and Construction Management
Klesse College of Engineering and Integrated Design
The University of Texas at San Antonio
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Research Interests

- Ambient Intelligence
- Smart Built Environments
- Human-Building Interactions
- Human-Computer/AI Interactions
- Wearable Sensors Applications
- Building Information Modeling (BIM)
- Mixed Reality (VR/AR)

Education

Virginia Polytechnic Institute and State University, Virginia, U.S. (Virginia Tech)
Doctor of Philosophy in Civil Engineering, May 2025
Advisor: Dr. Farrokh Jazizadeh

Master of Science in Civil Engineering, Jan 2021
Advisor: Dr. Farrokh Jazizadeh

Tongji University, Shanghai, China
Bachelor of Engineering Management, Jun 2019
Advisor: Dr. Yilong Han

Professional Positions

Assistant Professor
The University of Texas at San Antonio, Texas, U.S., 2025 - Current
Director of Ambient Intelligence Lab

Graduate Teaching Assistant
Virginia Polytechnic Institute and State University, Virginia, U.S., 2020 - 2025
CEE 4844 – Building Information Modeling (BIM) and Integrated Practices
CEE 5060 – Built Environment Information Modeling and Processing

Graduate Research Assistant
Virginia Polytechnic Institute and State University, Virginia, U.S., 2020 - 2025
Developed research proposals, designed/conducted research experiments, analyzed data, and prepared academic papers

Awards

XCaliber Award
Virginia Tech, 2024
For excellence in technology-assisted teaching and learning
CEE 5060 - Virtual prototyping of infrastructure projects' life cycle

Dr Aunt Peg Margaret Driscoll Fellowship
Virginia Tech, 2024
For students who are preparing for a career in higher education and actively engaged with transformative graduate education initiatives

Vecellio CEM Outstanding Graduate Student
Virginia Tech, 2022

Vecellio Fellowship
Virginia Tech, 2021 & 2024

Social Practice Scholarship
Tongji University, 2018

Publications

Journal Publications

J7) **He, T.**, Jazizadeh, F. (2025) "Context-aware LLM-based AI Agents for Smart Buildings Energy Management" *Applied Energy* (Manuscript in progress for submission)

J6) **He, T.**, Jazizadeh, F. (2025) "Occupants' Energy-saving Behavioral Intention Prediction with Machine Learning Techniques in IoT-enabled Smart Homes" *Building and Environment* (Manuscript in progress for submission)

J5) **He, T.**, Jazizadeh, F. (2024) "Can I Control Your Smart Home? Users' Perspectives Towards Smart Home Automation with AI-powered Virtual Assistants" *Scientific Report* (Manuscript in progress for submission)

J4) **He, T.**, Chen, K., Jazizadeh, F., Reichard, G. (2024) "Unmanned Aerial Vehicles (UAV)-based As-built Survey of Buildings" *Automation in Construction*, 161, 105323. (https://doi.org/10.1016/j.autcon.2024.105323)

J3) Chang, R., **He, T.**, Han, Y., Xue, R., Zhang, W. E. (2023). "Geographical Imbalance and Influential Characteristics of the Green Building Market." *Journal of Construction Engineering and Management*, 149(10), 04023093. (https://doi.org/10.1061/JCEMD4.COENG-12971)

J2) **He, T.**, Jazizadeh, F., Arpan, L. (2022). "AI-powered Virtual Assistants Nudging Occupants for Energy Saving: Proactive Smart Speakers for HVAC Control." *Building Research & Information*, 50.4: 394-409. (https://doi.org/10.1080/09613218.2021.2012119)

Publications

J1) Han, Y., **He, T.**, Chang, R., Xue, R. (2020). "Development Trend and Segmentation of the US Green Building Market: Corporate Perspective on Green Contractors and Design Firms." *Journal of Construction Engineering and Management*, 146, no. 11: 05020014. (https://doi.org/10.1061/(ASCE)CO.1943-7862.0001924)

Conference Publications

C5) **He, T.**, Jazizadeh, F. (2024). "LLM-Based Building Energy Management System with AI Assistant" *2024 ASCE International Conference on Computing in Civil Engineering (i3CE 2024)* (Manuscript Accepted and Presented)

C4) **He, T.**, Jazizadeh, F. (2023). "Trust in Human-AI Interaction: Review of Empirical Research on Trust in AI-powered Smart Home Ecosystems" *2023 ASCE International Conference on Computing in Civil Engineering (i3CE 2023)* (https://ascelibrary.org/doi/abs/10.1061/9780784485224.064)

C3) **He, T.**, Jazizadeh, F. (2022). "Nudging Occupants For Energy-Saving through Voice-Based Proactive Virtual Assistants." *Construction Research Congress 2022 (CRC 2022)*(https://ascelibrary.org/doi/abs/10.1061/9780784483961.043)

C2) **He, T.**, Jazizadeh, F. (2021). "Proactive Smart Home Assistants for Automation - User Characteristic-Based Preference Prediction with Machine Learning Techniques." *2021 ASCE International Conference on Computing in Civil Engineering (i3CE 2021)* (https://ascelibrary.org/doi/abs/10.1061/9780784483893.034)

C1) **He, T.**, Chang, R., Han, Y., Yang, Z. (2020). "Exploring the Development Trends and Characteristics of the US Green Building Market." *Construction Research Congress 2020 (CRC 2020)* (https://ascelibrary.org/doi/abs/10.1061/9780784482858.098)

Proposal Experiences

Wearable Sensors for Ambient Intelligence in Smart Homes: Unveiling the Divide Between Laboratory and Real-Life Performances
Grants in Aid for Research, Sigma Xi, Sep 2023
PI: Tianzhi He
Developed and submitted a comprehensive proposal for a wearable sensor integration project.

Pathway Towards Users' Trust in AI-empowered Proactive Smart Home Ecosystems: Understanding Influential Factors and Features
Research Grant, Commonwealth Cyber Initiative (CCI), Sep 2022
PI: Dr. Farrokh Jazizadeh, Co-PI: Dr. Carlos Evia
Contributed to the drafting of the research proposal with its major sections, emphasizing innovative approaches to secure trust between users and the smart environments within the Cyber-Physical Security context.

Proposal Experiences

Smarter and Healthier Buildings: AI-powered Smart Interfaces for Indoor Environmental Quality toward Occupants' Health and Well-being
VT 4-VA Collaborative Research Project, 4-VA, Oct 2021
PI: Dr. Farrokh Jazizadeh, Co-PI: Dr. Arsalan Heydarian
Conducted extensive literature reviews to identify the research gap and formulate research questions that address challenges in developing AI-powered smart interfaces for occupants' well-being.

Research Experiences

Human State (Thermal Comfort) Identification with Wearable Sensors
2024-Current
Developed comprehensive research on wearable technologies and human-AI interaction, utilizing mixed methods to assess user engagement and the efficacy of wearable sensors in the identification of human states (thermal comfort)

LLM-based AI Assistants for Smart Home Energy Management
2023-2024
Integrated Large Language Models (LLMs) into Smart Home Energy Management Systems for AI-powered assistants that showcase the potential of LLMs to improve smart home energy efficiency and management practices.

Mixed Reality for Smart Home Privacy and Security
2023-2024
Investigated the use of Mixed Reality (MR) to enhance user perceptions of privacy, security, and trust in the smart home ecosystem through the visualization of IoT devices network traffic data flows in VR and AR environments.

Human-Immersive Virtual Environment Interactions: Comparison Between 360 Image-based and Graphical IVEs
2023-2024
Explored the application of VR in human-building interactions by comparing user performance and experiences in 360-image-based and graphical Immersive Virtual Environments (IVEs), and identified factors that influence users' performances and preferences in IVEs.

Trust in AI-powered Smart Home Ecosystems
2022-2023
Identified the key characteristics, influencing factors, and features to enhance trust in human-AI interactions for smart homes through systematic literature reviews, addressing challenges in building trust in AI-powered smart homes.

Unmanned Aerial Vehicles (UAV)-based As-built Survey of Buildings
2020-2023
Conducted a systematic literature review and a UAV-based case study on building surveys to examine the impact of various factors on UAV-based 3D model reconstruction, and proposed a data schema for future research.

Human-Building Interaction with Voice-based Proactive Smart Home Assistants
2019-2021
Developed a conceptual framework for voice-based Smart Home Assistants, conducting user studies and employing machine learning models to improve proactive interactions for energy conservation and user comfort.

Research Experiences

Systematic Analysis of U.S. Green Construction Companies
2018-2019
Conducted in-depth data analysis of U.S. green construction companies using k-means clustering and spatial autocorrelation techniques to categorize market strategies and analyze industry trends.

Teaching Experiences

CEE 4984 (Building Information Modeling and Integrated Practices)
Teaching Assistant & Section Instructor, 2021-Current
• Assisted in developing tailored assignments leveraging professional software (e.g., Revit, Navisworks) to enhance students' understanding of the Building Information Modeling (BIM) process.
• Innovated the curriculum by designing modules on reality capture and laser scanning techniques, integrating practical hands-on experiences with Matterport and FARO Laser Scanner.

CEE 5060 (Built Environment Information Modeling and Processing)
Teaching Assistant & Section Instructor, 2021-Current
• Pioneered the integration of virtual reality applications into the curriculum, leading a team of graduate students to create extensive tutorials on Recap Pro and Unity to enrich the learning experience.
• Led the design and implementation of a series of group-based VR design review sessions for class final projects. Scheduled and organized design-review sessions for students, receiving positive feedback from students.

Future Professoriate Certificate
Certified, 2024
• Enrolled in the Future Professoriate Graduate Certificate Program, as part of the Transformative Graduate Education initiative, aiming to innovate higher education training and leadership.
• Engaged with advanced academic and pedagogical concepts through core courses including Preparing the Future Professoriate, Pedagogical Practices in Contemporary Contexts, and Citizen Scholar (9 Credits in total).

Advising Experiences

Esteban Amezquita Radillo
Graduate Thesis, 2022
Title: Towards Immersive Virtual Environments Using 360 Cameras for Human Building Interaction Studies
• Mentored Esteban in the development of his research project, including the creation of immersive virtual environments. Guided him through the process of designing experiments, analyzing data, and interpreting results.

Kshipra Gandhi
Graduate Research Project, 2022
Title: Understanding Human Interactions with Virtual Environments and Their Associated Tools
• Supervised Kshipra in her research exploring human interactions within virtual environments. Provided guidance on research methodologies, data collection design, and the use of various analytical tools for data analysis.

Invited Talks

Artificial Intelligence in the AEC Industry & Smart Built Environments
Guest Lecture, University of Alabama, Nov 2024

Human-centered Ambient Intelligence in Smart Buildings
CEE Graduate Seminar, Virginia Tech, Oct 2024

Building Information Modeling (BIM): Trends and Future for the AEC Industry
CEE Undergraduate Seminar, Virginia Tech, Aug 2021

Human-Building Symbiotic Communication with Voice-based Proactive Smart Home Assistants
CEE Graduate Seminar, Virginia Tech, Aug 2021

Outreach Activities

Smart Built Environments
BLAST (Building Leaders for Advancing Science and Technology) Activity
Blacksburg High Schools, July 2024

Introduction and New Technologies in Civil Engineering
STEM Outreach Activity
Blacksburg High Schools, Oct 2018

Professional Membership

- The American Society of Civil Engineers (ASCE)
  Student Member, 2021-Present
- Data Sensing And Analysis Committee, ASCE
  Student Member, 2022-Present
- Visualization, Information Modeling, and Simulation Committee, ASCE
  Student Member, 2023-Present
- Sigma Xi
  Member, 2023-Present
- VCEMP Graduate Student Council, Virginia Tech
  Member, 2020-Present
- University Students' Union, Tongji University
  Vice President, 2018-2019
- School of Economics and Management Students' Union, Tongji University
  Vice President, 2018-2019

Reviewer

Journals
[**JCEM**] Journal of Construction Engineering and Management *(2021-Current)*
[**JME**] Journal of Management in Engineering *(2024-Current)*
[**AutoCon**] Automation in Construction *(2024-Current)*

Conferences
[**I3CE**] International Conference on Computing in Civil Engineering *(2022-2024)*
[**VTD&D**] Dennis Dean Undergraduate Research Scholarship Conference *(2024)*
[**CRC**] Construction Research Congress *(2022)*