

Tzu-Hsin Hsieh (Celine)

Ph.D. Researcher · Spatial AI · Generative 3D · XR Systems

✉ thhsieh@tudelft.nl | github.com/celine-hsieh | [linkedin.com/in/celinehsieh68](https://www.linkedin.com/in/celinehsieh68) | [Tzu-Hsin Hsieh](https://www.tzhhsieh.com)

SUMMARY

Ph.D. researcher in spatial AI, generative 3D, and XR systems. Experienced in building end-to-end research prototypes that combine **VLM-based 3D scene understanding, generative AI, computer vision, XR hand tracking,** and human-centered XR interfaces for spatial reasoning and content generation.

EDUCATION

Delft University of Technology (TU Delft) <i>Ph.D. in Computer Science, Computer Graphics and Visualization Group</i>	Jul. 2024 – Present Delft, The Netherlands
National Cheng Kung University <i>M.S. in Architecture; M.S. in Computer Science; Minor in Electrical Engineering</i>	Sep. 2021 – Jul. 2024 Tainan, Taiwan
National University of Kaohsiung <i>Bachelor of Architecture, GPA: 3.68 / 4.0</i>	Sep. 2017 – Aug. 2021 Kaohsiung, Taiwan

PUBLICATIONS (SELECTED)

- CHI 2026. [Paper].** Tzu-Hsin Hsieh, Cassandra Michelle Stefanie Visser, Elmar Eisemann, and Ricardo Marroquim. *Skill-Adaptive Ghost Instructors: Enhancing Retention and Reducing Over-Reliance in VR Piano Learning.* (1st author, full paper).
- Manuscript under review.** Tzu-Hsin Hsieh and Ricardo Marroquim. *ElasticFit: Fit-Aware 3D Object Insertion via VLM Reasoning and Generative Adaptation.* (1st author, under review).
- CAADRIA 2024. [Paper].** Tzu-Hsin Hsieh and Tay Sheng J. *UrbanSight: Application of Digital Twin to Augmented Reality.* (1st author, full paper).
- IEEE ECICE 2023. [Paper].** Chia Hung L., Tzu-Hsin Hsieh, et al. *TMSR: Tiny Multi-path CNNs for Super Resolution.* (2nd author, full paper).

EXPERIENCE

Ph.D. Researcher, Computer Graphics and Visualization Group <i>TU Delft</i>	Jul. 2024 – Present Delft, The Netherlands
<ul style="list-style-type: none">Conducting research on spatial AI, generative 3D, and 3D scene understanding for XR-based spatial reasoning and content generation.Developed XR prototypes with hand tracking, real-time interaction logging, adaptive feedback control, and user-study evaluation.	
Research Assistant, Digital IC Design Lab <i>National Cheng Kung University</i>	May 2022 – Jul. 2024 Tainan, Taiwan
<ul style="list-style-type: none">Conducted computer vision research on AI-based image recognition, super-resolution, satellite-image analysis, and deep learning for remote sensing applications.	
Research Assistant, Interactive Architecture Lab <i>National Cheng Kung University</i>	Sep. 2021 – Jul. 2024 Tainan, Taiwan
<ul style="list-style-type: none">Developed mixed reality and digital-twin systems integrating BIM, 3D spatial data, and collaborative interaction workflows.	
Research Assistant, City Science Lab @ Taipei <i>MIT UROP Program</i>	Feb. 2023 – Jun. 2023 Taipei, Taiwan
<ul style="list-style-type: none">Built an AR iOS application using real-world weather data, AprilTag tracking, and plane detection for spatial model registration.	

TECHNICAL SKILLS

Research Areas: Spatial AI, Generative 3D, XR Systems, 3D Scene Understanding, Human-Centered AI
AI / CV / 3D: PyTorch, PyTorch3D, TensorFlow, OpenCV, Generative AI, Multimodal Scene Reasoning, 3D Spatial Grounding, Geometry Optimization
XR / Graphics: Unity, C#, Meta XR SDK, OpenGL, XR Hand Tracking, AR/MR Interaction
Programming: Python, C/C++, C#, JavaScript
3D / Design Tools: Blender, Rhino, Grasshopper, Revit

PROJECTS

- ElasticFit** | *VLM Reasoning, Generative 3D, 3D Scene Understanding, Spatial AI, Python, PyTorch3D* 2026
- Developed a **fit-aware 3D object insertion** framework that combines VLM-based scene reasoning, generative 3D object synthesis, geometry-aware fitting, and physics-guided refinement.
 - Designed a scene-grounded fitting representation that converts high-level spatial instructions into explicit **3D placement, orientation, and deformation constraints**.
 - Evaluated the system on **120 object-insertion tasks** across common placement and fit-critical scenarios, measuring spatial relation success, collision-free rate, support success, and contextual plausibility.
- Skill-Adaptive Ghost Instructors** | *VR, Meta Quest 3, Hand Tracking, User Study, Unity, C#* 2025
- Built a **VR piano learning system** with ghost-hand guidance, real-time hand tracking, adaptive transparency control, and interaction logging.
 - Designed and compared **two ghost-hand guidance conditions**: static baseline guidance, and skill-adaptive dynamic guidance.
 - Conducted a user study to evaluate retention, over-reliance, workload, and learning performance using performance logs, questionnaires, and workload measures.
- UrbanSight** | *Digital Twin, Mixed Reality, Microsoft HoloLens 2* 2024
- Built a collaborative **multi-user MR space** where users interact with a shared digital twin in real time.
 - Integrated BIM, 3D spatial data, and shared interaction workflows for digital-twin-based urban visualization.
- CityScope** | *AR, AprilTag, Weather Visualization* 2023
- Created an AR app to display **real-time 3D weather information** from Taiwan's Central Weather Bureau.
 - Used **AprilTag-based localization** to register virtual weather visualizations onto a physical model of Taiwan Island.
- FruitVeg Culinary Compass** | *CNN, Web App, Generative AI* 2023
- Developed a **CNN-based recognition app** for fruit and vegetable classification, recipe recommendation, and image generation using the ChatGPT API and Stable Diffusion.
- Crowd Counting & Prediction Dashboard** | *GRU, Web System* 2022
- Collaborated with Tainan City Government's Tourism Bureau and Far Eastone to build a **pedestrian flow prediction dashboard** using data analysis and GRU-based time-series modeling.
- Non-Euclidean VR Space** | *VR, Unity, C#, HTC VIVE* 2021
- Developed a VR environment using connected virtual spaces and scale mismatches to create **impossible-space and size-perception effects**.

ADDITIONAL PUBLICATIONS

- ACM SIGSPATIAL 2025. [Paper].** Lai, Shih-Yu, **Tzu-Hsin Hsieh**, Pei-Chi Tsai, Chao-Chun Kung, Sing-Kai Ling, and Hsun-Ping Hsieh. *M3: Recommendation via Attention-Graph Cluster Q-Learning with Multi-Scale Spatial Heterogeneity for Multi-Purpose, Multi-Stakeholder Green Attractions in Transportation. (2nd author, full paper).*
- ACM SIGSPATIAL 2024. [Paper].** Lai, Shih-Yu, **Tzu-Hsin Hsieh**, Sing-Kai Ling, Pei-Chi Tsai, Chao-Chun Kung, and Hsun-Ping Hsieh. *GreenSpot: Improving Public Transport with GIS-Based AR and Cluster-GCN Recommendation. (2nd author, short paper).*
- ACIS 2023. [Paper].** Hsun Ping H., Tzu Chang L., **Tzu-Hsin Hsieh**, et al. *Enhancing Urban Crowd Monitoring through Predictive Modeling System with Diverse Geospatial Datasets. (co-author, full paper).*

HONORS

- Young CAADRIA Award**, Computer-Aided Architectural Design Research in Asia (CAADRIA). 2024
- Best Paper Award**, Architectural Institute of Taiwan. 2023
- Gold Award**, Cathay Life Real Estate Business Case Analysis Contest. 2023
- Gold Award**, IEEE Signal Processing Society AIoT Competition. 2022
- Silver Award**, Tainan City Digital Governance Talent Training Program Competition. 2022

ACADEMIC SERVICES

- ACM CSCW'24 | Reviewer** 2024
- Reviewed paper submissions in human-computer interaction and collaborative systems.