KAIZHEN TAN

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Research Interests: Urban AI, Smart Cities, Spatial Intelligence, Social Sensing

EDUCATION

Carnegie Mellon University — Aug. 2025 - Aug. 2026
M.S. in Artificial Intelligence Systems Management — *Pittsburgh, United States*

· GPA: 4.11/4.3 (Now)
· Core Courses: AI Model Development | Operationalizing AI | Agentic Technologies | AI Cloud and DevOps

Tongji University — Sept. 2021 - Jun. 2025
B.S. in Information Management and Information System — *Shanghai, China*

· Average Score: 90.24/100, GPA: 3.94/4.0 (WES)
· Core Courses: System Design | Database Application | Data Structures | Programming (Python/C++/Java)

PUBLICATIONS

Tan, K., Wu, Y., Liu, Y., & Zeng, H. (2025). A multidimensional AI-powered framework for analyzing tourist perception in historic urban quarters: A case study in Shanghai. *Global Smart Cities Summit cum The 4th International Conference on Urban Informatics.* (Accepted). arXiv:2509.03830

Tan, K. (2025). Multimodal deep learning for ATCO command lifecycle modeling and workload prediction. *7th Asia Conference on Machine Learning and Computing* (Accepted). arXiv:2509.10522

Huan, W., **Tan, K.**, Liu, X., Jia, S., Lu, S., Zhang, J., & Huang, W. (2025). A spatiotemporal adaptive local search method for tracking congestion propagation in dynamic networks. *GIScience & Remote Sensing*, 62(1), 2602215. https://doi.org/10.1080/15481603.2025.2602215

Tan, K., Zhang, F. (2026). UrbanVGGT: Scalable Sidewalk Width Estimation from Street View Images. (In preparation; extended abstract accepted at *ISPRS Congress 2026*).

Tan, K. (2026). What We Lose, What We Gain: Spatio-temporal Patterns of Lost-and-Found Items in Qingdao Metro. (In preparation).

RESEARCH EXPERIENCES

Urban Geometric Reconstruction and Measurement from Street View — Oct. 2025 - Now
Research Assistant, Advisor: Dr. Fan Zhang, Dr. Yu Liu, Peking University — *Beijing, Remote*

· Develop a VGGT-based framework to automate the measurement of urban elements (e.g., sidewalk width) by integrating 3D world point prediction with semantic segmentation from street view imagery, and recover metric scale via ground-plane fitting and camera height calibration.
· Analyze global inequalities in geospatial data availability, demonstrating how street-view imagery can complement existing sources to improve fairness in global urban analytics, enabling large-scale urban dataset generation.

Multidimensional AI-powered Framework for Analyzing Tourist Perception — Apr. 2024 - Apr. 2025
Research Assistant, Advisor: Dr. Yujia Zhai, Tongji University — *Shanghai*

· Assessed tourists' perception of historic urban quarters in Shanghai using deep learning methods.
· Crawled travel reviews from social media, integrated the SAM model for automatic labeling to form a training dataset, and developed a semantic segmentation model for focal point extraction by fine-tuning SOTA models.
· Categorized building facade colors using fuzzy quantization method, compared dominant colors in travel photos with actual street views, and analyzed tourists' preferences and expectations for urban street color schemes.
· Applied named entity recognition and sentiment analysis to calculate satisfaction scores for various dimensions (Activities, Built environment, Facilities, Business types) and employed BERT for multi-task learning.

Modeling and Optimization of Air Traffic Management at Changi Airport — Sept. 2024 - Dec. 2024
Research Intern, Advisor: Dr. Yicheng Zhang, Dr. Sheng Zhang, A*STAR — *Singapore*

· Established a behavioral model for air traffic controllers to predict communication tasks and optimize workload using radiotelephony communication and aircraft trajectory data.

· Collected and cleaned historical and real-time air traffic data from various sources, conducted exploratory analysis to identify patterns, trends, and anomalies, and utilized statistical methods and visualization tools to uncover insights into traffic density, peak times, and common routes.

· Analyzed factors affecting air traffic, such as weather, airspace restrictions, and airport capacity; developed a hybrid CNN-transformer model to test various scenarios and strategies for efficient air traffic management.

Spatio-temporal Traffic Congestion Propagation Patterns Modelling   Apr. 2024 - Sept. 2024
Research Assistant, Advisor: Dr. Wei Huang, Tongji University   *Shanghai*

· Modeled traffic congestion propagation patterns (TCPP) using geospatial-temporal-semantic knowledge graphs.

· Mapped Shanghai's taxi trajectory data to real roads, calculated traffic state index to identify congestion, and built feature-embedded graphs by fusing node curvature, degree, spatial proximity, and semantic information.

· Proposed a novel spatiotemporal adaptive local search (STALS) method to track the propagation of traffic congestion by identifying multi-scale communities in the dynamic adjacency matrices.

· Identified the causality and correlation between TCPP and built environment by using causal inference and calculating weighted values of POIs within each buffer, and quantified the impacts through propagation probabilities.

CFGPT: Chinese Financial Generative Pre-trained Transformer Framework   Jan. 2024 - Apr. 2024
Research Assistant, Advisor: Dr. Dawei Cheng, Tongji University   *Shanghai*

· Established the datasets of CFGPT, an open-sourced Chinese financial large language model (LLM), and contributed to model refinement as a prompt engineer.

· Collected online financial content using distributed crawlers, filtered texts with regular expressions, banned word lists, and locality-sensitive hashing algorithm, to assemble a pre-training dataset.

· Designed text prompts for further supervised instruction tuning, enhancing the model's generalization ability across 6 specific downstream financial tasks, such as sentiment analysis, topic decomposition and stock prediction.

· Crafted real-world financial application cases to provide textual support for retrieval-augmented generation (RAG).

ACADEMIC PROJECTS

Urban Vision-Language Guide Agent for Visually Impaired People   Oct. 2025 - Now

· Design a real-time egocentric navigation assistant that provides spoken guidance to blind users while walking.

· Build a lightweight perception and event engine to segment key urban classes, estimate depth, and convert detections into concise voice prompts (e.g., "enter tactile paving," "obstacle left/right," "traffic light walk/stop").

Pavement Disease Recognition for Smart Road Maintenance   Sept. 2023 - Nov. 2023

· Enhanced YOLOv8 for small-target recognition and applied Wise-IoU, improving F1 by 26.3%.

· Applied AI to urban infrastructure monitoring, winning Second Prize at the national AI competition (top 5%).

Agent-based Modeling and Simulation for Public Facility Optimization   Jun. 2023 - Aug. 2023

· Collected behavioral data on library seat usage and applied clustering & FAHP analysis.

· Built an AnyLogic-based simulation system for crowd behavior modeling, achieving 0.87 grey correlation.

INTERNSHIP

Shanghai Artificial Intelligence Lab   Jan. 2025 - Apr. 2025
AI Product Manager Intern   *Shanghai*

· Conducted end-to-end market research and competitive analysis for AI products (e.g., Migo, Auto-Research), benchmarking against 50+ vertical tools and delivered 5+ analytical reports to guide product positioning.

· Built operational data dashboard tracking KPIs, enabling granular analysis of user retention and behavior funnels.

· Established evaluation frameworks for Migo's InternLM model, enabling data-driven iteration cycles.

SKILLS

Languages: IELTS 7.5 (L:9, R:8.5, W:6.5, S:6), GRE 331 (V:161, Q:170, AW:3)
Programming & Tools: Python, C++, C#, Java, HTML, SQL, Git, Docker, Tableau, ArcGIS, Stata
Coursera Certificates: IBM Data Science Specialization, Stanford Machine Learning Specialization