Zhangding Liu

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Education

Georgia Institute of Technology

Ph.D. Computational Science and Engineering, GPA:3.9/4.0 — *Aug 2023 – Dec 2027*

M.S. Computational Science and Engineering, GPA:4.0/4.0 — *Aug 2023 – Dec 2025*

Tongji University

B.Eng. Artificial Intelligence (Civil Engineering), GPA:89.1/100.0 — *Sep 2019 – Jun 2023*

Skills

- Skill Set: Machine Learning, Deep Learning, Natural Language Processing, Computer Vision
- Technical Skills: **Python**, SQL, R, C++, Java, **PyTorch**, Scikit-Learn, TensorFlow, Hugging Face, Pandas, NumPy
- Developer Tools: Git, Docker, Linux, Jupyter, Flask/FastAPI, REST APIs, VS Code

Experience

Partnership for Innovation — **May 2025– Jul 2025**

PhD Researcher Intern — *Atlanta, GA*

- Developed **FloodVision**, a **retrieval-augmented** multimodal system combining GPT-4o with a curated flood knowledge graph to estimate urban flood depth from street-level camera images.
- Designed a pipeline integrating semantic anchor detection, structured knowledge retrieval, and knowledge-constrained visual estimation. Achieved **8.17** cm MAE on real-world imagery in zero-shot tests, a **20.5%** error reduction vs. GPT-4o baseline.

Lawrence Berkeley National Laboratory — **May 2024– Jul 2024**

Research Assistant Intern — *Berkeley, CA*

- Developed a **Heat Vulnerability Index (HVI)** mapping system for Oakland analyzing **200+ census tracts**, integrating multi-source geospatial data using **Python** (GeoPandas for spatial joins) and **R** (statistical analysis).
- Deployed an interactive **web application** with **Flask backend**, **Leaflet.js mapping library**, and **Bootstrap UI framework**, enabling city planners to visualize and query block-level HVI data for urban climate resilience planning.
- Reviewed robotics applications in HVAC, with emphasis on multimodal sensing; contributed to a paper under review.

Georgia Institute of Technology — **Aug 2023– Present**

Graduate Research Assistant — *Gatech, GA*

- Developed **MCANet**, a multi-scale attention network with a **Res2Net** backbone and multi-head **residual attention** to address challenges of co-occurring and visually similar damages; achieved **92.35% mAP** on the **RescueNet** dataset (+5.1% vs ResNet-101, +1.6% vs ViT) for **multi-label post-hurricane damage classification** from UAV imagery.
- Designed a synthetic image **dataset generation** pipeline (UE4 + **Swin Transformer**) for construction machinery detection, enabling context-aware object placement and improving detection robustness with a **+2.1% mAP** gain over real-world datasets.

Projects

SymPlanner: Deliberate Planning with Symbolic Representations — **Apr 2025– Aug 2025**

Research Project — *Gatech, GA*

- Developed **SymPlanner**, a framework augmenting LLMs with symbolic world models for multi-step planning, introducing **iterative correction** and **contrastive ranking** to enhance reasoning reliability.
- Built a full pipeline with policy model, symbolic simulator, and discriminator, achieving up to **54% accuracy** on PlanBench long-horizon tasks, outperforming CoT, ToT, and RAP baselines by 2–3×.

Selected Publications

- Xiong, S., **Liu, Z.**, Zhou, J., & Su, Y. (2025). Deliberate Planning in Language Models with Symbolic Representation. *ArXiv*. https://arxiv.org/abs/2505.01479 (Accepted at ACS 2025)
- **Liu, Z.**, Mohammadi, N., & Taylor, J. E. (2025). FloodVision: Urban Flood Depth Estimation Using Foundation Vision-Language Models and Domain Knowledge Graph. *ArXiv*. https://arxiv.org/abs/2509.04772
- **Liu, Z.**, Mohammadi, N., & Taylor, J. E. (2025). MCANet: A Multi-Scale Class-Specific Attention Network for Multi-Label Post-Hurricane Damage Assessment using UAV Imagery. *ArXiv*. https://arxiv.org/abs/2509.04757 (I3CE 2025)
- Lu, Y., Liu, B., Wei, W., Xiao, B., **Liu, Z.**, & Li, W. (2025). Generating synthetic images for construction machinery data augmentation utilizing context-aware object placement. *Developments in the Built Environment*, 21, 100610. https://doi.org/10.1016/j.dibe.2025.100610