Mengning Wu

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Research Interests

Fields: Natural Language Processing; Computer Vision; Generative Modeling for Robotics

Topics: My current research interest lies in the fundamental principles of generative modeling, specifically in architectures and training objectives that can generalize to complex tasks with scaling abilities.

Education

Carnegie Mellon University Sep 2023 – May 2025

- M.S. in Electrical and Computer Engineering
- GPA: 4.0/4.0
- **Courses:** Visual Learning and Recognition, Physics-Based Rendering, Robot Localization and Mapping, Geometry-based Methods in Vision

Beijing Jiaotong University Sep 2019 – May 2023

- B.E. in Software Engineering (**Advisor:** Prof. Ruipeng Gao)
- GPA: 3.9/4.0 (Top 3%)

Publications

Diffusion Beats Autoregressive in Data-Constrained Settings

Mihir Prabhudesai*, **Mengning Wu***, Amir Zadeh, Katerina Fragkiadaki, Deepak Pathak
NeurIPS 2025 (accepted)

Can LLMs Lie? Investigation beyond Hallucination

Haoran Huan*, Mihir Prabhudesai*, **Mengning Wu***, Shantanu Jaiswal, Deepak Pathak
arXiv preprint, 2025

No Longer Getting Lost on Fork Road: Vehicle Off-Route Detection Via Multi-Sensor Integration

Xuan Xiao, Weiwei Xing, Ruipeng Gao, **Mengning Wu**
IEEE Transactions on Intelligent Vehicles, 2024

Smartphone-Based Multi-level Indoor Floor Plan Construction via Acoustic Ranging and Inertial Sensing

Chuize Meng, Shan Jiang, **Mengning Wu**, Xuan Xiao, Dan Tao, Ruipeng Gao
International Conference on Wireless Algorithms, Systems, and Applications (WASA) 2022

Research

Pathak Research Group / Prof. Deepak Pathak Sep 2024 – Present
Graduate Research Assistant

Scaling Masked Diffusion Models in Data Constraint Settings

- Developed a comparative study on Masked Diffusion Models and Autoregressive Models in data-constrained scenarios, which shows the effectiveness of MDMs in learning from limited data and mitigating overfitting.
- Constructing a data-constrained scaling law for MDMs.
- Published a co-first author paper to NeurIPS 2025

Interpretation of Deception in LLM Beyond Hallucination

- Explored the bottom-up formation and top-down control of deceptive responses in LLMs, which analyzed how deception emerges and propagates to the next prediction.
- Responsible for conducting layer-to-neuron level experiments to analyze how lying intent and incorrect facts are encoded in MLP and propagate through Attention.
- Co-authored a paper currently under submission

Robotic Caregiving and Human Interaction Lab / Prof. Zackory Erickson Apr 2025 - July 2025
Graduate Research Assistant

Robot Shared Autonomy with Real-world Incremental Learning

- Leveraged 3D diffusion models for shared autonomy in data-constrained real-world manipulation, using few RGB-D expert demonstrations complemented by a synthetic data generation pipeline.
- Enabled continual user-specific improvement via incremental adaptation from in-the-loop corrections.

Biorobotics Lab / Prof. Howie Choset Jul 2023 - Dec 2024
Graduate Research Assistant

Robot-agnostic Representation Learning

- Developed a unified latent shape space for robots that alleviates the data bottleneck and enables cross-robot knowledge by aligning kinematic configurations using geometric-based soft contrastive loss.
- Exploring the integration of the unified latent space with pre-trained vision-language action models to enhance their robustness and generalizability.

ARPA-E REPAIR Mapping

- Developed a pipeline of robotic system for in-pipe inspection that leveraging confined space VILL-SLAM and geometry-based pipe defect detection and reconstruction. Responsible for algorithm and software design.
- Responsible for developing a UE-based simulation environment for robotic sensing.
- This project has been transited into the startup company Pipe Force.

Prof. Ruipeng Gao Feb 2022 - Mar 2023
Undergraduate Research Assistant

Vehicle Off-route Detection via Multi-sensor Fusion

- Developed a multisensor fusion framework based on Particle Filter for real-time vehicle tracking and off-route prediction. Responsible for data fusion and processing, and model pruning for mobile deployment.
- Published a paper in the Journal of IEEE Transactions on Intelligent Vehicles.

Smartphone-based Multi-level Indoor Floor Construction

- Developed a smartphone-based indoor floor plan construction system using acoustic ranging and inertial tracking. Responsible for processing IMU data and implementing the inertial sensing module.
- Published a paper in WASA 2022

Honors & Awards

First-class academic award	2022
Interdisciplinary Contest in Modeling Certificate of Achievement - Honorable Mention	Jun 2021
The 45th ICPC Asia Regional Contest Jinan Site 2020-Bronze Medal	Dec 2020
Second-class academic award	2020, 2021

Skills

Programming: Python, C/C++, Java

Technologies: Pytorch, verl, diffusers, Megatron&Deepspeed, ROS, MuJoCo, PyBullet, Open3D

Projects

Learning the Relationships Between Motions Oct 2024 - Dec 2024
Course Project

- Developed a VAE-based framework to encode and reconstruct human motions, enabling motion composition and similarity analysis, demonstrating the effectiveness of latent representations in capturing semantic info.

Elevating Dense SLAM with 3D Gaussian Splatting Feb 2024 - Apr 2024
Course Project

- Developed a SLAM framework integrating 3DGS and leveraging a submap strategy to enhance scalability and real-time performance. Achieved an improved tracking speed (10X) while maintaining comparable reconstruction quality.

3D Reconstruction System Based on End-Cloud Integration Jan 2023 - Apr 2023
Undergraduate Thesis

- Developed a generalized 3D reconstruction system that allows users to collect images and view 3D models using mobile devices. This system used COLMAP and Instant-NGP to create dense reconstruction.