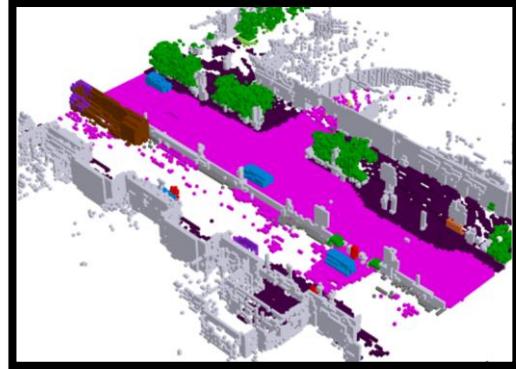


Master Thesis

Occupancy-Centric 4D World Model for Connected Autonomous Driving

Background:

Understanding and forecasting the dynamic evolution of complex driving environments is a core challenge in autonomous systems. Traditional object-centric approaches (e.g., bounding boxes) have limitations in capturing fine-grained scene structure and future dynamics. Occupancy representations provide a dense, grid-based description of the environment and enable fine-grained modeling of both static and dynamic elements, forming a solid foundation for world models in autonomous driving. Recent research has demonstrated the effectiveness of occupancy-based world models for future scene prediction. OccWorld introduces a generative 3D occupancy world model that jointly forecasts scene evolution and ego motion via tokenized occupancy representations and transformer-based temporal modeling. UniOcc further provides a unified benchmark and evaluation protocol for both occupancy prediction and forecasting, including support for cooperative driving scenarios and per-voxel motion annotations. Together, these works establish a strong methodological and benchmarking basis for next-generation occupancy world models.



Your Tasks:

- Review and analyze state-of-the-art methods for occupancy world modeling
- Evaluate SOTA models under unified benchmarks
- Design and implement a multi-agent OccWorld, enabling collaborative occupancy forecasting and collaborative path planning
- Evaluate performance and analyze the impact of communication and fusion strategies.

Your Profile:

- Background in machine learning, robotics, or computer vision
- Solid programming skills (Python, PyTorch)
- Interest in autonomous driving and multi-agent systems
- Independent, research-oriented mindset and the ability to explore open-ended problems

Start date: Immediately

Duration: As per the applicable examination regulations.

If you are interested or have any questions regarding this thesis position, feel free to contact:
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[1] Zheng, Wenzhao, et al. "Occworld: Learning a 3d occupancy world model for autonomous driving." European conference on computer vision. Cham: Springer Nature Switzerland, 2024.

[2] Wang, Yuping, et al. "Uniocc: A unified benchmark for occupancy forecasting and prediction in autonomous driving." arXiv preprint arXiv:2503.24381 (2025).