

# Deep Learning World Models with Latent States for Autonomous Driving

Bachelor / Master Thesis

The scope is designed for a Master Thesis.  
For a Bachelor Thesis, we can customize it.

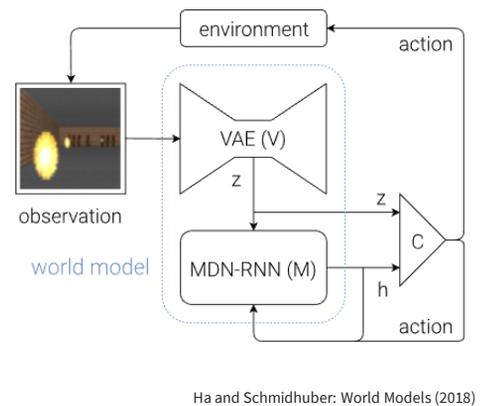
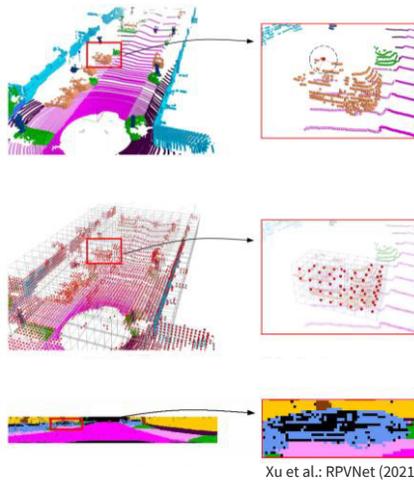
Autonomous Driving

Deep Learning

Reconstruction

Prediction

In computer vision, we often deal with models that have no good understanding of the how the world works. This leads to cases, where neural networks are severely wrong, while we humans can easily identify the issue. Luckily, world models, which learn a representation of the world, come to the rescue. In this thesis, you will train a world model, that not only learns from 2D image data, but also 3D voxel data.



## The Topic

- You will perform state-of-the-art research on current world models with latent state representations
- Based on the CARLA simulation engine, you will train a world model that included a reconstruction error based on a 3D voxel representation of the world
- You will evaluate its performance based on available sensor data from camera and lidar. Reconstruction and prediction errors will be your metrics of choice
- You will create appealing image and video visualizations

## Your Skills

- You study Computer Science or a related course of study
- You are deeply interested in topics such as Autonomous Driving, Robotics, Deep Learning or Computer Vision
- You are able to read and write scientific texts in English
- You are fluid in Python, first experiences with PyTorch
- You show an above-average degree of initiative and commitment as well as a thorough way of working

## What We and I Offer

- You get exciting insights into our research and gain valuable practical experience
- We use the latest hardware and software. Together with us you work in first-class laboratories (on-site or remotely)
- Regular and extensive support: Weekly 1:1 meetings, bi-weekly student group meetings, monthly 1:1 strategy meetings
- Collaboration with other students to get tips, learn together, and fix issues quickly
- High-quality theses will be published on KITopen, with the code on GitHub
- We aim to publish this work in an IEEE paper with shared first authorship

## Application

- Start: Immediately
- Shoot me an e-mail at [daniel.bogdoll@kit.edu](mailto:daniel.bogdoll@kit.edu) with your CV, grades, and a few sentences why you are interested. No cover letter necessary 😊