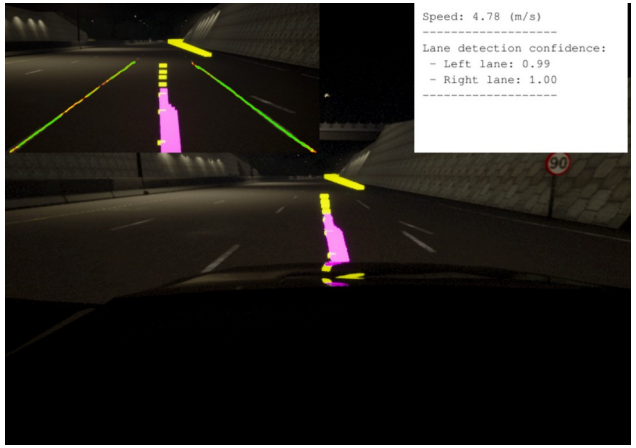
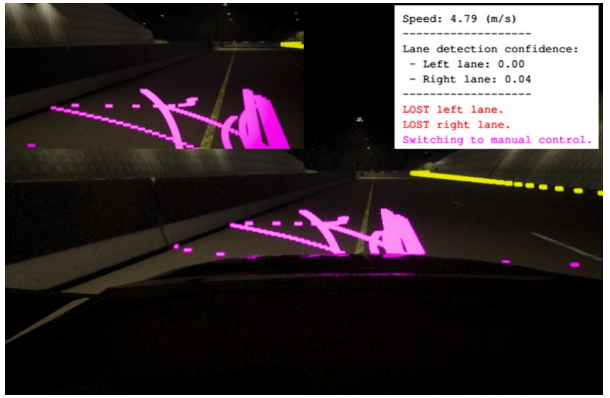
Hazard Anticipation in Autonomous Vehicles Using AI





- Build a machine learning model that detects and predicts hazardous situations in autonomous driving environments
- Multi-modal dataset creation with CARLA and existing frameworks for conflict injections[1]
- Train model[2] to assess risk levels and suggest evasion actions
  - Consider past behavior of ride to estimate a potential conflict
  - Recognize deviations from normal driving patterns, such as reckless driving or unpredictable pedestrian movement

[1] Tsvetomila Mihaylova, Stefan Reitmann, Elin A. Topp, and Ville Kyrki. 2025. “Injecting Conflict Situations in Autonomous Driving Simulation using CARLA”. In Proceedings of the 2025 ACM/IEEE International Conference on Human-Robot Interaction (HRI ‘25). IEEE Press, 1052–1056.
[2] Chitta, Kashyap, Aditya Prakash, Bernhard Jaeger, Zehao Yu, Katrin Renz and Andreas Geiger. “TransFuser: Imitation With Transformer-Based Sensor Fusion for Autonomous Driving.” IEEE Transactions on Pattern Analysis and Machine Intelligence 45 (2022): 12878-12895.

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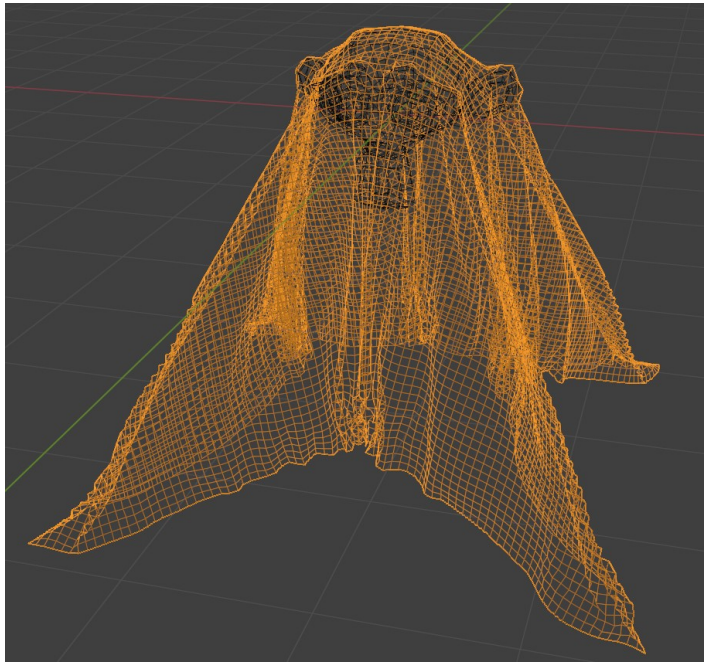
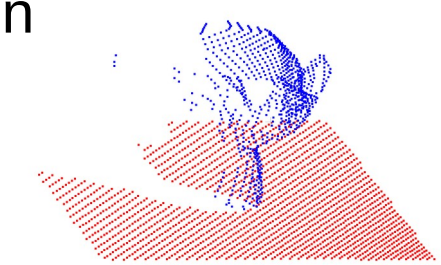
Latent Space Interpolation for Deformable Objects



- Latent space represents a compressed, lower-dimensional representation of deformed object states (e.g., different fabric folds, stretched cloth, compressed soft bodies)
- Data set creation with Blender's clothing simulation and
  - Create a script-based and comprehensive framework / add-on
  - Connect your add-on with former work for synthetic data generation[1]



- Extract data and train a variational autoencoder (VAE) or GAN to learn a latent representation of deformed meshes and interpolate between different deformation states

[1] S. Reitmann, L. Neumann and B. Jung. "BLAINDER—A Blender AI Add-On for Generation of Semantically Labeled Depth-Sensing Data". In: Sensors 21.6 (2021). ISSN: 1424-8220. DOI: 10.3390/s21062144. URL: https://www.mdpi.com/1424-8220/21/6/2144.

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