Team Project

Agentic AI for Automated Integration of Traffic Signal Plans in Traffic Simulations of Mannheim

UNIVERSITY OF MANNHEIM
School of Business Informatics and Mathematics

Background

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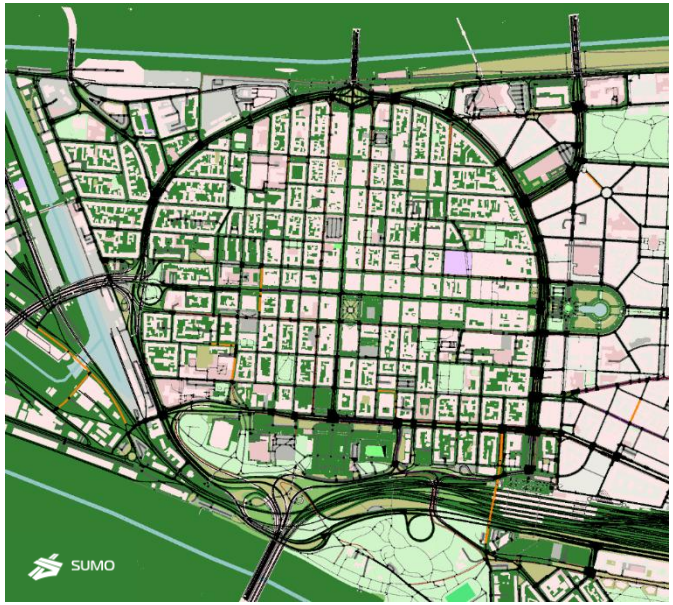
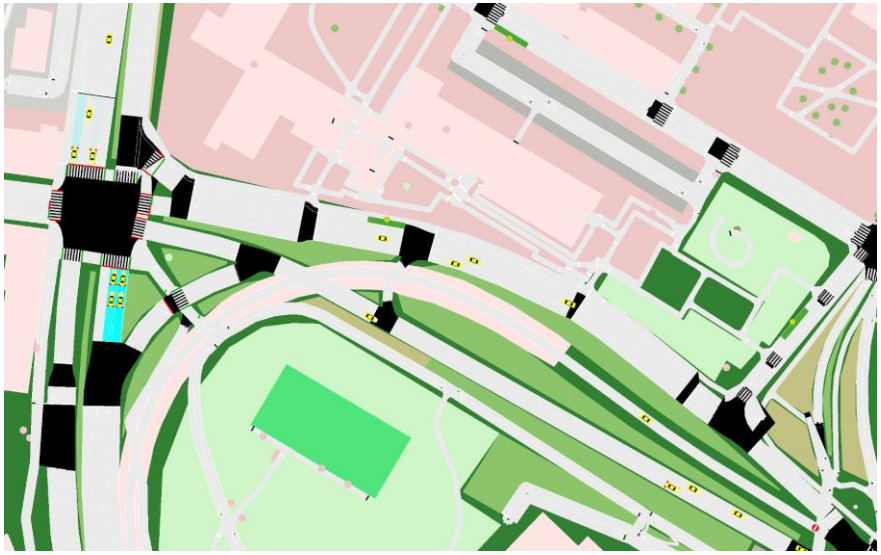
- Urban traffic negatively impacts the environment, public health, and overall quality of life in modern cities.
- Proposed solutions to these problems are often difficult to test in practice
- Traffic simulations allow for testing new approaches in a realistic setting
- **We are developing a traffic simulation of the city of Mannheim using SUMO (Simulation of Urban MObility)**





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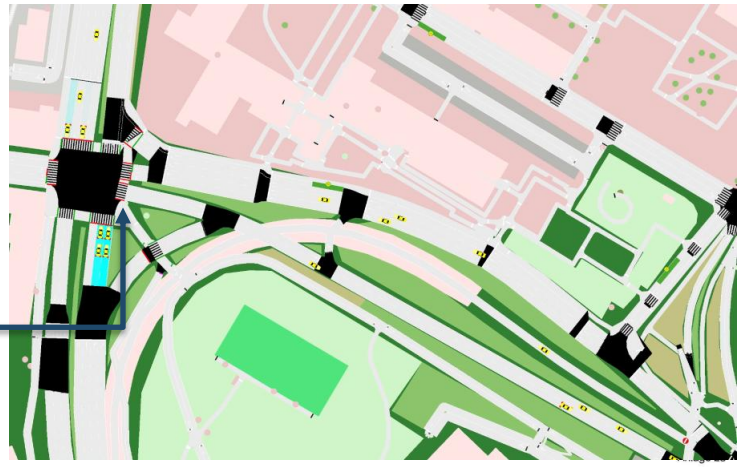
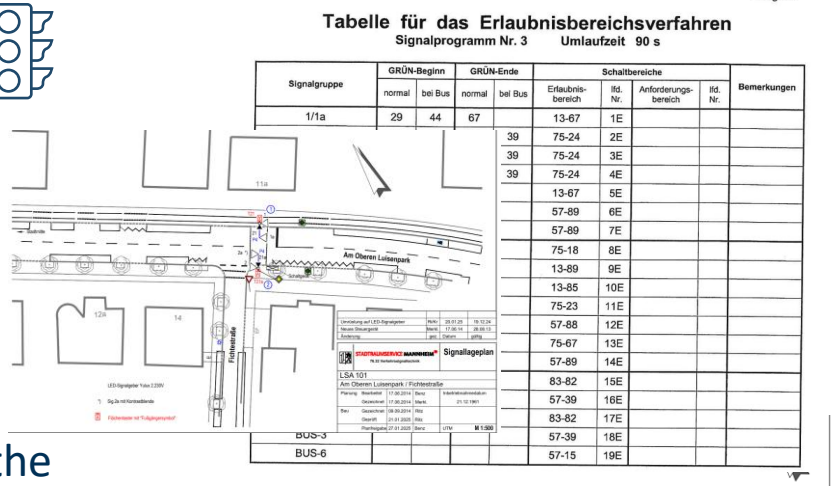
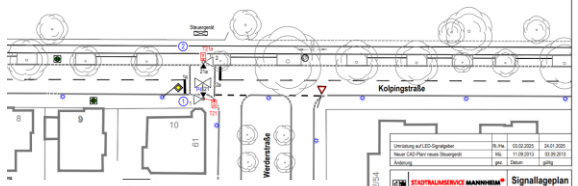
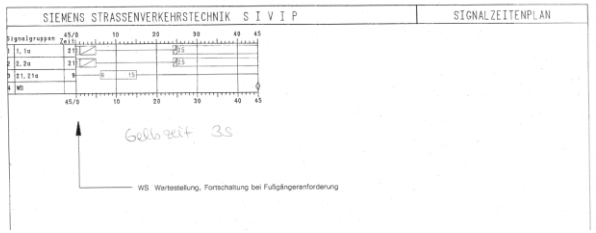


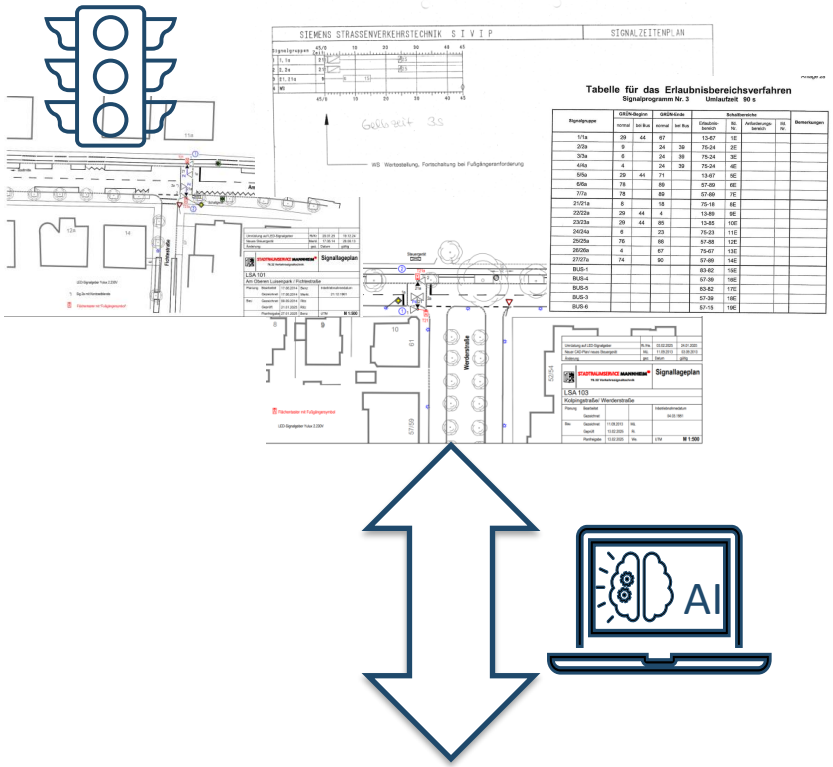
- To make the simulation more realistic, the traffic signal infrastructure needs to be represented accurately in the model.
- The City of Mannheim provides hundreds of traffic signal plans containing important information about signalized intersections, signal phases, movements, timings, and intersection layouts.
- Currently: integrating this information into the SUMO model involves significant manual work.







Project Goals



- Develop a new AI-based workflow which can handle the variety of existing signal plan formats **to automate this manual effort**.
- The system will combine
  - Vision-Language Models (VLMs) for extracting and interpreting information from maps, diagrams, and other visual content,
  - Large Language Models (LLMs) for reasoning and re-solving ambiguities,
  - deterministic Python tools for SUMO network analysis, matching, validation, and XML generation.

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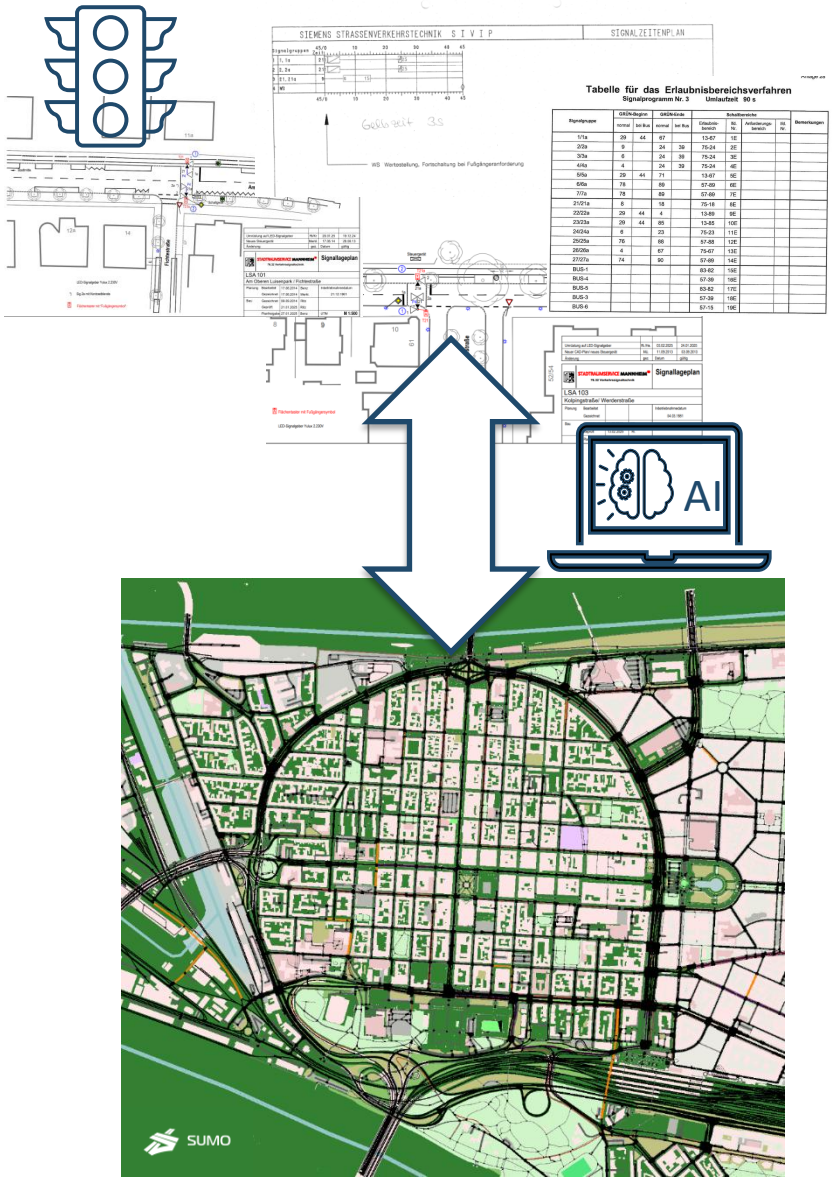

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You will

- … gain hands-on experience with coding, simulations, and applying recent AI models in a **relevant real-world scenario** in the city of Mannheim
- … have liberties to explore different approaches and develop your own ideas

Key Information

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- Project Name: Agentic AI for Automated Integration of Traffic Signal Plans in Traffic Simulations of Mannheim
- Duration: 6 months
- Participant number: 4-6
- Language: English (German if wanted) – **At least 1 person should understand the German traffic signal plans**
- Online (except final presentation)
- Prior knowledge: programming experience (python)
- Open to: MMDS and Business Informatics
- Supervised by Daniel Kerger, Julia Gastinger, Heiner Stuckenschmidt (Chair of AI)
  - With special support from Christian Meilicke

More questions?

- We offer a Q&A session on Monday, Sept 14th, 2-2:30pm, via teams: https://teams.microsoft.com/meet/321257122660313?p=0GWQiTl64plJGqB7AO
- Or: send us an email (julia.gastinger[at]uni-mannheim.de).