

AI-based tutor for driver assistance systems: Development and evaluation of an LLM-supported prototype

Institut Lehrstuhl für Ergonomie 
Typ Bachelorarbeit / Semesterarbeit / Masterarbeit /
Inhalt experimentell / konstruktiv /
Beschreibung **Background:**

Driver assistance systems (e.g. ACC, LKA) are complex and are often misunderstood by users. Previous work has developed static and adaptable tutorials that explain these systems and use quiz questions to test knowledge. The next step is to develop an **AI-based, dialogic tutor** and evaluate it in a driving simulator: An LLM-supported application that makes a personalized learning offer when entering the vehicle or in case of queries and suggests existing tutorial chapters appropriately.

Aims of the work:

- Conception and prototypical implementation of a **moderated bot dialog** that reacts to **prior knowledge, experience and user input**
- Utilization and integration of **existing tutorial and quiz content** (structured preparation)
- Development of a **technology pipeline** for the connection of an LLM (e.g. retrieval augmented generation, rule-based filters, logging)
- Evaluation of the prototype in the form of **functional tests** and possibly initial user studies (e.g. usability, comprehensibility, acceptance)

Possible subtasks:

- Design/further development of a **system architecture** (backend, interfaces, frontend)
- **Connection** to an **LLM** (e.g. ChatGPT API or open source models)
- Implementation of **moderation and retrieval logic** to ensure correct and secure responses
- **Optimization of prompt strategies** for control and quality assurance of LLM outputs (e.g. comparison of different prompts through automated test runs and analysis of the error rate)
- Development of a **dialog front end** (e.g. web UI) and integration into the chair's **driving simulator**
- **Documentation and evaluation** of the prototype

Voraussetzu... Prerequisites:

- Interest in **human-machine interaction, AI applications** and **prototyping**
- **Very good programming skills** (e.g. in JavaScript or Python); experience with APIs, web frameworks and the optimization of prompt strategies; knowledge of web development (frontend/backend) or LLM integration an advantage
- Good analytical skills as well as an **independent** and **structured way of working**
- Degree in **informatics**, media informatics, human factors or a comparable course of study

If you are interested, please send an informal e-mail with a short motivation (3-4 sentences), your CV and a current overview of your grades to verena.i.pongratz@tum.de. I look forward to receiving your application!

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Möglicher B... immediately
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