Lehrstuhl für Fahrzeugtechnik
Fakultät für Maschinenwesen
Technische Universität München

Interdisciplinary Project | Term Project | Master's Thesis

Map-based Predictive Quality of Service for Teleoperation

Motivation:

As the fallback solution of autonomous driving, teleoperation provides the bridging technology for level 4 autonomous driving, [1] which enables the operator to control the vehicle remotely. However, the safe operation highly relies on many key performance indicators (KPIs) of the network connection between the vehicle and the remote operator. Therefore, predictive quality of service (pQoS) provides the possibilities of predicting the network condition and hence allows the teleoperation to adapt to dynamic network condition.

Description:

To predict the imminent changes in network condition, a previously recorded radio map that contains information of the network condition can be used. However, a homogeneous radio map that does not take temporal and context-related features cannot perform well enough for real-world application. Therefore, the main purpose of this project is to investigate the map-based approaches for predictive quality of service with enhanced temporal information and real-time context.

This project can be divided into the following sub-tasks:

- Literature research on the topic map-based pQoS for teleoperation.
- Develop and implement a proof of concept (PoC) for map-based pQoS with the existing software stack for teleoperation.
- Experiment and analyze the performance of the developed PoC.

Requirements:

- General interest in research topics of teleoperation and autonomous driving.
- Basic knowledge of network communication and OSI model [2].
- Programming skills with object-oriented programming (OOP) languages, e.g., Python, C++.
- Self-motivated working style.
- Good English and/or German communication.

Reference:

1. Society of Automotive Engineers (2021) - Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles (J3016_202104)
2. Wikipedia – OSI model

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