Modular and synchronised routing for combined passenger and freight transport with PoDs

Problem description

At the heart of this project are small automated vehicles (pods) that seamlessly transport both passengers and freight. Pods mount on a moving infrastructure. These pods can operate independently or couple into trains (concept referred to as modularity). The end goal is to synchronize pods operating on roads and rail to create a seamless intermodal transportation. In this thesis, we focus on **PoDs4Road**.

Objectives and assignment

This project builds upon existing research on modular vehicle concepts and load consolidation. The objective is to extend the optimization framework by integrating three involved planning levels: the load consolidation phase, routing of pods, and routing of moving infrastructure, within the context of modular fleet management. Simply said, moving infrastructure and pods should be readily available at load pick up points which could be at railway stations or customer locations. The study seeks to create a comprehensive framework that optimizes all three phases simultaneously, considering factors such as demand patterns, vehicle capacities, delivery and pick up time windows, and operational costs. By doing so, the research aims to demonstrate how this integrated framework can lead to increased efficiency, reduced operational costs, and enhanced sustainability in a combined freight and passenger transport. Through scenario analysis and validation, the thesis intends to showcase the practical applicability of this innovative approach, providing valuable insights for enhancing intermodal transportation.

Candidate background

TTE or TIL Students who have knowledge and interest in both passenger and freight transport and have affinity with data analysis and related optimization problems.

Research group

This is a joint work between the Freight and Logistics Lab and Smart Public Transport Lab, Transport & Planning Department

External support

The project is performed in cooperation with the PoDs4Rail European Project.

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