TECHNISCHE UNIVERSITÄT DRESDEN

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How does urban air mobility affect railway systems? An integration model and policy analysis

Problem description

The concept of "flying cars" originated in the early 1900s and has recently re-emerged in public consciousness as urban air mobility (UAM). UAM involves the use of electric vertical take-off and landing (eVTOL) vehicles to provide air transportation services for passengers and goods. These services aim to reduce commuting times for long-distance travel in highly congested areas by utilizing eVTOLs.
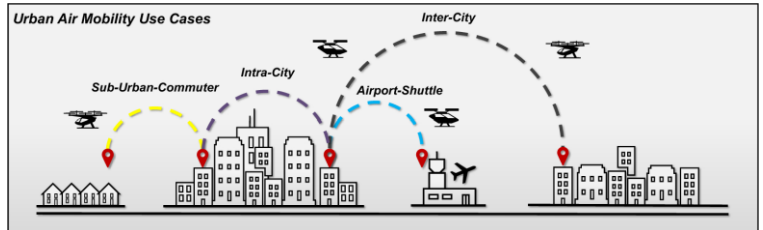

Fig 1: Asmer, L., et al.: Urban air mobility use cases and technology scenarios for the HorizonUAM project. In: AIAA Aviation 2021 Forum (2021)

The emergence of UAM could significantly and complexly impact existing railway passenger flows. On one hand, UAM could compete with long-distance railway routes due to its high speed and comfort. On the other hand, UAM's accessibility is limited by infrastructure constraints. Integrating railway stations with UAM vertiports and using railway systems for access and egress to UAM services have been widely discussed. Understanding the interaction between UAM and railway systems can provide valuable insights for decision-makers regarding infrastructure planning, operational scheduling, and policy regulation.

This project aims to develop an integration model of UAM and railway systems to help decision-makers understand their interactions within an integrated system. The model includes supply and demand components:
*   Supply Modeling: Develop a new network representation for the integrated system and analyze passenger costs within the network. The model is capable of modelling the service supply of UAM and railway separately and the connections between them.
*   Demand Modeling: Propose a passenger assignment model for the integrated network that considers different passenger archetypes. The model takes the origin-destination matrix as input and assigns the passengers to various UAM and railway services.

Assignment
*   Analyze the cost structure and choice behavior of passengers in both UAM and railway systems
*   Develop a network representation and passenger assignment model for the integrated system
*   Investigate current regulation policies for UAM
*   Apply the model in a real-world case study and test multiple scenarios with different supply, demand and regulation policies
*   Write a report/thesis

Background
This topic is suitable for a student work, diploma and MSc thesis.

References
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