

IVT - Seminar

## ***Exchange in transport sciences Switzerland-Japan***

Friday, 05 July 2024

ETH Zurich, Campus Höggerberg HIL F 36.1 13.30-15.30

Program:

13.30 Prof F. Corman, head of IVT

**Welcome and introduction to the Institute for Transport Planning and Systems**

13.35 Prof Fumitaka Kurauchi, Gifu University

**Overview of recent research topics**

13.45 Prof. Hiroe Ando, Assistant Professor at Kumamoto University

**The impact of reserve power sources on vulnerability and restoration from disaster with interdependence of power and road networks**

When a natural disaster damages one infrastructure, interdependencies also affect other infrastructures. On the other hand, other infrastructures are often necessary for the recovery process after a disaster and may complement each other. This study focuses on the interdependence of power and road networks and evaluate the impact of a reserve power sources like electric vehicles or buses. Connectivity evaluation identifies those who cannot reach disaster prevention sites and those who have power outage, and how the situation changes with the deployment and operation of reserve power sources are verified. The restoration process that uses road network to resolve power outage is also considered. The results using actual road and power networks in Kuma Village, Kumamoto Prefecture, which was severely damaged by the rainfall of August 2020, are presented.

14.15 Du Ran, PhD student at Gifu University

**How flexible are travellers under flexible transportation services? - some insights from real-world observations –**

Japan's public transportation faces challenges such as depopulation, low demand, and driver shortages. Flexible transport systems, like demand-responsive services, are increasingly popular in rural areas due to ICT advancements. Despite potential cost savings from efficiency, overall costs remain high. Improving service efficiency requires understanding traveler behavior. Flexible transport systems often use online booking, generating valuable data for analysis. This study examines 9 years of booking data from a mid-sized city in Gifu Prefecture, involving 845 users and 142,638 records. Results show high-frequency travelers dominate vehicle usage, often excluding low-frequency users, emphasizing the need for service designs considering user behavior, spatial, and temporal factors.

14.45 Prof. Satoshi Sugiura, Associate Professor at Hokkaido University

**Urban transit network design using spanning tree: A case study of Canberra transit network**

This study presents a novel approach to optimize transit network design, focusing on minimizing passenger-kilometers under a spanning tree constraint using Origin-Destination data from Canberra's smart card system. The proposed model aims to enhance operational efficiency and service quality. A new algorithm, Link Swapping with Tabu Search, is introduced, outperforming existing heuristic methods. Extensive numerical experiments using Canberra's bus network data demonstrate the algorithm's superiority in computation time and solution quality. The study also identifies major hubs and trunk routes, showing the practical relevance of the proposed method in real-world transit planning.

Organisation:

Prof. F. Corman ([corman@ethz.ch](mailto:corman@ethz.ch))

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The slides will be available after the seminar at <http://www.ivt.ethz.ch>