

## SEMINAR ANNOUNCEMENT

**Thursday July 10, 2025**

**at 10:00 am**

**Room "T023" - Abacus Building (U14)**

Meeting link:

<https://unimib.webex.com/unimib/j.php?MTID=m1732d65e10f7009a3a98e07c1ddf2257>

Meeting number (access code): 2740 169 3745

Meeting password: qFefn3Mf8Q6 (73336363 when dialing from a phone)

### **Tokyo Metro Network Analysis: Integrating Station Attributes and Transfer Connectivity**

#### **Speaker**

**Lin Xi**

PhD candidate at the Department of Advanced Interdisciplinary Studies, Graduate School of Engineering, The University of Tokyo

#### **Abstract**

With growing urbanization and increasing reliance on public transport, understanding the resilience and functionality of metro networks has become critical. This seminar introduces analytical approaches for metro network assessment by redefining various centrality measures to integrate both station attributes, such as passenger volume, and operational factors, such as comprehensive travel time and transfer connectivity. Unlike conventional topological centralities, these weighted metrics provide a more realistic assessment of station importance in the Tokyo Metro network, enabling better identification of critical nodes for network resilience analysis.

The seminar highlights how strength degree, betweenness, and closeness centralities have been extended by incorporating passenger volumes, travel times, and transfer conditions. It also discusses future research directions aimed at exploring relationships between different weighted centralities and various urban factors, including land use, urban morphology, and socioeconomic characteristics. In particular, these refined measures reveal distinct patterns of ridership fluctuations during and after the COVID-19 pandemic, highlighting clear connections between station centrality rankings and recovery at the station level. Furthermore, the presented analytical framework serves as a basis for simulating passenger redistribution scenarios in response to station closures, providing valuable insights into the reliability and robustness of urban transit networks.

#### **Short Bio**

Lin Xi is a PhD candidate at the Department of Advanced Interdisciplinary Studies, Graduate School of Engineering, The University of Tokyo. His research interests lie in traffic flow theory and transportation network analysis. Specifically, he utilizes microscopic discrete dynamic models of traffic flow, such as Cellular Automata models, aimed at simulating and understanding the interactions between vehicles on roadways, as well as between vehicles and infrastructure or pedestrians. Additionally, he employs network science methodologies, integrating topological network theory with the unique characteristics of public transportation systems, to analyze and optimize urban metro networks. Lin Xi's research aims to bridge theoretical traffic models with practical urban transportation applications, seeking to mitigate traffic congestion and develop effective strategies to enhance network efficiency.