The Institute of Transportation and Urban Engineering (IVS) offers a position as
Research Associate (PhD) (m/f/d)

(EG 13 TV-L, full-time, fixed-term for 3 years, with possible extension)

We are seeking a highly motivated researcher to contribute to the DFG-funded research project SEED – A Single-Source Approach for the Endogenous Estimation and Calibration of Travel Demand Models. The project is a collaborative effort between Technische Universität Braunschweig and Universität Stuttgart, combining expertise in transport modelling, traffic simulation, and data-driven mobility analysis.

The goal of SEED is to develop and evaluate an innovative methodology for estimating travel demand based entirely on floating car data (FCD). Unlike conventional travel demand models, which rely on costly and infrequent travel surveys, SEED explores the potential of using movement data from vehicles as a single, consistent data source. These data, often referred to as probe vehicle data, are collected from GPS-equipped vehicles and provide spatial and temporal trajectories that reflect actual driving behavior in the network. This approach enables the endogenous estimation of origin-destination (OD) flows directly from FCD, meaning that the travel demand is inferred from the traffic itself rather than being imposed from external data sources such as surveys. In other words, the OD matrix is derived from observed movement patterns, namely trajectories of probe vehicles, without requiring prior behavioral assumptions. These endogenously estimated OD flows can then serve both as a model input and as an independent reference for calibrating and validating macroscopic or agent-based travel demand models.

The research addresses fundamental methodological challenges, such as the derivation of reliable traffic volumes from movement data, the integration of observed route choice behavior into OD matrix estimation, and the use of this information to improve the accuracy and robustness of travel demand models. The project combines empirical data collection in a real-world urban network with simulation-based experiments to test and validate the proposed methods.

Your Tasks

- Contribute to the SEED research project by developing and applying innovative approaches for data-driven travel demand estimation and model calibration
- Analyze and process large-scale movement data to derive traffic-relevant indicators such as route choice, travel times, and traffic volumes
- Explore and implement methodological approaches for the estimation of OD matrices using single source movement data (FCD)
- Support the calibration and validation of travel demand models by integrating results from data-driven analyses
- Collaborate with academic and non-academic project partners and contribute to interdisciplinary exchange
- Support teaching and supervision of student projects

Experience in one or more of these research areas is an advantage.

Your Qualifications

- Completed university degree (Master's or Diploma) in traffic engineering, urban planning, computer science, data science or related disciplines
- Programming skills in Python and/or other comparable programming languages relevant to data processing or simulation
- Very good knowledge of English is required; knowledge of German is desirable
- Strong interest in mobility data analysis, travel demand estimation, and data-driven transport research
- Familiarity with methods for estimating origin-destination matrices, such as entropy maximization or information minimization (e.g., after Van Zuylen & Willumsen), is an advantage
- Knowledge of transport models or traffic analysis tools (e.g., OD matrix estimation frameworks, GIS-based traffic analysis, or network assignment models) is beneficial but not mandatory
- Ability to work independently and as part of a collaborative team
- Experience in research, methodological knowledge and passion for scientific writing
- Interest in pursuing a PhD in the fields of FCD analysis, OD matrix estimation, and data-driven calibration of travel demand models

We Offer

- A research position in an interdisciplinary and internationally networked project
- Flexible work hours and remote work options
- Excellent academic supervision and support for your PhD
- Access to real-world traffic datasets and a strong research infrastructure
- Opportunities for professional development and training programs
- Support for active participation in national and international scientific conferences

About Technische Universität Braunschweig and the Institute of Transportation and Urban Engineering

TU Braunschweig is the academic center in the middle of one of the most active research regions in Europe and has a renowned Faculty of Architecture, Engineering and Environmental Sciences. We work successfully with over 20 research institutions in our neighborhood as well as with our international partner universities. Our university's core research areas are mobility, engineering for health, future city and metrology. TU Braunschweig is part of TU9 - the association of Germany's leading Institutes of Technology. The cooperating institutes stand for relevant research, strategic and results-driven thinking and action, committed teaching and successful transfer of knowledge and technologies to society and industry.

The IVS is a small, research-oriented institute with a strong focus on integrated transport planning, traffic engineering, and sustainable mobility. Our size fosters a collaborative and supportive environment with close interaction between students, researchers, and faculty. IVS offers a practice-based curriculum in areas such as traffic simulation, public transport planning, mobility data analysis, and street space design. In research, the institute develops data-driven methods for traffic analysis, travel demand forecasting, and the simulation of innovative mobility solutions, with a particular emphasis on agent-based models and the use of floating car data. Close cooperation with cities, public authorities, and industry ensures both practical relevance and real-world impact.

Further Notes

We welcome applicants of all nationalities. At the same time, we welcome the interest of severely disabled people and give preference to their applications if they are equally qualified. Please indicate this in your application and enclose proof. Furthermore, we are working to fulfill the equality mandate based on the Lower Saxony Equal Opportunities Act (NGG) and are striving to reduce underrepresentation as defined by the NGG in all areas and positions. We are therefore particularly pleased to receive applications from women.

As part of your application, please submit a short proposal (1–3 pages, plus references) outlining a research idea, or potential publication topic related to the goals of the SEED project. This could include, for example, a conceptual approach for estimating an OD matrix from FCD, the integration of route choice proportions, or a novel idea for improving estimation accuracy using data-driven techniques. The application deadline is mid-August 2025, with interviews scheduled for September 2025. The expected start date is October, 2025.

The personal data will be stored for the purpose of processing the application. By submitting your application, you agree that your data may be stored and processed electronically for application purposes in compliance with data protection regulations. Further information on data protection can be found in our privacy policy at www.tu-braunschweig.de/datenschutzerklaerung-bewerbungen. Application expenses cannot be refunded.

Please send your complete application as a single PDF file to:

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We look forward to your application!