Technische Universität Braunschweig

Institut für Verkehr und Stadtbauwesen
Prof. Dr.-Ing. Bernhard Friedrich

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 2 years, with possible extension)

We are seeking a highly motivated researcher to contribute to a new interdisciplinary research project focused on designing and evaluating future mobility solutions in rural and peri-urban areas. The project investigates how flexible, shared, and potentially automated transport services such as demand-responsive transport (DRT) can complement and extend existing public transport to offer reliable, inclusive, and sustainable mobility options in low-density regions. To systematically explore and test these concepts, the project uses an agent-based simulation framework (MATSim) that captures individual travel behavior, system operations, and network interactions in a realistic spatial context. The research aims not only to simulate isolated innovations but to examine transformative pathways toward integrated rural mobility systems. This includes assessing how DRT services can be coordinated with existing bus networks, how they can be scaled and automated over time, and what infrastructure or policy conditions are required to ensure successful implementation. The agent-based approach allows for a detailed exploration of realistic transition scenarios, enabling evidence-based recommendations for sustainable and inclusive mobility transformations in structurally weak regions.

The project examines how DRT services, possibly operated with automated vehicles, can be designed, simulated, and evaluated as part of an integrated rural transport system. Key questions include how such services should be spatially and temporally configured, how they interact with existing bus systems, and how settlement structure and user needs influence system efficiency and accessibility. To explore these questions, the project develops and applies an agent-based simulation framework. The simulation is used to evaluate service configurations, coordination strategies, and infrastructure requirements. Scenarios will assess impacts on accessibility, equity, efficiency, and environmental performance across different settlement types and user groups. The IVS leads the development of the simulation framework, the design and execution of mobility scenarios, and the evaluation of policy-relevant indicators to support planning decisions for future-ready rural mobility systems.

Your Tasks

- Contribute to the development of an agent-based simulation framework (MATSim) for future rural mobility scenarios
- Design and implement new and innovative strategies including automated vehicle operation, and evaluate their integration into existing public transport networks
- Analyze spatial and behavioral aspects of mobility in rural areas using empirical data and geospatial indicators
- Quantify impacts on accessibility, equity, environmental performance, and system efficiency
- Collaborate with interdisciplinary academic partners and engage with stakeholders from planning practice and policy
- 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 Java and/or Python
- Experience in traffic or transport simulation, ideally with agent-based models such as MATSim
- Knowledge of rural mobility challenges, shared mobility concepts, and public transport planning is desirable
- Familiarity with geospatial data analysis (e.g. GIS) and performance evaluation methods is an advantage
- Very good knowledge of English is required; knowledge of German is desirable
- Strong analytical skills and the ability to work independently and in a team
- Experience in research, methodological knowledge and passion for scientific writing
- Interest in pursuing a PhD in the fields of agent-based transport modelling, DRT, and integrated rural mobility systems

We Offer

- A position in a forward-thinking research environment at the interface of simulation, planning, and mobility innovation
- Flexible work hours and remote work options
- Excellent academic supervision and support for your PhD
- Access to advanced modelling tools, mobility data, and interdisciplinary collaboration
- Opportunities for professional development and training programs
- Support for active participation in national and international scientific conferences
- Contribution to a relevant societal challenge: the development of equitable and sustainable mobility in rural areas within a practice-oriented research project

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 to 3 pages, plus references) outlining a research idea or potential publication topic related to the goals of the project. This could include, for example, a simulation-based approach to assess the integration of DRT into rural public transport, an evaluation framework for the spatial and social impacts of automated shared mobility, or the development of strategies for coordinating on-demand services with existing bus networks. The application deadline is August 2025, with interviews scheduled for end-September 2025. The expected start date is December, 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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https://www.tu-braunschweig.de/en/ivs

We look forward to your application!