Technische Universität Dresden - "Friedrich List" Faculty of Transport and Traffic Sciences, Institute of Transport Planning and Road Traffic, Chair of Transport Modelling and Simulation

TECHNISCHE UNIVERSITÄT DRESDEN

The Chair of Transport Modelling and Simulation at TUD Dresden University of Technology is investigating models, algorithms and simulations to achieve an enhanced scientific understanding of transport systems spanning microscopic, mesoscopic and macroscopic levels. Of particular focus will be automated planning methods that leverage emerging data and novel metrics that embed ethics-based concepts including equity and fairness within mobility systems. This position will be closely involved in developing and implementing the new methodologies thereby helping to create more equitable and efficient transport outcomes for society. For TUD diversity is an essential feature and a quality criterion of an excellent university. Accordingly, we welcome all applicants who would like to commit themselves, their achievements and productivity to the success of the whole institution.

Research Associate / PhD Student (m/f/x)

At the "Friedrich List" Faculty of Transport and Traffic Sciences, Institute of Transport Planning and Road Traffic, the Chair of Transport Modelling and Simulation is seeking an excellent and highly motivated Research Associate / PhD Student (m/f/x) (subject to personal qualification employees are remunerated according to salary group E 13 TV-L) for our DFG-funded EJMobility project, starting as soon as possible. The position is limited to three years. The period of employment is governed by the Fixed Term Research Contracts Act (Wissenschaftszeitvertragsgesetz - WissZeitVG). The position offers the chance to obtain further academic qualification (usually PhD). Project description: Pursuing equity and justice in transportation systems is a fundamental aspect of building inclusive and sustainable cities. However, in many cities, disparities in transportation access and its urban impacts persist, reflecting deep-rooted inequalities. Complexity arises in defining transport equity, as the choice of distributive principle significantly influences its measurement and outcomes. Therefore, it is still challenging for policymakers to practically evaluate and compare different equity case definitions due to the lack of suitable tools that can universally model transport equity. EJMobility aim is to develop methods that can (i) measure, (ii) optimize, and (iii) evaluate fairness in transport under different facets of environmental justice. We develop a novel bi-level formulation that integrates the concepts of Environmental Justice (EJ) and Environmental Justice over Time (EJoT) into a unified framework for network design and resource pricing. By incorporating these vital elements into the transportation planning process, we strive to create a more inclusive, efficient, and equitable system that caters to the needs of diverse populations and regions.

City: Dresden; Starting date (earliest): At the earliest possible; Duration: limited to three years; Remuneration: subject to personal qualification employees are remunerated according to salary group E 13 TV-L; Closing date: 30/04/25

Working field

• investigate and formalize critical equity cases in transportation systems using datasets

(e.g., POI, population, travel time) to quantify environmental justice (EJ) metrics and integrate them into network design frameworks
• formulate novel optimization models for combined network design and resource pricing, incorporating fairness for different transport aspects (e.g., accessibility, emissions, safety)
• employ state-of-the-art metaheuristic algorithms (e.g., genetic algorithms, simulated annealing) to solve large-scale EJ-integrated optimization problems, supplemented by exact methods (e.g., MILP solvers) for benchmarking small-scale scenarios
• perform sensitivity analyses to assess how network structures, pricing schemes, and EJ parameters influence equity outcomes for protected groups
• participate in and/or present at conferences and/or workshops relevant to the project as required
• assist with the project-related supervision of research students in the research area where required

Requirements

• have a university degree in a relevant field, e.g., transportation engineering, mathematics, computer science
• are passionate about transportation research with a good grasp on the fundamentals of transportation systems optimization
• possess excellent research, academic writing, and analytical skills
• have a strong programming background with experience in using Python, C/C++, and/or Java, etc.
• strong interpersonal skills with demonstrated ability to communicate (written and oral in English) and interact with a diverse range of stakeholders and students

Application

TUD strives to employ more women in academia and research. We therefore expressly encourage women to apply. The University is a certified family-friendly university. We welcome applications from candidates with disabilities. If multiple candidates prove to be equally qualified, those with disabilities or with equivalent status pursuant to the German Social Code IX (SGB IX) will receive priority for employment.

Please submit your comprehensive application including the usual documents by April 30, 2025 (stamped arrival date of the university central mail service or the time stamp on the email server of TUD applies), preferably via the TUD SecureMail Portal https://securemail.tu-dresden.de by sending it as a single pdf file to katrin.gloeckner@tu-dresden.de or to: TU Dresden, Fakultät Verkehrswissenschaften “Friedrich List”, Institut für Verkehrsplanung und Straßenverkehr, Professur für Transport Modelling and Simulation, Herrn Prof. Travis Waller, Helmholtzstr. 10, 01069 Dresden, Germany. Please submit copies only, as your application will not be returned to you. Expenses incurred in attending interviews cannot be reimbursed.

Reference to data protection: Your data protection rights, the purpose for which your data will be processed, as well as further information about data protection is available to you on the website: https://tu-dresden.de/karriere/datenschutzhinweis.