DR. ARSLAN ALI SYED

Research Scientist | Transportation Systems, Optimization & Simulation

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SUMMARY

Research scientist with a Ph.D. in Transportation Engineering and an M.Sc. in Computational Science and Engineering from the Technical University of Munich (TUM). Experienced in optimization, multi-agent simulation, machine learning, and control, with applications in transportation systems. Previous experience includes academic and industrial research at TUM, BMW, and Infineon Technologies. Research interests include modelling of complex transportation systems, multi-agent systems, self-adaptive digital twins, and reinforcement learning.

KEY ACHIEVEMENTS

Patents

Inventor on six published BMW patent applications related to mobility optimization

Research Publications

5 journal and 12 conference papers
Google Scholar h-Index of 8

Research Software

Founding developer of FleetPy, used in 10+ TUM research projects

Experience

Technical University of Munich

Munich, Germany

Postdoctoral Researcher (02/2024 - 10/2025) | Research Associate (upto 02/2024) 02/2021 - 10/2025

- **Group Leader, "Test Fields and Simulators"**: coordinated research activities of PhD researchers working on simulation platforms and digital twins.
- **Founding co-developer and contributor to FleetPy**, an open-source simulation framework for mobility-on-demand systems and associated optimization problems. It has been used in more than ten research projects at TUM.
- **Developed demand forecasting, fleet repositioning, and assignment methods for mobility-on-demand systems**.
- **Developed algorithms to control** coordinated movement of Connected Autonomous Vehicles in Lane-Free Traffic.
- **Conducted and coordinated research activities in two projects and contributed to the writing of research proposals.**
- **Contributed to the teaching of MSc courses:** Traffic Control Basics and Object Oriented Programming for Transportation Engineers
- **Guided the tender-based procurement of a €220K driving simulator** to support research on human driving behaviour.
- **Supervised 10 M.Sc. theses** on a range of simulation and optimization topics.

Mobility Services, BMW Group

Munich, Germany

Research Associate 04/2017 - 12/2020

- **Built fleet management algorithms** using both traditional optimization and machine-learning-based methods. Published 4 research papers on the topic.
- **Inventor on six published BMW patents related to optimization in mobility services.**

Infineon Technologies

Neubiberg, Germany

Analog Circuit Simulator Developer - Working Student 10/2015 - 01/2017

- Optimized analog device models in Verilog-AMS.
- Developed a fast quasi-Newton method, providing a high-performance algorithm for large-scale simulations.

Technical University of Munich

Garching, Germany

Working Student 06/2015 - 02/2016

- Implementation of a high-speed communication system for surgical instruments

Shaheen Air International

Karachi, Pakistan

Trainee Aircraft Engineer 11/2012 - 08/2014

- Managed necessary software setup for the health monitoring of aircrafts

Education

Technical University of Munich
Munich, Germany

Doctor of Engineering (Dr.-Ing.)
04/2017 - 02/2024

- Dissertation Title: **Optimization of Autonomous Mobility on Demand Services based on Spatio-Temporal Relations.**
- Research Areas: Optimization, Agent-based Simulation, Demand Forecasts, Machine Learning and Mobility Services.

Technical University of Munich
Munich, Germany

Master of Science (M.Sc.) in Computational Sciences and Engineering
10/2014 - 11/2016

- Software Architecture, High-Performance Computing, Algorithms in Scientific Computing, Parallel Programing

National University of Sciences and Technology (NUST)
Islamabad, Pakistan

Bachelor of Engineering (B.E.) in Avionics Engineering
08/2008 - 09/2012

- Core Area of Study: Electronics Engineering
- Award: Received the Best Final Year Project Award

SKILLS

Programming: Python · C/C++ · Java · Parallel Programming

ML / Simulation: Ray RLlib · SUMO · FleetPy · Aimsun Next · MATLAB

Optimization / Data: CPLEX · Gurobi · SQL

Development: Git · GitLab · PyCharm · Visual Studio

Language: English (C2-Fluent) · German (B2-Working Proficiency) · Arabic (A2-Basic) · Urdu (Native)

SELECTED PUBLICATIONS

Syed, Arslan Ali, Majid Rostami-Shahrbabaki, and Klaus Bogenberger. "**Can human drivers and connected autonomous vehicles co-exist in lane-free traffic? A microscopic simulation perspective.**" *Transportation Research Part C: Emerging Technologies* 180 (2025): 105315.

Syed, Arslan Ali, Florian Dandl, Bernd Kaltenhäuser, and Klaus Bogenberger. "**Density based distribution model for repositioning strategies of ride hailing services.**" *Frontiers in Future Transportation* 2 (2021): 681451.

Syed, Arslan Ali, Irina Gaponova, and Klaus Bogenberger. "**Neural network-based metaheuristic parameterization with application to the vehicle matching problem in ride-hailing services.**" *Transportation Research Record* 2673.10 (2019): 311-320.

Engelhardt, Roman, Florian Dandl, Arslan Ali Syed, Chenhao Ding, Santiago Alvarez-Ossorio Martinez, Yunfei Zhang, Hoda Hamdy, Joel Brodersen, Zhipu Chen, and Klaus Bogenberger. "**FleetPy: an open source simulator for reproducible research on mobility-on-demand services.**" *European Transport Research Review* 18, no. 1 (2026): 52.

Syed, Arslan Ali, Karim Akhnoukh, Bernd Kaltenhaeuser, and Klaus Bogenberger. "**Neural network based large neighborhood search algorithm for ride hailing services.**" In *EPIA Conference on Artificial Intelligence*, pp. 584-595. Cham: Springer International Publishing, 2019.