

DR AFZAL AHMED

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RESEARCH INTERESTS

- Sustainable Urban Transport
- Traffic Flow Modelling
- Real-time Traffic State Estimation
- Dynamic Traffic Assignment
- Advanced Traveller Information Systems (ATIS)
- Adaptive Traffic Control Systems

EDUCATION

2011-2015	PhD in Transport Studies (Institute for Transport Studies, University of Leeds, United Kingdom)
2008-2009	MS in Civil Engineering (University of Mississippi, Mississippi, United States)
2003-2007	BE in Urban Engineering (NED University of Engineering & Technology, Karachi, Pakistan)

PROFESSIONAL EXPERIENCE

Jan 2022-to date	Associate Professor , Department of Urban & Infrastructure Engineering, NED University of Engineering & Technology, Karachi, Pakistan.
Sep 2019-to date	Director , Advanced Traffic Lab for Analytics & Simulation, NED University of Engineering & Technology, Karachi, Pakistan.
Jun 2015-Dec 2021	Assistant Professor , Department of Urban & Infrastructure Engineering, NED University of Engineering & Technology, Karachi, Pakistan.
Aug 2009-Jul 2011	Lecturer , Department of Urban & Infrastructure Engineering, NED University of Engineering & Technology, Karachi, Pakistan.
Jan 2008-Jul 2009	Research Assistant , Department of Civil Engineering, University of Mississippi, United States.
Jan 2007- Dec 2008	Research Assistant , Road Traffic Injury Research & Prevention Center, Jinnah Postgraduate Medical Center, Karachi, Pakistan.

PUBLICATIONS

1. **Ahmed, A.**, SM Noman, D Ngoduy, M Adnan, A Qadir, A Ismail, MAU Baig. 2022. Estimating Passenger Car Equivalent Factors for Heterogeneous Traffic Using Occupancy Density Linear Regression Model. **Transportation Research Record** (Accepted for publication).
2. Ali S, Siddiqui MO, **Ahmed A**, Iqbal K, Noorani MU, Sun D, Iqbal W. 2022. Performance evaluation of hot mix asphalt using textile waste. **Industria Textilă** (Accepted for publication).
3. **Ahmed, A.**, Ngoduy, D., Adnan, M. and Baig, M.A.U., 2021. On the fundamental diagram and driving behavior modeling of heterogeneous traffic flow using UAV-based data. **Transportation Research Part A: Policy and Practice**, 148, pp.100-115.
4. MU Farooq, **A Ahmed**, SM Khan, MB Nawaz, 2021. Estimation of Traffic Occupancy using Image Segmentation. **Engineering, Technology & Applied Science Research** 11 (4), 7291-7295.
5. M S Rahman, **A Ahmed**, P Timms, I Anwer, F Khan. 2021. Examining the Impacts of Restrictions Due to COVID-19 on Mobility of Elderly and Physically Challenged People in Megacities of Pakistan. Proceedings of 2021 EASTS Conference Hiroshima, Japan.
6. SU Khan, **A Ahmed**, S Ali, A Ayub, S Ahmed, MA Shahid (2020). Use of Scrapped Rubber Tires for Sustainable Construction of Manhole Covers. **Journal of Renewable Materials**.
7. Rizvi, S.M.A., **Ahmed, A.** and Shen, Y., 2020. Real-Time Incident Detection and Capacity Estimation Using Loop Detector Data. **Journal of Advanced Transportation**.
8. **Ahmed, A.**, Zaidi, S.O.R., Ali, M. S. (2020). Modelling Behaviour of Shuttle Service Users and Preference towards a Proposed Bus Rapid. **European Transport**. Issue 79, Paper n° 6.
9. **Ahmed, A.**, Outay, F., Zaidi, S. O. R., Adnan, M., & Ngoduy, D. (2020). Examining queue-jumping phenomenon in heterogeneous traffic stream at signalized intersection using UAV-based data. **Personal and Ubiquitous Computing**, 1-16.
10. Noman, S. M., **Ahmed, A.**, & Ali, M. S. (2020). Comparative analysis of public transport modes available in Karachi, Pakistan. **SN Applied Sciences**, 2, 1-13.
11. **Ahmed, A.**, Ali, M. S., Ansari, T., & Mansoor, U. (2020). Modelling Heterogeneous and Undisciplined Traffic Flow using Cell Transmission Model. **Journal of Traffic and Transportation Management**, 1(1), 01-05.
12. Abbas, M., **Ahmed, A.**, Ali, M. S., Ngoduy, D., (2020) "Modelling the Effect of Length of Weaving Sections on Traffic Conditions at Unconventional U-Turns" Presented at the 99th Annual Meeting of Transportation Research Board, 12-16 January 2020. Washington DC, USA.
13. **Ahmed, A.**, Mehdi, M. R., Ngoduy, D., & Abbas, M. (2019). Evaluation of accuracy of advanced traveler information and commuter behaviour in a developing country. **Travel Behaviour and Society**, 15, 63-73.
14. **Ahmed, A.**, Naqvi, A., Ngoduy, D., Watling, D (2019). "Real-Time Dynamic Traffic Control Based on Traffic State Estimation" **Transportation Research Record**, 2673(5), 584-595.

15. **Ahmed, A.** Ukkusuri, S., Mirza, S. R., Jafri, A (2019). "Width-based Cell Transmission Model (WCTM) for Heterogeneous and Undisciplined Traffic Streams" **Transportation Research Record**, 2673(5), 682-692.
16. **Ahmed, A.**, Mehdi, M. R., Abbas, M & Fatima, T (2019). "Evaluation of Existing Performance and Potential for Optimization of Traffic Signals in Karachi." **Arabian Journal for Science & Engineering**.
17. **Ahmed, A.**, Abbas, M., Fatima, T., "Optimization and Synchronization of Traffic Signals for Selected Corridor in Karachi". 9th International Civil Engineering Congress (ICEC-2017), 22-23 December 2017. Karachi, Pakistan.
18. **Ahmed, A.**, Zaidi, S. O., & Awan, P., 2017. Mode choice modelling using stated preference surveys to estimate demand for proposed mass transit lines. 5th International Conference on Infrastructure Engineering in Developing Countries (IEDC-2017), 14-15 July, 2017, Karachi, Pakistan.
19. Ali, O., **Ahmed, A.**, Ali, M. S., & Naqvi, A., 2017. Calibration of cell transmission model for heterogeneous traffic. 5th International Conference on Infrastructure Engineering in Developing Countries (IEDC-2017), 14-15 July, 2017, Karachi, Pakistan.
20. **Ahmed, A.**, Ngoduy, D., & Watling, D., 2016. Prediction of traveller information and route choice based on real-time estimated traffic state. **Transportmetrica B: Transport Dynamics**, 4(1), 23-47.
21. Ali, M. S., Nisa, K., **Ahmed, A.**, 2016. Estimation of GHG Emissions from Diesel-based Freight Transport, Proceeding of 8th International Civil Engineering Congress (ICEC-2016), 23-24 December 2016, Karachi, Pakistan.
22. **Ahmed, A.**, 2015. "Integration of Real-time Traffic State Estimation and Dynamic Traffic Assignment with Applications to Advanced Traveller Information Systems." Ph.D. Thesis. Institute for Transport Studies, University of Leeds, Leeds, United Kingdom.
23. **Ahmed, A.**, Watling, D., & Ngoduy, D. 2014. Modelling day-to-day travellers' route choice and level of trust in traveller information using real-time estimated traffic state. Croucher Foundation ASI workshop: Toward a New Generation of Dynamic Network Models, 18-20 November 2014, Hong Kong University of Science & Technology, Hong Kong.
24. **Ahmed, A.**, Watling, D., & Ngoduy, D. 2014. Day-to-day variation in level of trust in advanced traveller information and the impact of improved methods for estimating traffic states. 3rd Symposium of the European Association for Research in Transportation, 10-12 September 2014, Leeds, United Kingdom.
25. **Ahmed, A.**, D. Watling, D. Ngoduy, 2014. "Modelling day-to-day travellers' route choice using real-time estimated traffic state with time-varying traffic demand" 5th International Symposium on Dynamic Traffic Assignment, June 17 – 19, 2014, Salerno, Italy.
26. **Ahmed, A.**, Ngoduy, D. & Watling, D. 2014. Real-time urban traffic management based on estimated traffic state. Universities Transport Study Group Conference, 5-7 January 2014, Newcastle, United Kingdom.
27. **Ahmed, A.**, Watling, D., & Ngoduy, D. 2014. Significance of Sensor Location in Real-time Traffic State Estimation. *Procedia Engineering*, 77, 114-122.
28. Uddin, W., **Ahmed, A.**, & Ali, M. S. 2013. Satellite Imagery Applications of Urban Road Inventory, Traffic Flow Attributes, and Road Capacity Assessment.

International Journal of Recent Development in Engineering and Technology
(ISSN 2347-6435(Online) Volume 1, Issue 3.

29. Kumar, R., M.S. Ali, **Ahmed, A.** 2010. "An appraisal of signal-free corridor in Karachi via empirical study of road accidents and pedestrian movement concerning road crossing" conference proceedings, First International Conference on Sustainable Transportation & Traffic Management. Karachi, Pakistan.
30. Ali, M.S., **Ahmed, A.** 2009. "Development and Analysis of GIS-based Road Traffic Injury Database for Karachi, Pakistan." Conference Proceedings, 14th HKSTS international conference. Hong Kong.
31. **Ahmed, A.** 2009. "Geospatial Analysis of Satellite Imagery for Mapping Road Inventory and Traffic Flow Attributes." MS Thesis. Department of Civil Engineering, University of Mississippi. August 2009. Mississippi, USA.

SCHOLARSHIPS AND AWARDS

1. **Best Published Researcher Award for the Year 2019 by NED Alumni Association of Southern California (NEDAASC)**
2. **Best Researcher Award of NED University for the Year 2020**
3. **Best Researcher Award of NED University for the Year 2019**
4. Fully-funded scholarship for pursuing PhD studies at the University of Leeds, UK from NED University of Engineering and Technology for **3 years and 10 months** amounting up to **GBP 70,000.** (August 2011-June 2015)
5. Fully funded MS in Civil Engineering through Graduate Research Assistantship from Department of Civil Engineering, the University of Mississippi to perform assigned research duties on USAID-Pak research project for 2 years with total funding amounting to **\$45,072.** (January 2008-August 2009)
6. Partial Fee-waiver towards the fee of PhD studies from Institute for Transport Studies, the University of Leeds under Tony May Scholarship amounting up to **GBP 12,000** (GBP 4000 for each year in study period-August 2011-July 2014)
7. Funding from The Croucher Foundation for the presentation of research work at the workshop organized by Advanced Study Institute, The Hong Kong University of Science and Technology. (**GBP 1500- November 2014**)
8. Institute for Transport Studies, University of Leeds fund to attend a one-week short course in Crete, Greece and present research work in an international conference in Salerno, Italy. (**GBP 2500**)

FUNDED PROJECTS

1. **Co-PI** in Research Project Funded by The Road Traffic Injuries Research Network (RTIRN) with title "Design and implementation of a Video-based School children road injury prevention tool (V-SCRIPT) in Karachi: A quasi experimental study" **EURO 5000 (2021-22)**
2. Advanced Traffic Lab for Analytics & Simulation (ATLAS) has been granted as the founding director under National Centre for Big Data Cloud Computing (NCBC) by Higher Education Commission of Pakistan and Ministry of Planning & Development, Government of Pakistan. The lab will be undertaking research and development in traffic flow modelling, simulation, and optimization of transportation network performance. The approved budget for 3-years is **PKR 16.2 Million** (around **\$115,000**).

3. Co-PI in Project funded by PAKSTRAN & UNDP-Pakistan with the title “STUDY ON THE ASSESSMENT OF CO₂ EMISSIONS FROM TRUCK FREIGHT TRANSPORT IN A BUSINESS-AS-USUAL SCENARIO” with total funding of \$ 26,000. (2015-16).

REVIEWING OF SCIENTIFIC PAPERS

1. Transportation Research Part-A
2. Journal of Advanced Transportation
3. Transportation Research Record
4. 97th Transportation Research Board’s Annual Meeting in 2018, Washington DC, USA
5. 98th Transportation Research Board’s Annual Meeting in 2019, Washington DC, USA
6. 99th Transportation Research Board’s Annual Meeting in 2020, Washington DC, USA
7. EGWT2015 Conference
8. Mathematical Problems in Engineering
9. Journal of Traffic and Transportation Management

RESEARCH SUPERVISION

PhD

Supervising PhD candidate Mirza Asad Ullah Baig.

Thesis for Masters in Transportation Engineering

- i. Supervised MS research student Mr. Muhammad Faiq Ahmed on “Performance Evaluation of Link Transmission Model for Heterogeneous Traffic” (2021).
- ii. Supervised MS research student Mr Farhan Ali on “Modelling the Effect of Traffic Mix on Road Capacity”. (2021)
- iii. Supervised MS research student Mr Muhammad Hassan on “Estimation of PCE values for heterogeneous traffic”. (2020)
- iv. Supervised MS research student Ms Ofaq Zaidi’s research on “Modeling Heterogeneous Traffic at Signalized Intersections” (2020).
- v. Supervised MS Research Thesis by Engr. Bilal Nawaz on “Development of Real-time Traffic Measurement System for Heterogeneous Traffic of Karachi” (2017)
- vi. Supervised MS Research Thesis by Engr. Ahsan Ali on “Traffic signal optimization based on real-time traffic estimate” (2016).
- vii. Supervised MS Research Thesis by Engr. Osama Ali on “Calibration of cell transmission model for heterogeneous traffic” (2016).

UNDERGRADUATE DESIGN PROJECTS

I have supervised more than 50 undergraduate Final Year Projects.

TEACHING EXPERIENCE

1. NED University of Engineering & Technology

Currently, I am working as Assistant Professor in Urban & Infrastructure Engineering Department of NED University of Engineering & Technology, Karachi, Pakistan. I have taught the following undergraduate courses to the students of Civil Engineering and Urban Engineering:

- Urban Mass Transportation (UE-413)
- Planning and Design of Transportation Systems (UE-213)
- Traffic Engineering and Management (UE-316)
- Transportation Engineering-I (CE-312)
- Computing Tools and Applications (UE-114)
- Engineering Surveying-I (UE-113)
- Engineering Surveying-II (UE-202)

I have taught the following postgraduate level course:

- Intelligent Transportation Systems (UE-503)
- Urban Transportation Planning (CE-561)

2. University of Leeds

As a PhD student at the Institute for Transport Studies, University of Leeds, I worked as MSc Module Demonstrator and taught various software including OmniTRANS, SATURN, and DRACULA. I also invigilated semester examinations at the University of Leeds during my stay at Leeds University.

3. University of Mississippi

As a graduate research assistant of Prof. Waheed Uddin at the University of Mississippi, USA, I assisted Prof. Waheed Uddin in various Civil Engineering undergraduate courses for conducting lectures and exams.

INVITED LECTURES

1. Invited lecture in a short training course organized by Sir Syed University of Engineering & Technology, Karachi on “A-ITS and Road Safety” on 15th December 2021.
2. Invited Lecture in Road Safety Workshop at Karachi University in February 2020.
3. Invited for lecture in a short training course organized by Pakistan Engineering Council on “Role of Traffic Management in Metropolitan Areas” on 26 October 2017 in Karachi, Pakistan.

RESEARCH EXPERIENCE

1. Institute for Transport Studies, University of Leeds, UK

I carried out research work as a postgraduate research student at the Institute for Transport Studies, University of Leeds from August 2011 to June 2015. My main focus of

the research was to combine real-time traffic state estimation with dynamic traffic assignment modelling techniques to improve traffic control strategies.

2. Centre for Advanced Infrastructure Technology, Mississippi, USA

I worked as a research assistant at the Centre for Advanced Infrastructure Technology, University of Mississippi, USA from January 2008 to May 2009. The research work included geospatial analysis of satellite imagery to create various maps for provinces in Pakistan and townships in Karachi. A detailed road and landuse map was extracted from high-resolution satellite imagery. Traffic analysis for the traffic data extracted for a selected road using 0.6-m multispectral QuickBird2 satellite imagery was carried out to demonstrate the application of satellite images to extract traffic data and analyze traffic flow attributes.

3. Road Traffic Injury Research and Prevention Centre, Karachi, Pakistan

I worked as a research assistant at Road Traffic Injury Research and Prevention Centre (RTIRPC) from January 2007 to December 2007. My responsibilities at the RTIRPC included management of a database for road traffic injuries, analysis of trends observed from the data, presentation of key results to concern authorities, identification and analysis of frequent incident locations and development of proposals to improve road safety.

EXTRACURRICULAR ACTIVITIES

1. Member of the British Alumni Association of Pakistan (BAAP)
2. Founding Faculty Advisor of ITE (Institute of Transportation Engineers) Students' Chapter at NED
3. Faculty Coordinator of Students' Society of Urban Engineering Department (Urban Realm)
4. Area Coordinator for Urban Engineering Department MR ISO 9001:2015
5. Secretary Board of Studies, Department of Urban & Infrastructure Engineering
6. Member Contractor Selection Committee (CSC) on Integrated Intelligent Transport Systems (IITS) of Bus Rapid Transit Service in Karachi
7. Organized Internship on "Traffic Data Collection and Analysis" (October 2017)
8. Conference Coordinator for IEDC-2017 International Conference
9. Postgraduate Research Students' Representative at ITS, Leeds University (2012-13)
10. Coordinator and Secretary for IEDC-2010 International Conference organized under HEC-USAID funded Project
11. Supervisor of Internship for GIS-based Extraction of Road & Landuse Map (December 2009)
12. Senator for Graduate Student Council at The University of Mississippi (2008-09)
13. Member of Governor's Advisory Group for Road Safety (2007)

CERTIFIED SHORT COURSES

1. Dynamic Traffic Flow Modelling and Control

Attended one-week short course offered by Prof. Markos Papageorgiou on Dynamic Traffic Flow Modelling and Control in October 2012 at the University of Crete, Greece.

2. Image Processing through ERDAS Imagine

Short training course offered by Pakistan Space & Upper Atmosphere Research Commission from 04-08 January 2010.

3. Traffic Work-zone Safety and Operation

Successfully completed a certified course offered by the Mississippi Department of Transportation on Traffic Work-zone Safety and Operation in February 2008.

SOFTWARE PROFICIENCY

- Programming (MATLAB)
- Microscopic Traffic Simulation (S-Paramics, VISSIM)
- Image Processing Software (ERDAS Imagine)
- GIS and Geospatial Analysis (GeoMedia Professional, ARCGIS)
- Travel Demand Modelling software (TRANSCAD, OmniTrans, EMME2, SATURN)
- Traffic Signal Optimization (VISTRO, DISCO, SIGMIX)