BACHU ANILKUMAR, Ph.D.

Assistant Professor, Indian Institute of Technology Patna, Bihta - 801103, Bihar, India.

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EDUCATION

Doctor of Philosophy	Indian Institute of Technology Madras Chennai, Tamil Nadu	Jul 2012 - Jul 2017
Master of Science (by research)	Indian Institute of Technology Madras Chennai, Tamil Nadu	Jul 2012 - Jul 2017
Bachelor of Technology	Bharat Institute of Engineering and Technology Hyderabad, Andhra Pradesh	Aug 2008 - Jun 2012

PROFESSIONAL EXPERIENCE

Assistant Professor	Indian Institute of Technology Patna Patna, Bihar	Jun 2019 - Till date
Research Fellow	Energy Research Institute @ NTU (ERI@N) Nanyang Technological University, Singapore	Jul 2018 - May 2019
Senior Project Officer	Indian Institute of Technology Madras Chennai, Tamil Nadu	Jul 2017 - Jun 2018
Pre-Doctoral Fellow	Indian Institute of Technology Madras Chennai, Tamil Nadu	Dec 2016 - Jun 2017

AWARDS AND HONORS

1. Member - Standing Committee on Transit Capacity and Quality of Service (AP015), Transportation Research Board (TRB), National Academies, USA
2. *International Travel Grant* from Department of Science and Technology to attend 16th WCTR, Montreal, Canada. July 2023.
3. *International Travel Grant* from Department of Science and Technology to attend 97th Transportation Research Board Annual Meeting, Washington D.C., USA. January 2018.
4. Merit based *Institute Pre-Doctoral Fellowship* from IIT Madras, December 2016 - June 2017.
5. *Institute Research Award* from Indian Institute of Technology Madras in recognition of quality and quantity of work done, April 2017.
6. *Best Paper* award in IEEE ICITE conference, Singapore, August 2016.
7. *Best PhD Student* award for the all round performance from Department of Civil Engineering, IIT Madras, April 2016.
8. *Best Paper* award in 3rd CTRG, Kolkata, December 2015.
9. Merit-based monthly scholarship from MHRD, Govt. of India, July 2012 - December 2016.
10. *Gold Medal* from Bharat Institute of Engineering and Technology for under graduate performance, 2012.

MEMBERSHIPS

1. Affiliate Member, American Society of Civil Engineers (#12313006)
2. Member, Indian Roads Congress (#102665)
3. Member, Transportation Research Group of India
4. Member, Institute of Electrical and Electronics Engineers (#95665888)

RESEARCH PROJECTS

Sponsored Research Projects at IIT Patna

S. No	Title	Investigator(s)	Funding Agency	Amount (in lakhs)	Duration (Status)
1	Analysis and Modelling of Driver Behavior using Naturalistic Driving Data under Indian Traffic Conditions	Dr. Bachu Anilkumar	SERB	28.54	24 Months (Completed)
2	Development of a Performance Evaluation Dashboard for Urban Arterials and Highways using NavIC GNSS Data	Dr. Vasantha Kumar Dr. Bachu Anilkumar Dr. Lelitha Devi	SAC, ISRO	25.13	36 Months (Ongoing)
3	Demand Responsive Public Transit Scheduling Strategies for Indian Cities	Dr. Bachu Anilkumar Dr. Lelitha Devi	MeitY	358.85	under review
4	On-Demand Transit Systems: Towards Last Mile Connectivity	Dr. Mayank Agarwal Dr. Bachu Anilkumar Dr. Satendra Kumar	MeitY	415.57	under review
5	Low-Cost Integrated Driver Assistance System for Indian Traffic Conditions	Dr. Pranames Dr. Bachu Anilkumar Dr. Lelitha Devi	MeitY	138.08	under review
6	Evaluation of Bus Operations and Schedule Optimization: A Study on a Selected BSRTC Bus Route, Patna City	Dr. Bachu Anilkumar	Govt. of Bihar	18.99	under review
7	Low-Cost Solution for Abnormal Driving Behavior Detection using Multi-Source Data Fusion	Dr. Lelitha Devi Dr. Bachu Anilkumar	CSR IIT Madras	140.00	under review

Research Project Experience as Post-Doc and Student

1. Development of Software Stack for Traffic Estimation and Intelligent Fleet Management: An Autonomous Vehicle Context
   (PI: Prof. Justin Dauwels and Dr. Anshuman Tripathi, ERI@N, NTU Singapore)
2. Utilization of Virtual Singapore for Autonomous Vehicles
   (PI: Prof. Justin Dauwels, NTU Singapore)
3. Development of a Dynamic Traffic Congestion Prediction System for Indian Cities
   (PI: Prof. V. Lelitha Devi, Dept. of Civil Engineering, IIT Madras)
4. Enhanced Traffic Mobility using Signal Improvements
   (PI: Dr. Bhargava Rama Chilukuri, Dept. of Civil Engineering, IIT Madras)

PUBLICATIONS

Refereed Journals

1. **Kumar, B.A.,** R. Singh, H.E. Shaji, and L. Vanajakshi. (2025). Bus Arrival Time Prediction: A Comprehensive Review. Transactions on Intelligent Transportation Systems. (In Press). DOI: 10.1109/TITS.2025.3545695 [**Q1, IF:7.90**]
2. **Kumar, B.A.,** G. Chandana, and L. Vanajakshi. (2025). Travel Time Reliability Prediction Using Quantile Random Forest Regression. *Transportation in Developing Economies: A Journal of the Transportation Research Group of India*. (In Press) [**Q4, IF:1.50**]
3. Kushwaha, A.K., K. Shinde, and **B.A. Kumar**. (2024). Fuzzy Probabilistic Approach to Identify Driving Behaviour of Two-Wheeler Drivers under Mixed Traffic Conditions. IEEE Access. vol. 12, pp. 76169-76179, DOI: 10.1109/ACCESS.2024.3406195. [**Q1, IF:3.40**]
4. Kushwaha, A.K. and **B.A. Kumar**. (2023). Rule Based First Principles Approach to Identify Safe/Unsafe Behavior of Two-Wheeler Drivers under Mixed Traffic Conditions. *IEEE Access*. Vol. 11, pp. 31541-31548, DOI: 10.1109/ACCESS.2023.3262292. [**Q1, IF:3.40**]
5. Singh, A., S. Banik, **B.A. Kumar**, L. Vanajakshi and L. Rilett. (2023). Impact of COVID-19 related Travel Restrictions on the Environment and Travel Time Reliability. *ASCE Journal of Transportation Engineering, Part A: Systems*. Vol. 149 (7), pp. 05023002, DOI: 10.1061/JTEPBS.TEENG-7290. [**Q2, IF:1.80**]
6. Banik, S., **B.A. Kumar** and L. Vanajakshi. (2022). Stream Travel Time Reliability using GPS Equipped Probe Vehicles. *Current Science, Indian Academy of Sciences*. Vol. 123(9), pp. 1107-1116, DOI: 10.18520/cs/v123/i9/1107-1116. [**Q2, IF:1.00**]
7. Achar, A., A. Natarajan, R. Regikumar and **B.A. Kumar**. (2022). Predicting Public Transit Arrival: A Nonlinear Approach. *Transportation Research Part-C: Emerging Technologies*. Vol. 144, 103875, DOI: 10.1016/j.trc.2022.103875. [**Q1, IF:7.60**]
8. Nair, G.K., **B.A. Kumar** and L. Vanajakshi. (2022). Mapping Bus and Stream Travel Time using Machine Learning Approaches. *Journal of Advanced Transportation*. vol. 2022, Article ID 9743070, DOI: 10.1155/2022/9743070 [**Q2, IF:2.00**]
9. Gracious, R., **B.A. Kumar** and L. Vanajakshi. (2022). Performance Evaluation of Passenger Information Systems. *Transportation in Developing Economies: A Journal of the Transportation Research Group of India*, Vol. 8(4), DOI: 10.1007/s40890-021-00140-5. [**Q4, IF:1.50**]
10. **Kumar, B.A.**, K.K. Reddy and L. Vanajakshi. (2021). Bus Travel Time Prediction using Support Vector Machines for High Variance Conditions. *Transport*. Vol. 36(3), pp. 221-234, DOI: 10.3846/ transport.2021.15220, [**Q3, IF:1.30**]
11. Nithishwer, M.A., **B.A. Kumar**, and L. Vanajakshi. (2021). Deep Learning - Just Data or Domain Related Knowledge adds Value?: Bus Travel Time Prediction as a Case Study. *Transportation Letters: The International Journal of Transportation Research*, Vol. 14(8), pp. 863–873, DOI: 10.1080/194278 67.2021.1952042, [**Q2, IF:3.30**]
12. Shalayar, A.K., **B.A. Kumar** and L. Vanajakshi. (2021). Analysis of Global Positioning System based Bus Travel Time Data and its use for Advanced Public Transportation System Applications. *Journal of Intelligent Transportation Systems: Technology, Planning and Operations.* Vol. 25(1), pp. 58-76, DOI: 10.1080/15472450.2020.1754818. [**Q1, IF:2.80**]

13. Gracious, R., **B.A. Kumar** and L. Vanajakshi. (2021). Characterizing Bus Travel Time using Big Data Visualization Techniques. *Transportation in Developing Economies: A Journal of the Transportation Research Group of India*. Vol. 7(1), DOI: 10.1007/s40890-020-00109-w. [**Q4, IF:1.50**]
14. **Kumar, B.A.**, R. Gracious, C. Gangrade and L. Vanajakshi. (2020). City Level Route Planning with Time Dependent Networks. *Current Science, Indian Academy of Sciences*, Vol. 119(4), pp. 680-690, DOI: 10.18520/cs/v119/i4/680-690. [**Q2, IF:1.00**]
15. **Kumar, B.A.**, S. Mothukuri and L. Vanajakshi. (2020). Numerical Stability of Conservation Equation for Bus Travel Time Prediction using Automatic Vehicle Location Data. *International Journal of Intelligent Transportation Systems Research.* Vol. 19, pp. 141–154, DOI: 10.1007/s13177-020-00230-5. [**Q3, IF:1.10**]
16. Dhivyabharathi, B., **B.A. Kumar**, L. Vanajakshi and A. Achar. (2020). Bus Arrival Time Prediction using Log-normal Auto-Regressive (AR) Modelling. *Transportmetrica A: Transport Science*. Vol. 16(3), pp. 807-839, DOI: 10.1080/23249935.2020.1720864. [**Q1, IF:3.60**]
17. **Kumar, B.A.**, H. Prasath and L. Vanajakshi. (2019). Dynamic Bus Scheduling based on Real-Time Demand and Travel Time. *International Journal of Civil Engineering*. pp. 1-9, DOI: 10.1007/s40999-019-00445-y. [**Q3, IF:1.80**]
18. Achar, A., D. Bharathi, **B.A. Kumar** and L. Vanajakshi. (2019). Bus Arrival Time Prediction: A Spatial Kalman Filter Approach. *IEEE Transactions on Intelligent Transportation Systems*, Vol. 21(3), pp. 1298-1307, DOI: 10.1109/TITS.2019.2909314. [**Q1, IF:7.90**]
19. Jairam, R., **B.A. Kumar**, S. Arkatkar and L. Vanajakshi. (2018). Performance Comparison of Bus Travel Time Prediction Models across Indian Cities. *Transportation Research Record: Journal of the Transportation Research Board*. Vol. 2672(31), pp. 87-98, DOI: 10.1177/0361198118770175. [**Q2, IF:1.60**]
20. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian. (2018). A Hybrid Model Based Method for Bus Travel Time Estimation. *Journal of Intelligent Transportation Systems: Technology, Planning and Operations*. Vol. 22(5), pp. 390-406, DOI: 10.1080/15472450. 2017.1378102. [**Q1, IF:2.80**]
21. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian. (2017). Bus Travel Time Prediction using a Time-Space Discretization Approach. *Transportation Research Part-C: Emerging Technologies*. Vol. 79, pp. 308-332, DOI: 10.1016/j.trc.2017.04.002. [**Q1, IF:7.60**]
22. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian. (2017). Pattern-Based Time-Discretized Method for Bus Travel Time Prediction. *Journal of Transportation Engineering, Part A: Systems*, ASCE, Vol. 143(6), pp. 04017012:1-15, DOI: 10.1061/JTEPBS.0000029. [**Q2, IF:1.80**]
23. **Kumar, B.A.**, R. Jairam, L. Vanajakshi and S. Arkatkar. (2017). Real Time Bus Travel Time Prediction using k-NN Classifier. *Transportation Letters: The International Journal of Transportation Research*, Vol. 11(7), pp. 362-372, DOI: 10.1080/19427867.2017.1366120. [**Q2, IF:3.30**]
24. **Kumar, B.A.**, V. Kumar, L. Vanajakshi and S.C. Subramanian. (2017). Performance Comparison of Data Driven and Less Data Demanding Techniques for Bus Travel Time Prediction. *European Transport*, Vol. 65(9), ISSN: 1825-3997. [**Q4, IF:0.70**]
25. Behera, R., **B.A. Kumar** and L. Vanajakshi. (2017). Real Time Identification of Inputs for a BATP Systems using Data Analytics. *International Journal of Civil Engineering*. Vol. 15(8), pp. 1173-1185, DOI: 10.1007/s40999-017-0210-y. [**Q3, IF:1.80**]

26. Dhivyabharathi, B., **B.A. Kumar**, L. Vanajakshi and M. Panda. (2017). Particle Filter for Reliable Bus Travel Time Prediction under Indian Traffic Conditions. *Transportation in Developing Economies: A Journal of the Transportation Research Group of India* (TRG). Vol. 3(13). DOI: 10.1007/s40890-017-0043-z. [**Q4, IF:1.50**]
27. Reddy, K.K., **B.A. Kumar** and L. Vanajakshi. (2016). Bus Travel Time Prediction under High Variability Conditions. *Current Science, Indian Academy of Sciences*, Vol. 111(4), pp. 700-711. DOI: 10.18520/cs/v111/i4/700-711. [**Q2, IF:1.00**]
28. **Kumar, B.A.**, S. Mothukuri, L. Vanajakshi and S.C. Subramanian. (2015). Analytical Approach to Identify the Optimum Inputs for a Bus Travel Time Prediction Method. *Transportation Research Record: Journal of the Transportation Research Board*, Vol. 2535, pp. 25-34, DOI: 10.3141/2535-03. [**Q2, IF:1.60**]

Under Review/Preparation

1. Singh, R., D.N. Rani, and **B.A. Kumar.** Prediction of Bus Travel Time using Physics Informed Neural Networks.
2. Singh, R., Madhur Garg, and **B.A. Kumar.** Self Attention based ConvLSTM Networks for Bus Travel Time Prediction.
3. Singh, R., Madhur Garg, and **B.A. Kumar.** How to Select Context-Specific Models for Predicting ETA of Buses?: Insights from Mixed-Traffic and Dedicated Lane Scenarios from Indian Cities
4. Kushwaha, A., Mukul, **B.A. Kumar.** Driving Towards Safety: Abnormal Driving Detection using Dash Cam Data.
5. Singh, R., Sinha, S., **B.A. Kumar.** VMD-CNN: A Combined Model for Predicting ETA of Buses. Public Transit Travel Time Prediction Utilizing Hybrid Deep Learning Models
6. Rai, D., **B.A. Kumar.** Use of sparse LiDAR data for development of microscopic models under Indian traffic conditions.
7. Chandhirathil, P.S., **B.A. Kumar.** Deep reinforcement learning-based Dynamic Scheduling Strategy for Bus Fleets.
8. Kushwaha, A., H. Arora, and **B.A. Kumar**. Deep Embedded Clustering Methods for Identifying Driving Safety Profiles from GPS Data.
9. Kushwaha, A., N. Takhellambam, and **B.A. Kumar**. Driving Behaviour Classification Techniques: A Comprehensive Review.

Refereed International Conferences

1. Singh, R., M. Garg, **B.A. Kumar**. Self-Attention Based ConvLSTM with Deep Embedded Clustering Approach for Bus Travel Time Prediction. 27th Annual Conference of Euro Working Group on Transportation. Scotland. 01-03 Sep 2025.
2. Kushwaha, A., and **B.A. Kumar**. A Systematic Approach for Identifying Unsafe Driver Behaviour in Mixed Traffic Using Rule-Based First Principles. Transportation Research Symposium 2025. The Netherlands. 25-28 May 2025.
3. Kushwaha, A., M. Panchal, and **B.A. Kumar**. Driving Towards Safety: A CNN based Approach for Facial Expression Recognition and Activity Detection. 11th International Conference on

Vehicle Technology and Intelligent Transport Systems (VEHITS). Porto, Portugal. 02-04 April 2025

4. Kushwaha, A., K. Prakash, and **B.A. Kumar**. Analysis of Truck Driver Behavior using Factor Analysis – A Study of Drivers from Bihar, India. 104th Annual Meeting of Transportation Research Board. Washington D.C., USA. 05-09 Jan 2025.
5. Singh, A., R. Singh, A.K. Kushwaha, and **B.A. Kumar**. Detction, Classification, and Trajectory Extraction of Vehicles Under Mixed Traffic Conditions. 15th *International Conference on Transportation Planning and Implementation Methodologies for Developing Countries* (TPMDC), IIT Bombay, 18-20 Dec 2024.
6. Kushwaha, A., H. Arora, and **B.A. Kumar**. Deep Embedded Clustering Methods for Identifying Driving Safety Profiles from GPS Data. 103rd Annual Meeting of Transportation Research Board. Washington D.C., USA. 07-11 Jan 2024.
7. Jaiswal, R., M.K. Jha, and **B.A. Kumar**. Impact of COVID-19 on Roadway Travel Behavior: A Comparative Study of the States of Washington and Maryland, USA. 7th Conference of Transportation Research Group of India. 17-20 December 2023, Surat, India.
8. Jha, M.K. R. Jaiswal and **B.A. Kumar**. A Bi-Layered Machine Learning Model for Travel-Time Prediction along a Congested Section of I-495, USA. 7th Conference of Transportation Research Group of India. 17-20 December 2023, Surat, India.
9. Jaiswal, R., **B.A. Kumar** and M.K. Jha. A Statistical and Machine Learning Framework for Measuring the Economic Impact of Reduced Travel due to COVID-19 in Maryland. The 16th World Conference on Transport Research, 17-21 July 2023 in Montréal, Québec, Canada.
10. Jha, M.K., D.S.K Varma, R. Jaiswal, S. Rankavat and **B.A. Kumar**. A Machine Learning Approach to Traffic Congestion Hotspot Identification and Prediction. The 16th World Conference on Transport Research, Montréal, Québec, Canada, 17-21 July 2023.
11. Pandey, P.K., H. Arora and **B.A. Kumar**. Development of Driving Cycles for Electric Buses in Patna, India. 8th International Conference on Models and Technologies for Intelligent Transportation Systems. Nice, France, 14-16 June 2023.
12. Jha, M.K., N. Wanko, **B.A. Kumar.**. A Machine Learning-based Active Learning Framework to Capture Risk and Uncertainty in Transportation Construction Project Scheduling, Transportation Infrastructure Projects : Conception to Execution, IIT Roorkee, 14-17 Sep 2022.
13. Banik, S., **B.A. Kumar** and L. Vanajakshi. Stream Travel Time Reliability using GPS Equipped Probe Vehicles. 100th *Annual Meeting of the Transportation Research Board*, Washington D.C., USA, 21-29 Jan 2021.
14. Reddy, S. and **B.A. Kumar**. Travel Time Variability Analysis of Public Transit Buses using GPS Data. 13th *International Conference on Transportation Planning and Implementation Methodologies for Developing Countries* (TPMDC), IIT Bombay, 10-11 Dec 2020.
15. Nithishwer, M., **B.A. Kumar** and L. Vanajakshi. Application of Deep Learning for Bus Travel Time Prediction. 12th *International Conference on COMmunication Systems & NETworkS: Intelligent Transportation Systems Workshop*, Bengaluru, India, 7-11 Jan 2020.
16. Gracious, R., **B.A. Kumar** and L. Vanajakshi. Performance Evaluation of Passenger Information Systems. 5th *Conference of the Transportation Research Group of India*, Transportation Research Group of India, Bhopal, India, 18-21 December 2019.

17. Gracious, R., **B.A. Kumar** and L. Vanajakshi. Characterizing Bus Travel Time using Big Data Visualization Techniques. 5th *Conference of the Transportation Research Group of India*, Transportation Research Group of India, Bhopal, India, 18-21 December 2019.
18. **Kumar, B.A.**, A. Achar, Dhivya Bharathi and L. Vanajakshi. A Seasonal Modelling Approach Capturing Spatio-Temporal Correlations for Dynamic Bus Travel Time Prediction. 2019 22nd *IEEE Intelligent Transportation Systems Conference - ITSC 2019*, Auckland, New Zealand, 27-30 October 2019, pp. 503-508, DOI: 10.1109/ITSC.2019.8917055.
19. Narayanan, A., C. Pranesh, S. Nagavarapu, **B.A. Kumar** and J. Dauwles. Data-driven Models for Short-term Travel Time Prediction. 2019 22nd *IEEE Intelligent Transportation Systems Conference - ITSC 2019*, Auckland, New Zealand, 27-30 October 2019, pp. 1941-1946, DOI: 10.1109/ITSC.2019.8917456.
20. Achar, A., R. Regikuamr and **B.A. Kumar**. Dynamic Bus Arrival Time Prediction exploiting Non-linear Correlations. *The 2019 International Joint Conference on Neural Networks (IJCNN)*, Budapest, Hungary, 14-19 July 2019, pp. 1-8, DOI: 10.1109/IJCNN.2019.8852358.
21. **Kumar, B.A.**, H. Prasath and L. Vanajakshi. Demand and Travel Time Responsive Real-Time Bus Scheduling. 98th *Annual Meeting of the Transportation Research Board*, Washington D.C., USA, 13-17 Jan 2019.
22. George, R., **B.A. Kumar**, L. Vanajakshi and S.C. Subramanian. Traffic Density Estimation under Lane Indisciplined Conditions using Strips along the Road Width. 11th *International Conference on COMmunication Systems & NETworkS: Intelligent Transportation Systems Workshop*, Bengaluru, India, 7-11 Jan 2019.
23. Jairam, R., **B.A. Kumar**, S. Arkatkar and L. Vanajakshi. Performance Comparison of Bus Travel Time Prediction Models across Indian Cities. 97th*Annual Meeting of the Transportation Research Board*, Washington D.C., USA, 07-11 Jan 2018.
24. **Kumar, B.A.**, V. Kumar, K.K. Reddy, L. Vanajakshi and S.C. Subramanian. Bus Travel Time Prediction using Machine Learning Approaches. *Indo-US workshop on Big Data Analysis for Transportation Engineering Systems*, Indian Institute of Technology Madras, Chennai, India, 05-06 December 2016.
25. Dhivyabharathi, B., **B.A. Kumar** and L. Vanajakshi. Real Time Bus Arrival Time Prediction System under Indian Traffic Condition. 2016 *IEEE International Conference on Intelligent Transportation Engineering* (ICITE), IEEE, Nanyang Technological University, Singapore, pp. 18-22, DOI: 10.1109/ICITE.2016.7581300.
26. **Kumar, B.A.** and L. Vanajakshi. Use of Data Mining for Improved Bus Travel Time Prediction. 4th *CEW*, TU Delft, Delft, The Netherlands, 29 Jun - 1 Jul 2016.
27. Reddy, J.K.K., **B.A. Kumar** and L. Vanajakshi. Bus Travel Time Prediction using Support Vector Machines for High Variance Conditions.95th*Annual Meeting of Transportation Research Board*, National Research Council, Washington. D.C., USA, 07-11 January 2016.
28. Reddy, K.K., **B.A. Kumar** and L. Vanajakshi. Bus Travel Time Prediction using Support vector Machines. 3rd *Conference of the Transportation Research Group of India*, Transportation Research Group of India, Kolkata, India, 17-20 December 2015.
29. Dhivyabharathi, B., **B.A. Kumar**, L. Vanajakshi and M. Panda. Particle Filter for Reliable Bus Travel Time Prediction under Indian Traffic Conditions. 3rd *Conference of the Transportation Research Group of India*, Transportation Research Group of India, Kolkata, India, 17-20 December 2015.

30. **Kumar, B.A.**, S. Mothukuri, L. Vanajakshi and S.C. Subramanian. Analytical Approach to Identify the Optimum Inputs for a Bus Travel Time Prediction Method. 94th *Annual Meeting of Transportation Research Board*, National Research Council, Washington. D.C., USA, 11-15 January 2015.
31. **Kumar, B.A.**, S. Mothukuri, L. Vanajakshi and S.C. Subramanian. A Spatio-Temporal Discretization Approach for Real Time Bus Travel Time Prediction Using A Linear Traffic Model. 11th *Transportation Planning and Implementation Methodologies for Developing Countries*, Indian Institute of Technology Bombay, Mumbai, India, 10-12 December 2014.
32. Kumar, V., **B.A. Kumar**, L. Vanajakshi and S.C. Subramanian. Comparison of Model based and Machine Learning Approaches for Bus Travel Time Prediction. 93rd *Annual Meeting of Transportation Research Board*, National Research Council, Washington. D.C., USA., 12-16 January 2014,
33. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian. Pattern-Based Bus Travel Time Prediction under Heterogeneous Traffic Conditions. 93rd *Annual Meeting of Transportation Research Board*, National Research Council, Washington. D.C., USA, 12-16 January 2014.
34. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian. Day-Wise Travel Time Pattern Analysis under Heterogeneous Traffic Conditions. 2nd *Conference of the Transportation Research Group of India*, Transportation Research Group of India, Agra, India, 12-15 December 2013.

Refereed National Conferences

1. **Kumar, B.A.**, L. Vanajakshi and S.C. Subramanian, Pattern-Based Spatial Formulation for Bus Travel Time Prediction under Mixed Traffic Conditions. *Colloquium on Transportation Systems Engineering and Management*, National Institute of Technology Calicut, Calicut, India, 12-13 May 2014.
2. Sashank, Y., A.N. Navali, A.B. Prakash, **B.A. Kumar** and L. Vanajakshi, Calibration of SUMO for Indian Heterogeneous Traffic Conditions. *Recent Advances in Traffic Engineering*, Sardar Vallabhai National Institute of Technology, Surat, India, 09-11 August 2018.

Book Chapters

1. Banik, S., **B.A. Kumar** and L. Vanajakshi. Travel Time Reliability. International Encyclopedia of Transportation, edited by Roger Vickerman, Elsevier, 2021, Pages 109-121
2. Sashank Y., N.A. Navali, A. Bhanuprakash, **B.A. Kumar** and L. Vanajakshi. (2020) Calibration of SUMO for Indian Heterogeneous Traffic Conditions. In: Arkatkar S., Velmurugan S., Verma A. (eds) Recent Advances in Traffic Engineering. Lecture Notes in Civil Engineering, vol 69, pp 199-214. Springer, Singapore. DOI: 10.1007/978-981-15-3742-4_13

Technical Reports

1. Vanajakshi, L., S.C. Subramanian, A.Koppineni, K. Chaitanya, K. Siddharth, R. Behera, R.P.S. Padmanabhan, S.V. Kumar and **B.A. Kumar**. *Development of a Real Time Bus Arrival Time Prediction System under Indian Traffic Conditions*. Technical Report. Center of Excellence in Urban Transport, The Ministry of Urban Development, Govt. of India. 2016.

2. Vanajakshi, L., **B.A. Kumar**, B.R. Muthurajan. *Use of Global Positioning System (GPS) Data from MTC Bus Routes to Develop APTS/ATIS Applications*. Technical Report. Center of Excellence in Urban Transport, The Ministry of Urban Development, Govt. of India. 2018.

Patents (Granted/Filed)

Granted

1. **Kumar, B.A.**, A. Achar, D. Bharathi, L. Vanajakshi and R. Jayaprakash. A Seasonal Modelling Approach Capturing Spatio-Temporal Correlations for Dynamic Bus Travel Time Prediction. Patent No: 442700.
2. Vanajakshi, L., **B.A. Kumar**, and M.A. Nithishwer. A Method and System for Predicting a Vehicle Travel Time. Patent No. 501967.
3. Achar, A., **B.A. Kumar**, B. Dhibyabharathi, L. Vanajakshi and R. Jayaprakash. Prediction of Travel Time of Vehicles. Patent No. 510184.
4. Achar, A., R. Rohith, **B.A. Kumar**, L. Vanajakshi and R. Jayaprakash. Bus Travel Time Prediction capturing Non-linear Spatial Correlations using Support Vector Machines. Patent No. 515541.
5. Vanajakshi, L., B. Dhibyabharathi, **B.A. Kumar**, A. Achar, and R. Jayaprakash. Time Series Model based Prediction of Travel Time. Patent No. 541168

Filed/Under Review

1. Achar, A., R. Rohith, **B.A. Kumar**, L. Vanajakshi and R. Jayaprakash. Bus Travel Time Prediction exploiting Non-linear Correlations. Ref. #: 201921037662

STUDENT GUIDANCE

Ph.D. Students

1. Ankit Kumar Kushwaha, Jan 2021 - Dec 2025 (expected)
2. Ramanand Singh, Jul 2022 - Dec 2026 (expected)

M.Tech./M.Sc. Students

1. Priyanka Kumari, IIT Patna, 2024-25
2. Krishanu Prakash, IIT Patna, 2023-24
3. Anuj Kumar, IIT Patna, 2022-23
4. Rishav Jaiswal, IIT Patna, 2022-23
5. Piyush Kumar Pandey, IIT Patna, 2021-22
6. Brajesh Kumar Dubey, IIT Patna, 2020-21
7. Chaitra Pranesh, NTU Singapore, 2018-19
8. Aakash Kumar Narayanan, NTU Singapore, 2018-19

B.Tech./B.E. Students

1. Shriyansh Sinha, IIT Patna, 2024-25
2. Devansh Rai, IIT Patna, 2024-25
3. Pranav Shajan Chandhirathil, IIT Patna, 2024-25
4. Prince Kumar Singh, IIT Patna, 2024-25
5. Abhinav Singh, IIT Patna, 2023-24
6. Mukul, IIT Patna, 2023-24
7. Madhur Garg, IIT Patna, 2023-24
8. Dhangar Neha Rani, IIT Patna, 2023-24
9. Hardik Arora, IIT Patna, 2022-23
10. Gaurav Chaudhary, IIT Patna, 2022-23
11. Kartik Shinde, IIT Patna, 2022-23
12. Abhilash Reddy, IIT Patna, 2022-23
13. Kamal Kaushik, IIT Patna, 2021-22
14. Ananya Singh, IIT Patna, 2021-22
15. Gopikrishnan Nair, IIT Patna, 2020-21
16. Pawan Tiwari, IIT Patna, 2020-21

Internship Students

1. Nithishwer Mourouganand, BS-MS, IISER Mohali, May - Jul 2020

TEACHING

*Represents Co-Instructor for the Course

S. No	Semester	Course	Rating (Out of 5)
1	Jan-May, 2025	CE 318 - Construction Planning and Management	-
		CE 324 - Transportation Engineering*	-
		CE 392 - Transportation Engineering Laboratory*	-
		CE 2290 - Construction Technology and Management*	-
2	Jul-Nov, 2024	CE 1101 - Engineering Drawing (Tutorial)	-
		CE 491 - Design Studio*	4.45
		CE 543 - Traffic Engineering and Highway Safety	4.43
		CE 507 - Civil Engineering Design - I	-
3	Jan-May, 2024	CE 111 - Engineering Drawing (Tutorial)	-
		CE 318 - Construction Planning and Management	-
		CE 543 - Transportation Engineering Laboratory	-
4	Jul-Nov, 2023	CE 111 - Engineering Drawing (Tutorial)	-
		CE 491 - Design Studio*	-
		CE 543 - Traffic Engineering and Highway Safety	-
5	Jan-May, 2023	CE 324 - Transportation Engineering*	4.68
		CE 318 - Construction Planning and Management	4.68
		CE 392 - Transportation Engineering Laboratory*	4.67
6	Nov - Mar, 2023	CE 111 - Engineering Drawing (Tutorial)	-
7	Jul-Nov, 2022	CE 491 - Design Studio*	4.55
		CE 543 - Traffic Engineering and Highway Safety	4.59
8	May-Jun, 2022	CE 111 - Engineering Drawing (Tutorial)	4.56
9	Jan - May, 2022	CE 318 - Construction Planning and Management*	4.54
		CE 324 - Transportation Engineering*	4.62
		CE 392 - Transportation Engineering Laboratory*	4.15
10	Nov - Mar, 2022	CE 111 - Engineering Drawing (Tutorial)	4.58
11	Jul - Nov, 2021	CE 491 - Design Studio*	4.50
		CE 507 - Civil Engineering Design - I*	-
		CE 543 - Traffic Engineering and Highway Safety	4.78
12	Jan - May, 2021	CE 324 - Transportation Engineering*	4.93
13	Jul - Nov, 2020	CE 491 - Design Studio*	4.54
14	Jan - May, 2020	CE 554 - Traffic Flow Theory	4.48
		CE 392 - Transportation Engineering Laboratory*	4.27
15	Jul - Nov, 2019	CE 111 - Engineering Drawing (Tutorial)	-
		CE 213 - Fluid Mechanics	4.20
		CE 291 - Fluid Mechanics Laboratory	4.00

POSITIONS OF RESPONSIBILITY

Institute level

1. Professor In-Charge for Cultural Affairs, Jan 2024 - Jun 2024
2. Professor In-Charge for Cultural, E-Cell and Technical Affairs, Jun 2023 - Jan 2024
3. Professor In-Charge for Cultural Affairs, Sep 2022 - Jun 2023
4. Professor In-Charge for NSS, Nov 2021 - Mar 2023
5. Assoc. Professor In-Charge for 9th Convocation, Dec 2022
6. Professor In-Charge for Landscaping, Aug 2019 - Aug 2021
7. Institute Representative, GATE-2022, Feb 2022
8. Institute Representative, JEE (Adv.)-2022, Aug 2022
9. Institute Representative, JEE (Adv.)-2021, Sep 2021
10. Institute Representative, JEE (Adv.)-2020, Sep 2020
11. JoSAA Document Verification Committee, 2021, 2022, and 2023

Department Level

1. Faculty Advisor for B.Tech in CE 2024-28 batch
2. Lab In-Charge, Transportation Engineering Specialization, Mar 2023 - till date
   (a) Designed the curriculum for MTech in Transportation Engineering, Dual Degree (5 Years): BTech in Civil Engineering and MTech in Transportation Engineering
   (b) Revised Curriculum for BTech in Civil Engineering (w.e.f. AY 2024-25)
3. Member, Department Academic Programme Committee, Sep 2020 - till date
4. Faculty In-Charge, ASCE Student Chapter IIT Patna, Sep 2022 - till date
5. Faculty Selection Committee, Dec 2021 - Jun 2022
6. Shortlisting Committee for Staff Recruitment (JTS and JM), Aug 2023
7. Faculty In-Charge, Association of Civil Engineers (ACE), Nov 2020 - Feb 2023
8. In-Charge for Faculty Meeting, Mar 2021 - Feb 2023
9. PhD Coordinator, Jul 2022 - Jan 2023
10. Faculty Advisor for M. Tech in CE, 2020-22 batch
11. Member, Department Purchase Committee, May 2020 - May 2022

Others

1. Post Graduate level department coordinator in *CEA Research Expo, Civil Engineering Association*, Department of Civil Engineering, IIT Madras, Jul 2014-Jul 2016
2. Post Graduate level department coordinator in *Mentoring for Individual TRansformation* (MITR), Department of Civil Engineering, IIT Madras, Jul 2015-Jul 2016
3. Technical Affairs Secretary for *Cauvery Hostel*, IIT Madras, Jul 2015-Jul 2016
4. Volunteer in *Civil Engineering Association*, Department of Civil Engineering, IIT Madras, March 2014

SYNERGISTIC ACTIVITIES

Editorial Boards

1. Editorial Board Member, Scientific Reports, Nature Publishing Group.
2. Editorial Board Member, Discover Civil Engineering, Springer Nature.

Workshops/Short-Term Courses Conducted

1. Workshop on Applications of AI and Data Science in Transportation Engineering, 20 September 2024, IIT Patna
2. Faculty Development Program on Basics of Transportation Engineering, Sponsored by Department of Science and Technology, Govt. of Bihar (15.93 Lakhs); Co-organizers: Dr. Sudhir Varma, Dr. Syed KK Hussaini, 14-25 July 2022
3. Short-Term Course on Advanced Techniques for Traffic Data Analysis, Visualization and State Estimation for Indian Cities. Sponsored by I-DAPT Hub Foundation, IIT (BHU) Varanasi; Co-organizers: Dr. Agnivesh Pani, Dr. Ankit Gupta, 20-24 Dec 2021 (Online Mode)
4. Workshop on Intelligent Transportation Systems (ITS), 13th International Conference on COMmunication Systems & NETworkS, Bengaluru, India, 09 Jan 2021; Chair: Prof. Nagendra Velaga

Organizing/Technical Committees

1. Technical Advisory Committee: 1st International Conference on Innovations and Sustainability in Civil Engineering: Shaping Tomorrow's Infrastructure (ISCESTI'25), NIT Patna, May 2025
2. Organizing committee: International Conference on Advances in Structural and Geotechnical Engineering (ASAGE'25), IIT Patna, Feb 2025
3. Technical Committee in CTSEM 2025, MANIT Bhopal, Jul 2025
4. Convener for Social Media Committee - Transportation Research Group of India, Nov 2020 - till date
5. Program Committee - 17th *COMSNETS: ADVnet Workshop*, Bengaluru, India, 06 Jan 2025
6. Panel Member- Workshop on Naturalistic Driving Studies: Progress and Prospects, IIT Jammu, 30-31 Aug 2024.
7. Program Committee - CTRG 2023
8. Co-Chair for Technical Committees of TRG (TCT-H01): Emerging travel technologies (ITS and IOT), 2022-2026
9. Panel Member- IPCC AR6 WGIII Report: Highlights & Implications for India and Bihar, 4th May 2022.
10. Advisory Committee - International Web Conference in Civil Engineering for a Sustainable Planet (ICCESP-2021), TKM College of Engineering, Kerala.
11. Program Committee - 12th *COMSNETS: ITS Workshop*, Bengaluru, India, 2020
12. Program Committee - 11th *COMSNETS: ITS Workshop*, Bengaluru, India, 2019

Review Work

1. Reviewer (Journals) - *IEEE Transactions on Intelligent Transportation Systems*; *Journal of Intelligent Transportation Systems*; *IEEE Access*; *IEEE/CAA Journal of Automatica Sinica*; *IET Intelligent Transport Systems*; *Journal of Urban Planning and Development*; *Sustainable Cities and Society*; *Transportation Letters: The International Journal of Transportation Research*; *Transportation Research Record*; *Transportation in Developing Economies*; *Journal of Transport Geography*; *Journal of The Institution of Engineers (India): Series A*.
2. Reviewer (Conferences) - *IEEE Conference on Intelligent Transportation Systems* (ITSC); *Conference of the Transportation Research Group of India* (CTRG); *Transportation Planning and Implementation Methodologies for Developing Countries* (TPMDC); *Transportation Research Board*.

INVITED TALKS

1. Talk on "Dynamic Bus Scheduling Strategies for Indian Cities" 2nd Jan 2023, CBIT, Hyderabad.
2. Talk on "Dynamic Bus scheduling based on Real time demand and travel time," Recent advancements leading to safe, sustainable and efficient transportation systems, Thiagarajar College of Engineering, Nov 24-26, 2021, Madurai.
3. Talk on "Applications of Machine Learning for Efficient Public Transit Systems" in *Online Faculty Development Programme On Emerging Transportation Technologies For Sustainable Smart Cities*, Thiagarajar College of Engineering, Madurai, Nov 24-26, 2021.
4. Talk on "AI & ML for Efficient Public Transit Systems" in *Faculty Development Program on Artificial Intelligence in REAL LIFE*, PESITM, Shivamogga, Aug 30 - Sep 06, 2021.
5. Talk on "Empirical to Theory based Modelling of Indian Traffic" in *International Conference on Contemporary and Sustainable Infrastructure*, SJB Institute of Technology, Bengaluru, India. 22 May 2021.
6. Talk on "Public Transit and its Role in Urban Mobility" in *Faculty Development Program on Urban Mobility: Challenges & Opportunities*, TKM College of Engineering, Kollam, Kerala, India. 08-14 September 2020.
7. Talk on "Deep Learning – Just Data or Domain Knowledge adds Value?" in *Webinar Series of Transportation Research Group of India*. 22 May 2020.
8. Talk on "Macroscopic Modeling Concepts and Applications", *AICTE Short Term Training Programme (STTP) on Modeling and Control of Traffic under Mixed Conditions*, IIT Madras, Chennai, India. 01-07 December 2019.

CONSULTANCY PROJECTS

1. TPQA Services for Patna Medical College and Hospital, Patna. Value: 0.26 Cr
2. TPQA Services for Muzaffarpur Smart City Limited, Govt. of Bihar. Value: 1.61 cr
3. TPQA Services for Bhagalpur Smart City Limited, Govt. of Bihar. Value: 1.43 Cr
4. TPQA Services for Biharshariff Smart City Limited, Govt. of Bihar. Value: 1.16 Cr
5. TPQA Services for State Disaster Response Force, Govt. of Bihar. Value: 0.87 Cr