Apoorba Bibeka, EIT

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SUMMARY

4 years of experience as a graduate assistant researcher at Texas A&M Transportation Institute. Extensive experience with traffic operation and safety projects, modern detector modeling, connected and autonomous vehicle modeling, data manipulation, visualization and predictive modeling. Seeking full time opportunities in transportation analytics, planning and/ or traffic operations field starting May 2019.

EDUCATION

Texas A&M University, College Station, TX
M.S. in Industrial Engineering—Data Science (GPA 4/4) May 2019
M.S. in Civil Engineering—Transportation Engineering (GPA 4/4) Aug 2016
Amity University, Noida, India
B.S. in Civil Engineering (GPA 7.84/10) May 2013

COURSEWORK

Transportation Planning | Economics | Traffic Operations | Highway Design | Traffic Flow Theory—CVAV | Predictive-Modeling | Deep Learning | Probability for Engineering Decisions | Statistical Inference | Optimization

SKILLS

Traffic Operations: VISSIM (APIs & COM), HCS, Synchro, PASSER, CORSIM, TRANSYT, MOVES
Highway Design: AutoCAD; **Languages:** R, Python, C++; **Transportation Planning:** VISUM, QGIS
DBMS: PostgreSQL; **Big Data Tools:** Hive; **Cloud Platforms:** Amazon S3 & EC2
Other Software/Tools: Jupyter Notebook, Spyder, IPython, RStudio, Visual Studio, Git
Statistical Analysis: Design and Analysis of Experiment, Hypothesis Testing, ANOVA, Linear and. Logistic Regression

EXPERIENCE

Texas A&M Transportation Institute, College Station, TX Mar 2015–Present
Graduate Assistant Researcher

- **Guidelines for Semi-Autonomous Truck Operation on Texas Roadways (TxDOT)**
  - Designed a full factorial simulation experiment for evaluating the impact of truck platooning (trucks following each other closely) with automated driving support systems on traffic operations.
  - Modelled truck platooning using driver model API of VISSIM.
  - Identified the measurement locations for performance measures such as average speed or average maximum queue length to conduct an unbiased comparison between different scenarios.
  - Established guidelines about the conditions in which truck platooning should be allowed.
- **Identifying Optimal Traffic Signal Controller Setting for Video and Radar Detectors (TxDOT)**
  - Designed a full factorial experiment to compare different traffic signal controller settings and proposed guidelines to aid traffic engineers decide optimal controller settings when using modern detectors.
  - Modelled Iteris and Wavetronix advance detectors in VISSIM COM.
- **Assessing Environmental, Safety and Operational Impact of Semi-Autonomous Vehicles (ATLAS Center, UMTRI)**
  - Developed a framework in VISSIM driver model API to model semi-autonomous vehicles.
  - Analysed the emission results across different scenarios using Tukey's HSD test and conditional plots.
  - Identified operational settings such as optimal following distance for reducing emissions.
- **New Approaches for Testing Connected Highway and Vehicle Systems (FHWA project)**
  - Aided in the creation of a hardware in the loop framework for testing connected vehicles using VISSIM.
  - Developed method to input signal phases from an external signal controller into VISSIM using Signal Controller API.
- **Road User Cost: IH 69 – Spur 527 to SH 288 (TxDOT)**
  - Modelled IH 69 in VISSIM to compute the road user cost of lane addition on IH 69 between Spur 527 and SH 288.
- **Safety of Managed Lanes (FHWA)**
  - Analysed relationship between road cross section and number of crashes using excel pivot tables.
- **Potential Use of Ramp Metering as Congestion Management Strategy in Dallas-Fort Worth (TxDOT)**
  - Coded signal timing plan for diamond interchanges in VISSIM.

Central Road Research Institute, New Delhi, India Nov 2013–July 2014
Research Assisstant

- **Evaluation of Fuel Loss during Idling of Vehicles at Signalized Intersections** *(VISSIM, TRANSYT)*
  - Optimized signal timing for an urban arterial corridor.
- **Traffic Study for Feasibility of Mineral Transportation in Joda Barbil, Odisha** *(VISUM)*
  - Developed a truck demand model to forecast traffic for freight transport in a mining area.

PROJECTS

- **Taxi Demand Prediction using Long Short-Term Memory (LSTM) Recurrent Neural Network** *(Python: RNN)*
  - Developed an LSTM RNN to predict hourly taxi demand in a Chicago community area based on the hourly taxi demand for the last seven days.
- **Predictive Analysis of Bike Sharing Data** *(R: Regression Models)*
  - Analysed Capital bike-share dataset to improve demand prediction by using supervised learning methods such as random forest and support vector machines. Improved model prediction by using k-fold cross-validation.
  - Identified important demand predictors and developed insights that would help increase revenue.
- **Predictive Analysis of Median Chicago Taxi Trips and Fare** *(R: Random Forest, Decision Trees)*
  - Evaluated 110 million Chicago taxi trips between 2013 and 2017 using supervised learning and data visualization to improve Chicago taxi business. Expedited the analysis using High-Performance Computing (HPC) systems.
  - Conducted feature engineering to improve model prediction. Developed heat maps to see how the earning of a typical Chicago taxi vary over time of day and day of the week.
  - Recommended pickup locations for the different time of days for increasing earnings.
- **Evaluation of Best Chip Expansion Strategy** *(AMPL & CPLEX: Linear Optimization)*
  - Evaluated different strategies to increase revenue for a snack company by formulating and solving a linear programming problem. Recommended the optimal number of different snacks that need to be shipped from different production sites to customer location to minimize cost.
- **Anomaly Detection on a Multivariate Data using PCA and Hotelling T^2 Charts** *(Python: PCA)*
  - Developed a control chart for a manufacturing process to identify and remove out of control observations.
  - Conducted Principal Component Analysis to reduce noise and improve signal for the high dimensional dataset.
- **Macro Level Analysis of Pedestrian and Bike Commuting using Self-Organizing Map** *(R: SOM)*
  - Analysed the correlation between pedestrian and bike commuting and other factors such as crime rate or poverty using unsupervised learning.

PUBLICATIONS AND CONFERENCE PRESENTATIONS

- **Bibeka, A.**, Songchitruksa, P. & Zhang, Y. (Accepted for publication). Assessing Environmental Impacts of Ad-Hoc Truck Platooning on Multilane Freeways. Journal of Intelligent Transportation Systems: Technology, Planning, and Operations.
- **Bibeka, A.**, Das, S., Martin, M. W., Jalayer, M., & Munira, S. (2018). Macro-Level Analysis of Association between Non-motorized Trips, Socio-Economic Characteristics, and Crime. Presented at the Transportation Research Board 97th Annual Meeting, Transportation Research Board.
- Das, S., **Bibeka, A.**, Sun, X., Zhou, H. & Jalayer, M. (2019). Elderly Pedestrian Fatal Crash related Contributing Factors: Applying Empirical Bayes Geometric Mean Method. Transportation Research Board 98th Annual Meeting, Transportation Research Board.
- Sunkari, S., Charara, H., **Bibeka, A.**, Balke, K., & Songchitruksa, P. (2018). A Platform to Evaluate Connected Vehicle Applications Using Hardware-in-the-Loop Simulation. Presented at the Transportation Research Board 97th Annual Meeting, Transportation Research Board.
- Das, S., Dutta, A., Jalayer, M., **Bibeka, A.**, & Wu, L. (2018). Factors Influencing the Patterns of Wrong-way Driving Crashes on Freeway Exit Ramps and Median Crossovers: Exploration using 'Eclat' Association Rules to Promote Safety. International Journal of Transportation Science and Technology.
- Lukus, M., Kuhn, B., Balke, K. **Bibeka, A.**, Florence, D., Sunkari, S. & Wood, N. (2019). Developing Geometric/Traffic Operations Guidance for Level 2 Automated Commercial Truck Platooning. Transportation Research Board 98th Annual Meeting, Transportation Research Board.

HONOR & AWARDS

Competent Communicator and Leader – Toastmasters International
Intelligent Transportation System (ITS) Scholarship 2016

LEADERSHIP

Sergeant at Arms – Toastmasters International (2017–2018)
Treasurer, TexITE – Texas A&M University Student Chapter (2014–2015)