KRISHNA MURTHY GURUMURTHY

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EDUCATION

The University of Texas at Austin, USA   *expected* May 2021

Doctor of Philosophy in Civil Engineering (*Transportation Engineering*)   GPA: 4.00 / 4.00

Current Courses   'Public Transportation Engineering' and 'Mathematical Statistics - I'

Courses   'Dynamic Traffic Assignment' and 'Bayesian Statistical Methods'

The University of Texas at Austin, USA   December 2017

Master of Science in Civil Engineering (*Transportation Engineering*)   GRE: V153 Q167 AW4.0   GPA: 3.81 / 4.00

Thesis   Perceptions and Preferences of Autonomous and Shared Autonomous Vehicles: A Focus on Dynamic Ride-Sharing

Courses   'Statistical Modeling I', 'Advanced Theory of Traffic Flow', 'Optimization 1', 'Design and Evaluation of Ground-based Transportation Systems', 'Sensors and Signal Interpretation', 'Transportation Network Analysis', 'Urban Transportation Planning' and 'Linear Regression and Discrete Choice Methods'

National Institute of Technology Karnataka (NITK), India   May 2016

Bachelor of Technology in Civil Engineering   GPA: 8.92 / 10.00

Courses   'Highway and Traffic Engineering', 'Railways, Tunnels, Harbors and Airports' and 'Traffic Engineering and Management'.

EXPERIENCE

Graduate Research Assistant   Supervisor: Dr. Kara Kockelman   Fall 2016 – Present

Responsible for an ANL project focusing on transportation planning/forecasting for autonomous vehicles   *UT Austin*

Research Aide – Technical   Supervisor: Dr. Joshua Auld   Summer 2018

Tasked with developing algorithms for the control of shared-automated vehicle fleets and implementing the control & optimization algorithms in ANL's POLARIS   *Argonne National Laboratory*

Graduate Teaching Assistant   Course Instructor: Dr. Kara Kockelman & Ms. Heidi Ross[*]   Spring 2017 & 2018[*]

Responsible for students' performance, grading, lab lectures (on MicroStation and GEOPAK) and final design-project outcome in a capstone course for transportation engineering   *UT Austin*

Project Research Intern   Supervisors: Drs. Tom V Mathew & Gowri Asaithambi   Spring 2016 – Summer 2016

Tasked with devising incorporating traffic models into existing simulation software   *IIT Bombay*

Summer Research Intern   Supervisor: Dr. Tom V Mathew   Summer 2015

Tasked with devising and programming microscopic traffic model and simulation software in MATLAB   *IIT Bombay*

PAPERS & PRESENTATIONS

- **Gurumurthy, K.M.**, Kockelman, K. and Simoni, M.D. 2018. Benefits & Costs of Ride-Sharing in Shared Automated Vehicles Across Austin, Texas: Opportunities for Congestion Pricing. Accepted for presentation at the 98th Annual Meeting of the Transportation Research Board and under review for publication in *Transportation Research Record*.

- Mahmoud, J., Auld, J., and **Gurumurthy, K.M.** 2018. Intra-Household Fully Automated Vehicles Assignment Problem: Model Development and Case Study. Under review for presentation at the 98th Annual Meeting of the Transportation Research Board.

- Simoni, Michele D., Kockelman, K., **Gurumurthy, K.M.** and Bischoff, J. 2018. Congestion Pricing in a World of Self-Driving Vehicles: An Analysis of Different Strategies in Alternative Future Scenarios. Under review for publication in *Transportation Research Part C: Emerging Technologies*.

- Becker, H., Becker, F., Abe, R., Bekhor, S., Belgiawan, P.F., Compostella, J., Frazzoli, E., Fulton, L.M., Garrick, N., Bicuda, D.G., **Gurumurthy, K.M.**, Hensher, D.A., Joubert, J.W., Kockelman, K.M., Kroger, L., Kuhnimhof, T., Vine, S.L., Malik, J., Marczuk, K., Nasution, R.A., Rich, J., Carrone, A.P., Shen, D., Shiftan, Y., Tirachini, A., Verdis, D., Wong, Y.Z., Zhang, M., Bosch, P.M. and Axhausen, K.W. 2018. Impact of Vehicle Automation and Eletric Propulsion on Production Costs for Mobility Services Worldwide. *Working Paper.*

- **Gurumurthy, K.M.** and Kockelman, K. 2018. Modeling Americans' Autonomous Vehicle Preferences: A Focus on Dynamic Ride-Sharing, Privacy & Long-Distance Mode Choices. Summary presented at the 2017 Automated Vehicles Symposium in San Francisco, California, 11-13 July, 2017 titled "Deeper Understanding of Americans' Autonomous

Vehicle Preferences: Questions on Long-Distance Travel, Ride-Sharing, Privacy, & Crash Ethics" and accepted for presentation at the 98th Annual Meeting of the Transportation Research Board.

- **Gurumurthy, K.M.** and Kockelman, K. 2018. Analyzing the Dynamic Ride-Sharing Potential for Shared Autonomous Vehicle Fleets using Cellphone Data from Orlando, Florida. *Computers, Environment and Urban Systems* 71: 177-185. DOI: https://doi.org/10.1016/j.compenvurbsys.2018.05.008.
- Kotagi, P., Asaithambi, G. and **Gurumurthy, K.M**. 2018. Development of Microscopic Simulation Model for Bidirectional Mixed Traffic on Urban Roads. Presented at the 97th Annual Meeting of the Transportation Research Board in Washington, D.C.
- Invited Speaker, at the Machine Intelligence in Autonomous Vehicles Summit held in San Francisco, presentation titled "Anticipating a World of Shared Fully-Automated Vehicles" on behalf of Dr. Kara Kockelman, 23-24 March, 2017.
- **Gurumurthy, K.M.**, Munigety, C.R., Peeta, S., Mathew, T.V. and Asaithambi, G. 2017. An Integrated Pedestrian Crossing Behavioural Model Using Spring-mass-damper Dynamics. Presented at the 96th Annual Meeting of the Transportation Research Board in Washington, D.C.
- **Gurumurthy, K.M.,** Singh, V. and Asaithambi, G. 2016. Microscopic Analysis of Lateral and Longitudinal Gaps in Mixed Traffic Conditions with Weak Lane Discipline. Presented at the 12th International Conference on Transportation Planning and Implementation Methodologies for Developing Countries in Mumbai, India.
- Munigety, C.R., Gupta, P.A., **Gurumurthy, K.M**., Peeta, S. and Mathew, T.V. 2016. Vehicle-type Dependent Car following Model Using Spring-mass-damper Dynamics for Heterogeneous Traffic. Presented at the 95th Annual Meeting of the Transportation Research Board in Washington, D.C.

SOFTWARE SKILLS

MATLAB • TransCAD • Java • Microsoft Office Suite • R • ArcGIS • C# • C++ • Python

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RESEARCH PROJECTS

Implementing Shared Autonomous Vehicles in POLARIS and Assessing the Impact of Dynamic Ride-Sharing in Chicago   Fall 2018 – Present
    Supervisor: Dr. Kara Kockelman (Sponsored by Argonne National Laboratory)   *UT Austin*

POLARIS, an agent-based discrete event simulator developed by the Argonne National Laboratory, is being enhanced to simulate shared autonomous vehicles with dynamic ride-sharing capabilities. Policies such as geofencing the service, predetermined pick-up and drop-off spots, and congestion pricing are being analyzed to understand the future of mobility.

Agent-Based Microsimulations of Shared Autonomous Vehicles in Austin using Dynamic Ride-Sharing on MATSim   Fall 2016 – Summer 2018
    Supervisor: Dr. Kara Kockelman (Sponsored by TxDOT)   *UT Austin*

MATSim (Multi-agent Transport Simulation), an agent-based simulation model was studied to include shared autonomous vehicle simulations. Tolling and AVs were incorporated into an existing SAV module. Several scenarios were run based on different congestion-pricing and fare policies with dynamic ride-sharing being an integral part of the analysis.

Nationwide Survey on the Implications of Autonomous Vehicles in the United States   Spring 2017 – Spring 2018
    Supervisor: Dr. Kara Kockelman (Sponsored by TxDOT)   *UT Austin*

A survey with around 70 questions was created to address various issues regarding autonomous vehicles. The main topics targeted in this survey were privacy, security and ethics and questions regarding dynamic ride-sharing. 2,588 respondents were acquired using a panel of Americans by Survey Sampling International.

Analyzing the Dynamic Ride-Sharing Potential for Shared Autonomous Vehicle Fleets Using Cellphone Data from Orlando, Florida   Spring 2017 – Spring 2018
    Supervisor: Dr. Kara Kockelman (Sponsored by TxDOT)   *UT Austin*

Cellphone data obtained for Orlando was spatially and temporally disaggregated to have a resolution of one minute and intersection-level detail. Disaggregated data was used to assess the dynamic ride-sharing potential for the region by comparing origin-destination versus en route dynamic ride-sharing. A simulation of a fleet of autonomous vehicles was used to estimate optimal fleet sizes for the region.

Estimating a Car-Following Model Based on Spring-Mass-Damper Dynamics using NGSIM Data   Fall 2017
    Supervisor: Dr. Christian Claudel (In a graduate course: CE 391F)   *UT Austin*

An open-source dataset for vehicle trajectories by NGSIM has been used to develop a microscopic car-following model. Model formulation was carried out based on an existing Spring-Mass-Damper based dynamics with certain alterations. Then, data fitting was carried out using non-linear optimization in MATLAB.

Evaluating Traffic Characteristics by Mining IMU Data: An Exploratory Study Spring 2017
    Supervisor: Dr. Christian Claudel (In a graduate course: CE 397) *UT Austin*

Inertial Measurement Unit (IMU) fitted with a GPS device was used to collect 3-4 hours' worth of data over a period of 7 days. Data was cleaned and processed to ensure segmented continuity and an unsupervised machine learning model was applied. The predictive power of certain pitch and acceleration variables from the IMU was high. The project concluded that better data collection efforts and data tagging can ensure high prediction of traffic characteristics using an IMU.

Travel Demand Modeling using TransCAD Fall 2016
    Supervisor: Dr. Kara Kockelman (In a graduate course: CE 391H) *UT Austin*

CAMPO Data was used to carry out Travel Demand Modeling in the 6-county region of Austin. Various scenarios were developed and their feasibility was tested. Increasing parking costs in the Central Business District was concluded as a viable scenario to mitigate congestions.

A Path-Based Incentive Approach to Achieving System Optimum Fall 2016
    Supervisor: Dr. Stephen Boyles (In a graduate course: CE 392C) *UT Austin*

A mathematical model with equilibrium constraints was developed to achieve system optimum. Budgeted allocation of path-based incentives was analyzed. Significant reductions in travel times based on economic use of funds was the typical end product.

Framework for Various Traffic Models under Mixed Traffic Conditions Fall 2015 – Spring 2016
    Supervisors: Dr. Gowri Asaithambi & Dr. Tom V Mathew *NITK & IIT Bombay*

Previous simulation models under mixed traffic conditions were studied to identify important parameters affecting similar conditions. Models for pedestrian crossing, uncontrolled intersections were formulated and executed.

Quantitative Determination of Vehicle Influence in Mixed Traffic Conditions Fall 2015
    Supervisor: Dr. Gowri Asaithambi *NITK*

Open access mixed traffic trajectory data collected in Chennai, India was used in this project. Vehicle type dependency and factors affecting the influence was analyzed. Sensitivity analysis was conducted to check the effect of influential parameters.

Modeling Mid-Block Sections under Mixed Traffic Conditions Summer 2015
    Supervisor: Dr. Tom V Mathew *IIT Bombay*

The traffic model was theorized based on spring-mass-damper dynamics for integrated movement. Microscopic model for a single vehicle was implemented in Excel and then extrapolated as a Simulator using MATLAB. Extensive test cases were conducted to verify the robustness of the model.

CO-CURRICULARS & VOLUNTEERING

Member & Ex-Officer, Women's Transportation Seminars, UT Austin Student Chapter Fall 2017 – Present
Member & Past President, Institute of Transportation Engineers, UT Austin Student Chapter Fall 2016 – Present
Member & Ex-Officer, Intelligent Transportation Society of America, UT Austin Student Chapter Fall 2016 – Present
Mentor, Graduates Linked with Undergraduates in Engineering (GLUE) Fall 2017
Lead Event Organizer, Texas Student Leadership Summit Fall 2017
Member, ASCE UT Austin Chapter Spring 2017 – Fall 2017
Core Team Member, UT Austin Traffic Bowl Team Spring 2017 – Summer 2017
Volunteer, Clean-up drive organized by Capital Area Section – ITE Spring 2017
Executive Member, ASCE NITK Students' Chapter Spring 2014 – Spring 2016
Joint Convener, Civil Events Committee in 'ENGINEER' Fall 2015
Executive Member, Institution of Engineers – NITK Chapter Fall 2013 – Spring 2016

PEER REVIEWER - JOURNALS

Transportation Research – Part B, Part C • *Computers, Environment and Urban Systems* • *Transport Policy* • *Transportation* • *Transportation Research Record: Journal of the Transportation Research Board*

AWARDS & ACHIEVEMENTS

- Awarded the Graduate Research Award by the Airport Cooperative Research Program for the period 2018-19
- Awarded the CAS-ITE and ITS Texas scholarships in 2017.
- Awarded the Texas district ITE Fellowship award in 2017.
- Part of the UT Austin Traffic Bowl Team that won the Texas district championship in Spring 2017 and came second in the International championships in Summer 2017
- Won the "Best Paper Award" at a student-run symposium called "AAKAAR" at IIT Bombay for presenting a paper titled "Quantitative Determination of Vehicle Influence in Mixed Traffic Conditions".

MENTEES

Hyungseung (Jeffrey) Hahm • Evelyn Reyes (GLUE)