Saipraneeth Devunuri
Apt 304, 1004 W Main, Urbana, Illinois, 61801
+1-(979)-676-6670
sd37@illinois.edu

Education

University of Illinois at Urbana Champaign, Urbana, IL — *Aug 2020 – Present*

Doctor of Philosophy in Civil Engineering – Transportation Engineering, GPA: 4.0/4.0

Texas A&M University, College Station, TX — *Aug 2018 – Aug 2020*

Master of Science in Civil Engineering – Transportation Engineering, GPA: 4.0/4.0

Indian Institute of Technology Madras, Chennai, India — *Jul 2014 – Jun 2018*

Bachelor of Technology in Civil Engineering, Minor – Management Studies, CGPA: 8.44/10

Academic Publications

- **S.Devunuri**, S.Qiam, L.Lehe and A.Pandey ; "Bus Stop Spacing Statistics: Theory and Evidence, Transportation Research Record (2022)[*Under review*].
- Liu, **Devunuri**, Lehe, and Gayah ; "Scale Effects in Ridesplitting: A Case Study of the City of Chicago, Transportation Research Record (2022)[*Under review*].
- Kulkarni, S., Singh, S., Balakrishnan, D., Sharma, **S., Devunuri**, S., & Korlapati, S. C. R. (2022). CrackSeg9k: A Collection and Benchmark for Crack Segmentation Datasets and Frameworks. arXiv preprint.
- Hosseini, M. K., Talebpour, A., **Devunuri, S.**, & Hamdar, S. H. (2022). An unsupervised learning framework for detecting adaptive cruise control operated vehicles in a vehicle trajectory data. Expert Systems with Applications, 118060.
- Lehe, L. J., **Devunuri, S.** (2021). Large Elasticity at Introduction. Research in Transportation Economics, 101116.
- Lehe, L., **Devunuri, S.**, Rondan, J., & Pandey, A. (2021). Taxation of Ride-hailing (No. FHWA-ICT-21-029).

Conference Presentation

- **Devunuri**; Jhamb; MW Burris; "Examining cost aspects of shared autonomous vehicles (SAV) as mobility as a service (MaaS)", Transportation Research Board 2020
- Khajeh Hosseini; **Devunuri**; Talebpour; Hamdar; "Vehicle Trajectory Data Collection Using Aerial Videography", Transportation Research Board 2020
- A Nayak; **Devunuri**; Liu; and Rathinam; "Response of Autonomous Vehicles to Emergency Vehicles (RAVEV)", 4th Annual Texas A&M Transportation Technology Conference on connected and automated vehicle (CAV) research - 2019
- **Devunuri**; Vanajakshi, Lelitha; Chilukuri, Bhargava; "Image Processing Techniques for Traffic Data Extraction from Aerial Imagery", Urban Mobility India Symposium – 2017, Hyderabad, India
- Chilamkurthy; **Devunuri**; "Automation of Glass Fragmentation Analysis Using Image Processing", International Conference on Civil Engineering (ICCEN 2017), Australia

Professional Experience

Texas A&M Transportation Institute - Pelican Movement Model

- Aggregated and cleansed time-series sensor data collected from 900 pelicans over a period of 2 years
- Analyzed the activity of birds and identified the daily, weekly, and monthly bird movement patterns
- Developed a predictive movement model using Hidden Markov Models and regression analysis
- Identified 4 hotspots where pelicans cross highways frequently and suggested modifications to SH 48 (TX)

ITS Planners and Engineers Pvt. Ltd.

- Designed and Developed Incident Reporting and Management system following guidelines of National Highways Authority of India
- Implemented route mapping to find the shortest path in case of emergencies and integrated it with EMS interfaces
- Created an interface to control camera remotely and detect number plate of vehicles

Teaching Experience

University of Illinois at Urbana Champaign

- *Teaching Assistant*, CEE 201 - Systems Engineering & Economics - Fall 2022
- *Teaching Assistant*, CEE 310 - Introduction of Transportation Engineering, Fall 2021

Research and Academic Projects

Bus Stop Spacings Statistics: Theory and Evidence

- Devised a new theory to calculate stop spacings statistics under different weighting schemes
- Curated transit schedules from over 500 transit agencies and obtained their spacing statistics
- Developed a python package 'gtfs-segments' that can analyze spacings, generate maps and tabulate data.

Investigating Factors that Influence Vehicular Emissions

- Explored EPA - Light Motor Vehicle(LMV) dataset consisting of over 250k vehicles with 55 variables describing vehicle properties, manufacturing processes, and testing procedures for emissions
- Performed pre-processing to clean the dataset and exploratory data analysis to identify the relevant variables
- Modeled emissions using Ordinary Least Squares with categorical variables that had RMSE$<$ 50g/mile and $R^2 > 0.80$

Optimizing the Collection Operations of Covid Test Samples

- Devised a model that encapsulates various testing, inventory, transportation and operation costs
- Formulated the problem as MIP with non-linear constraints and solved using Sweep & Ring-sweep algorithms
- Reduced the total costs by 13%(˜$25000/week) using Genetic Algorithm with local perturbations

Drone Routing in Conjunction with Transit Network

- Formulated the problem as a Stochastic Dynamic Program on a graph network considering energy vs time trade-offs
- Created a simulation, modelled after San Francisco to emulate drone and transit routing on the network
- Achieved $\tilde{8}5\%$ success rate in delivering $\tilde{1}0$ packages/drone/day with an average trip length of $\tilde{5}$ miles

Response of Autonomous Vehicles to Emergency Vehicles (RAVEV)

- Prepared image and sound datasets for emergency vehicles, and trained Keras classifier
- Integrated detection algorithms with path planning and controls using Robot Operating System (ROS)
- Conducted experiments on high-speed autonomous vehicle (up to 70 mph) to avoid obstacles, and respond to emergency vehicles (EV) in real-time
- Presented research poster at 4th Annual Texas A&M Transportation Technology Conference on Connected and Automated Vehicle (CAV) Research.

Examining Cost Aspects of Shared Autonomous Vehicles as MaaS

- The focus of this study was to evaluate pricing schemes for subscription autonomous ride-sharing system considering cost aspects
- Generated Origin-Destination matrix for Austin city using ArcGIS and integrated it with a grid-based network
- Developed an autonomous ride-sharing simulation with dynamic trip generation and allocation scheme algorithms
- Evaluated the pricing scheme for MaaS to compete with vehicle ownership and other ride-sharing services
- Accepted for presentation at Transportation Research Board (TRB) 2020 and in review for publication

Traffic Signal Control using Reinforcement Learning

- The aim of this project is to build an autonomous agent which operates on the idea of envy-minimizing traffic signal and tries to minimize the envy of users in a traffic grid
- Applied Deep Q-learning with prioritized experience replay and target network to train an agent that minimizes wait-times, emissions and increase throughput

Image Processing Techniques for Traffic Data Extraction from Aerial Imagery

- Proposed a novel image processing algorithms on a drone-based video in an Indian Scenario to detect mixed-traffic
- Otsu thresholding, edge detection, and morphological operations were implemented for vehicle detection
- Support vector machine was used for classification of vehicles into two-wheeler, light and heavy motor vehicles
- Presented research work at Urban Mobility India Symposium – 2017

Academic Honours

- *Runner Up*, Intelligent Water Systems Challenge, IWEA, 2022
- *DeLeuw Travel Fellowship*, Dept of Civil Engineering, UIUC, 2022
- *Teaching Assistant*, CEE310- Introduction of Transportation Engineering, UIUC, 2021
- *Graduate Research Assistant*, Dept of Mechanical Engineering, TAMU, 2019
- *Institute for Transportation Engineers District Fellowship*, Texas District ITE, 2019
- *Civil Engineering General Departmental Fellowship*, Texas A&M University, 2019
- *Theodore Edward Ziller Fellowship*,Dept of Civil Engineering, Texas A&M University, 2018
- *Best Student with All Round Performance*, Civil Engineering Association, IIT Madras, 2018

Courses (* Ongoing)

University of Illinois at Urbana-Champaign

- Learning Methods *
- Statistical Learning
- Transportation Economics
- Public Transportation Systems
- Data Science for CEE
- Logistic Systems Analysis
- Optimizations Methods for Large Scale Networks

- Game Theory and Fair Division
- Micro Economic Theory 1
- Urban Transportation Models

Texas A&M University

- Robotic Perception
- Reinforcement Learning
- Architecture for Autonomous Vehicles
- Transportation Economics
- Traffic Engineering: Operations
- Traffic Engineering: Characteristics
- Street & Highway Design
- Seminar - Transportation Engineering
- Engineering & Planning Urban Transportation

Online - Udacity

- Self-Driving Car Engineer
- Reinforcement Learning
- Introduction to Computer Vision

IIT Madras

- Computer Applications in Traffic and Highway Engineering
- Intelligent Transportation Systems
- Transportation Network Analysis
- Computer Methods in Civil Engineering
- Discovering Creativity
- Principles of Economics
  Principles of Management
- Probability, Statistics and Stochastic Processes
- Calculus - Function of Single and Several Variables

Technical and Other Skills

Programming Languages: Python, R, C++, JavaScript
Packages & Tools: SUMO, ROS, Keras, TensorFlow, Pandas, NumPy, OpenCV
Software: Git, AutoCAD, ArcGIS, LaTeX, Revit, NavisWorks
Languages: English, Hindi & Telugu

Other Activities

Autodrive Challenge
Mentor – Perception Team

- Used an ensemble of Image processing algorithms to identify parking spots for autonomous vehicles
- Presented social responsibility report portraying challenges for AV w.r.t human-vehicle interaction, ethical issues, costs, and societal acceptance in future
- Secured 3rd place in the Year 2 of competition consisting of various Static and Dynamic events conductednfo

TAMU ITE Student Chapter
Webmaster & Publicist

- Member of Traffic Bowl team representing Texas A&M University
- Designed flyers for technical meetings and workshop
- Maintained the social media accounts and website for the chapter
- Actively participated in the lectures, workshops and other social activities

Institute Webops & Mobops, IIT Madras
Head & Mentor

- Headed a team 8 students that developed "IIT Madras Students App", which has over 8000 downloads with 4.7 rating
- Developed dynamic and flexible backend architecture, and optimized data consumption