

# Brief Research Statement

## Dipesh Lamsal

I am a prospective graduate student in Transportation Engineering with a strong interest in traffic operations and safety, particularly in understanding and modeling traffic system behaviour to support data-driven decision making. I recently completed my Bachelor of Civil Engineering from the School of Engineering, Pokhara University, where my academic training and undergraduate research focused on traffic flow characteristics, speed variability, congestion, and intersection-level performance under mixed-traffic conditions.

My primary research interest lies in traffic operations and safety analysis at urban intersections and corridors, with an emphasis on how traffic flow characteristics, speed dispersion, and demand variability influence safety outcomes. During my undergraduate research, I conducted a comprehensive field-based transportation study at the Zero KM intersection in Pokhara, Nepal which is a major urban junction dominated by mixed traffic, particularly two-wheelers. This work involved classified traffic volume surveys, Passenger Car Unit (PCU)-based flow analysis, spot speed studies, and percentile-based speed analysis (15th, 50th, 85th, and 98th percentiles). Through this experience, I developed a strong interest in understanding congestion-prone conditions, speed variability, and their operational and safety implications.

Building on this foundation, I am particularly interested in traffic flow modeling and short-term operational performance analysis, including the use of data-driven methods to capture uncertainty in traffic demand and speed behaviour. I am motivated to explore how traffic flow parameters and demand fluctuations can be used to support operational control strategies and proactive safety evaluation at intersections and along urban corridors. I am also interested in extending traditional field-based traffic analysis by incorporating larger datasets and predictive approaches for short-term traffic operations.

Another area of interest is multimodal traffic safety in mixed-traffic environments, where interactions between vehicles, two-wheelers, pedestrians, and bicycles create complex safety challenges. My undergraduate work exposed me to the limitations of conventional safety evaluation in such contexts, motivating my interest in surrogate safety measures and data-driven approaches for identifying safety-critical conditions before crashes occur. I am keen to contribute to research that uses traffic flow and speed characteristics to better understand and improve multimodal safety outcomes.

At the graduate level, I aim to strengthen my methodological skills in traffic flow modeling, statistical analysis, and transportation data analytics, and to apply these tools to operations- and safety-oriented research problems. I am particularly interested in contributing to research on traffic operations, uncertainty-aware prediction, and safety analysis under your guidance, and in working on projects that combine field data with analytical and computational approaches.

My long-term goal is to develop expertise in transportation operations and safety research that can inform practical, data-driven solutions for urban mobility challenges, particularly in rapidly growing cities with heterogeneous traffic conditions.