



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Assessing the safety of mixed traffic on rural highways is essential since the traffic fatalities on such road facilities are disproportionately higher. Still the safety studies are very limited, especially analyzing the detailed driver behavior that leads to crashes. This study addresses the challenge of road traffic safety by utilizing naturalistic driving data collected through unmanned aerial vehicles (UAVs) and fixed video cameras on divided and undivided rural highways passing through flat and mountainous terrain, particularly in low- and middle-income countries (LMICs) like India. Surrogate safety measures (SSMs) are employed to assess safety by identifying conflicts as observable non-crash events. A multidimensional conflict indicator called anticipated collision time (ACT) is used to capture various conflict types associated with mixed traffic. The analysis reveals that sideswipe conflicts are more of a safety concern than rear end conflicts on low-volume multilane rural highways, while run-off-road (ROR) conflicts involving single vehicles are more of a safety concern on the curved segments of undivided highways in mountainous terrains. Crash risk is estimated using extreme value theory (EVT) by extrapolating crashes from severe traffic conflicts. Powered two-wheelers (PTWs) exhibit significantly higher sideswipe crash risk on multilane highways, emphasizing their vulnerability in mixed traffic conditions. Heavy commercial vehicles (HCVs) experience a significant ROR crash risk on rural curved segments of undivided mountainous highways. Microscopic variables such as evasive actions are incorporated to enhance crash risk estimates, showing the influence of braking and steering rates on sideswipe crash risk. Various road geometry factors are incorporated to improve the ROR crash risk estimates. The findings highlight the need for appropriate infrastructure design, considering the specific characteristics of different conflict types and vehicle types, to improve road safety.