

## **Comprehensive Study of Probability Distributions to Enhance Controllability Simulations to Introduce Autonomous Emergency Braking (AEBS) Feature in India**

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**Abstract :** India is a diverse country in terms of road conditions, road maintenance, traffic conditions, traffic density, quality of traffic which implies presence of agricultural tractors, bullock carts, 3 wheelers, motor bikes, oncoming traffic in same lane, vulnerable road users (VRU's) crossing roads without using pedestrian crossings etc. as additional traffic quality deterrents in comparison to developed countries. The driving pattern of such vivid road users may not be at par with global approximations adopted in developing features like AEBS (Autonomous Emergency Braking). For developing an entangled feature like AEBS for Indian traffic conditions, one must adapt different methodologies than to the conventions that exist as a global practice. The paper provides the reaction time and time gap data of Indian roads across various categories of vehicle. The paper deals with the mathematical approximations of different probability bivariant models to closely represent the data, which was acquired by collecting and analyzing data of random actual vehicle data on Indian roads. A case study to demonstrate the adoption of different probability models based on Monte Carlo simulations shall be provided to calculate the controllability by analyzing a better fit for the Indian road user driving pattern simulation.

**Keywords :** autonomous emergency braking, Monte Carlo simulations, probability bivariant models, vulnerable road users

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