

Peer Review

Review of: "Advancing Autonomous Vehicle Safety: A Combined Fault Tree Analysis and Bayesian Network Approach"

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This paper tackles a critical issue in the development of autonomous vehicles (AVs): how to systematically evaluate and mitigate the risk of collisions due to failures in complex subsystems. What makes this work compelling is its integration of two well-established safety analysis techniques—Fault Tree Analysis (FTA) and Bayesian Networks (BN)—into a hybrid framework that not only decomposes failure paths logically but also adapts dynamically to new data.

The authors decompose the AV architecture into four core subsystems: sensors, perception, decision-making, and motion control. They then construct a fault tree using collision as the top-level failure event and apply Bayesian inference to continuously update the probabilities of subsystem failures. This dual approach allows the model to be both interpretable and responsive, which is a big step forward from traditional static risk models.

Importantly, the authors go beyond diagnosis. They propose clear, subsystem-specific mitigation strategies—from improving AI training for rare events to incorporating redundancy in braking and steering systems—making the research not only rigorous but also practically useful for AV developers.

Declarations

Potential competing interests: No potential competing interests to declare.