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(57) Abstract :
 The present invention discloses a machine learning-based predictive failure detection framework (100) for autonomous vehicles, comprising a Data Acquisition Module (101), Multi-Sensor Data Fusion Engine (102), Predictive Modeling Unit (103), Real-Time Context Analyzer (104), Adaptive Retraining Mechanism (105), and Failure Alert and Response System (106). The invention enables real-time monitoring, context-aware prediction, and preventive actions to mitigate potential system failures. It enhances autonomous driving safety by offering adaptive learning and early intervention mechanisms based on dynamic operational data.

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