Risk on Risk Off Sensor System

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Abstract
Currently, many AI auto-driving pipeline models are used to control cars and advance autonomous vehicle technology, but they remain insufficient in safety and engagement, leading to many of tragic in automotive accidents, especially in autonomous driving. To address this issue, this research proposes a Risk-on-Risk-Off (RoRo) model to enhance safety in autonomous driving, particularly for the future Aerial Vehicle industry. We aim to benefit the world and enhance safety for all citizens.

Keywords: Risk On Risk Off System (RoRo), Automotive Driving, Automatic Stabilizer.

Introduction:

Recently, there has been a notable rise in incidents involving autonomous vehicles. Current autonomous driving systems predominantly prioritize route-oriented objectives such as efficient route completion, often at the expense of comprehensive safety. This oversight has contributed to a higher incidence of traffic accidents attributable to insufficient emphasis on auto-driving behaviors [1][2]. To address these critical issues, this research paper suggests an innovative approach to safety-critical autonomous driving, specifically tailored for vehicles as well as aerial vehicles.

Numerous artificial intelligence (AI) models are employed within autonomous driving pipelines to facilitate vehicle control and advance the development of intelligent transportation systems. Despite significant progress, these models exhibit notable limitations in terms of safety robustness and driver engagement, which contribute to a substantial number of automotive accidents, particularly in scenarios involving autonomous vehicle operation. To mitigate these issues, this research introduces a novel Risk-on-Risk-Off (RoRo) modelling framework designed to enhance safety assurance mechanisms in autonomous systems, with a specific focus on the emerging flying car industry. The proposed framework leverages adaptive risk management techniques, integrating probabilistic modelling, real-time sensor fusion, and machine learning-based hazard prediction to assess and respond to evolving operational risks dynamically. The ultimate goal is to contribute to safer autonomous mobility solutions, thereby benefiting societal transportation safety and supporting the next-generation aerial personal mobility devices.

The risk-on risk-off (RoRo) model in road safety describes how road users change their behaviors based on different conditions. It shows how drivers and pedestrians switch between risky (risk-on) and cautious (risk-off) actions depending on the environment and situation. Our (RoRo) model helps explain the cyclical decision-making of road users and supports the creation of interventions that promote longer risk-off periods to reduce crashes. Overall, integrating risk-on, risk-off dynamics into road safety plans underscores the need for behavioral changes alongside engineering and policy efforts to reduce road traffic accidents.

Methodology:

Our proposed methodology employs our novel risk-on-risk-off sensor framework, leveraging advanced sensor fusion and probabilistic risk assessment models to modulate driving behaviors based on contextual risk levels dynamically. This paradigm shift aims to enhance vehicular safety robustness by integrating real-time sensor data with risk management strategies, thereby improving operational safety margins in complex, unpredictable environments.

Literature Review:

Studies have reviewed that dangerous behaviors emerge in contexts of lower perceived threat, leading to risk-taking such as speeding or distracted driving. We aid in understanding the cyclical nature of road user decision-making and support the design of our Risk On Risk Off (RoRo) System, which is an automatic stabilizer interventions that encourage prolonged risk-off states to reduce crashes. Ultimately, our risk-on risk-off dynamics in road safety strategies highlight the importance of adaptations alongside engineering and automatic stabilizer measures to reducing road traffic crashes and injuries [1][2][3][4][5][6].

Discussion:

Nowadays, although the motor industry often employs the OT to the PT and pipeline method auto-driving approach, it is insufficient for operating in the real world. Clearly, driving safety measurement should come first.

In real-world scenarios, especially in sudden road cases outside the setup menu, malfunctions can occur when a function is performed under casualty conditions. To address this issue, we're introducing a new method called the Risk on Risk off Motor Sensor System. This model accounts for both expected and unexpected scenarios. Instead of relying solely on pipeline systems on both the front and back of the vehicle, we have developed a close safety distance mode. When a vehicle gets too close, this mode activates the risk-on system. The sensor then analyzes whether the vehicle is within a dangerous proximity, enabling strategies that help protect the vehicle and passengers.

This risk-on, risk-off strategy is not only suitable for the current case, but it is also applicable to unexpected scenarios, particularly in avoiding a traffic accident.

Some may say, this autonomous driving model already exists in the car industry, but the traditional auto driving car approach focuses only on the driving site-to-site destination; they usually ignore situations like unexpected events, approach, and the car crash moment event. (This RoRo model is suitable for the car and the Aerial machine).

Our innovative system have 6 sensor, that will detect the whole ground situation, in between, the safety distance of the opposite car, so, when the distance in our car and the opposite car too close enough (to crash), the Risk on signal will detected, and our innovative Risk off system, will then computation the risk of the selection, so, the auto mate of the risk off takeover system will alert.

Our (RoRo) System employs a probabilistic framework as a foundational risk anchor to systematically evaluate Road Path Risk over a temporal horizon. The model incorporates a series of natural logarithmic transformations to precisely estimate the state level within a tiered analytical structure, thereby facilitating the calculation of selection risk. Initially, the model establishes a steady-state condition, serving as a baseline for risk levels. Subsequently, a trend component is integrated to simulate potential evolutionary pathways of risk dynamically and systematically. To enhance the robustness of the risk assessment, the model imposes a transition dynamics mechanism designed to mitigate the likelihood of car crashes. Notably, this conceptual framework is adaptable and exhibits applicability to emerging transportation modalities such as cars and Aerial vehicles.

Likelihood of the Car Crash Risk Anchor

$$\left| \ ln\left[\frac{Expected\ Car\ Crash\ Risk - Actual\ Car\ Crash\ Risk}{Mean\ of\ Expected\ Car\ Crash\ Risk} \times 100\%\right] \ \right|$$

A lower value indicates higher danger, while a higher value suggests greater safety

Safe	Tier 1	2.4
Non-Safe	Tier 2	1.1
Crash	Tier 3	0.1

Figure 1: The likelihood of the Car Crash Risk Anchor in a tiered approach

Therefore, the Risk-off system will then calculate the expected case and the unexpected case, and subsequently compute the optimal Risk-off (Car driver & Aerial vehicle) solution. That is, we call it an automatic stabilizer system.

Suggestion:

Automatic Stabilizer System (RoRo)

This innovative method is essential for vehicle safety and can also integrate with other driving systems. As long as the distance alarm signal is active, the Risk Off system will take control, provided the situation is safe.

Additionally, the Risk-On Risk-Off system has a unique brake system. When another vehicle tries to hit ours, the auto-brake system alerts us before a collision occurs. This risk-on, risk-off system is paired with the auto brake system that also operates on the risk-on, risk-off principle.

When the distance of the other car gets too close to our vehicle in front, our Risk On Risk Off Model of the auto brake system will alert us. The Risk Off system will then activate to prevent a crash.

Our innovative Risk On Risk Off sensor alert brake system is accompanied by our Risk On Risk Off Method approach, which relies on the sensor detection of the safety distance of the car-to-car distance. When it appears to be a high-risk distance, our sensor system will alert, and the Risk on/Risk off mode will activate. The computation of Expected and Observed events will conduct an analysis to improve the speed of car control and the safety distance application.

<table>
<tr><td colspan="7">Authentic Risk On Risk Off Model</td></tr>
<tr><td>The Latest Road Risk Ratings</td><td>⇨</td><td>Authentic Road Review</td><td>⇨</td><td>Road Safety Ratings & Access</td><td>⇨</td><td>N-Objectives (Car) and Other Object Particulars</td></tr>
<tr><td colspan="4">Allocation & Road Data (Risk)</td><td colspan="3">Unit Road Anchor Data, Startup Ratios, & Simulation Analysis</td></tr>
</table>

Figure 2: Authentic Framework in the Risk On Risk Off (RORO) Model

So, when the opposing car is ahead from our car, our auto motion in Risk On Risk Off mode will alert, and the auto brake system will start, until a safe distance is reached.

In addition, our Risk On Risk Off (RoRo) paradigm offers a versatile framework adaptable to a diverse array of conditions, unlike conventional models that predominantly emphasize pt to pt features. Our new approach, can focus more on distance-to-distance safety metrics. This enhanced approach leverages advanced road-path risk assessment techniques, incorporating sophisticated statistical and computational methodologies characteristic of road-safety standards in high-performance computing and data analysis, to improve the robustness and predictive accuracy of risk evaluation across varying temporal and different regimes.

Furthermore, our proprietary Innovation Risk On Risk Off (RoRo) model uses advanced algorithms for real-time monitoring and proactive crisis detection. By leveraging machine learning and high-frequency analysis of road data, the system can identify potential instability or irregularities with minimal delay. When a risk event is detected, the model automatically initiates suspension protocols to reduce speed, maintaining system resilience and operational reliability.

In conclusion:

'Risk On' and 'Risk Off' (RoRo) systems are essential concepts when guiding emerging technologies such as advanced automotive safety systems. We highlight the importance of strategic risk management and real-world situation analysis in adopting our new transportation safety solutions. The (RoRo) senser architecture allows for quick responses and high reliability through practical deployment in complex environments. Our (RoRo) System is an automatic stabilizer intervention that encourages prolonged risk-off states to reduce crashes. Its design complies with industry safety standards and incorporates cutting-edge system availability. Hopefully, this research benefits the world and humanity.

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