



차량 시스템 & 제도



차량 안정성 향상을 위한 타이어 마모 수명 조기 예측

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Proactive Prediction Method for Tire Wear Mileage to Enhance Vehicle Safety

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Key Words : Tread wear(트레드 마모), Mileage(주행거리), RandomForest(랜덤 포레스트), Safety(안전)

ABSTRACT

Tire wear is mostly evaluated using vehicles, which requires a test period of 1 to 2 months. Tread depth is recorded after a regular intervals, and the final predicted mileage is calculated at the end of the test. Although abrasion is also measured using tire weight, tread depth measurement is useful for predicting uneven wear and weak points of the tread pattern. Tread patterns that change due to wear are important factors for vehicle stability and wet handling. Especially, Tire wear is becoming increasingly important in autonomous vehicles, as it can cause unstable control due to reduced road contact, irregular vibrations and increased braking distance on roads. Initial prediction of wear performance can offer various benefits, such as reduced test costs and decreased safety risks for drivers. Although conventional regression analysis is often used for wear prediction, non-linear and low predictability of wear, and the need for a minimum of two or more data for prediction, it is used as a reference value. In this paper, we utilized Random Forest, a machine learning technique to predict tire wear mileage. To increase predictability, major wear factors were utilized, and also initial wear data was used for cost-effectiveness. Finally, the validity of the machine learning prediction method was confirmed through comparison with conventional regression and statistical analysis methods.

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주행특성 분석 기술을 이용한 스마트 타이어 시스템 성능향상에 관한 연구

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Study on Enhancing the Performance of Smart Tire Systems Using Driving Behavior Analysis Technology

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Key Words : Smart Tire System(스마트 타이어 시스템), Driving Behavior(주행 특성), IMU(관성측정장치), On-road Experiment(실차 시험), Vehicle Dynamics(차량 거동)

ABSTRACT

Smart tire systems are an important technology for improving vehicle safety and driving performance. However, most current systems mainly use pressure and temperature data from inside the tire. This is not enough to clearly understand important factors like tire wear, load changes, and road surface conditions. To improve the system, it is helpful to include driving behavior data that shows how the vehicle moves during driving.

In this study, we developed a system that measures real-time vehicle dynamics using an Inertial Measurement Unit (IMU) sensor to capture acceleration and yaw, and a GPS sensor to measure speed. The system collects data during actual driving conditions, focusing on events such as acceleration, deceleration, and turning. From the collected data, key driving indicators such as acceleration, yaw angle, and jerk were extracted and compared against those measured by a high-precision reference sensor to evaluate accuracy and reliability.

Field tests demonstrated that the proposed system achieved more than 90% similarity in signal patterns, indicating sufficient performance in on-road conditions. The proposed technology shows strong potential for future applications such as tire wear prediction, driver behavior analysis, and vehicle stress evaluation in smart mobility platforms.

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CarMaker를 이용한 Euro NCAP 2026 프로세스 대응

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Implementation of Euro NCAP 2026 Protocols Using CarMaker Simulation Environment

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Key Words : Euro NCAP, Virtual Testing(가상 테스트), Virtual Driving Environment(가상 주행 환경), CarMaker (카메이커), Simulation(시뮬레이션)

ABSTRACT

In recent vehicle safety assessments, the significance of simulation-based approaches has been steadily increasing. Among the four evaluation areas defined by Euro NCAP, the Crash avoidance area introduces the VTA framework to evaluate Advanced Driver Assistance Systems (ADAS). This study presents the implementation and automation of a virtual simulation environment using CarMaker, incorporating diverse road models and scenarios to conduct VTA. This process includes In-house Qualification to validate the simulation tool and Final Scoring. Through this approach, this paper illustrates how CarMaker can be effectively utilized to fulfill the requirements of Euro NCAP 2026.

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주요국 자동차인증제도 및 인증산업에 대한 고찰과 시사점

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A Study on Vehicle Type-Approval Systems and the Homologation Industry in Major Countries: Implications and Insights

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Key Words : Vehicle Type-Approval Systems(자동차인증제도), Component Type-Approval System(부품인증제도), Technical Service(기술서비스기관, 인증기관), Approval authority(인증당국), 1958 Agreement(1958협정), Homologation Industry(인증산업), Testing Lab.(시험소), Type Approval(형식승인), Self-Certification(자기인증)

ABSTRACT

Until now, homologation in the automotive sector has largely been addressed from an institutional perspective by the relevant stakeholders, and this perspective is expected to remain to some extent in the future. Since 2003, Korea has operated a self-certification system, under which certification is structurally limited from being regarded as an industry in its own right. By contrast, under the type-approval system adopted in most countries worldwide, homologation is considered an industry, and in fact its scale is already significant. Furthermore, with the advent of electric vehicles and automated driving, the potential for expansion of the homologation industry is growing even greater. Against this background, the present study compares the approval systems and the scale of the homologation industry in major countries, with the aim of examining the future direction of Korea's regulatory framework from an industrial perspective and identifying appropriate responses.

지금까지 인증은 관련자들에 의해 제도적 관점에서 다루어지고 있고, 앞으로도 그 관점은 일정부분 유지될 것으로 예상된다. 한국은 2003년부터 자기인증제도를 운용 중에 있으며, 이 제도하에서 인증은 산업으로 여겨지기 어려운 구조적 한계가 있다. 그러나, 전세계 대부분의 국가가 채택하고 있는 형식승인제도하에서는 인증이 하나의 산업으로 여겨지고 있으며 실제 그 규모도 상당하다. 또한 전기차, 자율주행차 시대가 도래하면서 인증산업의 확대가능성은 더욱 커지고 있다. 따라서, 주요국가의 인증제도와 그에 따른 인증산업 규모를 비교고찰하여, 향후 한국 인증제도의 나아갈 방향을 산업적 측면에서 바라보고 대응하기위해 본 연구를 진행하였다.

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친환경 저상버스 도입 과제에 관한 실증연구; 도입 과제 우선순위를 중심으로

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An Empirical Study on the Introduction of Eco-Friendly Low-Floor Buses - Focusing on Prioritizing Challenges in Introduction

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Key Words : Eco-friendly low-floor bus(친환경 저상버스), 도입(Introducing), Charging infrastructure(충전 인프라), Priority(우선순위)

ABSTRACT

This study is an empirical study on the challenges of introducing eco-friendly low-floor buses through an Analytic Hierarchy Process (AHP) questionnaire. The study found that charging infrastructure improvement was the top priority for introduction by Pairwise comparisons. This study is the first empirical study on the challenges of stakeholders and provides policy implications for promoting them.

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