



# 전기차 안전성 확보를 위한 전략 및 연구개발 동향





## 전기자동차 배터리 이상 알림 긴급호출 장치 프로토타입 구현

김유원\*

### Prototype Implementation of an Emergency Call Device for Electric Vehicle Battery Alert Notification

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**Key Words :** Electric Vehicle(전기자동차), BMS(배터리관리시스템), Thermal Runaway(열폭주), Emergency Call(긴급호출), SMS(문자메시지), Alert Notification System(비상알림체계)

#### ABSTRACT

The number of electric vehicle fires caused by battery thermal runaway is also increasing as the number of electric vehicles continues to expand. Therefore, it has become crucial to promptly notify the vehicle owner and the 119 center of any irregularities in an electric vehicle battery to facilitate the implementation of measures such as fire suppression. In this paper, we present a prototype of an emergency call device that detects and notifies abnormal situations such as thermal runaway of electric vehicle battery in real time. The prototype has been developed based on the hardware and software design of the battery warning message structure, the battery alert notification via SMS to the vehicle owner and the 119 call center, the interface between the electric vehicle and the BMS, and other relevant considerations. The prototype is connected to the BMS via CAN, detects the trigger message of the electric vehicle battery abnormality, generates the abnormality notification message, and sends the SMS message to the recipients via LTE network. In the future, we will test the functionality and performance of the prototype presented in this paper, and conduct experiments to evaluate the performance of vehicle-based BMS integration and incident message transmission.

이 연구는 국토교통과학기술진흥원의 전기자동차 안전성 평가 및 통합 안전 기술개발(RS-2023-00243574)과제의 일환으로 수행된 연구 결과로 이에 감사드립니다.

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## 국내 전기차 충돌 후 화재안전성 강화를 위한 KNCAP 평가 방안 연구

인정민\* · 김홍익\*\* · 이명수\*\*\* · 이현우\*\*\*\*

### Development of KNCAP New Evaluation System to Improve the EV Post-Crash Fire Safety

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**Key Words :** Electric vehicle(전기차), Post-crash fire(충돌 후 화재), High-speed frontal collision(고속정면충돌), Direct impact to battery pack by road curbs at low-speed(저속 배터리 하부 직접충돌) KNCAP evaluation system(KNCAP 평가제도)

#### ABSTRACT

Recently, the number of electric vehicle (EV) post-crash fire accidents has been increasing rapidly with the EV sales expansion in Korea. The EV post-crash fire may be lower than that of internal combustion engine (ICE), but it could occur to more severe situations like occupant fatality. There is no difference in the evaluation methods according to the regulations on the fuel system integrity of post-crash between EV and ICE vehicles. However, the post-crash fire causes may be different between EV and ICE vehicles due to differences in the characteristics and design of the fuel system. Therefore, we derived two representative risk scenarios of EV post-crash fire from analysing 9 cases of EV post-crash fire accidents in Korea. The two derived scenarios are as follows. The first is the high intrusion into the EV front end structure resulting from the high-speed frontal collision. The second is the direct impact to the battery pack mounted bottom of the vehicle by road curbs at low speed (under 30 km/h). This research conducted the battery severity evaluation tests according to two crash test modes reflecting both the high-speed frontal collision and the direct impact to the battery pack mounted on the bottom of EVs by a curb at low speed. This research will plan to develop the new evaluation methods and differentiation system(star rating) of future KNCAP (Korean New Car Assessment Program) to improve EV post-crash fire safety using the research results on the collision severity of EV battery following each crash tests.

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## 배터리 성능평가를 위한 운행 전기차 검사모드 개발

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### Development In-Use Electric Vehicles Driving Mode for Battery Performance Inspection

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**Key Words :** Battery(배터리), Electric vehicle(전기차), Inspection mode(검사모드), In-use vehicle(운행자동차),  
Periodic technical inspection(정기검사), Battery Management System(배터리관리시스템)

#### ABSTRACT

The registration rate of electric vehicles is continuously increasing, and the market for used batteries is also developing. Battery performance evaluation must be conducted to remanufacture or recycle batteries separated from electric vehicles. Since the current battery performance evaluation method requires at least 8 hours, resulting in significant time and financial costs, therefore, this study investigated a battery performance evaluation method using vehicle periodic inspection equipment. It proposed an inspection mode by improving the IEC62660-1 evaluation method. Additionally, it presented a vehicle-based battery performance evaluation method by deriving the battery resistance value using the direct current impedance measurement method with BMS data like real-time voltage, current values, etc.

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## 자동차 수리 및 관리 정보에 관한 선진 사례와 제도화 방안

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### Advanced Practices and Legal Institutionalization Plans for Automobile Repair and Management Information

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**Key Words** : RTR(수리할 권리), RMI(수리및관리정보), Legal institutionalization(제도화)

#### ABSTRACT

Recently, in line with consumer rights protection, environmental protection, and climate change issues, proposals for the Right to Repair(RTR) have originated from the automobile industry and are being actively discussed and implemented in some overseas countries.

In order to activate automobile Right to Repair, accurate and comprehensive access to repair and management information(RMI) is essential for independent automobile repair shops, mechanics, and vehicle owners to effectively diagnose and resolve vehicle problems. This is because it is a factor in maintaining vehicle performance, reliability, and safety by ensuring that automobile repairs are performed safely and efficiently according to manufacturer specifications.

However, since the domestic repair service market environment is different from overseas countries, preliminary research such as detailed investigation of domestic conditions and situations and consumer awareness survey is necessary. In connection with this, we seek to establish a legal institutionalization that can guarantee fair access to RMI based on overseas cases to promote competition, consumer choice, and innovation in the automobile repair industry while protecting vehicle safety and reliability.

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## 전기차 배터리 화재 시 발생 가스 영향 분석

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### Analysis of Gas Emissions During Electric Vehicle Battery Fires

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**Key Words :** Elecrylic vehicle(전기차), Bateery(배터리), Gas emission(가스 발생), Fure(화재)

#### ABSTRACT

Analysis of gases emitted during battery fires has led to a global review of the harmfulness of gases inside electric vehicle cabins. Specifically, there is interest in analyzing the types, concentrations, and harmfulness of gases produced during electric vehicle, especially battery, fires. To achieve this, individual cells were subjected to thermal runaway to induce ignition, and gas types and quantities produced during the ignition were analyzed using FTIR (Fourier-transform infrared spectroscopy). Additionally, an analysis was conducted on the human health risks associated with varying concentrations of carbon monoxide.

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