
실사고 II



국내 차대차 정면충돌 실사고 데이터를 활용한 자동긴급제동장치가 적용된 차량에서의 사고재구성

신윤식* · 박요한** · 정재일***,†

Accident Reconstruction of Vehicles with Autonomous Emergency Braking System Applied using Domestic Vehicle-to-vehicle Head-on Collision Accident Data

Yunsik Shin*, Yohan Park**, Jayil Jeong***,†

Key Words : Accident reconstruction(사고재구성), Autonomous emergency braking(긴급자동제동), Urban area(도심 지역)

ABSTRACT

The purpose of this study is to identify the accident type that appears in a frontal collision among domestic car-to-car accidents to predict what type of accident will change in the same accident in a vehicle to which the automatic emergency braking system is applied. Accidents with head-on collisions were classified using the insurance company accident database. It was confirmed that there were 13 types of accidents that appear in head-on collisions, and the most frequent accident type was LT/OD-SC (Left Turn / Opposite Direction - Straight Cross) intersection accidents. Additionally, by applying the AEB algorithm, a simulation was performed with a vehicle to which autonomous emergency braking was applied through PC-CRASH, an accident reproduction program. As a result of reconstructing accidents for 150 front-end accidents, it was confirmed that the number of accidents was reduced to 58.

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* 국민대학교 기계시스템공학과/연구원

** 삼성교통안전문화연구소/수석연구원

*** 국민대학교 기계공학부/교수

† 교신저자 : jayjeong@kookmin.ac.kr

첨단안전장치 장착 자동차의 사고사례 분석

박종진* · 박정우** · 전우정***

Analysis for Traffic Accident of the Vehicle with Advanced Driver Assistance System(ADAS)

Jongjin Park*, Jungwoo Park**, Woojeong Jeon***

Key Words : Advanced driver assistance system(첨단안전장치), Autonomous emergency braking system(비상자동제동장치), Adaptive cruse control(적응형 크루즈 컨트롤), Digital tacho graph(전자식운행기록계), Event data recorder(사고기록장치), Traffic accident investigation(교통사고조사)

ABSTRACT

국토교통부에서 2022년 9월 19일에 모빌리티 혁신 로드맵에 완전자율주행 버스·셔틀(2025년) 및 구역 운행 서비스 상용화(2027년) 등을 통해 기존의 대중교통 체계를 자율주행 기반으로 대전환한다는 내용을 발표하였다. 그러나, 아직 Level 3 이상의 자율주행자동차에 대한 사고분석 체계가 갖춰져 있지 않은 상황에서 향후 발생할 자율주행자동차 교통사고에 대한 책임소재 규명과 사고원인 분석을 준비해야 한다. 이에 본 연구에서는 AEB(Autonomous Emergency Braking System), LDWS(Lane Departure Warning System), ACC(Adaptive Cruse Control) 등과 같은 ADAS (Advanced Driver Assistance Systems) 장착 자동차에 장착된 DTG(Digital Tacho Graph), EDR(Event Data Recorder), VDR(Video Data Recorder), 텔레매틱스 정보(Telematics) 등의 기록데이터를 통한 교통사고 분석 사례를 소개하고자 한다.

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* 국립과학수사연구원/실장

** 국립과학수사연구원/감정관

*** 국립과학수사연구원/과장

E-mail : vortex820@korea.kr

자율주행차 정면충돌평가방안 마련을 위한 정면충돌사고 심층분석 연구

박요한* · 박원필** · 김승기**

An In-depth Analysis of Head-on Collision Accidents for a Frontal Crash Test of Automated Driving Vehicles

Yohan Park*, Wonpil Park**, Seungki Kim**

Key Words : In-depth Analysis(심층 분석 연구), Head-on Collision(정면충돌), Frontal Crash Test(정면충돌평가), Automated Driving Vehicles(자율주행자동차)

ABSTRACT

The seating postures of passengers in the automated driving vehicle are possible in atypical forms such as rear-facing and lying down. It is necessary to improve devices such as airbags and seat belts to protect occupants from injury in the accidents of the automated driving vehicle, and collision safety evaluation tests must be newly developed. The purpose of this study is to define representative types of head-on collision accidents to develop collision standards for autonomous vehicles that take into account changes in driving behavior and occupants' postures. 150 frontal collision cases were remained by filtering (accident videos, images, AIS 2+, passenger car, etc...) and random sampling from approximately 320,000 accidents claimed by a major insurance company over the past 5 years. The most frequent accident type is a head-on collision between a vehicle going straight and a vehicle turning left from the opposite side, accounting for 54.7% of all accidents, and most of these accidents occur in permissive left turns. The next most common frontal collision is the center-lane violation by drowsy driving and careless driving, accounting for 21.3% of the total. For the two types above, data such as vehicle speed, contact point/area, and PDOF at the moment of impact are obtained through accident reconstruction using PC-Crash. As a result, two types of autonomous vehicle crash safety test scenarios are proposed: (1) a frontal oblique collision test based on the accident types between a straight vehicle and a left-turning vehicle, and (2) a small overlap collision test based on the head-on accidents of center-lane violation.

후기

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* 삼성교통안전문화연구소/수석연구원

** 삼성교통안전문화연구소/책임연구원

E-mail : john1643@naver.com

압축공기 누출에 의한 덤프트럭의 제동장치 결함 사례 분석

윤석현* · 김승희**

A Case Study of Brake System Defects in Dump Trucks Due to Leakage of Compressed Air

Seok-Hyun Yoon*, Song-Hui Kim**

Key Words : Traffic accident(교통사고), Braking system(제동장치), Parking brake(주차 제동장치)

ABSTRACT

Traffic accidents are caused by various causes such as human factors : carelessness of vehicle drivers, etc, vehicle defects : braking system defects, etc and environmental factors. Among them, accidents caused by vehicle defects occur regardless of the will of the driver of the vehicle. In this time, we will introduce accident case of vehicle defect that is a dump truck drove downhill at high speed and crash against a guardrail in August 2022. The accident vehicle was a 1995 model, it was confirmed situation of an accident through the dash-cam video of oncoming traffic and a skid mark was formed on the road surface of some sections of the accident site.

Generally, the main brake system of the dump truck uses pneumatic device and hydraulic system, and the parking brake system uses a chamber to operate a drum-type brake system installed on the drive shaft when there is no pneumatic pressure.

We investigated that this dump truck artificially has a separate horn installed in the air tank, moreover, the rubber hose of the horn installed in the air tank was detached regardless of the traces of external impact, and compressed air was leaked. Also, the drum-type braking device installed on the drive shaft was severely overheated, and some of the rubber hoses were damaged by heat in the adjacent area.

As a results, testing the outflow of compressed air from the air tank of the main brake system, confirming that the brake system was defective.

* 국립과학수사연구원/실장

** 국립과학수사연구원/감정관

E-mail : jangdoyoon@naver.com

교차로에서 좌회전 중 직진 충돌 조건 분석과 충돌 시뮬레이션을 이용한 동승자 목 거동 분석

김문영* · 정재일**

A Study on Neck Injury to Passengers using the Analysis of LTAP/OD Crash Conditions at Intersection and Crash Simulation

Moon Young Kim*, Jayil Jeong**

Key Words : Intersection-based collision(교차로 충돌), Neck injury(목 상해), Crash simulation(충돌 해석), LTAP/OD (좌회전 주행 시 및 반대편 직진 주행)

ABSTRACT

In this paper, the boundary conditions are derived by analyzing the LTAP/OD(Left Turn Across Path/Opposite Direction) crash conditions when driving at an intersection and analyzing neck injury risk is performed through car-to-car crash simulation. Using CISS and CRSS data, the crash speed and angle at the LTAP/OD accident at the intersection are derived. After setting an intersection driving route, driving simulation is performed to derive possible crash points in case of an intersection LTAP/OD crash. After constructing a car-to-car crash simulation model using the derived crash point, crash speed, and crash angle, crash analysis is performed according to the case. By analyzing the simulation result data on the neck of the dummy derived from the crash analysis, the risk of an accident similar to this boundary condition is presented.

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* 국민대학교 자동차공학전문대학원/박사과정

** 국민대학교 기계공학부/교수

E-mail : jayjeong@kookmin.ac.kr

급가속을 유발하는 운전자의 주행 상황에 대한 사례분석

김송희* · 윤석현** · 전우정***

Case Study on the Driving Situation of the Driver Causing Rapid Acceleration

Sonhhui Kim*, Seokhyun Yoon**, WooJeong Jeon***

Key Words : EDR data(EDR 기록), Driver's behavior(운전자의 운전행태), Dash cam video(차량용 블랙박스 영상), CCTV video(CCTV 영상), Sudden unintended acceleration(급발진)

ABSTRACT

Under normal circumstances, a collision may occur when a vehicle that was traveling at a certain speed suddenly accelerates rapidly, and a vehicle that was at a temporary stop starts rapidly, including failure of the driver's judgment, mismanagement mistakes, and mechanical defects in the vehicle due to poor maintenance of the vehicle. In this case study, the driving status of the accident vehicle was carefully analyzed through the dash cam video, the CCTV video of the accident scene, and the EDR record of the accident vehicle, so that it was assumed that the rapid acceleration situation of the accident vehicle was caused by the driver's failure to judge or the mistake of operation rather than the defect of the vehicle.

* 국립과학수사연구원 교통과/공업연구사

** 국립과학수사연구원 교통과/공업연구관

*** 국립과학수사연구원 교통과/공업연구관

E-mail : songhkim907@korea.kr