

Documents

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Neck protection in autonomous car crashes

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Abstract

Autonomous cars which are expected to be on the market in the upcoming years, present new challenges to restraint system design since unconventional seating plans can put the occupants at more risk. For instance, an occupant sitting on a rear facing seat can experience higher risk of whiplash in a frontal impact considering the fact that statistically frontal impacts do happen at higher severities than rear impacts as seen in the crash test conditions of US NCAP. In this study, an improvement to car seat design is presented in which the seatback is automatically rotated into a more upright position prior to impact in order to increase the energy absorbing potential of the seatback. The study involves computer simulation of a seat-occupant system to demonstrate the benefits of the proposed system. © 2020 Kaunas University of Technology. All rights reserved.

Author Keywords

Autonomous car safety; Seat design; Whiplash

Index Keywords

Accidents, Crashworthiness, Seats; Car seats, Crash tests, Frontal impacts, Rear impact, Restraint systems, Upright position; Autonomous vehicles

References

- Himmetoglu, S.
An Adaptive Car-seat to Mitigate Whiplash in Rear Impacts
(2017) *Proceedings of the 21st International Scientific Conference Transport Means*, pp. 32-38.
- Spitzhüttl, F., Liers, H.
Calculation of the Point of No Return (PONR) from Real-world Accidents
(2019) *Proceedings of the 26th ESV Conference*,
Eindhoven, The Netherlands, National Highway Traffic Safety Administration, paper 19-0141
- Trepel, R.E., Zuby, D.S., Edwards, M.A.
IIHS head restraint ratings and insurance injury claim rates
(2016) *Traffic Injury Prevention*, 17 (6), pp. 590-596.
- Otte, D., Facius, T., Johannsen, H., Hüfner, T.
(2018) *Estimation of Injury Risk of the Cervical Spine of Car Occupants after Emergency Braking*,
SAE Technical Paper 2018-01-0541
- Eis, V., Fay, P., Sferco, R.
A Detailed Analysis of the Characteristics of European Rear Impacts
(2005) *Proceedings of 19th ESV Conference*,
Washington DC, USA, National Highway Traffic Safety Administration, paper 05-0385-O
- Van Ratingen, M., Ellway, J., Avery, M., Gloyns, P., Sandner, V., Versmissen, T.
The EuroNCAP Whiplash Test
(2009) *Proceedings of the 21st ESV Conference*,
Stuttgart, Germany, National Highway Traffic Safety Administration, paper 09-0231

- National Highway Traffic Safety Administration (NHTSA) [online cit.: 2019-06-06]
- Moon, J., Bae, I., Kim, S.
A Pre-Crash Safety System for an Occupant Sitting on a Backward Facing Seat for Fully Automated Vehicles in Frontal Crashes
(2017) *Proceedings of the 2017 IEEE International Conference on Vehicular Electronics and Safety (ICVES)*, pp. 168-171.
Vienna, Austria
- Himmetoglu, S., Acar, M., Bouazza-Marouf, K., Taylor, A.J.
A multibody human model for rear-impact simulation
(2009) *Proc. IMechE Part D Journal of Automobile Engineering*, 223 (5), pp. 623-638.
- (2008) *RCAR-IIWPG seat/head restraint evaluation protocol*,
International Insurance Whiplash Prevention Group (IIWPG)

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