

Exponent®
Engineering & Scientific Consulting

Bob Lange

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Professional Profile

Mr. Lange has over 50 years of experience in automotive engineering. He specializes in motor vehicle systems architectures, structures, safety, and public health.

Mr. Lange has worked in the following areas: vehicle structures, advanced architectures and compartment engineering; vehicle fuel economy; vehicle emissions; safety, emissions, and fuel economy rulemaking; restraint system performance; vehicle safety and emissions policy development; vehicle technology development and application patterns; collision causal factors and collision typology; collision and injury risk assessment; occupant performance (restraint use, behavior modification, driver distraction in controls application, task time and glance duration, cell phone use, the human/machine interface, and alcohol impairment); owners' manuals and warnings; vehicle dynamics, responsiveness, and control; chassis systems and collision avoidance (anti-lock brake systems [ABS], electronic stability control [ESC] systems, emergency brake application); rollover vehicle dynamics, occupant kinematics, and injury mechanisms; autonomous sensor-based and cooperative wireless collision avoidance technologies; dynamic collision response for vehicles and occupants in planar and rollover events; occupant protection technologies (energy-absorbing structures, active and passive restraint systems); inflatable restraint and sensor system design, performance, and specifications; fuel system design and performance; post-collision performance and responses; motor vehicle safety certification; policy approaches to motor vehicle safety; consumer metrics; rule making; and defect investigations.

Academic Credentials & Professional Honors

M.S.E., Mechanical Engineering, University of Michigan, Ann Arbor, 1975

B.S.E., Mechanical Engineering, University of Michigan, Ann Arbor, 1969

Award for Safety Engineering Excellence, National Highway Traffic Safety Administration, 2007

Prior Experience

Executive-in-Charge, Engineering Director, and Executive Director Vehicle Structure and Safety Integration, General Motors Corporation, 1994-2008

Vice President and Principal Engineer, Failure Analysis Associates, 1982-1994

Engineer, Principal Engineer, and Supervisor, Ford Motor Company, 1969-1982

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Professional Affiliations

Transportation Research Board Advisory Committee for Congressional Report on the Strategic Highway Research Plan, SHRP-2 (member)

Past member, Board of Directors National Safety Council, 1996-2006

Past Chair, Society of Automotive Engineers' Motor Vehicle Systems Board, 2004-2008

Publications

Agarwal G, Kidambi N, Lange R. Seat Belts: A Review of Technological Milestones, Regulatory Advancements, and Anticipated Future Trajectories. SAE International, United Sates, October 2021.

Lange R, Campbell J, Groves E, Monk C, Huang R, Wishart J. Response of Exponent, Inc. to NHTSA Advanced Notice of Proposed Rule Making; Docket NHTSA 2019-0036-0024.

Lange R, Kelly S, Senatore C, Wilson J, Yee R, Harrington R. Data requirements for post-crash analyses of collisions involving collision avoidance technology equipped, automated, and connected vehicles. ESV 17-0338, June 2017.

Lange R, Balavich K, Gregory S, Brown T, Pearce H. Installation patterns for emerging safety technologies, 2000-2015, ESV 17-0335, June 2017.

Lange R, Iyer M, Pearce H, Jacuzzi E, Croteau J. Rollover injury science and rollover crash typology. Paper Number 11-0116, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Balavich K, Soderborg N, Lange R, Pearce H. Deployment characteristics of seat mounted side impact airbags. Paper Number 11-0358, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Lange R, Pearce H, Jacuzzi E. Installation patterns for emerging injury mitigation technologies, 1998 through 2010. Paper Number 11-0088, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Lange R, Jacuzzi E, Soderborg N, Pearce H. Injury mitigation technology applications and the relationships to vehicle mass, price, and fuel economy. Paper Number 11-0114, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Parker D, Mikolajczak C, Lange R. Considerations regarding electric and hybrid vehicle safety. Paper 11-0117, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Lange R, Soderborg N, Pearch H, Balavich K, Huang S-W. Side impact air bag efficacy, injury mitigation performance in vehicle models with and without side impact air bags and inflatable head protection. Paper Number 11-0115, 22nd Enhanced Safety Vehicles Conference, Washington DC, June 2011.

Lange RC. Motor vehicle safety in the global environment. SAE 2008-21-0030.

O'Brien-Mitchell BM, Horn CK, Lange RC. Rollover sensor signature test development. SAE 2007-01-0375.

O'Brien-Mitchell BM, Cassatta SJ, Giasson MA, Lange RC, Melocchi AG. Data analysis methodology and observations from rollover sensor development tests. ESV 07-0308, 20th International Technical Conference on the Enhanced Safety of Vehicles Conference (ESV), Lyon, France, June 18-21, 2007.

Verma M, Lange RC, McGarry D. A study of US crash statistics from Automatic Crash Notification data.

ESV Paper 07-0058, 20th International Technical Conference on the Enhanced Safety of Vehicles Conference (ESV), Lyon, France, June 18-21, 2007.

O'Brien-Mitchell BM, Lange RC. Ejection mitigation in rollover events — Component test development. SAE 2007-01-0374.

Ray RM, Grossman HL, Murray SJ, Lange RC. Evaluation of passenger vehicle crashworthiness using field performance data. IMECE2006-14630, ASME International Mechanical Engineering Congress & Exposition, Chicago, IL, November 5-10, 2006.

Verma M, Lavelle J, Tan SA, Lange RC. Injury patterns and effective countermeasures for vehicle collision compatibility. ESV Paper 05-0173, 19th International Technical Conference on the Enhanced Safety of Vehicles (ESV), Washington DC, June 6-9, 2005.

Verma M, Lange RC, Lavelle J. Relationship of crash test procedures to vehicle compatibility. SAE 2003-01-0900, SAE Annual Conference, 2003.

Wood CT, Arndt SR, Kelkar R, Lange R. Children's use of various internal automobile trunk release mechanisms intended to reduce child entrapment risk. Proceedings, 43rd Annual Meeting, Human Factors and Ergonomics Society, 1999.

Lange R. Child occupant safety — What we might expect. SAE 2000-01-C039.

Padmanaban J, Lange R, Curzon A, Cooperrider N. Automatic seat belt system risk assessment. American Society of Mechanical Engineers Winter Annual Meeting, pp. 39-45, Atlanta, GA, December 1991.

Padmanaban J, Lange R, Lunghi P. Strengths and weaknesses of occupant restraint use codes in motor vehicle accident databases. 16th International Forum on Traffic Records Systems, July 1990.

McCarthy G, Davis C, Lange R, McCarthy R. The impact of the 1968 Evaporative Loss Standard on automotive risk. American Society of Mechanical Engineers Winter Annual Meeting, San Francisco, CA, 1989.

McCarthy G, McCarthy R, Lange R, Davis C. Gasoline fires at service stations: Safety benefits of Stage II Refueling Vapor Recovery Systems. American Society of Mechanical Engineers Winter Annual Meeting, San Francisco, CA, 1989.

McCarthy R, Padmanaban J, Ray R, Lange R. An analysis of fatal rollover risk associated with utility vehicles and selected passenger cars. American Society of Mechanical Engineers Conference, pp. 17-20, December 1989.

McCarthy R, Ray R, Padmanaban J, Lange R. An examination of the relationship between vehicle mass, wheelbase and safety. American Society of Mechanical Engineers Conference, December 1989.

McCarthy R, Robinson J, Lange R, Keefer R. Product life and its relationship to product safety. Proceedings, American Society of Mechanical Engineers Spring Design Show and Conference, Chicago, IL, March 1987.

Plastiras J, Lange R, McCarthy R, Padmanaban J. An examination of the correlation between vehicle performance in FMVSS 216 versus injury rates in rollover accidents. Paper No. 850335, Society of Automotive Engineers International Congress and Exposition, February 1985.

McCarthy R, Taylor R, Sanford S, Lange R. Seat belts: Effectiveness of mandatory use requirements. Paper No. 840329, Society of Automotive Engineers International Congress and Exposition, February 1984.

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Selected Presentations

Lange RC. Rear Seat Occupant Protection, Current and Emerging Topics, SAE WCX Digital Summit, June 16, 2020; Moderator.

Lange RC. Securing America's Future Energy (SAFE) Report on autonomous vehicle testing and safety, Automotive Safety Council Annual Meeting, Turnberry Isle Miami, March 2017.

Lange RC. Commission on autonomous vehicle testing and safety. SAE Government Industry Conference, Washington DC., January 2017.

Lange RC. Test procedures to evaluate active safety systems. SAE 2013 Active Safety Systems Symposium, November 2013.

Lange RC. Vehicle safety and public health data. SAE Brazil, Sao Palo, October 2013.

Lange RC. Criteria for advanced driver assist technologies and safety improvement. Automotive Megatrends USA 2012, Dearborn, MI, January 31, 2012.

Lange RC. SAE Electric Vehicles. 2nd Annual SAE Safety Standards Summit, Detroit, MI, September 27, 2011.

Lange RC, Pearce HM, Soderborg N, Balavich K. Injury control technology insertion patterns during 1998 to 2009. SAE Government Industry Meeting, Washington DC. January 28, 2010.

Lange RC, Soderborg N, Pearce HM, Balavich K, Huang SW. An estimate of side impact air bag effectiveness in fatality reduction. SAE Government Industry Meeting, Washington DC. January 27, 2010.

Lange RC. Working with technical experts. The Defense Trial Counsel of Indiana, Indianapolis, IN, 2009.

Lange RC. Motor vehicle safety challenges and sustainable mobility. Infrastructure Development and Sustainability Industry Summit, Abu Dhabi, UAE, May 19, 2009.

Lange RC. General Motors Corporation's approach to motor vehicle safety. Carl XVI Gustaf King of Sweden, Milford, MI, 2008.

Lange RC. Occupant injury mechanisms in rollover collisions as recorded in dynamic vehicle testing. Consumer Reports, East Haddam, CT, 2008.

Lange RC. Motor vehicle safety as a public health challenge. Ontario Police Academy, Ontario, Canada, 2008.

Lange RC. Advanced vehicle telematics, OnStar services and developing markets. Keynote Address, SAE Annual Conference, Shanghai, China, 2008.

Lange RC. A project management plan for the "Cooperative Research Agreement" between the National Highway Traffic Safety Administration (NHTSA) and the Automobile Coalition for Traffic Safety (ACTS). The NHTSA Blue Ribbon Panel on Alcohol Detection, Washington DC, 2008.

Lange RC. Consideration of the conditions necessary for deployment of vehicle to vehicle wireless communications technology. American Association of State Highway and Transportation Officials (AASHTO) Executive Leadership meeting, Novi, MI, 2007.

Lange RC. Public health challenges associated with motor vehicle collisions. Continuing Medical Education Conference, Indianapolis, IN, 2007.

Lange RC. A comparison of collision risk for active OnStar users while in a cellular telephone call and while not in a call; presented to NHTSA Research and Development staff, Washington DC, 2007.

Lange RC. New car assessment programs. China Quality Committee, Shanghai, China, 2007.

Lange RC. Technical requirements necessary for a manufacturer's consideration of "Dedicated Short Range Communication" (DSRC) technology implementation. Center for Automotive Research (CAR) Management Briefing Seminar, Traverse City, MI, 2007.

Lange RC. Developing issues in motor vehicle safety. Holden Press Briefing and Conference, Melbourne, Australia, 2007.

Lange RC. General Motors sponsorship of a collision data workshop for developing Asia Pacific Economic Commission (APEC) members. APEC Ministerial Meeting, Adelaide, Australia, 2007.

Lange RC. A proposal for revision to the National Highway Traffic Safety Administration's "New Car Assessment Program." National Highway Safety Administration public hearing, Washington DC, 2007.

Lange RC. An introduction to "Safety Integration." General Motors Corporation, 2007, 2006, 2005.

Lange RC. General Motor's rollover testing procedures and facility. Briefing for NHTSA Administrator Nason, Milford, MI, 2006.

Lange RC. Rollover injury mechanisms based upon dynamic vehicle testing. NHTSA Research and Development meeting, Washington DC, 2006.

Lange RC. Possible safety applications and deployment mechanisms for vehicle to vehicle telematics. The American Association of State Highway and Transportation Officials (AASHTO) Annual Conference, Portland, OR, 2006.

Lange RC. Saab Alkokey research status report. Swedish Technology Forum, Sweden House, Washington DC, 2006.

Lange RC. The connected vehicle. Center for Automotive Research (CAR) Management Briefing Seminar, Traverse City, MI, 2006.

Lange RC. Alcohol detection applications for improved roadway safety and reliable mobility for unimpaired drivers. Mothers Against Drunk Driving (MADD) Technical Symposium, Albuquerque, NM, 2006.

Lange RC. Advanced vehicle technology development. Keynote Address, SAE Annual Conference, Shanghai, China, 2006.

Lange RC. Research applications for advanced automatic collision notification data, collision severity profile. China Automotive Technology & Research Center (CATARC), 2006.

Lange RC. GM's approach to motor vehicle safety, "Continuous Safety — Before, During, and After." Automotive Press Association of Detroit, 2006.

Lange RC. A vision for a detection technology to inhibit alcohol impaired driving and enable sober driver mobility. MADD Conference for a Technical Symposium, 2005.

Lange RC. Event data recorders, sensor diagnostic modules and their functions. NHTSA Blue Ribbon

Panel on Advanced Air Bag Safety, Washington DC, 2005.

Lange RC. Motor vehicle safety and global engineering. Korea National Delegation, Milford, MI, 2005.

Lange RC. Motor vehicle collisions and public health in developing economies. APEC Ministerial Meeting, Bali, Indonesia, 2005.

Lange RC. Motor vehicle safety as a public health challenge and response. China National Development and Reform Commission Delegation, Milford, MI, 2005.

Lange RC. Motor vehicle safety in the global economy. NHTSA Enhanced Safety Vehicle Conference Keynote Speech, Washington DC, 2005.

Lange RC. Motor vehicle safety, technology and developing economies. Automobile Research Association of India, Pune, India, 2005.

Lange RC. A report on child occupant safety. Lifesavers Conference, San Diego, CA, 2004.

Lange RC. A report on advanced air bag safety. Lifesavers Conference, Denver, CO, 2001.

Lange RC. Air bag safety, occupant behaviors, public awareness, and technology. National Transportation Safety Board Public Hearing on Air Bag Safety, Washington DC, March 1997.

Lange RC. International standards harmonization. Trans-Atlantic Business Dialog, Washington DC, 1996.

Project Experience

While at GM, Mr. Lange was responsible for: fire safety research projects; advanced safety research, technology and development (collision avoidance sensors; displays; human interface; control performance; alerts and warnings; vehicle structures, restraints, and occupant protection; collision compatibility and partner protection), non-collision sensors; advanced engineering (program safety strategy, performance and technology contenting, program imperatives, structures design, tools development, and restraint selection); program execution (resource allocation and training, structural performance, restraint performance, validation, assessment, and certification, launch support, tools applications and facilities); product investigations (identify and investigate potential product defects, respond to government investigation requests, register corrective actions, prepare final investigation reports, and recommend disposition); field performance assessment; consumer metrics and regulations; and safety-related communications to technical forums, the press, the public, and various government agencies.

In his assignment at GM, Mr. Lange conducted programs on: advanced air bag technology, warnings, and systems to disable air bags; occupant safety belt use, methods and technologies to increase safety belt use; child seat installation and fitment to motor vehicles; entrapment in vehicle trunks; ABS effectiveness; ESC performance and metrics; rollover dynamics and occupant kinematics; vehicle mass and safety; sustainable mobility, global collision fatality, and injury rates; driver distraction; collision compatibility; voluntary industry agreements to improve safety performance (out of position occupant considerations and limits, collision compatibility, brake/transmission interlock) ; tire technology and specifications; rearward vision and supplemental technologies; motor vehicle standards harmonization; vehicle dynamics and metrics for safe handling; occupant protection in collision and post-collision events, consumer metrics development, and applications; pedestrian protection standards; collision data collection and analyses; passenger van safety; collision and rollover sensor development; event data recorder development and applications; vehicle wireless communications; integration of active and passive safety technologies; and advanced injury modeling and injury data collection.

Advisory Appointments

National Highway Traffic Safety Administration (NHTSA) Expert Panel on Trunk Entrapment, 1998

U.S. Department of Transportation Advisory Board, Intelligent Transportation Systems (member), 2008

External Advisory Board, Wayne State University School of Biomedical Engineering, 2005-2009

External Advisory Board, University of Michigan Transportation Research Institute, 2004-2013

External Advisory Board, International Center for Automotive Medicine, University of Michigan Hospital, 2014-2017.

Peer Reviews

Society of Automotive Engineers technical publications