# Automated Vehicle Safety Technologies

**automated vehicle safety technologies: Measuring Automated Vehicle Safety** Laura Fraade-Blanar, Marjory S. Blumenthal, James M. Anderson, Nidhi Kalra, 2018 This report presents a framework for measuring safety in automated vehicles (AVs): how to define safety for AVs, how to measure safety for AVs, and how to communicate what is learned or understood about AVs.

**automated vehicle safety technologies:** Autonomous Vehicle Technology James M. Anderson, Kalra Nidhi, Karlyn D. Stanley, Paul Sorensen, Constantine Samaras, Oluwatobi A. Oluwatola, 2014-01-10 The automotive industry appears close to substantial change engendered by "self-driving" technologies. This technology offers the possibility of significant benefits to social welfare—saving lives; reducing crashes, congestion, fuel consumption, and pollution; increasing mobility for the disabled; and ultimately improving land use. This report is intended as a guide for state and federal policymakers on the many issues that this technology raises.

**automated vehicle safety technologies:** Characterizing the Safety of Automated Vehicles Juan Pimentel, 2019-03-07 Safety has been ranked as the number one concern for the acceptance and adoption of automated vehicles since safety has driven some of the most complex requirements in the development of self-driving vehicles. Recent fatal accidents involving self-driving vehicles have uncovered issues in the way some automated vehicle companies approach the design, testing, verification, and validation of their products. Traditionally, automotive safety follows functional safety concepts as detailed in the standard ISO 26262. However, automated driving safety goes beyond this standard and includes other safety concepts such as safety of the intended functionality (SOTIF) and multi-agent safety. Characterizing the Safety of Automated Vehicles addresses the concept of safety for self-driving vehicles through the inclusion of 10 recent and highly relevent SAE technical papers. Topics that these papers feature include functional safety, SOTIF, and multi-agent safety. As the first title in a series on automated vehicle safety, each will contain introductory content by the Editor with 10 SAE technical papers specifically chosen to illuminate the specific safety topic of that book.

**automated vehicle safety technologies:** *Autonomous Driving* Markus Maurer, J. Christian Gerdes, Barbara Lenz, Hermann Winner, 2016-05-21 This book takes a look at fully automated, autonomous vehicles and discusses many open questions: How can autonomous vehicles be integrated into the current transportation system with diverse users and human drivers? Where do automated vehicles fall under current legal frameworks? What risks are associated with automation and how will society respond to these risks? How will the marketplace react to automated vehicles and what changes may be necessary for companies? Experts from Germany and the United States define key societal, engineering, and mobility issues related to the automation of vehicles. They discuss the decisions programmers of automated vehicles must make to enable vehicles to perceive their environment, interact with other road users, and choose actions that may have ethical consequences. The authors further identify expectations and concerns that will form the basis for individual and societal acceptance of autonomous driving. While the safety benefits of such vehicles are tremendous, the authors demonstrate that these benefits will only be achieved if vehicles have an appropriate safety concept at the heart of their design. Realizing the potential of automated vehicles to reorganize traffic and transform mobility of people and goods requires similar care in the design of vehicles and networks. By covering all of these topics, the book aims to provide a current, comprehensive, and scientifically sound treatment of the emerging field of "autonomous driving.

**automated vehicle safety technologies: Handbook of Human Factors for Automated, Connected, and Intelligent Vehicles** Donald L. Fisher, William J. Horrey, John D. Lee, Michael A. Regan, 2020-05-31 Handbook of Human Factors for Automated, Connected, and Intelligent Vehicles Subject Guide: Ergonomics & Human Factors Automobile crashes are the seventh leading cause of

death worldwide, resulting in over 1.25 million deaths yearly. Automated, connected, and intelligent vehicles have the potential to reduce crashes significantly, while also reducing congestion, carbon emissions, and increasing accessibility. However, the transition could take decades. This new handbook serves a diverse community of stakeholders, including human factors researchers, transportation engineers, regulatory agencies, automobile manufacturers, fleet operators, driving instructors, vulnerable road users, and special populations. It provides information about the human driver, other road users, and human–automation interaction in a single, integrated compendium in order to ensure that automated, connected, and intelligent vehicles reach their full potential. Features Addresses four major transportation challenges—crashes, congestion, carbon emissions, and accessibility—from a human factors perspective Discusses the role of the human operator relevant to the design, regulation, and evaluation of automated, connected, and intelligent vehicles Offers a broad treatment of the critical issues and technological advances for the designing of transportation systems with the driver in mind Presents an understanding of the human factors issues that are central to the public acceptance of these automated, connected, and intelligent vehicles Leverages lessons from other domains in understanding human interactions with automation Sets the stage for future research by defining the space of unexplored questions

**automated vehicle safety technologies:** Autonomous Vehicles: Safety, Deployment and Effect on Infrastructure Nyle Phillips, 2020-12-30 Fully autonomous vehicles, which would carry out many or all of their functions without the intervention of a driver, may someday bring sweeping social and economic changes and lead to breakthrough gains in transportation safety. At present, no fully autonomous vehicles are available for public use. Many new vehicles have automated some driver functions, but all require a human to monitor the driving environment and control the vehicle. However, rapid advances in technology have made it likely that vehicles with high levels of automation will be on the market within a few years, raising questions about the adequacy of existing methods of safety as discussed in chapter 1. For this and other reasons, federal oversight of the testing and deployment of autonomous vehicles has been of considerable interest as reported in chapters 2 and 3. Chapter 4 examines the implications of autonomous vehicles on America's roadway infrastructure.

**automated vehicle safety technologies:** *Connected and Automated Vehicles* Raj Ponnaluri, Priyanka Alluri, 2021-07 These discussions are technologically interdisciplinary and procedurally cross-functional, hence the need for CAV: Developing Policies, Designing Programs, and Deploying Projects.This book is aimed at the policy-maker who wants to know the high-level detail; the planner who chooses to pursue the most efficient path to implementation; the professional engineer who needs to design a sustainable system; the practitioner who considers deployable frameworks; the project manager who oversees the system deployment; the private sector consultant who develops and delivers a CAV program; and the researcher who evaluates the project benefits and documents lessons learned. .

**automated vehicle safety technologies:** *Autonorama* Peter Norton, 2021-10-21 In Autonorama: The Illusory Promise of High-Tech Driving, historian Peter Norton argues that driverless cars cannot be the safe, sustainable, and inclusive mobility solutions that tech companies and automakers are promising us. The salesmanship behind the driverless future is distracting us from better ways to get around that we can implement now. Unlike autonomous vehicles, these alternatives are inexpensive, safe, sustainable, and inclusive. Norton takes the reader on an engaging ride--from the GM Futurama exhibit to smart highways and vehicles--to show how we are once again being sold car dependency in the guise of mobility. Autonorama is hopeful, advocating for wise, proven, humane mobility that we can invest in now, without waiting for technology that is forever just out of reach.

**automated vehicle safety technologies: Automated Driving Systems 2.0.** U. S. Department Of Transportation, 2018-07-25 A Vision for Safety replaces the Federal Automated Vehicle Policy released in 2016. This updated policy framework offers a path forward for the safe deployment of automated vehicles by: encouraging new entrants and ideas that deliver safer vehicles; making

Department regulatory processes more nimble to help match the pace of private sector innovation; and supporting industry innovation and encouraging open communication with the public and with stakeholders.--Introductory message.

**automated vehicle safety technologies:** Road Vehicle Automation 3 Gereon Meyer, Sven Beiker, 2016-07-01 This edited book comprises papers about the impacts, benefits and challenges of connected and automated cars. It is the third volume of the LNMOB series dealing with Road Vehicle Automation. The book comprises contributions from researchers, industry practitioners and policy makers, covering perspectives from the U.S., Europe and Japan. It is based on the Automated Vehicles Symposium 2015 which was jointly organized by the Association of Unmanned Vehicle Systems International (AUVSI) and the Transportation Research Board (TRB) in Ann Arbor, Michigan, in July 2015. The topical spectrum includes, but is not limited to, public sector activities, human factors, ethical and business aspects, energy and technological perspectives, vehicle systems and transportation infrastructure. This book is an indispensable source of information for academic researchers, industrial engineers and policy makers interested in the topic of road vehicle automation.

**automated vehicle safety technologies: Automated Driving** Daniel Watzenig, Martin Horn, 2016-09-23 The main topics of this book include advanced control, cognitive data processing, high performance computing, functional safety, and comprehensive validation. These topics are seen as technological bricks to drive forward automated driving. The current state of the art of automated vehicle research, development and innovation is given. The book also addresses industry-driven roadmaps for major new technology advances as well as collaborative European initiatives supporting the evolvement of automated driving. Various examples highlight the state of development of automated driving as well as the way forward. The book will be of interest to academics and researchers within engineering, graduate students, automotive engineers at OEMs and suppliers, ICT and software engineers, managers, and other decision-makers.

**automated vehicle safety technologies:** Creating Autonomous Vehicle Systems Shaoshan Liu, Liyun Li, Jie Tang, Shuang Wu, Jean-Luc Gaudiot, 2017-10-25 This book is the first technical overview of autonomous vehicles written for a general computing and engineering audience. The authors share their practical experiences of creating autonomous vehicle systems. These systems are complex, consisting of three major subsystems: (1) algorithms for localization, perception, and planning and control; (2) client systems, such as the robotics operating system and hardware platform; and (3) the cloud platform, which includes data storage, simulation, high-definition (HD) mapping, and deep learning model training. The algorithm subsystem extracts meaningful information from sensor raw data to understand its environment and make decisions about its actions. The client subsystem integrates these algorithms to meet real-time and reliability requirements. The cloud platform provides offline computing and storage capabilities for autonomous vehicles. Using the cloud platform, we are able to test new algorithms and update the HD map—plus, train better recognition, tracking, and decision models. This book consists of nine chapters. Chapter 1 provides an overview of autonomous vehicle systems; Chapter 2 focuses on localization technologies; Chapter 3 discusses traditional techniques used for perception; Chapter 4 discusses deep learning based techniques for perception; Chapter 5 introduces the planning and control sub-system, especially prediction and routing technologies; Chapter 6 focuses on motion planning and feedback control of the planning and control subsystem; Chapter 7 introduces reinforcement learning-based planning and control; Chapter 8 delves into the details of client systems design; and Chapter 9 provides the details of cloud platforms for autonomous driving. This book should be useful to students, researchers, and practitioners alike. Whether you are an undergraduate or a graduate student interested in autonomous driving, you will find herein a comprehensive overview of the whole autonomous vehicle technology stack. If you are an autonomous driving practitioner, the many practical techniques introduced in this book will be of interest to you. Researchers will also find plenty of references for an effective, deeper exploration of the various technologies.

**automated vehicle safety technologies:** Confessions of a Recovering Engineer Charles L. Marohn, Jr., 2021-08-26 Discover insider secrets of how America's transportation system is designed, funded, and built – and how to make it work for your community In Confessions of a Recovering Engineer: Transportation for a Strong Town, renowned speaker and author of Strong Towns Charles L. Marohn Jr. delivers an accessible and engaging exploration of America's transportation system, laying bare the reasons why it no longer works as it once did, and how to modernize transportation to better serve local communities. You'll discover real-world examples of poor design choices and how those choices have dramatic and tragic effects on the lives of the people who use them. You'll also find case studies and examples of design improvements that have revitalized communities and improved safety. This important book shows you: The values of the transportation professions, how they are applied in the design process, and how those priorities differ from those of the public. How the standard approach to transportation ensures the maximum amount of traffic congestion possible is created each day, and how to fight that congestion on a budget. Bottom-up techniques for spending less and getting higher returns on transportation projects, all while improving quality of life for residents. Perfect for anyone interested in why transportation systems work – and fail to work – the way they do, Confessions of a Recovering Engineer is a fascinating insider's peek behind the scenes of America's transportation systems.

**automated vehicle safety technologies:** *Safe Enough* Marjory S. Blumenthal, Laura Fraade-Blanar, Ryan Best, J. Luke Irwin, 2021-01-15 RAND researchers analyzed three approaches to assessing the safety of automated vehicles (AVs)--measurements, processes, and thresholds--and how they interact. Researchers also explored the elements of effective communications regarding AV safety.

**automated vehicle safety technologies:** Multi-Agent Safety Juan Pimentel, 2019-03-07 Safety has been ranked as the number one concern for the acceptance and adoption of automated vehicles since safety has driven some of the most complex requirements in the development of self-driving vehicles. Recent fatal accidents involving self-driving vehicles have uncovered issues in the way some automated vehicle companies approach the design, testing, verification, and validation of their products. Traditionally, automotive safety follows functional safety concepts as detailed in the standard ISO 26262. However, automated driving safety goes beyond this standard and includes other safety concepts such as safety of the intended functionality (SOTIF) and multi-agent safety. Multi-Agent Safety addresses the concept of safety for self-driving vehicles through the inclusion of 10 recent and highly relevent SAE technical papers. Topics that these papers feature include vehicle interaction with other vehicles, pedestrians, bicyclists, and other road objects. As the second title in a series on automated vehicle safety, each will contain introductory content by the Editor with 10 SAE technical papers specifically chosen to illuminate the specific safety topic of that book.

**automated vehicle safety technologies:** Driving to Safety Nidhi Kalra, Susan M. Paddock, 2016

**automated vehicle safety technologies: Driverless** Hod Lipson, Melba Kurman, 2016-09-23 When human drivers let intelligent software take the wheel: the beginning of a new era in personal mobility.

**automated vehicle safety technologies: Autonomous Vehicles** George Dimitrakopoulos, Aggelos Tsakanikas, Elias Panagiotopoulos, 2021-04-15 Autonomous Vehicles: Technologies, Regulations, and Societal Impacts explores both the autonomous driving concepts and the key hardware and software enablers, Artificial intelligence tools, needed infrastructure, communication protocols, and interaction with non-autonomous vehicles. It analyses the impacts of autonomous driving using a scenario-based approach to quantify the effects on the overall economy and affected sectors. The book assess from a qualitative and quantitative approach, the future of autonomous driving, and the main drivers, challenges, and barriers. The book investigates whether individuals are ready to use advanced automated driving vehicles technology, and to what extent we as a society are prepared to accept highly automated vehicles on the road. Building on the technologies, opportunities, strengths, threats, and weaknesses, Autonomous Vehicles: Technologies, Regulations,

and Societal Impacts discusses the needed frameworks for automated vehicles to move inside and around cities. The book concludes with a discussion on what in applications comes next, outlining the future research needs. - Broad, interdisciplinary and systematic coverage of the key issues in autonomous driving and vehicles - Examines technological impact on society, governance, and the economy as a whole - Includes foundational topical coverage, case studies, objectives, and glossary

**automated vehicle safety technologies: Nonlinear Approaches in Engineering Applications** Reza N. Jazar, Liming Dai, 2019-08-06 This book focuses on the latest applications of nonlinear approaches in engineering and addresses a range of scientific problems. Examples focus on issues in automotive technology, including automotive dynamics, control for electric and hybrid vehicles, and autodriver algorithm for autonomous vehicles. Also included are discussions on renewable energy plants, data modeling, driver-aid methods, and low-frequency vibration. Chapters are based on invited contributions from world-class experts who advance the future of engineering by discussing the development of more optimal, accurate, efficient, cost, and energy effective systems. This book is appropriate for researchers, students, and practising engineers who are interested in the applications of nonlinear approaches to solving engineering and science problems. Presents a broad range of practical topics and approaches; Explains approaches to better, safer, and cheaper systems; Emphasises automotive applications, physical meaning, and methodologies.

**automated vehicle safety technologies: Autonomous Driving** Andreas Herrmann, Walter Brenner, Rupert Stadler, 2018-03-26 The technology and engineering behind autonomous driving is advancing at pace. This book presents the latest technical advances and the economic, environmental and social impact driverless cars will have on individuals and the automotive industry.

**automated vehicle safety technologies:** *Smart Transport for Cities and Nations* Christian Claudel, Paul Avery, Wendy Wagner, Lisa Loftus-Otway, Daniel Fagnant, Prateek Bansal, Michael Levin, Rahul Patel, Tianxin Li, Yong Zhao, Michele Simoni, Lewis Clements, Guni Sharon, Duncan Stewart, Peter Stone, Aqshems Nichols, Tejas Choudhary, Josiah Hanna, Purser Sturgeon, Michael Albert, Jia Li, Krishna Murthy Gurumurthy, Kenneth A. Perrine, Marc Segal, Qinglu Ma, Hagen Fritz, 2018-06-30

**automated vehicle safety technologies:** Autonomous Vehicles in Support of Naval Operations National Research Council, Division on Engineering and Physical Sciences, Naval Studies Board, Committee on Autonomous Vehicles in Support of Naval Operations, 2005-08-05 Autonomous vehicles (AVs) have been used in military operations for more than 60 years, with torpedoes, cruise missiles, satellites, and target drones being early examples.1 They have also been widely used in the civilian sector-for example, in the disposal of explosives, for work and measurement in radioactive environments, by various offshore industries for both creating and maintaining undersea facilities, for atmospheric and undersea research, and by industry in automated and robotic manufacturing. Recent military experiences with AVs have consistently demonstrated their value in a wide range of missions, and anticipated developments of AVs hold promise for increasingly significant roles in future naval operations. Advances in AV capabilities are enabled (and limited) by progress in the technologies of computing and robotics, navigation, communications and networking, power sources and propulsion, and materials. Autonomous Vehicles in Support of Naval Operations is a forward-looking discussion of the naval operational environment and vision for the Navy and Marine Corps and of naval mission needs and potential applications and limitations of AVs. This report considers the potential of AVs for naval operations, operational needs and technology issues, and opportunities for improved operations.

**automated vehicle safety technologies:** *Autonomous Vehicles and Future Mobility* Pierluigi Coppola, Domokos Esztergár-Kiss, 2019-06-11 Autonomous Vehicles and Future Mobility presents novel methods for examining the long-term effects on individuals, society, and on the environment for a wide range of forthcoming transport scenarios, such as self-driving vehicles, workplace mobility plans, demand responsive transport analysis, mobility as a service, multi-source transport data provision, and door-to-door mobility. With the development and realization of new mobility

options comes change in long-term travel behavior and transport policy. This book addresses these impacts, considering such key areas as the attitude of users towards new services, the consequences of introducing new mobility forms, the impacts of changing work related trips, and more. By examining and contextualizing innovative transport solutions in this rapidly evolving field, the book provides insights into the current implementation of these potentially sustainable solutions. It will serve as a resource of general guidelines and best practices for researchers, professionals and policymakers.

**automated vehicle safety technologies: Autonomous Vehicles** Clifford Winston, Quentin Karpilow, 2020-06-30 Better public policies can make the road smoother for self-driving vehicles and the society that soon will depend on them. Whether you find the idea of autonomous vehicles to be exciting or frightening, the truth is that they will soon become a significant everyday presence on streets and highways—not just a novel experiment attracting attention or giggles and sparking fears of runaway self-driving cars. The emergence of these vehicles represents a watershed moment in the history of transportation. If properly encouraged, this innovation promises not only to vastly improve road travel and generate huge benefits to travelers and businesses, but to also benefit the entire economy by reducing congestion and virtually eliminating vehicle accidents. The impacts of autonomous vehicles on land use, employment, and public finance are likely to be mixed. But widely assumed negative effects are generally overstated because they ignore plausible adjustments by the public and policymakers that could ameliorate them. This book by two transportation experts argues that policy analysts can play an important and constructive role in identifying and analyzing important policy issues and necessary steps to ease the advent of autonomous vehicles. Among the actions that governments must take are creating a framework for vehicle testing, making appropriate investments in the technology of highway networks to facilitate communication involving autonomous vehicles, and reforming pricing and investment policies to enable operation of autonomous vehicles to be safe and efficient. The authors argue that policymakers at all levels of government must address these and other issues sooner rather than later. Prompt and effective actions outlined in this book are necessary to ensure that autonomous vehicles will be safe and efficient when the public begins to adopt them as replacements for current vehicles.

**automated vehicle safety technologies: Self-Driving Vehicles and Enabling Technologies** , 2021-09-22 This book examines the development and technical progress of self-driving vehicles in the context of the Vision Zero project from the European Union, which aims to eliminate highway system fatalities and serious accidents by 2050. It presents the concept of Autonomous Driving (AD) and discusses its applications in transportation, logistics, space, agriculture, and industrial and home automation.

**automated vehicle safety technologies: Emerging Technologies and Their Expected Impact on Non-Federal Spectrum Demand** Executive Office of the President of the United States, 2019-05 The Presidential Memorandum of October 25, 2018, Developing a Sustainable Spectrum Strategy for America's Future, calls for the development of a National Spectrum Strategy. The development of the strategy is to be informed by three interim products, one of which is a report on emerging technologies and their expected impact on non-Federal spectrum demand, to be submitted to the President by the Director of the Office of Science and Technology Policy (OSTP) or the Director's designee. The purpose of this paper is to assist OSTP in developing the required report.Fifth Generation (5G) Wireless TechnologyThis study assesses the potential impact on spectrum demand of emerging 5G wireless technology and 5G enable applications, which is recognized by the Trump Administration as one of four Industries of the Future that will ensure American prosperity and national security. 5G is expected to be revolutionary in its impact. It will enhance mobile broadband performance with an order of magnitude increase in speed, which will enable new classes of applications--such as augmented reality and virtual reality--to emerge in offices, classrooms, museums, sports events, and retail premises. 5G will also accommodate crowd densities at the scale of Super Bowls and support broadband access for users moving at the speed of express trains. Moreover, 5G will enable applications--such as self-driving cars, factory automation,

and remote surgery--that require ultra-high reliability and low latency. In addition, 5G will enable the world of the Internet of Things (IoT)--which will lay the foundation for smart homes, smart buildings, smart cities, precision agriculture, and more.

**automated vehicle safety technologies:** An Introduction to Ethics in Robotics and AI Christoph Bartneck, Christoph Lütge, Alan Wagner, Sean Welsh, 2020-08-11 This open access book introduces the reader to the foundations of AI and ethics. It discusses issues of trust, responsibility, liability, privacy and risk. It focuses on the interaction between people and the AI systems and Robotics they use. Designed to be accessible for a broad audience, reading this book does not require prerequisite technical, legal or philosophical expertise. Throughout, the authors use examples to illustrate the issues at hand and conclude the book with a discussion on the application areas of AI and Robotics, in particular autonomous vehicles, automatic weapon systems and biased algorithms. A list of questions and further readings is also included for students willing to explore the topic further.

**automated vehicle safety technologies: General Estimates System** , 1988

**automated vehicle safety technologies: Safety-Critical Automotive Systems** Juan R Pimentel, 2006-08-01 Focusing on the vehicle's most important subsystems, this book features an introduction by the editor and 40 SAE technical papers from 2001-2006. The papers are organized in the following sections, which parallel the steps to be followed while building a complete final system: Introduction to Safety-Critical Automotive Systems Safety Process and Standards Requirements, Specifications, and Analysis Architectural and Design Methods and Techniques Prototyping and Target Implementation Testing, Verifications, and Validation Methods

**automated vehicle safety technologies:** Transport and Safety Geetam Tiwari, Dinesh Mohan, 2021-05-20 This volume addresses a variety of issues on traffic safety policy, ranging from issues of climate change, urban equity, and transport safety, in a broad global and societal context, while retaining situation-specific details. Written by international experts on issues of transportation and traffic safety, it will be of special interest to advanced researchers in the engineering and planning disciplines working on these issues as well as policy makers concerned with setting up institutions and legislations for traffic safety.

**automated vehicle safety technologies: Characterizing the Safety of Automated Vehicles** Juan Pimentel, 2019-03-07 Safety has been ranked as the number one concern for the acceptance and adoption of automated vehicles since safety has driven some of the most complex requirements in the development of self-driving vehicles. Recent fatal accidents involving self-driving vehicles have uncovered issues in the way some automated vehicle companies approach the design, testing, verification, and validation of their products. Traditionally, automotive safety follows functional safety concepts as detailed in the standard ISO 26262. However, automated driving safety goes beyond this standard and includes other safety concepts such as safety of the intended functionality (SOTIF) and multi-agent safety. Characterizing the Safety of Automated Vehicles addresses the concept of safety for self-driving vehicles through the inclusion of 10 recent and highly relevent SAE technical papers. Topics that these papers feature include functional safety, SOTIF, and multi-agent safety. As the first title in a series on automated vehicle safety, each will contain introductory content by the Editor with 10 SAE technical papers specifically chosen to illuminate the specific safety topic of that book.

**automated vehicle safety technologies: Automated Vehicles are Probably Legal in the United States** Bryant Walker Smith, 2012 Note: This is the original 2012 report. An updated 2014 law review article is available as 1 Tex. A&M. L. Rev. 411. This report provides the most comprehensive discussion to date of whether so-called automated, autonomous, self-driving, or driverless vehicles can be lawfully sold and used on public roads in the United States. The short answer is that the computer direction of a motor vehicle's steering, braking, and accelerating without real-time human input is probably legal. The long answer, contained in the report, provides a foundation for tailoring regulations and understanding liability issues related to these vehicles. The report's largely descriptive analysis, which begins with the principle that everything is

permitted unless prohibited, covers three key legal regimes: the 1949 Geneva Convention on Road Traffic, regulations enacted by the National Highway Traffic Safety Administration (NHTSA), and the vehicle codes of all fifty US states. The Geneva Convention, to which the United States is a party, probably does not prohibit automated driving. The treaty promotes road safety by establishing uniform rules, one of which requires every vehicle or combination thereof to have a driver who is at all times ... able to control it. However, this requirement is likely satisfied if a human is able to intervene in the automated vehicle's operation. NHTSA's regulations, which include the Federal Motor Vehicle Safety Standards to which new vehicles must be certified, do not generally prohibit or uniquely burden automated vehicles, with the possible exception of one rule regarding emergency flashers. State vehicle codes probably do not prohibit-but may complicate-automated driving. These codes assume the presence of licensed human drivers who are able to exercise human judgment, and particular rules may functionally require that presence. New York somewhat uniquely directs a driver to keep one hand on the wheel at all times. In addition, far more common rules mandating reasonable, prudent, practicable, and safe driving have uncertain application to automated vehicles and their users. Following distance requirements may also restrict the lawful operation of tightly spaced vehicle platoons. Many of these issues arise even in the three states that expressly regulate automated vehicles. The primary purpose of this report is to assess the current legal status of automated vehicles. However, the report includes draft language for US states that wish to clarify this status. It also recommends five near-term measures that may help increase legal certainty without producing premature regulation. First, regulators and standards organizations should develop common vocabularies and definitions that are useful in the legal, technical, and public realms. Second, the United States should closely monitor efforts to amend or interpret the 1969 Vienna Convention, which contains language similar to the Geneva Convention but does not bind the United States. Third, NHTSA should indicate the likely scope and schedule of potential regulatory action. Fourth, US states should analyze how their vehicle codes would or should apply to automated vehicles, including those that have an identifiable human operator and those that do not. Finally, additional research on laws applicable to trucks, buses, taxis, low-speed vehicles, and other specialty vehicles may be useful. This is in addition to ongoing research into the other legal aspects of vehicle automation.

**automated vehicle safety technologies: Unsettled Issues Concerning Semi-Automated Vehicles** Francesca Favaro, 2020-02-28 Across the span of the SAE International-defined Levels of Driving Automation, human drivers occupy a diverse range of responsibilities and authority on the vehicle movement and the monitoring of the outside environment. From both a technological and a regulatory perspective, there is a gap that divides lower levels of automation (L1 through L3) and higher levels of automation (L4 and L5). For those vehicles that require the cooperation between a human driver and the autonomous technology, it is important to ascertain the safety consequences of such a design choice. It is also important to understand what the transition between automated driving and manual driving entails for the human driver, as well as for the surrounding traffic. This SAE EDGE™ Research Report investigates unsettled issues concerning what is commonly referred to as “semi-automation,” including an overview of the role of human drivers, the quantification of the “transition-to-manual” problem, the role played by L3 toward full automation, and regulatory and moral considerations surrounding the deployment of these vehicles. NOTE: SAE EDGE™ Research Reports are intended to identify and illuminate key issues in emerging, but still unsettled, technologies of interest to the mobility industry. The goal of SAE EDGE™ Research Reports is to stimulate discussion and work in the hope of promoting and speeding resolution of identified issues. SAE EDGE™ Research Reports are not intended to resolve the issues they identify or close any topic to further scrutiny. Click here to access the full SAE EDGETM Research Report portfolio. https://doi.org/10.4271/EPR2020001

**automated vehicle safety technologies: Automotive Systems and Software Engineering** Yanja Dajsuren, Mark van den Brand, 2019-07-17 This book presents the state of the art, challenges and future trends in automotive software engineering. The amount of automotive software has

grown from just a few lines of code in the 1970s to millions of lines in today's cars. And this trend seems destined to continue in the years to come, considering all the innovations in electric/hybrid, autonomous, and connected cars. Yet there are also concerns related to onboard software, such as security, robustness, and trust. This book covers all essential aspects of the field. After a general introduction to the topic, it addresses automotive software development, automotive software reuse, E/E architectures and safety, C-ITS and security, and future trends. The specific topics discussed include requirements engineering for embedded software systems, tools and methods used in the automotive industry, software product lines, architectural frameworks, various related ISO standards, functional safety and safety cases, cooperative intelligent transportation systems, autonomous vehicles, and security and privacy issues. The intended audience includes researchers from academia who want to learn what the fundamental challenges are and how they are being tackled in the industry, and practitioners looking for cutting-edge academic findings. Although the book is not written as lecture notes, it can also be used in advanced master's-level courses on software and system engineering. The book also includes a number of case studies that can be used for student projects.

**automated vehicle safety technologies: Handbook of Driver Assistance Systems** Hermann Winner, Stephan Hakuli, Felix Lotz, Christina Singer, 2015-10-15 This fundamental work explains in detail systems for active safety and driver assistance, considering both their structure and their function. These include the well-known standard systems such as Anti-lock braking system (ABS), Electronic Stability Control (ESC) or Adaptive Cruise Control (ACC). But it includes also new systems for protecting collisions protection, for changing the lane, or for convenient parking. The book aims at giving a complete picture focusing on the entire system. First, it describes the components which are necessary for assistance systems, such as sensors, actuators, mechatronic subsystems, and control elements. Then, it explains key features for the user-friendly design of human-machine interfaces between driver and assistance system. Finally, important characteristic features of driver assistance systems for particular vehicles are presented: Systems for commercial vehicles and motorcycles.

**automated vehicle safety technologies: Research Anthology on Cross-Disciplinary Designs and Applications of Automation** Information Resources Management Association, 2021-10-29 Throughout human history, technological advancements have been made for the ease of human labor. With our most recent advancements, it has been the work of scholars to discover ways for machines to take over a large part of this labor and reduce human intervention. These advancements may become essential processes to nearly every industry. It is essential to be knowledgeable about automation so that it may be applied. Research Anthology on Cross-Disciplinary Designs and Applications of Automation is a comprehensive resource on the emerging designs and application of automation. This collection features a number of authors spanning multiple disciplines such as home automation, healthcare automation, government automation, and more. Covering topics such as human-machine interaction, trust calibration, and sensors, this research anthology is an excellent resource for technologists, IT specialists, computer engineers, systems and software engineers, manufacturers, engineers, government officials, professors, students, healthcare administration, managers, CEOs, researchers, and academicians.

**automated vehicle safety technologies: Why We Drive** Matthew B. Crawford, 2020-06-09 A brilliant and defiant celebration of driving as a unique pathway of human freedom, by one of the most influential thinkers of our time (Sunday Times) Why We Drive weaves philosophers, thinkers, and scientific research with shade-tree mechanics and racers to defend our right to independence, making the case that freedom of motion is essential to who we are as a species. … We hope you'll read it. —Road & Track Once we were drivers, the open road alive with autonomy, adventure, danger, trust, and speed. Today we are as likely to be in the back seat of an Uber as behind the wheel ourselves. Tech giants are hurling us toward a shiny, happy "self-driving" future, selling utopia but equally keen to advertise to a captive audience strapped into another expensive device. Are we destined, then, to become passengers, not drivers? Why We Drive reveals that much more

may be at stake than we might think. Ten years ago, in the New York Times-bestselling Shop Class as Soulcraft, philosopher-mechanic Matthew B. Crawford—a University of Chicago PhD who owned his own motorcycle shop—made a revolutionary case for manual labor, one that ran headlong against the pretentions of white-collar office work. Now, using driving as a window through which to view the broader changes wrought by technology on all aspects of contemporary life, Crawford investigates the driver's seat as one of the few remaining domains of skill, exploration, play—and freedom. Blending philosophy and hands-on storytelling, Crawford grounds the narrative in his own experience in the garage and behind the wheel, recounting his decade-long restoration of a vintage Volkswagen as well as his journeys to thriving automotive subcultures across the country. Crawford leads us on an irreverent but deeply considered inquiry into the power of faceless bureaucracies, the importance of questioning mindless rules, and the battle for democratic self-determination against the surveillance capitalists. A meditation on the competence of ordinary people, Why We Drive explores the genius of our everyday practices on the road, the rewards of "folk engineering," and the existential value of occasionally being scared shitless. Witty and ingenious throughout, Why We Drive is a rebellious and daring celebration of the irrepressible human spirit.

**automated vehicle safety technologies:** *The Role of ISO 26262* Juan Pimentel, 2019-03-07 Safety has been ranked as the number one concern for the acceptance and adoption of automated vehicles since safety has driven some of the most complex requirements in the development of self-driving vehicles. Recent fatal accidents involving self-driving vehicles have uncovered issues in the way some automated vehicle companies approach the design, testing, verification, and validation of their products. Traditionally, automotive safety follows functional safety concepts as detailed in the standard ISO 26262. However, automated driving safety goes beyond this standard and includes other safety concepts such as safety of the intended functionality (SOTIF) and multi-agent safety. The Role of ISO 26262 addresses the concept of safety for self-driving vehicles through the inclusion of 10 recent and highly relevent SAE technical papers. Topics that these papers feature include model-based systems engineering (MBSE) and the use of SysML language in a management-based approach to safety As the fourth title in a series on automated vehicle safety, this contains introductory content by the Editor with 10 SAE technical papers specifically chosen to illuminate the specific safety topic of that book.

**automated vehicle safety technologies: V2V/V21 Communications for Improved Road Safety and Efficiency** Ronald K. Jurgen, 2012

**automated vehicle safety technologies:** *Autonomous Vehicles for Safer Driving* Ronald K Jurgen, 2013-04-16 Self-driving cars are no longer in the realm of science fiction, thanks to the integration of numerous automotive technologies that have matured over many years. Technologies such as adaptive cruise control, forward collision warning, lane departure warning, and V2V/V2I communications are being merged into one complex system. The papers in this compendium were carefully selected to bring the reader up to date on successful demonstrations of autonomous vehicles, ongoing projects, and what the future may hold for this technology. It is divided into three sections: overview, major design and test collaborations, and a sampling of autonomous vehicle research projects. The comprehensive overview paper covers the current state of autonomous vehicle research and development as well as obstacles to overcome and a possible roadmap for major new technology developments and collaborative relationships. The section on major design and test collaborations covers Sartre, DARPA contests, and the USDOT and the Crash Avoidance Metrics Partnership-Vehicle Safety Communications (CAMP-VSC2) Consortium. The final section presents seven SAE papers on significant recent and ongoing research by individual companies on a variety of approaches to autonomous vehicles. This book will be of interest to a wide range of readers: engineers at automakers and electronic component suppliers; software engineers; computer systems analysts and architects; academics and researchers within the electronics, computing, and automotive industries; legislators, managers, and other decision-makers in the government highway sector; traffic safety professionals; and insurance and legal practitioners.

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