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This book on computing systems for autonomous driving takes a comprehensive look at the state-of-the-art computing technologies, including computing frameworks, algorithm

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***deployment optimizations,
systems runtime
optimizations, dataset and
benchmarking, simulators,
hardware platforms, and smart
infrastructures. The objectives
of level 4 and level 5***

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***autonomous driving require
colossal improvement in the
computing for this cyber-
physical system. Beginning
with a definition of computing
systems for autonomous
driving, this book introduces***

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promising research topics and serves as a useful starting point for those interested in starting in the field. In addition to the current landscape, the authors examine the remaining open

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**challenges to achieve L4/L5
autonomous driving.**

**Computing Systems for
Autonomous Driving provides
a good introduction for
researchers and prospective
practitioners in the field. The**

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***book can also serve as a useful
reference for university
courses on autonomous
vehicle technologies. This book
on computing systems for
autonomous driving takes a
comprehensive look at the***

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state-of-the-art computing technologies, including computing frameworks, algorithm deployment optimizations, systems runtime optimizations, dataset and benchmarking, simulators,

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hardware platforms, and smart infrastructures. The objectives of level 4 and level 5 autonomous driving require colossal improvement in the computing for this cyber-physical system. Beginning

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courses on autonomous
vehicle technologies.***

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Automated and connected vehicles (ACV) and, in particular, autonomous vehicles have captured the interest of the public, industry and transportation authorities. ACVs can significantly reduce

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***accidents, fuel consumption,
pollution and the costs of
congestion which in turn will
offer a fundamental change to
the future U.S. transportation
network. The objective of this
project was to evaluate ACV***

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technologies, activities, laws and policies that are now in place or proposed and to assess future ACV usage. The assessment also evaluates the highest level of automated vehicles called autonomous or

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self-driving vehicles and includes how electric vehicles (EVs) will participate in the future ACV transportation system. The results show that the three areas of largest activities are: (1) Autonomous

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vehicle development and demonstration, (2) Connected vehicle and their application to safety improvements, and (3) The interaction between autonomous and electric vehicles. The future dollar

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value in ACV technologies is huge with multi-billion dollar investments being made by auto manufacturers, ride sharing companies and technological innovators all seeking to establish their

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***positions. Due to the electro-
mechanical nature of the ACV
technology, electric propulsion
will likely dominate future
transportation. This is due to
regulatory reasons (no urban
emissions) and other***

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attributes of EVs (having fewer moving parts, reduced maintenance, and capability to be configured to drive, steer, brake and recharge by wire). Alex Davies tells the dramatic, colorful story of the quest to

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develop driverless cars—and the fierce competition between Google, Uber, and other companies in a race to revolutionize our lives. The self-driving car has been one of the most vaunted

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***technological breakthroughs
of recent years. But early
promises that these
autonomous vehicles would
soon be on the roads have
proven premature. Alex Davies
follows the twists and turns of***

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this story from its origins to today. The story starts with the Defense Advanced Research Projects Agency (DARPA), which was charged with developing a land-based equivalent to the drone, a

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vehicle that could operate in war zones without risking human lives. DARPA issued a series of three “Grand Challenges” that attracted visionaries, many of them students and amateurs, who

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***took the technology from
Jetsons-style fantasy to near-
reality. The young stars of the
Challenges soon connected
with Silicon Valley giants
Google and Uber, intent on
delivering a new way of***

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***driving to the civilian world.
Soon the automakers joined
the quest, some on their own,
others in partnership with the
tech titans. But as road testing
progressed, it became clear
that the challenges of driving***

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***a car without human
assistance were more
formidable than anticipated.
Davies profiles the industry's
key players from the early
enthusiasm of the DARPA days
to their growing awareness***

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***that while this spin on
artificial intelligence isn't yet
ready for rush-hour traffic,
driverless cars are poised to
remake how the world moves.
Driven explores this exciting
quest to transform***

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***transportation and change our
lives.***

***This book systematically
discusses the development of
autonomous driving,
describing the related history,
technological advances,***

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***infrastructure, social impacts,
international competition,
China's opportunities and
challenges, and possible
future scenarios. This popular
science book uses
straightforward language and***

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includes quotes from ancient Chinese poems to enhance the reading experience. The discussions are supplemented by theoretical elaborations, presented in tables and figures. The book is intended

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***for auto fans, upper
undergraduate and graduate
students in the field of
automotive engineering.
How the Driverless Revolution
will Change the World
Frequently Asked Questions***

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Volume 2

**Computing Systems for
Autonomous Driving
Road Vehicle Automation 7
Road Vehicle Automation 4**

*Autonomous Vehicles and
Future Mobility presents*

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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,

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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-

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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

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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

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of these potentially sustainable solutions. It will serve as a resource of general guidelines and best practices for researchers, professionals and policymakers. Covers hot topics, including travel

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behavior change, autonomous vehicle impacts, intelligent solutions, mobility planning, mobility as a service, sustainable solutions, and more Examines up-to-date models and applications using novel

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technologies Contains contributions from leading scholars around the globe Includes case studies with the latest research results "A Vision for Safety replaces the Federal Automated Vehicle Policy

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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

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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

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stakeholders."--Introductory message.

Autonomous and Connected Heavy Vehicle Technology presents the fundamentals, definitions, technologies, standards and future developments of autonomous

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and connected heavy vehicles. This book provides insights into various issues pertaining to heavy vehicle technology and helps users develop solutions towards autonomous, connected, cognitive solutions through

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the convergence of Big Data, IoT, cloud computing and cognition analysis. Various physical, cyber-physical and computational key points related to connected vehicles are covered, along with concepts such as edge

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computing, dynamic resource optimization, engineering process, methodology and future directions. The book also contains a wide range of case studies that help to identify research problems and an analysis of the

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issues and synthesis solutions. This essential resource for graduate-level students from different engineering disciplines such as automotive and mechanical engineering, computer science, data science and

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business analytics combines both basic concepts and advanced level content from technical experts. Covers state-of-the-art developments and research in vehicle sensor technology, vehicle communication

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technology, convergence with emerging technologies, and vehicle software and hardware integration
Addresses challenges such as optimization, real-time control systems for distance and steering mechanism, and

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cognitive and predictive analysis Provides complete product development, commercial deployment, technological and performing costs and scaling needs Disruption in Transportation, as some

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experts say, is here; so is this book at this critical inflection point in the history of transportation planning, engineering, and operations. With a focus on improving safety and maximizing available systems

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to accommodate all modes of travel, this work brings together an array of topics and themes on transportation technologies under the banner of Connected and Automated Vehicles (CAV). The emerging technology

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implementing entities, industry leaders, original equipment manufacturers, standard development organizations, researchers, and others are singularly focused on a global multilogue to promote

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Safety, Mobility, Environment, and Economic Development (SMEEEd). These discussions are technologically interdisciplinary and procedurally cross-functional, hence the need

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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

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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

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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. This book makes a business

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case for implementing CAV technologies to achieve SMeEd goals; presents the possibilities and challenges to deploying emerging technologies; identifies the institutional roles and responsibilities; and

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develops a policy framework for mainstreaming CAV. A comprehensive perspective on emerging technologies and CAV policies, planning, and practice A practical guide to support the development of a policy framework,

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business case, and justify funding A real-world experience-driven discussion with case studies, lessons learned, and road map creation A goal-oriented and practitioner-focused detail to draft, design, and deploy

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*emerging technologies and
CAV to achieve safety and
mobility outcomes*

*Technical, Security and
Social Challenges*

*Energy-Efficient Driving of
Road Vehicles*

Autonomous Driving

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Autonomous Vehicles and Future Mobility

A Guide for Policymakers Driven

"Automobile crashes are the seventh leading cause of death worldwide, resulting in over 1.25 million deaths yearly. Automated,

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connected, and intelligent vehicles are predicted to decrease crashes up to 80%. However, the transition will take decades. This new handbook provides both ordinary and vulnerable road users the information about the human

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driver that they need in a single, integrated compendium in order to ensure that automated, connected and intelligent vehicles reach their full potential of reduced crashes, congestion, and carbon emissions"--
When will we see autonomous

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vehicles on our roads? The answer is that to some degree, they are already here. Numerous organisations are testing fully autonomous prototypes on public roads in the UK, and even commercially available vehicles already have several 'quasi-

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autonomous' features. KPMG has forecasted that the connected and autonomous vehicles market could be worth as much as £51 billion to the British economy by 2030 and could create some 30,000 new jobs over the same period. Accordingly, the UK and a

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number of other jurisdictions are already implementing legal reforms with a view to smoothing the path for this technology. Notably, Parliament has passed the Automated and Electric Vehicles Act 2018 dealing with the insurance of such vehicles,

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and changes are currently being made to the Road Vehicle (Construction and Use) Regulations 1986 and to the Highway Code to accommodate highly automated technologies. The government has also issued non-statutory guidance in relation

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to testing on public roads, and in relation to vehicle cybersecurity. Against this rapidly changing landscape, this book analyses the key legal issues facing autonomous vehicles, including testing on public roads, insurance, product liability, and

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cyber security and data protection. It also examines the approach being taken in other jurisdictions, including Austria, Germany, Greece, Italy, the USA, and South Africa.

The main topic of this book is the recent development of on-board

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advanced driver-assistance systems (ADAS), which we can already tell will eventually contribute to the autonomous and connected vehicles of tomorrow. With the development of automated mobility, it becomes necessary to design a series of

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modules which, from the data produced by on-board or remote information sources, will enable the construction of a completely automated driving system. These modules are perception, decision and action. State-of-the-art AI techniques and their potential

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applications in the field of autonomous vehicles are described. Perception systems, focusing on visual sensors, the decision module and the prototyping, testing and evaluation of ADAS systems are all presented for effective

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implementation on autonomous and connected vehicles. This book also addresses cooperative systems, such as pedestrian detection, as well as the legal issues in the use of autonomous vehicles in open environments. Blockchain was first

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conceptualized as a method of building trust in machines and has grown into a vital aspect of many different sectors of the economy. Recently, attention has shifted to the field of autonomous vehicles, and the added value blockchain can provide for the

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future of this sector by building next generation secure decentralized, distributed, and trusted automated environments and enhancing the productivity of several autonomous applications. Opportunities and Challenges for Blockchain Technology in

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Autonomous Vehicles is a critical reference source that explores the applications of blockchain in automated industries. Featuring coverage on a wide range of topics including privacy, risk assessment, and performance optimization, this book is ideally

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designed for design engineers, industry professionals, cryptographers, service designers, entrepreneurs, government officials, consultants, researchers, academicians, and students.

Personal Urban Mobility for the

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21st Century**

AI-enabled Technologies for
Autonomous and Connected
Vehicles

Towards Connected and
Autonomous Vehicle Highways
Handbook of Human Factors for
Automated, Connected, and

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Intelligent Vehicles

Business, Technology and Law
Developing Policies, Designing
Programs, and Deploying Projects:
From Policy to Practice

Increasing the automation level of autonomous vehicles is a research area in which most vehicle

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manufacturers and many research groups are involved. One of the key issues in autonomous vehicles is decision-making algorithms in order to react safely and efficiently to the environment. There are several decision architectures and

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techniques for planning, decision and control tasks. Decision-making Techniques for Autonomous Vehicles provides a general overview of control and decision-making tools that could be used in autonomous vehicles. Motion

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prediction and motion planning tools are presented, as well as the use of machine learning and adaptability to improve performance of these algorithms in real scenarios. Additionally, driver monitoring and behavior analysis

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are used for these tools to produce comprehensive and predictable reactions in the automated vehicle. Lastly, regulatory and ethical issues that must be considered for implementing correct and robust decision-making are presented.

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This book is for researchers as well as Masters and PhD students working in these areas of autonomous vehicles and decision algorithms. Provides a complete overview of decision making and control techniques for autonomous

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vehicles Includes technical, physical and mathematical explanations to provide knowledge for implementation of tools Features machine learning to improve decision-making algorithms performance Shows how

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regulations and ethics influence the development and implementation of these algorithms in real scenarios "As connected and automated vehicle technology continues to advance, local agencies are seeking guidance on how to

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prepare and answer questions from elected officials and the public. The Local Road Research Board developed a Frequently Asked Questions interactive resource guide to help local agencies prepare for and respond to CAV

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changes. Note: To operate, the PDF file must be downloaded and opened within Adobe Acrobat; the navigation features won't work if opened within an Internet browsers, unless in IE mode."-- Project website.

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Driving automation and autonomy are already upon us and the problems that were predicted twenty years ago are beginning to appear. These problems include shortfalls in expected benefits, equipment unreliability, driver skill

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fade, and error-inducing equipment designs. Designing Interaction and Interfaces for Automated Vehicles: User-Centred Ecological Design and Testing investigates the difficult problem of how to interface drivers with automated vehicles by offering

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an inclusive, human-centred design process that focusses on human variability and capability in interaction with interfaces. This book introduces a novel method that combines both systems thinking and inclusive user-centred

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design. It models driver interaction, provides design specifications, concept designs, and the results of studies in simulators on the test track, and in road going vehicles. This book is for designers of systems interfaces, interactions,

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UX, Human Factors and Ergonomics researchers and practitioners involved with systems engineering and automotive academics. "In this book, Prof Stanton and colleagues show how Human Factors methods can be

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applied to the tricky problem of interfacing human drivers with vehicle automation. They have developed an approach to designing the human-automation interaction for the handovers between the driver and the vehicle.

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This approach has been tested in driving simulators and, most interestingly, in real vehicles on British motorways. The approach, called User-Centred Ecological Interface Design, has been validated against driver behaviour

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and used to support their ongoing work on vehicle automation. I highly recommend this book for anyone interested, or involved, in designing human-automation interaction in vehicles and beyond." Professor Michael A. Regan, University of

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NSW Sydney, AUSTRALIA

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

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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

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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

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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

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researchers, industrial engineers and policy makers interested in the topic of road vehicle automation.

Connected and Autonomous Vehicles in Smart Cities
Technical, Legal and Social Aspects

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Connected Autonomous Vehicles
Investigating Driver Experience and
Augmented Reality Head-up
Displays in Autonomous Vehicles
Networked Control Systems for
Connected and Automated
Vehicles

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Autonomous and Connected Heavy
Vehicle Technology

**Policy Implications of
Autonomous Vehicles,
Volume Five in the
Advances in Transport
Policy and Planning**

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**series systematically
reviews policy relevant
implications of AVs and
the associated possible
policy responses, and
discusses future avenues
for policy making and**

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research. It comprises 13 chapters discussing:
(a) short-term implications of AVs for traffic flow, human-automated bus systems interaction, cyber-

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**security and safety,
cybersecurity
certification and
auditing, non-commuting
journeys; (b) long-term
implications of AVs for
carbon dioxide (CO2)**

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**emissions and energy,
health and well-being,
data protection, ethics,
governance; (c)
implications of AVs for
the maritime industry
and urban deliveries;**

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**and (d) overall
synthesis and
conclusions. Provides
the authority and
expertise of leading
contributors from an
international board of**

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**authors Presents the
latest release in the
Advances in Transport
Policy and Planning
series Updated release
includes the latest
information on the**

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**policy implications of
autonomous vehicles
This book combines
comprehensive multi-
angle discussions on
fully connected and
automated vehicle**

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**highway implementation.
It covers the current
progress of the works
towards autonomous
vehicle highway
development, which
encompasses the**

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**discussion on the
technical, social, and
policy as well as
security aspects of
Connected and Autonomous
Vehicles (CAV) topics.
This, in return, will be**

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**beneficial to a vast
amount of readers who
are interested in the
topics of CAV, Automated
Highway and Smart City,
among many others.
Topics include, but are**

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**not limited to,
Autonomous Vehicle in
the Smart City,
Automated Highway, Smart-
Cities Transportation,
Mobility as a Service,
Intelligent**

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**Transportation Systems,
Data Management of
Connected and Autonomous
Vehicle, Autonomous
Trucks, and Autonomous
Freight Transportation.
Brings together**

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**contributions discussing
the latest research in
full automated highway
implementation;
Discusses topics such as
autonomous vehicles,
intelligent**

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**transportation systems,
and smart highways;
Features contributions
from researchers,
academics, and
professionals from a
broad perspective.**

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This edited book aims to address challenges facing the deployment of autonomous vehicles. Autonomous vehicles were predicted to hit the road by 2017. Even

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though a high degree of automation may have been achieved, vehicles that can drive autonomously under all circumstances are not yet commercially available, and the

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**predictions have been
adjusted. Now, experts
even say that we are
still decades away from
fully autonomous
vehicles. In this
volume, the authors form**

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**a multidisciplinary team
of experts to discuss
some of the reasons
behind this delay. The
focus is on three areas:
business, technology,
and law. The authors**

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**discuss how the
traditional car
manufacturers have to
devote numerous
resources to the
development of a new
business model, in which**

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**the sole manufacturing
of vehicles may no
longer be sufficient. In
addition, the book seeks
to introduce how
technological challenges
are creating a shift**

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**toward connected
autonomous vehicles.
Further, it provides
insight into how
regulators are
responding to the
insufficiently tested**

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**technology and how
lawyers try to answer
the liability question
for accidents with these
autonomous vehicles.
Why the United States
lags behind other**

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**industrialized countries
in sharing the benefits
of innovation with
workers and how we can
remedy the problem. The
United States has too
many low-quality, low-**

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wage jobs. Every country has its share, but those in the United States are especially poorly paid and often without benefits. Meanwhile, overall productivity

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**increases steadily and
new technology has
transformed large parts
of the economy,
enhancing the skills and
paychecks of higher paid
knowledge workers.**

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What's wrong with this picture? Why have so many workers benefited so little from decades of growth? The Work of the Future shows that technology is neither

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**the problem nor the
solution. We can build
better jobs if we create
institutions that
leverage technological
innovation and also
support workers though**

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**long cycles of
technological
transformation. Building
on findings from the
multiyear MIT Task Force
on the Work of the
Future, the book argues**

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**that we must foster
institutional
innovations that
complement technological
change. Skills programs
that emphasize work-
based and hybrid**

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**learning (in person and
online), for example,
empower workers to
become and remain
productive in a
continuously evolving
workplace. Industries**

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**fueled by new technology
that augments workers
can supply good jobs,
and federal investment
in R&D can help make
these industries worker-
friendly. We must act to**

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**ensure that the labor
market of the future
offers benefits,
opportunity, and a
measure of economic
security to all.**

Automated and Connected

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Vehicle Implications and Analysis

**The Race to Create the
Autonomous Car**

**The Work of the Future
Toward Cooperative,**

Connected, and Automated

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Mobility

**Reinventing the
Automobile**

**Road Vehicle Automation
8**

***CELLULAR V2X FOR CONNECTED
AUTOMATED DRIVING A unique***

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***examination of cellular
communication technologies for
connected automated driving,
combining expert insights from
telecom and automotive industries
as well as technical and scientific
knowledge from industry and
academia Cellular vehicle-to-***

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everything (C-V2X) technologies enable vehicles to communicate both with the network, with each other, and with other road users using reliable, responsive, secure, and high-capacity communication links. Cellular V2X for Connected Automated Driving provides an up-

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to-date view of the role of C-V2X technologies in connected automated driving (CAD) and connected road user (CRU) services, such as advanced driving support, improved road safety, infotainment, over-the-air software updates, remote driving, and traffic

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efficiency services enabling the future large-scale transition to self-driving vehicles. This timely book discusses where C-V2X technology is situated within the increasingly interconnected ecosystems of the mobile communications and automotive industries. An expert

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contributor team from both industry and academia explore potential applications, business models, standardization, spectrum and channel modelling, network enhancements, security and privacy, and more. Broadly divided into two parts—introductory and

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advanced material—the text first introduces C-V2X technology and introduces a variety of use cases and opportunities, requiring no prerequisite technical knowledge. The second part of the book assumes a basic understanding of the field of telecommunications,

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presenting technical descriptions of the radio, system aspects, and network design for the previously discussed applications. This up-to-date resource: Provides technical details from the finding of the European Commission H2020 5G PPP 5GCAR project, a collaborative

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research initiative between the telecommunications and automotive industries and academic researchers Elaborates on use cases, business models, and a technology roadmap for those seeking to shape a start-up in the area of automated and

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autonomous driving Provides up to date descriptions of standard specifications, standardization and industry organizations and important regulatory aspects for connected vehicles Provides technical insights and solutions for the air interface, network

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architecture, positioning and security to support vehicles at different automation levels Includes detailed tables, plots, and equations to clarify concepts, accompanied by online tutorial slides for use in teaching and seminars Thanks to its mix of introductory content and

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***technical information, Cellular V2X
for Connected Automated Driving is
a must-have for industry and
academic researchers, telecom and
automotive industry practitioners,
leaders, policymakers, and
regulators, and university-level
instructors and students.***

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This book discusses the latest advances in research and development, design, operation and analysis of transportation systems and their complementary infrastructures. It reports on both theories and case studies on road and rail, aviation and maritime

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transportation. Further, it covers a wealth of topics, from accident analysis, vehicle intelligent control, and human-error and safety issues to next-generation transportation systems, model-based design methods, simulation and training techniques, and many more. A

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special emphasis is placed on smart technologies and automation in transport, and on the user-centered, ergonomic and sustainable design of transport systems. The book, which is based on the AHFE 2019 International Conference on Human Factors in

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Transportation, held on July 24-28, 2019, in Washington D.C., USA, mainly addresses the needs of transportation system designers, industrial designers, human-computer interaction researchers, civil and control engineers, as well as vehicle

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system engineers. Moreover, it represents a timely source of information for transportation policy-makers and social scientists whose work involves traffic safety, management, and sustainability issues in transport.

Autonomous driving is on the

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horizon. Partially automated vehicles recently started to emerge in the market, and companies are dedicated to bringing more automated driving capabilities to the vehicles in the near future. Over the past twenty years, human factors research has increased our

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understanding of driver behavior and human-vehicle interaction, as well as human-automation interaction considerably. However, as the technological developments accelerate, there is an urgent need to conduct research to understand the challenges of driving a semi-

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automated vehicle, the role of cognitive and social factors and driver characteristics, and how interactive technology can be used to increase driving safety in this context. This thesis was an attempt to address some of these challenges. In this work, we present

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two studies on human factors of automated driving. In the first study, we present the results of a survey conducted with Tesla drivers who have been using partially automated driving features of Tesla cars. Our results revealed that current users of this

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technology are early adopters. Automation failures were common, but drivers were comfortable in dealing with these situations. Additionally, Tesla drivers have high levels of trust in the automated driving capability of their vehicles, and their trust increases as they

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experience these features more. The results also revealed that drivers don't use owner manuals, and seek out information about their cars by using online sources. The majority of Tesla drivers check multiple information sources when their car software receives an

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update. Overall these findings show that driver needs are changing as the vehicles become smarter and connected. In the second study, we focused on a future technology, augmented reality head-up displays, and explored how this technology can fit into the smart,

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connected and autonomous vehicle context. Specifically, we conducted an experiment looking into how these displays can be used to monitor the status of automation in automated driving. Participants watched driving videos enhanced with augmented reality cues.

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Results showed that drivers adjust their trust in the automated vehicle better when information about the vehicle's sensing capabilities are presented using augmented reality cues, and they have positive attitudes towards these systems. However, there were no major

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safety-related benefits associated with using these displays. Overall, this work provides several contributions to the knowledge about human-automation interaction in automated driving. This book examines the Internet of Things (IoT) and Data Analytics

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***from a technical, application, and
business point of view. Internet of
Things and Data Analytics
Handbook describes essential
technical knowledge, building
blocks, processes, design
principles, implementation, and
marketing for IoT projects. It***

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provides readers with knowledge in planning, designing, and implementing IoT projects. The book is written by experts on the subject matter, including international experts from nine countries in the consumer and enterprise fields of IoT. The text

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starts with an overview and anatomy of IoT, ecosystem of IoT, communication protocols, networking, and available hardware, both present and future applications and transformations, and business models. The text also addresses big data analytics,

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machine learning, cloud computing, and consideration of sustainability that are essential to be both socially responsible and successful. Design and implementation processes are illustrated with best practices and case studies in action. In addition, the book: Examines cloud

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computing, data analytics, and sustainability and how they relate to IoT overs the scope of consumer, government, and enterprise applications Includes best practices, business model, and real-world case studies Hwaiyu Geng, P.E., is a consultant with Amica

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Research

(www.AmicaResearch.org, Palo Alto, California), promoting green planning, design, and construction projects. He has had over 40 years of manufacturing and management experience, working with Westinghouse, Applied Materials,

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Hewlett Packard, and Intel on multi-million high-tech projects. He has written and presented numerous technical papers at international conferences. Mr. Geng, a patent holder, is also the editor/author of Data Center Handbook (Wiley, 2015).

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***Advanced Driver-Assistance
Systems (ADAS)***

***Autonomous Driving Changes the
Future***

***Decision-making Techniques for
Autonomous Vehicles***

***Their Implication on Capacity of a
Basic Freeway Section and Impacts***

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on Walkway Safety

***Advances in Human Factors of
Transportation***

***User-Centred Ecological Design
and Testing***

*This book is the eight
volume of a sub-series*

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on Road Vehicle

*Automation, published as
part of the Lecture
Notes in Mobility.*

*Written by researchers,
engineers and analysts
from around the globe,*

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*the contributions are
based on oral and poster
presentations from the
Automated Vehicles
Symposium (AVS) 2020,
held on July 27–30,
2020, as a fully virtual*

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*event. The book explores
public sector
activities, human
factors aspects, vehicle
systems and other
related technological
developments, as well as*

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*transportation
infrastructure planning,
which are expect to
foster and support road
vehicle automation.*

*Autonomous Vehicles:
Technologies,*

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*Regulations, and
Societal Impacts
explores both the
autonomous driving
concepts and the key
hardware and software
enablers, Artificial*

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*intelligence tools,
needed infrastructure,
communication protocols,
and interaction with non-
autonomous vehicles. It
analyses the impacts of
autonomous driving using*

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a scenario-based approach to quantify the effects on the overall economy and affected sectors. The book assess from a qualitative and quantitative approach,

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the future of autonomous driving, and the main drivers, challenges, and barriers. The book investigates whether individuals are ready to use advanced automated

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*driving vehicles
technology, and to what
extent we as a society
are prepared to accept
highly automated
vehicles on the road.
Building on the*

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*technologies,
opportunities,
strengths, threats, and
weaknesses, Autonomous
Vehicles: Technologies,
Regulations, and
Societal Impacts*

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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,

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*outlining the future
research needs. Broad,
interdisciplinary and
systematic coverage of
the key issues in
autonomous driving and
vehicles Examines*

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*technological impact on
society, governance, and
the economy as a whole
Includes foundational
topical coverage, case
studies, objectives, and
glossary*

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*How to leave behind our
unwieldy, gas-guzzling,
carbon dioxide-emitting
vehicles for cars that
are green, smart,
connected, and fun. This
book provides a long-*

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overdue vision for a new automobile era. The cars we drive today follow the same underlying design principles as the Model Ts of a hundred years ago and the tail-

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*finned sedans of fifty
years ago. In the twenty-
first century, cars are
still made for twentieth-
century purposes. They
are inefficient for
providing personal*

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*mobility within
cities—where most of the
world's people now live.
In this pathbreaking
book, William Mitchell
and two industry experts
reimagine the*

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*automobile, describing
vehicles of the near
future that are green,
smart, connected, and
fun to drive. They roll
out four big ideas that
will make this both*

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*feasible and timely. The
fundamental reinvention
of the automobile won't
be easy, but it is an
urgent necessity—to make
urban mobility more
convenient and*

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*sustainable, to make
cities more livable, and
to help bring the
automobile industry out
of crisis.*

*This book takes a look
at fully automated,*

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*autonomous vehicles and
discusses many open
questions: How can
autonomous vehicles be
integrated into the
current transportation
system with diverse*

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*users and human drivers?
Where do automated
vehicles fall under
current legal
frameworks? What risks
are associated with
automation and how will*

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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

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*the United States define
key societal,
engineering, and
mobility issues related
to the automation of
vehicles. They discuss
the decisions*

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*programmers of automated
vehicles must make to
enable vehicles to
perceive their
environment, interact
with other road users,
and choose actions that*

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*may have ethical
consequences. The
authors further identify
expectations and
concerns that will form
the basis for individual
and societal acceptance*

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*of autonomous driving.
While the safety
benefits of such
vehicles are tremendous,
the authors demonstrate
that these benefits will
only be achieved if*

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vehicles have an appropriate safety concept at the heart of their design. Realizing the potential of automated vehicles to reorganize traffic and

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*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*

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*provide a current,
comprehensive, and
scientifically sound
treatment of the
emerging field of
"autonomous driving".
The Law and Autonomous*

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Vehicles

*Cellular V2X for
Connected Automated
Driving*

*Policy Implications of
Autonomous Vehicles*

Autonomous and Connected

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Vehicles

*Measuring Innovation in
the Autonomous Vehicle
Technology
Building Better Jobs in
an Age of Intelligent
Machines*

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Automotive industry is going through a technological shock. Multiple intertwined technological advances (autonomous vehicle, connect vehicles and mobility-as-a-Service) are creating new rules for an industry that

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had not changed its way of doing business for almost a century. Key players from the tech and traditional automobile sectors - although with different incentives - are pooling resources to realize the

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goal of self-driving cars. AV innovation by auto and tech companies' innovation is still largely home based, however, there is some shifting geography at the margin. AV and other related technologies are broadening

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the automotive innovation landscape, with several IT-focused hotspots - which traditionally were not at the center of automotive innovation - gaining prominence.

This book is the fourth

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volume of the sub series of the Lecture Notes in Mobility dedicated to Road Vehicle Automation. Its chapters have been written by researchers, engineers and analysts from all around the globe. Topics covered

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include public sector activities, human factors and challenges, ethical, legal, energy and technology perspectives, vehicle systems development, as well as transportation infrastructure and planning.

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The book is based on the Automated Vehicles Symposium which took place in San Francisco, California (USA) in July 2016.

This book reports on cutting-edge research and advances in the field of intelligent

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vehicle systems. It presents a broad range of AI-enabled technologies, with a focus on automated, autonomous and connected vehicle systems. It covers advanced machine learning technologies, including deep and

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reinforcement learning algorithms, transfer learning and learning from big data, as well as control theory applied to mobility and vehicle systems.

Furthermore, it reports on cutting-edge technologies

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for environmental perception and vehicle-to-everything (V2X), discussing socioeconomic and environmental implications, and aspects related to human factors and energy-efficiency alike, of

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automated mobility.

Gathering chapters written by renowned researchers and professionals, this book offers a good balance of theoretical and practical knowledge. It provides researchers, practitioners

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and policy makers with a comprehensive and timely guide on the field of autonomous driving technologies.

The technology and engineering behind autonomous driving is

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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.

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*Road Vehicle Automation 3
Economic Research Working
Paper No. 60*

*Proceedings of the AHFE 2019
International Conference on
Human Factors in
Transportation, July 24-28,
2019, Washington D.C., USA*

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*From AI to Autonomous and
Connected Vehicles
Opportunities and Challenges
for Blockchain Technology in
Autonomous Vehicles
Internet of Things and Data
Analytics Handbook*

This book is the seventh

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***volume of a sub-series on
Road Vehicle Automation,
published as part of the
Lecture Notes in Mobility.
Written by researchers,
engineers and analysts from
around the globe, the
contributions are based on***

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***oral and poster presentations
from the Automated Vehicles
Symposium (AVS) 2019, held
on July 15-18, 2019, in
Orlando, Florida, USA. The
book explores public sector
activities, human factors
aspects, vehicle systems and***

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other related technological developments, as well as transportation infrastructure planning, which are expect to foster and support road vehicle automation.

This book elaborates the science and engineering basis

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for energy-efficient driving in conventional and autonomous cars. After covering the physics of energy-efficient motion in conventional, hybrid, and electric powertrains, the book chiefly focuses on the energy-saving

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potential of connected and automated vehicles. It reveals how being connected to other vehicles and the infrastructure enables the anticipation of upcoming driving-relevant factors, e.g. hills, curves, slow traffic,

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state of traffic signals, and movements of nearby vehicles. In turn, automation allows vehicles to adjust their motion more precisely in anticipation of upcoming events, and to save energy. Lastly, the energy-efficient

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motion of connected and automated vehicles could have a harmonizing effect on mixed traffic, leading to additional energy savings for neighboring vehicles. Building on classical methods of powertrain modeling,

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optimization, and optimal control, the book further develops the theory of energy-efficient driving. In addition, it presents numerous theoretical and applied case studies that highlight the real-world implications of the

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theory developed. The book is chiefly intended for undergraduate and graduate engineering students and industry practitioners with a background in mechanical, electrical, or automotive engineering, computer

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science or robotics.

***The automotive industry
appears close to substantial
change engendered by “self-
driving” technologies. This
technology offers the
possibility of significant
benefits to social***

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**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**

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policymakers on the many issues that this technology raises.

Autonomous vehicles have recently gained the attention of researchers due to their expected potential benefits on highway traffic streams,

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such as improving roadway capacity, among others. It is imperative to investigate how these expected benefits can be leveraged in the transportation sector. Understanding the safety and operational benefits helps the

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concerned transportation agencies and other key stakeholders to make necessary infrastructural and policy adjustments to accommodate such future traffic operation changes. The main goal of this dissertation

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***is to study the impact of
connected and automated
vehicles on freeway capacity.
The simulated environment
was created to emulate
autonomous vehicle
behaviors, connectivity
between vehicles, and various***

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***scenarios that answer
research questions to achieve
the research goal. The first
case study uses simulated
traffic flows at different
percentages of human-driven
heavy vehicles (HDHVs) and
automated passenger cars***

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(APCs) to investigate the impacts of both HDHVs and APCs on freeway capacity. In addition, the future applicability of the current design guidelines presented in the Highway Capacity Manual (HCM) is investigated.

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This case study provides information on how passenger car automation affects freeway capacity. Also, a modified formula is proposed in place of the current HCM formula for determining vehicle adjustment factors

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due to HDHVs and APCs in the traffic stream capacity. Also, a modified formula is proposed in place of the current HCM formula for determining vehicle adjustment factors due to HDHVs and APCs in the traffic

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stream. Another case study investigates the impact of connected and automated heavy vehicles (CAHV) on freeway basic section capacity. Various simulations were conducted considering the percent of human-driven

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heavy vehicles (HDHV) in the mix, platoon size, and percent of CAHV on HDHV and lane restriction. The simulation results provide insights into how these factors impact the freeway's capacity. In particular, freeway capacity

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significantly increased with CAHV and lane restriction scenarios. The increase in capacity was apparent at a higher percentage of trucks in the traffic mix. Regarding CAHV platoon size, the capacity does not appear to

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***significantly change with
platoon size for a given
percent of trucks in the traffic
mix. Furthermore, a system-
wide case study is conducted
in Michigan, covering all the
interstates. The model
developed using simulated***

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results is used to assess how the introduction of CAHVs alters the current capacity and their respective level of services without incurring any infrastructural changes. The observed positive benefits at the system-wide level are

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***discussed, and
recommendations are
provided to transportation
agencies. Lastly, the study
investigates how the adoption
of connectivity and
automation in the vehicle
industry will strengthen***

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***transportation equity,
especially for people with
disabilities and non-motorized
user groups. The survey on
non-users was used to
identify factors associated
with differences in the
perception of the feasibility of***

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the autonomous shuttles for solving the first and last-mile travel. The results provide insight to transportation planners on the possibilities of solving the first and last mile problem among people with disabilities. At the same

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time, they provide information about the concerns of the non-motorized users should the technology be adopted and operated on the same infrastructure as those used by the non-motorized users.

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***Automated Driving Systems
2.0.***

***Network Architectures from
Legacy Networks to
Automotive Ethernet
A Vision for Safety.***

***Autonomous Vehicles
Autonomous Vehicle***

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Technology

**Connected and Automated
Vehicles**

This book presents a
comprehensive coverage of
the five fundamental yet
intertwined pillars paving the

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road towards the future of connected autonomous electric vehicles and smart cities. The connectivity pillar covers all the latest advancements and various technologies on vehicle-to-

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everything (V2X)

communications/networking

and vehicular cloud

computing, with special

emphasis on their role

towards vehicle autonomy

and smart cities applications.

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On the other hand, the autonomy track focuses on the different efforts to improve vehicle spatiotemporal perception of its surroundings using multiple sensors and different

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perception technologies.

Since most of CAVs are expected to run on electric power, studies on their electrification technologies, satisfaction of their charging demands, interactions with

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the grid, and the reliance of these components on their connectivity and autonomy, is the third pillar that this book covers. On the smart services side, the book highlights the game-changing roles CAV will

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play in future mobility services and intelligent transportation systems. The book also details the groundbreaking directions exploiting CAVs in broad spectrum of smart cities applications.

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Example of such revolutionary applications are autonomous mobility on-demand services with integration to public transit, smart homes, and buildings. The fifth and final pillar

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involves the illustration of security mechanisms, innovative business models, market opportunities, and societal/economic impacts resulting from the soon-to-be-deployed CAVs. This book

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contains an archival collection of top quality, cutting-edge and multidisciplinary research on connected autonomous electric vehicles and smart cities. The book is an authoritative reference for

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smart city decision makers, automotive manufacturers, utility operators, smart-mobility service providers, telecom operators, communications engineers, power engineers, vehicle

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integration into smart cities and intelligent transportation systems.

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vehicles and what the future holds for this exciting technology In Autonomous and Connected Vehicles, networking experts Dominique Paret and Hassina Rebaine deliver a robust

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exploration of the major technological changes taking place in the field, and describe the different levels of autonomy possible with current technologies and the legal and regulatory contexts

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in which new autonomous vehicles will circulate. The book also includes discussions of the sensors, including infrared, ultrasound, cameras, lidar, and radar, used by modern autonomous

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vehicles. Readers will enjoy the intuitive descriptions of Advanced Driver Assistance Systems (ADAS), network architectures (CAN-FD, FlexRay, and Backbone Ethernet), and software that

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power current and future autonomous vehicles. The authors also discuss how ADAS can be fused with data flowing over newer and faster network architectures and artificial intelligence to create

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greater levels of autonomy.

The book also includes: A thorough introduction to the buzz and hype surrounding autonomous and connected vehicles, including a brief history of the autonomous

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vehicle Comprehensive explorations of common issues affecting autonomous and connected vehicles, including regulatory guidelines, legislation, relevant norms and standards,

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and insurance issues Practical discussions of autonomous vehicle sensors, from DAS to ADAS and HADAS, and VA L3 to L5 In-depth examinations of networks and architecture, including

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discussions of data fusion, artificial intelligence, and hardware architecture in vehicles Perfect for graduate and undergraduate students in programs dealing with the intersection of wireless

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communication technologies and vehicles, Autonomous and Connected Vehicles is also a must-read reference for industry professionals and researchers seeking a one-stop reference for the latest

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developments in vehicle communications technology. Control of large-scale distributed energy systems over communication networks is an important topic with many application domains.

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The book presents novel concepts of distributed control for networked and cyber-physical systems (CPS), such as smart industrial production lines, smart energy grids, and

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autonomous vehicular systems. It focuses on new solutions in managing data and connectivity to support connected and automated vehicles (CAV). The book compiles original research

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papers presented at the conference “ Networked Control Systems for Connected and Automated Vehicles ” (Russia). The latest connected and automated vehicle

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technologies for next generation autonomous vehicles are presented. The book sets new goals for the standardization of the scientific results obtained and the advancement to the level

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of full autonomy and full self-driving (FSD). The book presents the latest research in artificial intelligence, assessing virtual environments, deep learning systems, and sensor fusion

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for automated vehicles.

Particular attention is paid to new safety standards, safety and security systems, and control of epidemic spreading over networks. The issues of building modern transport

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infrastructure facilities are also discussed in the articles presented in this book. The book is of considerable interest to scientists, researchers, and graduate students in the field of

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transport systems, as well as for managers and employees of companies using or producing equipment for these systems.

Academic Paper from the year 2018 in the subject

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Computer Sciences - Internet
of Things, IOT, grade: A,
Columbia Universit ä t New
York, language: English,
abstract: This short paper
discusses the appearance of
IoT in the car industry.

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Therefor a brief history of autonomous cars is given. The origin of IoT usage within vehicle industry date back in early 1958, where the idea of the self-driving car became prominent. It was not

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until 1995 during the embedded era that different auto companies started exploring the connectivity aspect of the car and the roads, for instance, GM OnStar. But the idea was

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never implemented because of its capital-intensive involvement, lack of competition and use cases at the time. The first experience of true IoT was seen during infotainment era which ranges

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from 2007 to 2012. During this era, the car technology such as Ford Sync and GM Mylink took advantage of wireless connectivity aspect which was enabled by the wireless IoT technology. It

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was at this time the IoT usage in connecting autonomous car through smart cities and different car networks became prevalent. Internet of Things in Autonomous Car Industry. An

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Overview

Designing Interaction and
Interfaces for Automated
Vehicles
Technologies, Regulations,
and Societal Impacts