SAE INTERNATIONAL

SAE EDGE™
RESEARCH REPORT

Unsettled Topics Concerning Automated Driving Systems and the Transportation Ecosystem

Dr. Rahul Razdan

SAE EDGE™
RESEARCH REPORT

Unsettled Topics Concerning Automated Driving Systems and the Transportation Ecosystem

Dr. Rahul Razdan

Advanced Mobility Institute, Florida Polytechnic University

SAE INTERNATIONAL®

Warrendale, Pennsylvania, USA

About the Publisher

SAE International® is a global association of more than 128,000 engineers and related technical experts in the aerospace, automotive, and commercial-vehicle industries. Our core competencies are lifelong learning and voluntary consensus standards development. Visit sae.org

SAE EDGE™ Research Report Disclaimer

SAE EDGE™ Research Reports focus on topics that are dynamic, in which knowledge is incomplete, and which have yet to be standardized. They represent the collective wisdom of a group of experts and serve as a practical guide to the reader in understanding unsettled subject matter. They are not meant to provide a recommended practice or protocol. The experts engaged have contributed their own thoughts and points of view, and these are not the positions of the institutions or businesses with which they are affiliated. A professional writer has collectivized their input; there is no one contributor's perspective being advanced but rather that of a community of practitioners. SAE EDGE™ Research Reports are the property of SAE International and SAE alone is responsible for their content.

About This Publication

SAE EDGE™ Research Reports provide state-of-the-art and state-of-the-industry examinations of the most significant topics in mobility engineering. SAE EDGE™ contributors are experts from research, academia, and industry who have come together to explore and define the most critical advancements, challenges, and future direction in areas such as vehicle automation, unmanned aircraft, IoT and connectivity, cybersecurity, advanced propulsion, and advanced manufacturing.

Related Resources

SAE MOBILUS® Automated & Connected Knowledge Hub
http://sae.org/Mobilus/Automated

SAE Team

Frank Menchaca, Chief Product Officer
Michael Thompson, Director, Standards, Information and Research Publications
Monica Vogelpohl, Acquisitions Director
Jill Leonard, Product Manager
William Kucinski, Managing Technical Editor

ISSN 2640-3536
e-ISSN 2640-3544
ISBN 978-1-4868-0012-1

To purchase bulk quantities, please contact: SAE Customer Service

E-mail: CustomerService@sae.org
Phone: 877-606-7323 (*inside USA and Canada*)
724-776-4970 (*outside USA*)
Fax: 724-776-0790

Visit the SAE International Bookstore at books.sae.org

About the Editor

Dr. Rahul Razdan is Senior Director of Special Projects at Florida Polytechnic University in Lakeland, Florida. In this role, he serves as advisor to the president of the university and helps to manage the Advanced Mobility Institute, an applied research center for the development and testing of autonomous vehicle (AV)-related technology. Named on more than 24 issued patents, Razdan earned a Doctorate (PhD) in Computer Science from Harvard University and both a Master of Science in Computer Engineering and a Bachelor of Science in Electrical and Computer Engineering from Carnegie Mellon University.

Razdan boasts 35 years of experience in startups, academia, and Fortune 500 companies working in such areas as science, technology, engineering, and mathematics education; AV technology; and semiconductor design. The Association for Computing Machinery and the Institute of Electrical and Electronics Engineers have recognized him with "Hall of Fame" inductions. Razdan has also won numerous best-paper awards and has led several successful startups in areas such as electronic design automation, wireless power, artificial intelligence (AI), and machine learning.

contents

About the Editor

Unsettled Topics Concerning Automated Driving Systems and the Transportation Ecosystem 3

Introduction 4
State of the Industry 4

Autonomous Vehicles and Public Policy by Jim Boxold. 6
Current Automotive Ecosystem 6
Autonomous Vehicle Challenges 6
Recommendations 7

AVs and Legal Frameworks by J.W. Taylor, Esq. . . . 7
Introduction to Historical Automotive Legal Exposure. 7
Present Legal Framework 8
Emerging Liability Structures 9
Negligence and Negligent Entrustment of Vehicles 9
Res Ipsa Loquitur and Products Liability 9
Breach of the Implied Warranty of Merchantability 10
Liability of Local Governments 10
Emerging Tort Defenses 11
Recommendations 12

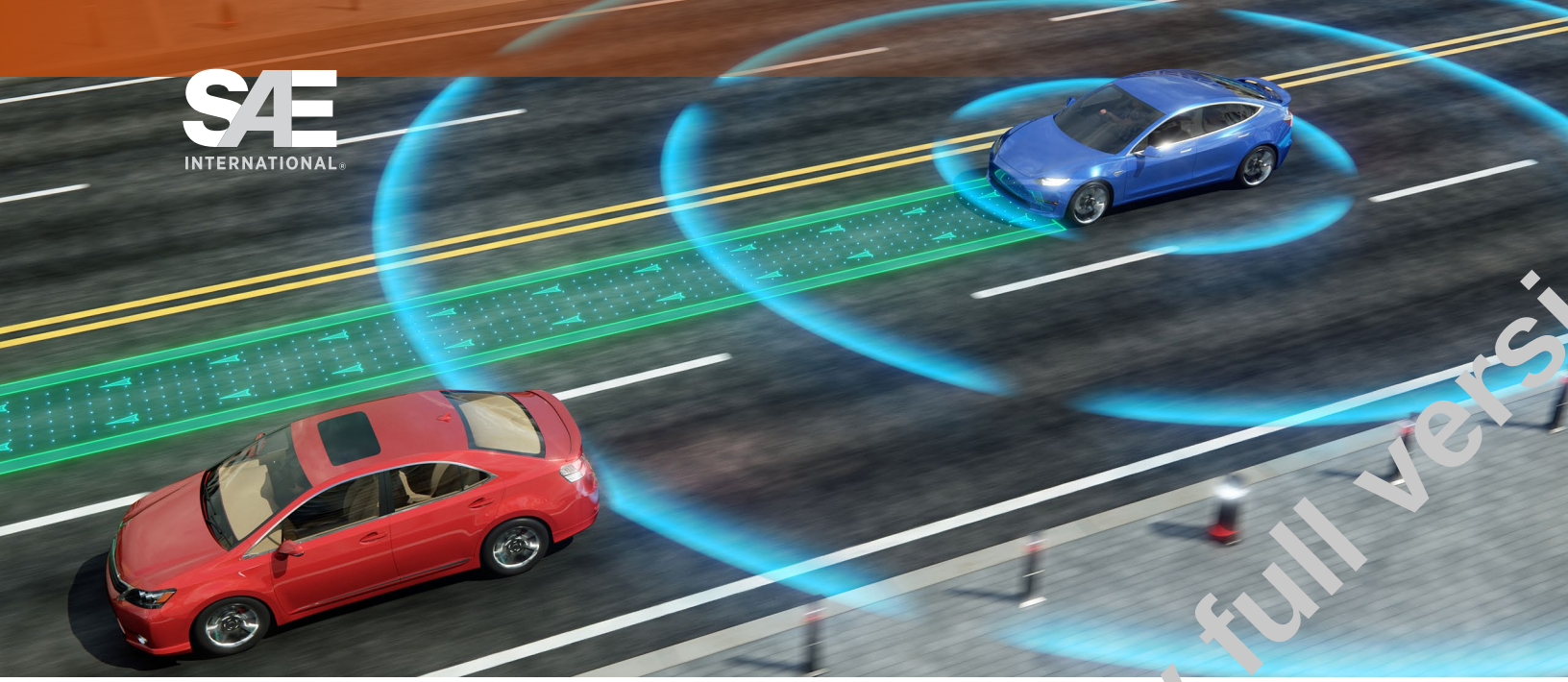
Considerations for the Automobile Insurance and Autonomous Vehicles by Richard Watts. 12
Current Automotive Ecosystem 12
AV Challenges 12
Recommendations 13

Smart Cities and Autonomous Vehicles by Dale Neef. 13
Built Infrastructure Implications 14
Policy Implications. 15
Recommendations 16

Autonomous Vehicles and Commercial Real Estate by Gary Ralston. 16
Truck Platooning 16
Car Ownership and Auto Dealerships 16
Parking 17
Recommendations 17

Media, Marketing and Advertising in the Age of AVs by Pankaj Mayor 18
Changes in Advertising 18
AVs as the New Media Platform 18
Who Is Leading the Push into Media and Advertising in AV? 19
Impact on Advertising of Cars 19
The Car as a Social Media Platform 19
What Is Happening Now? 19
Social, Legal, Ethical, and Business Impact 19
Recommendations 19

Summary/Conclusions 20
SAE EDGE™ Research Reports 20
Next Steps for Automated Driving Systems and the Transportation Ecosystem 21
Recommendations 21
Abbreviations/Definitions 21
Acknowledgments 22
Contributors 23
References 23
Contact Information 23



Unsettled Topics Concerning Automated Driving Systems and the Transportation Ecosystem

Abstract

Over the last 100 years, the automobile has become integrated in a fundamental way into the broader economy. A broad and deep ecosystem has emerged, and critical components of this ecosystem include insurance, after-market services, automobile retail sales, automobile lending, energy suppliers (e.g., gas stations), medical services, advertising, lawyers, banking, public planners, and law enforcement. These components - which together represent almost $2 trillion of the U.S. economy - are in equilibrium based on the current capabilities of automotive technology. However, the advent of autonomous vehicles (AVs) and technologies like electrification have the potential to significantly disrupt the automotive ecosystem. The critical cog governing the rate and pace of this shift is the management of the test and verification of AVs.

In this SAE EDGE™ report, six senior industry leaders in the impacted ecosystems essay articles which describe sectors of the current automotive ecosystem and the manner in which AV technology can potentially reshape them - providing a mosaic of the massive infrastructure shifts which will be required to absorb AV technologies.

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.

DR. RAHUL RAZDAN

Advanced Mobility Institute, Florida Polytechnic University

ISSN 2640-3536