SAE INTERNATIONAL

SAE EDGE™
RESEARCH REPORT

Unsettled Topics in Automated Vehicle Data Sharing for Verification and Validation Purposes

Yaser Khalighi, Ph.D.
Mohsen Khalkhali

SAE EDGE™
RESEARCH REPORT

Unsettled Topics in Automated Vehicle Data Sharing for Verification and Validation Purposes

Yaser Khalighi, Ph.D.
Caliber Data Labs, Inc.
Mohsen Khalkhali
Caliber Data Labs, Inc.

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 life-long 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 an unsettled subject matter. They are not meant to provide a recommended practice or protocol. The experts have assembled as a community of practitioners to contribute and collectivize their thoughts and points of view; these are not the positions of the institutions or businesses with which they are affiliated, nor is one contributor's perspective advanced over other contributors. 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-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, cybersecurity, advanced propulsion, advanced manufacturing, Internet of Things, and connectivity..

Related Resources

SAE MOBILUS® Automated & Connected Knowledge Hub
https://saemobilus.sae.org/automated-connected/

SAE Team

Frank Menchaca, Chief Growth Officer
Michael Thompson, Director, Standards, Information and Research Publications
Monica Noguchi, Acquisitions Director
Beth Ellen Deveiler, Product Manager
William Kozinski, Managing Technical Editor

Printed in USA

EPR2020007
ISSN 2640-3532
e-ISSN 2640-3540
ISBN 978-1-4868-0107-1

To purchase bulk quantities, please contact: SAE Customer Service

E-mail: CustomerService@sae.org
Phone: 877-606-7323 (*inside USA and Canada*)
+1-724-776-4970 (*outside USA*)
Fax: +1-724-776-0790

https://www.sae.org/publications/edge-research-reports

About the Editors

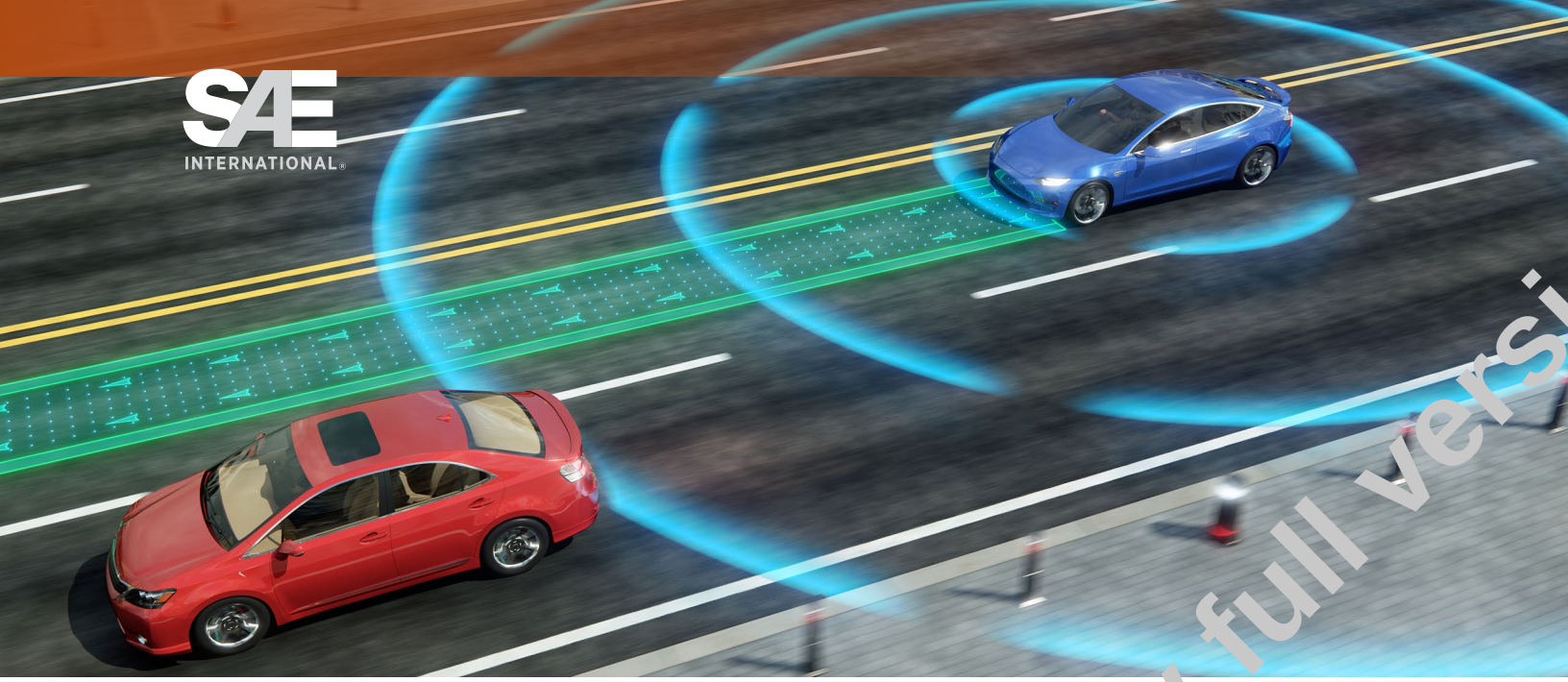
Yaser Khalighi, Ph.D. is a seasoned technologist and an entrepreneur. He earned a doctorate and master's degree from Stanford University with a specialization in high-performance distributed computing and mathematical modeling. His expertise includes artificial intelligence (AI), machine learning, and platform engineering.

Based in Silicon Valley, he has a stellar track record in building production-level computational solutions utilizing machine learning, simulation, and analytics to resolve a variety of complex, large-scale problems. He has been instrumental in recruiting and leading teams of engineers and scientists for reputable technology-based organizations.

Mohsen Khalkhali is a seasoned strategist, investor, and an entrepreneur. He has built and run global strategy and operations for a mobile telecoms company and started the world's first business-to-business transaction platform for telecom suppliers. More recently, he founded and ran a global venture capital firm investing in seed-stage startups with an active portfolio of 15 AI-rich companies across digital health, enterprise software-as-a-service, and industrial internet of things.

As a conscious leadership practitioner, Mohsen's expertise has been transformative in identifying, funding, and growing entrepreneurial teams that focus on exponential growth and long-term value.

contents



Unsettled Topics in Automated Vehicle Data Sharing for Verification and Validation Purposes

Abstract

The race to autonomy has been synonymous with the race to data collection. Automated vehicles (AVs) generate terabytes of data per day. Perception engineers use these large datasets to analyze and model the automated driving systems (ADS) that will eventually be integrated into vehicles that will drive themselves. However, the current industry practices of collecting data by driving on public roads to understand real-world scenarios is not practical and will be unlikely to lead to safe deployment of this technology anytime soon. Estimates show that it could take 400 years for a fleet of 100 AVs to drive enough miles to prove that they are as safe as humans.

We, therefore, discuss an unsettled topic of sharing data for verification and validation purposes where - instead of each testing project and organization doing their own tests in isolation and potentially duplicating work - a shared-data culture, business, and technology be developed. This could allow for rapid generation, testing, and sharing of the billions of possible scenarios that are needed to prove practicality and safety of an ADS - resulting in lower research and development costs to the industry. We explore how this could lead to better regulation, insurance, public acceptance - and finally, shorter technology development cycles. Finding a business case and changing to an open data culture are not going to be easy tasks, but we believe data sharing is the only way forward for the whole industry to move to the next phase of deployment after nearly a decade of intense research.

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.

YASER KHALIGHI, Ph.D.
Caliber Data Labs, Inc.

MOHSEN KHALKHALI
Caliber Data Labs, Inc.

Edge Development Team

Michał Antkiewicz, Ph.D., *University of Waterloo*
Sven Beiker, Ph.D., *Silicon Valley Mobility*
Nicola Croce, *Deepen AI*
Martin Holder, *Institute of Automotive Engineering (FZD) at Technical University of Darmstadt*
Danny Kim, *VSI Labs*
Mohammad Musa, *Deepen AI*
Dr. Rahul Razdan, *Florida Polytechnic University*
Philipp Rosenberger, *Institute of Automotive Engineering (FZD) at Technical University of Darmstadt*
Evangelos Simoudis, Ph.D., *Synapse Partners*
Dr. Joachim G. Taiber, *International Alliance for Mobility Testing and Standardization*
Adrian Zlocki, Ph.D., *fka GmbH*

ISSN 2640-3536