

Exponent®
Engineering & Scientific Consulting

David Gundana, Ph.D., P.E.

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Professional Profile

David Gundana, Ph.D., specializes in the technical analysis, safety evaluation, and performance assessment of autonomous systems, robotics platforms, advanced driver assistance systems (ADAS), safety-critical technologies, and complex mechanical systems. With his background as a mechanical engineer and roboticist, he assists clients through engineering analysis, testing, failure investigations, and evaluation of applicable industry standards and regulatory requirements. His work spans autonomous mobile robots, service and industrial robotics, physical Artificial Intelligence (AI) systems, automated systems, advanced vehicle technologies, transportation safety, and product safety.

Dr. Gundana has investigated incidents involving robotic platforms, autonomous systems, mechanical equipment, and consumer products, including evaluations of system performance, design and operational factors, human-machine interactions, and safety-related behavior. He has experience performing root cause analyses, assessing compliance with standards and regulations, evaluating safety requirements, conducting risk-based assessments, and reviewing the interaction between software, sensing systems, controls, and mechanical hardware, including the application of ISO, ANSI, and RIA standards. In addition, he assists clients with the evaluation of ADAS technologies, vehicle safety systems, automated driving functionality, and automotive regulatory requirements.

Prior to joining Exponent, Dr. Gundana earned his Ph.D. in Mechanical Engineering from Cornell University, where his research focused on autonomous mobile robots, multi-agent systems, human-robot interaction, and the safe operation of autonomous systems in dynamic and uncertain environments. He developed planning and coordination frameworks for robotic systems operating alongside humans and created simulation environments to evaluate robot behavior, human interaction, and system performance. His work also included the analysis of transportation systems, traffic behavior, and large-scale mechanical systems.

Autonomous Systems, Robotics, & Automation

Dr. Gundana assists clients in evaluating autonomous mobile robots, robotic systems, and software-controlled mechanical devices throughout product development, deployment, and failure investigation activities. His work includes assessing robot performance, system architecture, autonomous decision-making, sensing technologies, and operational behavior in complex environments. He has experience analyzing industrial and service robotics, warehouse automation technologies, autonomous forklifts, robotic mobility platforms, physical AI enabled robotic systems, and human-robot interaction scenarios.

Robotics Safety & Machine Safety

Dr. Gundana conducts evaluations of robotics safety, safety-related control systems, and risk mitigation approaches used in automated and autonomous systems. His work includes reviewing safety

requirements, engineering controls, operational constraints, testing methodologies, and the application of robotics safety standards, regulatory frameworks, and industry guidance, including ISO, ANSI, and RIA standards. He assists clients in understanding safety considerations associated with robotic systems operating in environments shared with workers or members of the public and evaluates foreseeable use conditions, operational limitations, and human-machine interactions associated with advanced automated systems.

ADAS, Automated Vehicles, & Transportation Systems

Dr. Gundana assists clients in evaluating ADAS technologies, automated driving systems, transportation safety issues, and vehicle system performance. His work includes reviewing driver assistance features, sensing and perception systems, vehicle safety technologies, and applicable regulatory, testing, and industry requirements. He evaluates system capabilities, operational limitations, and the real-world performance of advanced vehicle technologies.

Failure Analysis & Incident Investigation

Dr. Gundana performs root cause investigations involving robotic systems, autonomous technologies, mechanical equipment, consumer products, and advanced vehicle systems. He applies engineering analysis, testing, inspection, simulation, and data analysis to identify contributing factors associated with accidents, system failures, and unexpected behavior. His investigations often involve understanding the interaction of mechanical components, software, controls, sensing technologies, environmental conditions, product design, human actions, and applicable safety requirements.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Cornell University, 2023

M.S., Mechanical Engineering, Cornell University, 2021

B.S., Mechanical Engineering, Clemson University, 2018

Sloan Graduate Fellow, Cornell University

GEM Fellow, GEM National Consortium

Licenses and Certifications

Professional Engineer Mechanical, Texas, #162178

Prior Experience

Mechanical Engineer, MIT Lincoln Laboratory, 2018

Test Facility Engineer, Dominion Energy Innovation Center, 2016

Professional Affiliations

US Expert to ISO TC 299 Robotics and member of ANSI TAG A3 Automation

Institute of Electrical and Electronics Engineers (IEEE)

American Society of Mechanical Engineers (ASME)

Publications

Gundana D, Kress-Gazit H. Online modifications for event-based signal temporal logic specifications. IEEE Robotics and Automation Letters 2023; 9(8):6864–6871.

Hu Y, Ryu J, Gundana D, Petersen KH, Kress-Gazit H, Hoffman G. Nudging or waiting? Automatically synthesized robot strategies for evacuating noncompliant users in an emergency situation. 2023 ACM/IEEE International Conference on Human-Robot Interaction 2023; 603–611.

Gundana D, Kress-Gazit H. Event-based signal temporal logic tasks: execution and feedback in complex environments. IEEE Robotics and Automation Letters 2022; 7(4):10001–10008.

Gundana D, Kress-Gazit H. Event-based signal temporal logic synthesis for single and multi-robot tasks. IEEE Robotics and Automation Letter 2021; 6(2):3687–3694.

Gundana D, Dollar RA, Vahidi A. To merge early or late: analysis of traffic flow and energy impact in a reduced lane scenario. 21st international conference on intelligent transportation systems (ITSC) 2018; 525–530.

Additional Education & Training

Northwestern University Traffic Crash Reconstruction, March 2026