Exponent®
Engineering & Scientific Consulting

David Gundana, Ph.D.

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Professional Profile

Dr. Gundana's background is in mechanical engineering with specializations in robotics, autonomous vehicles, dynamic systems, and failure analysis. He has expertise in the development of optimization-based planning and coordination algorithms and simulation software for autonomous mobile robots. Additionally, he has experience in 3D CAD modeling, finite element analysis (FEA), and data analysis.

Prior to joining Exponent, Dr. Gundana completed his Ph.D. in Mechanical Engineering from the Verifiable Robotics Research Group at Cornell University. His research focused on developing strategies and algorithms for autonomous mobile robots to accomplish tasks such as automated warehouse navigation, search and rescue missions, and autonomous restaurant operation. Specifically, he worked to provide a framework and enable safe collaboration between multi-agent systems and humans operating in unknown or adversarial environments to accomplish dynamic goals. Dr. Gundana developed complex simulation environments to analyze robot behavior and user interaction. His algorithms and frameworks are publicly available and have been used to conduct human robot interaction experiments.

Other research Dr. Gundana has conducted include creating frameworks to simulate, test, and describe transportation and traffic efficiency as it relates to human vehicle behavior. In addition to his research experience, Dr. Gundana has experience analyzing the fatigue and failure of large-scale devices such as wind-turbine drivetrains at a turbine testing facility and with signal processing for airborne radar systems at MIT Lincoln Laboratory.

Dr. Gundana is proficient with the programming languages Python and MATLAB and software applications Solidworks and Ansys.

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

Prior Experience

Mechanical Engineer, MIT Lincoln Laboratory, 2018

Test Facility Engineer, Dominion Energy Innovation Center, 2016

Publications

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