



Exponent[®]
Engineering & Scientific Consulting

Narayanan Kidambi, Ph.D.

Associate | Vehicle Engineering
39100 Country Club Dr. | Farmington Hills, MI 48331
(248) 324-9133 tel | nkidambi@exponent.com

Professional Profile

Dr. Kidambi's area of expertise lies in the mechanics, dynamics, and control of systems. He has collaborated with industry partners to conduct research on methods to estimate vehicle parameters to improve the performance of safety systems, and on uncertainty propagation in vehicle propulsion systems to predict and mitigate the effects of future control actions. He has also studied the performance of origami-based deployable structures and developed energy absorption technologies to enhance the safety and efficiency of collaborative industrial robots. Dr. Kidambi has experience designing, fabricating, and conducting experiments on the vibration of structures, the mechanics of soft elastomer devices, and vehicle dynamics. He is proficient in theoretical dynamic analyses employing first principles and in numerical simulation using commercial tools.

Prior to joining Exponent, Dr. Kidambi was a postdoctoral research fellow at the University of Michigan's Structural Dynamics and Controls Lab. In this role, he collaborated with and mentored several graduate and undergraduate researchers on a variety of projects in the areas of mechanics and dynamics. Dr. Kidambi also served as Lab Manager, responsible for the acquisition, integration, and maintenance of new equipment and the day-to-day operation of the lab.

Dr. Kidambi's dissertation work at the University of Michigan developed new concepts for mechanical systems inspired by the microscale morphology of skeletal muscle. Through experimental, numerical, and theoretical study, his research showed how targeted, local configuration changes in structures and materials can be exploited for energy absorption and dissipation, stiffness adaptivity, and shape change. While pursuing his undergraduate degree at UC Berkeley, Dr. Kidambi worked on the university's solar-powered vehicle as subteam lead for driver controls.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Michigan, Ann Arbor, 2018

M.S., Mechanical Engineering, University of Michigan, Ann Arbor, 2014

B.S., Mechanical Engineering, University of California, Berkeley, 2012

2019 UROP (Undergraduate Research Opportunity Program) Outstanding Mentor Award, University of Michigan

2018 Towner Prize for Distinguished Academic Achievement, University of Michigan

2012-2013 Collarino Fellowship, University of Michigan

Prior Experience

Postdoctoral Research Fellow, University of Michigan, 2018-2019

Lab Manager, University of Michigan, 2015-2019

Graduate Research Assistant, University of Michigan, 2013-2018

Research Engineer Intern, Ford Motor Company, 2013

Mechanical Engineer Intern, Schlumberger, 2012

Professional Affiliations

American Society of Mechanical Engineers (ASME)

Languages

French

Patents

US Patent App. 14/215,812: Vehicle with mass and grade responsive cruise control

Inventors: Narayanan Kidambi, Yuji Fujii, Gregory M Pietron

Publications

Journal Articles:

N. Kidambi, R.L. Harne, and K.W. Wang, "Material systems drawing from the architecture of skeletal muscle," *Physical Review E*, 98(4), 2018 (Featured in APS highlight journal: Physics)

N. Kidambi, R.L. Harne, and K.W. Wang, "Energy capture and storage in asymmetrically multistable modular structures inspired by skeletal muscle," *Smart Materials and Structures*, 26(8), 2017

N. Kidambi, G.M. Pietron, M.A. Boesch, Y. Fujii, and K.W. Wang, "Accuracy and robustness of parallel vehicle mass and road grade estimation," *SAE Int. Journal of Vehicle Dynamics, Stability, and NVH*, 1(2), 2017

N. Kidambi, R.L. Harne, and K.W. Wang, "Adaptation of energy dissipation in a mechanical metastable module excited near resonance," *ASME Journal of Vibration and Acoustics*, 138(1), 2016

N. Kidambi, R.L. Harne, G.M. Pietron, Y. Fujii, and K.W. Wang, "Methods in vehicle mass and road grade estimation," *SAE Int. Journal of Passenger Cars - Mechanical Systems*, 7(3), 2014

Conference Papers:

N. Kidambi and K.W. Wang, "On the deployment of multistable Kresling origami-inspired structures," *ASME International Design Engineering Technical Conferences*, 2019, Anaheim, CA

H. Yang, N. Kidambi, K.W. Wang, G.M. Pietron, R. Hippalgaonkar, and Y. Fujii, "Quantifying the effect of initialization errors for enabling accurate online drivetrain simulations," *SAE Technical Paper*, 2019-01-0347, 2019, Detroit, MI

N. Kidambi, Y. Zheng, R.L. Harne, and K.W. Wang, "Energy release for the actuation and deployment of muscle-inspired asymmetrically multistable chains," SPIE Conf. on Smart Structures and Materials, 2018, Denver, CO

N. Kidambi, R.L. Harne, and K.W. Wang, "Multistability inspired by the oblique, pennate architectures of skeletal muscle," SPIE Conf. on Smart Structures and Materials, 2017, Portland, OR

N. Kidambi, R.L. Harne, and K.W. Wang, "Strain energy trapping due to energetic asymmetry in modular structures inspired by muscle cross-bridges," ASME International Design Engineering Technical Conferences, 2016, Charlotte, NC

N. Kidambi, R.L. Harne, and K.W. Wang, "Energy dissipation characteristics of a mechanical metastable module excited near resonance," ASME International Design Engineering Technical Conferences, 2015, Boston, MA

N. Kidambi, R.L. Harne, and K.W. Wang, "Asymmetric influences on the energy dissipation performance of a metastable module excited near resonance", 25th Canadian Congress of Applied Mechanics, 2015, London, ON