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A New Paradigm in Engineering Education, Delivery, Outreach and Research: Alabama Initiative on Manufacturing Development and Education (IMaDE)



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ABSTRACT:

Our new paradigm in engineering education and development, through a manufacturing example, is built around an underlying concept to address the future of industrial problems through the convergence of competency-based education, research, and service with a systems integration and industry mindset approach to better prepare the workers of tomorrow. The goal of this initiative is to produce broadly educated students/workers with a wide range of career opportunities centered on the future of manufacturing to cultivate an American workforce that will lead the global manufacturing sector through the fourth industrial revolution and beyond. To accomplish this, the Alabama Initiative on Manufacturing Development and Education (Alabama IMaDE) leads new paradigms in education and workforce development including: 1) a modular course structure for specialization-focused degrees, an educational approach that centers around a novel educational facility that enables hands-on project-based learning in robotic manufacturing—taught using real-world industrial robotic manipulators and software—as well as programming, operating, and implementing automation systems, 2) and the National Training Center, a workforce accelerator program that aims to bring the teaching modalities of colleges, workforce training, and companies into a singular ecosystem to allow both degree path and non-degree path students/workers to engage in competency-based educations catered to those seeking careers in industry. Through these programs, Alabama IMaDE provides students/workers the ability to be well-prepared for the high-skill careers of today and tomorrow and provide industry with the much-needed high-skill workers they presently lack. To complement these efforts, Alabama IMaDE has also been the lead on numerous research topics in core areas of interest, such as automation, human-robot collaboration/interaction, and augmentation. Furthermore, Alabama IMaDE has partnered with numerous outreach programs, including the development of workshops, to further promote new paths for middle/high schoolers and those from the Black Belt Region to obtain the competencies needed for high-skilled jobs in industry. From combined efforts in education, outreach, and research, Alabama IMaDE believes it has and will continue

BIOGRAPHY:

Dr. Nader Jalili joined the faculty of Mechanical Engineering at The University of Alabama in September 2018 as Professor and Department Head from Northeastern University (Boston, Massachusetts) where he was a Professor of Mechanical Engineering, Associate Department Chair for Graduate Studies and Research, and Director of Northeastern University Piezoelectric Systems Laboratory. An ASME Fellow, Dr. Jalili is the current Chair (2022-2023), past Vice-Chair (2021-2022) and Secretary (2020-2021) of ASME Mechanical Engineering Department Heads and Chairs (MEDHC); current Chair (2019-present) and past Vice-Chair (2018-2019) of ASME Southeast Mechanical Engineering Department Heads (SMEDH). He is currently the Dynamics and Control Systems Subject Editor of International Journal of Mechatronics and Manufacturing Systems, and Associate Technical Editor of Journal of Vibration and Control. He was the Founding Chair of ASME Dynamic Systems and Control Division Technical Committee on Vibration and Control of Smart Structures. He was also the past Associate Editors of ASME Journal of Vibration and Acoustics (2014-2017), ASME Journal of Dynamic Systems, Measurement and Control (2006-2012) as well as a past Technical Editor of IEEE/ASME Transactions on Mechatronics from 2005 to 2009. Dr. Jalili has had a solid, competitive external funding (as PI) totaling close to over \$22M (including some of the most competitive funding; e.g., NSF CAREER, NSF MRI, NSF-FW, DOD and DOE Ralph E. Powe Awards), of which \$7.5M are current. He is the author/co-author of more than 350 peer-refereed technical publications; including 130 journal papers, 2 textbooks and 5 book chapters, with an overall h-index of 42 and 6700 citations. He is currently the Director of Alabama IMaDE* (<http://eng.ua.edu/research/alabamaimade>), and Advanced and Intelligent Manufacturing Systems (AIMS) Lab (<https://aims.ua.edu>) at UA.