Options for a National Plan for Smart Manufacturing

Committee

Thomas R. Kurfess

Chair

Thomas R. Kurfess is the HUSCO/Ramirez Distinguished Chair in Fluid Power and Motion Control and Professor of Mechanical Engineering at Georgia Tech. During 2019-2021 he served as the Chief Manufacturing Officer, and the Founding Director for the Manufacturing Science Division at Oak Ridge National Laboratory. During 2012-2013 served as the Assistant Director for Advanced Manufacturing at the Office of Science and Technology Policy in the Executive Office of the President of the United States of America, where he was responsible for coordinating Federal advanced manufacturing R&D. He was President of SME in 2018, and currently serves on the Board of Governors of the ASME. His research focuses on the design and development of advanced manufacturing systems targeting secure digital manufacturing, additive and subtractive processes, and large-scale production enterprises. He is a member of the National Academy of Engineering and is a Fellow of ASME, AAAS, and SME.

He received his S.B., S.M. and Ph.D. degrees in mechanical engineering from M.I.T. in 1986, 1987 and 1989, respectively. He also received an S.M. degree from M.I.T. in electrical engineering and computer science in 1988.

Billy B. Bardin

Member

Billy B. Bardin is the Global Digitalization Director for Dow Inc. He is responsible for ensuring the development of a well-integrated and fully developed digital strategy to realize the vision of Digital Dow and the end to end connectivity necessary to make it a reality. He leads efforts to explore, evaluate and implement emerging and next generation digital technologies as well as drives initiatives to ensure Dow's workforce has the required skills, characteristics, and training to be digital ready. He most recently was Dow's Global Operations Technology Director and has held numerous global leadership roles in manufacturing and R&D, focused on process technology and catalyst development.

Bardin holds a BS in Chemical Engineering from North Carolina State University, and a MS and PhD in Chemical Engineering from the University of Virginia. He is a Professional Engineer (PE) with the WV State Board of Registration for Professional Engineers. Bardin is the 2023 President of the American Institute of Chemical Engineers (AIChE) and is Fellow of the Institute. Bardin is an member and past Chair of the Industrial Advisory Board for the School of Chemical Engineering at Purdue University and a member of the advisory boards for the Departments of Chemical Engineering at the University of Virginia and North Carolina State University. Bardin was founding chair of the RAPID advanced manufacturing institute. He is currently vice-chair of the board of directors for the MxD digital advanced manufacturing institute. Bardin is a member of the National Association of Manufacturers' Manufacturing Leadership Council. He was named as one of Smart Industry Magazines Top 50 Industrial Digital Transformation Leaders in 2018 and was recognized as a Visionary Digital Leader by the National Association of Manufacturers' Manufacturing Leadership Council in 2021.

Richard D. Braatz

Member

Richard D. Braatz is the Edwin R. Gilliland Professor of Chemical Engineering at the Massachusetts Institute of Technology (MIT), where he is affiliated with the MIT Energy Initiative, the Department of Chemical Engineering, the Center for Biomedical Innovation, the Center for Computational Science and Engineering, and Machine Intelligence for Manufacturing & Operations. He was the Millennium Chair and Professor of Chemical and Biomolecular Engineering at the University of Illinois at Urbana-Champaign and a Visiting Scholar at Harvard University before moving to MIT. His primary research expertise is in applied mathematics and control theory and their application to the smart manufacturing of complex chemical and biological products including lithium-ion batteries, advanced polymers, vaccines, and monoclonal antibodies. Honors include the IEEE Control Systems Society Transition to Practice Award, the Technical Innovation Award from the International Society of Automation, the Engineering Research Council's Curtis W. McGraw Research Award, and the American Automatic Control Council's Donald P. Eckman Award. He is a Fellow of AIChE, AAAS, IEEE, and IFAC, and a member of the National Academy of Engineering. He received the B.S. from Oregon State University and the M.S. and Ph.D. from the California Institute of Technology – all in chemical engineering.

Jian Cao

Member

JIAN CAO is the Cardiss Collins Professor and the founding Director of NIMSI, the university research center on manufacturing science and innovation at Northwestern University. Cao considers manufacturing as an integration platform and specializes in innovative manufacturing processes and systems, particularly dieless incremental forming process and laser processes. Cao received her Ph.D. in mechanical engineering from M.I.T. Cao is a member of the National Academy of Engineering (NAE) and an elected Fellow of the American Association for the Advancement of Science (AAAS), ASME, CIRP, and SME. Her major research awards include the ASME Milton C. Shaw Manufacturing Research Medal, SME Gold Medal, DoD Vannevar Bush Faculty Fellowship, ASME and Pi Tau Sigma Charles Russ Richards Memorial Award, and SME Frederick W. Taylor Research Medal. Prof. Cao is the Editor-in-Chief of the Journal of Materials Processing Technology. She served as Associate Vice President for Research at Northwestern University, President of the SME North America Manufacturing Research Institute, and a program director at NSF. Dr. Cao is a board member of SME Board of Directors, and of mHUB, Chicago's first innovation center focused on physical product development and smart manufacturing.

Krystel K. Castillo-Villar

Member

Krystel Castillo is an expert in building an intellectual bridge between modeling and optimization of complex smart manufacturing supply chains, integrating energy efficiency and cybersecurity. As Energy VP for DOE’s Cyber Manufacturing Innovation Institute (CyManII, $130M), she leads development of Cybersecure Energy & Emissions Quantification (CEEQ), which captures embodied energy and emissions at the product level throughout the digital supply chain. CEEQ optimizes energy consumption and emissions in advanced manufacturing contributing to saving 1 quadrillion BTUs. These discoveries can revolutionize smart manufacturing and enable secure automated processes and supply chain networks. As professor she has executed 39 grants ($11M). She is the Director of the Texas Sustainable Energy Research Institute (since 2017) managing a ~$4.28M/yr. portfolio and a $50M Alliance with CPS Energy. She was inducted to the UTSA Academy of Distinguished Researchers (2021), received the GreenStar Endowed Professorship in Energy (2015), and selected to participate in the National Academy of Engineering’s 2015 U.S. FOE and 2019 E.U.-U.S. FOE symposiums.She has taught manufacturing courses for more than 12 years and mentored 24 graduate students. She has served as principal investigator in 5 training grants. She is actively recruiting and mentoring next-generation minority leaders and educators in advanced manufacturing.

Lili Cheng

Member

Lili Cheng is a Corporate Vice President at Microsoft, and manages the Emerging Technology Group at Microsoft, is responsible for Conversational AI and the Industrial Metaverse in Microsoft's Cloud and AI division. She partners with start-ups to large-scale enterprises, to identify areas of collaboration, drive innovation and deliver AI driven products and experiences. Cheng has a long history of research and AI with Microsoft. Cheng founded the Social Computing Group and Future Social Experiences ("FUSE") Labs in Microsoft Research and works with top universities, and researcher around the world to help develop design and social science curriculum via the Microsoft Design Expo and the Social Computing Symposium. She was the Director of User Experience for Microsoft Windows and has innovated on technical infrastructure in the areas of real time data, search, and AI tools for Microsoft Azure. Prior to Microsoft, Cheng worked in Apple Computer's Advanced Technology Group on the User Interface research team, where she developed QuickTime Conferencing and QuickTime VR. Lili serves on the advisory board for AI4All, which partners with top universities to amplify diverse AI talent, and is on the board of Connected Camps, a learning organization focused on online learning, governance, and online social interaction. She has been recognized by Time Magazine ("Future of AI"), Forbes ("Women@Forbes 2018"), Fast Company ("Most Creative People 2016"), New York University ("Tisch 50th Anniversary Creativity Award"). She has given numerous keynotes and interviews including Wired, Forbes, O'Reilly Media, SXSW. Cheng was born in Tokyo, grew up in Omaha Nebraska, and lives in the Seattle area with her husband, and has three sons.

James F. Davis

Member

As Vice Provost IT, Jim has broad responsibilities for data and technology solutions in support of UCLA's digital research and scholarship mission. Within UCLA, Jim co-sponsors the Institute for Digital Research and Education (IDRE). He also has oversight of the Office of the Chief Privacy Officer and the campus Disabilities Computing Program. Nationally, Jim has program oversight and is vice chair of the Governance Board for DOE's Clean Energy Smart Manufacturing Innovation Institute (CESMII) and was a co-founder of the original Smart Manufacturing Leadership Coalition. He is currently on the Board of Governors of the Manufacturing Leadership Council. In Southern California he is program sponsor of Innovate@UCLA, a partnership with companies engaged in research exchanges and professional development programs in IT leadership. Jim is a Professor in UCLA's Department of Chemical and Biomolecular Engineering where he does research and consults on AI, machine learning, intelligent systems, monitoring/control, and data/modeling systems across manufacturing industries. Jim was formerly the CIO at UCLA and The Ohio State University and was Board Chair of the Corporation of Education Network Initiatives in California (CENIC). He has past work experience with Amoco Chemicals and is a Fellow of the American Institute of Chemical Engineers.

Robert X. Gao

Member

Dr. Robert Gao is the Cady Staley Professor and Department Chair of Mechanical and Aerospace Engineering at Case Western Reserve University in Cleveland, Ohio. He was the Pratt & Whitney Chair Professor in Mechanical Engineering at the University of Connecticut during 2008-2014. His research expertise includes signal transduction mechanisms, multi-resolution signal analysis, and artificial intelligence/machine learning for improving the observability of manufacturing processes and equipment to enhance product quality control. His work has led to the invention of multi-physics sensors and advanced signal processing methods for the in-situ monitoring of manufacturing processes such as plastic injection molding, sheet metal stamping, microrolling, etc. He has published 3 books, over 400 technical papers, including 190 journal articles, and received 13 patents. He is a Fellow of ASME, SME, IEEE, and CIRP, and received several awards from professional societies, including the ASME Blackall Machine Tool and Gage Award, SME Eli Whitney Productivity Award, IEEE Instrumentation and Measurement Society Technical Award, IEEE Best Application in Instrumentation and Measurement Award, etc. In 2020, he was named by SME as one of “The 20 Most Influential Professors in Smart Manufacturing”. Currently he is serving as Chair of the CIRP Collaborative Working Group on AI in Manufacturing.

Satyandra K. Gupta

Member

Satyandra K. Gupta holds Smith International Professorship in the Viterbi School of Engineering at the University of Southern California. He is the founding director of the Center for Advanced Manufacturing at the University of Southern California. His research interests are computer-aided design, physics-informed artificial intelligence, computational foundations for decision making, human-centered manufacturing automation, and robotics. He has published more than four hundred technical articles in journals, conference proceedings, and edited books. He is a fellow of the American Society of Mechanical Engineers (ASME), Institute of Electrical and Electronics Engineers (IEEE), Society of Manufacturing Engineers (SME), and Solid Modeling Association (SMA). He has received numerous honors and awards for his scholarly contributions. Representative examples include a Young Investigator Award from the Office of Naval Research, CAREER Award from the National Science Foundation, Presidential Early Career Award for Scientists and Engineers, Invention of the Year Award from the University of Maryland, Kos Ishii-Toshiba Award from ASME, Excellence in Research Award from ASME Computers and Information in Engineering Division, and Design Automation Award from ASME. He has also received ten best paper awards at international conferences. He earned a Ph.D. in Mechanical Engineering from the University of Maryland. He is a member of National Materials and Manufacturing Board.

Susan N. Houseman

Member

Susan Houseman is Vice-President and Director of Research at the Upjohn Institute for Employment Research. She is a labor economist whose recent research focuses on contract employment arrangements, domestic outsourcing, offshoring, manufacturing, and measurement issues in economic statistics.
She co-directs the Outsourcing Research Network, chairs the Technical Advisory Committee to the U.S. Bureau of Labor Statistics; co-directs the Labor Statistics Program at the Institute of Labor Economics (IZA) in Bonn, Germany; and chaired the National Academies of Sciences, Engineering, and Medicine, Consensus Study on Measuring Alternative Work Arrangements for Research and Policy.. She received her PhD in economics from Harvard University.

Jeannine Kunz

Member

Jeannine Kunz is the Chief Workforce Development Officer for the Society of Manufacturing Engineers. A recognized expert in the field of learning and development for over 20 years, Kunz is at the forefront of workforce management issues, providing forward-thinking learning and development solutions for companies, academia, and individuals. Kunz served on the executive committee of America Makes and is a board member for the National Coalition of Career Development, Chair for National Defense Industrial Association’s Manufacturing Workforce Committee, and sits on CESMII, the Smart Manufacturing Institute, and Advanced Robotics for Manufacturing’s (ARM) Workforce Committees. In 2020, she joined the industry advisory committee for Clemson University’s THINKER graduate program, and in 2022, she was appointed as Board of Director for the Manufacturing Technology Deployment Group. “Crain's Detroit Business” recognized Kunz’s work when the publication selected her as one of its 2018 Notable Women in Manufacturing – in Michigan, as well as one of its 2019 Notable Women in Education. Kunz earned a bachelor’s degree in business and marketing with a concentration in economics from Eastern Michigan University in Ypsilanti, Michigan. She has served on EMU's Alumni Board and the Pittsburgh State University College of Technology Board of Directors.

Stuart E. Lawrence, III

Member

Stuart Lawrence is the CEO and President of Titan Robotics, Inc. an advanced robotic manufacturing company he co-founded based on research conducted at Carnegie Mellon University's (CMU) National Robotics Engineering Center (NREC) on coordinated autonomous mobile robotics for large-scale industrial applications. His focus is on the development and adoption of autonomous robotics as tools for manufacturing and industrial processes, not requiring advanced training to program and operate, leveraging innate human capability. He was a faculty member at CMU's Robotics Institute, where he led award winning research, including of the development of autonomous systems, mobile robotic platforms, perception systems, control architectures, and complex system integrations. His career has been focused on technology transition and commercialization, with extensive experience in the aerospace and defense industry. Stuart earned a B.S. in Computer Engineering from the Pennsylvania State University College of Engineering.

Blake D. Moret

Member

Blake Moret is Chairman and CEO of Rockwell Automation, the world's largest company dedicated to industrial automation and digital transformation. Under Blake's leadership, Rockwell integrates control and information to help make industrial companies and their people more productive and the world more sustainable, bringing the Connected Enterprise to life. Blake joined Rockwell in 1985 as a sales trainee and has held leadership positions in marketing, solutions, services, and product groups, including international assignments in Europe and Canada. He was SVP of the Control Products and Solutions business segment before being named CEO in 2016. Blake serves on the Board of Directors of PTC, Inc., the Executive Committee of the National Association of Manufacturers, the Board of the Advanced Regenerative Medicine Institute, and the Georgia Tech Advisory Board. He is the co-chair of the World Economic Forum's Advanced Manufacturing Community of CEOs and a member of the Business Roundtable. Blake is also Chairman of the Rockwell Automation Charitable Corporation and serves on the boards of FIRST, United Way of Greater Milwaukee and Waukesha, and the Boys and Girls Club of Greater Milwaukee.

Chinedum E. Okwudire

Member

Chinedum Okwudire is an associate professor of Mechanical Engineering at the University of Michigan. Prior to joining Michigan, he was the mechatronic systems optimization team leader at DMG Mori USA. He received a PhD degree in Mechanical Engineering from the University of British Columbia in 2009. His research is in smart manufacturing, where he exploits fundamental methods from machine design, control, and computing to boost the performance of manufacturing automation systems at low cost. His research has found applications in 3D printing, machining and nanopositioning. He has received a number of awards and recognitions including the CAREER Award from the National Science Foundation; the Young Investigator Award from the International Symposium on Flexible Automation; the Outstanding Young Manufacturing Engineer Award from the SME (formerly, Society of Manufacturing Engineers); the Ralph Teetor Educational Award from SAE International; and the Russell Severance Springer Visiting Professorship from UC Berkeley. He has co-authored a number of best paper award winning papers on topics related to control, mechatronics and manufacturing. He participated in the 2014 Frontiers of Engineering Education Symposium and has recently served on a NASEM committee for Infusing Advanced Manufacturing in Engineering Education.

Melissa Orme

Member

Melissa Orme, PhD, Vice President, The Boeing Company, oversees Additive Manufacturing activity across the three Boeing business units: Boeing Commercial Airplanes; Boeing Defense, Space and Security; and Boeing Global Services; including metal and polymer flight hardware, as well as research and factory aids to enable product development and increase factory efficiency. Orme is also responsible for guiding the development of the digital thread across the Additive Manufacturing value chain, and the implementation of data driven models from extracted and archived data from the digital thread, utilizing machine learning and artificial intelligence to drive efficiency, quality, and scale within the Additive Manufacturing end-to-end value stream. Other key responsibilities include the development of initiatives geared towards quantifying the positive sustainability trades associated with Additive Manufacturing.

Orme has a diverse professional background and began her career in academia, where she rose to the rank of Full Professor at the University of California, Irvine. In that capacity she developed her internationally renowned research program on net-form manufacturing, where her research resulted in numerous peer reviewed journal articles and 15 U.S. patents. Later, she transitioned to small business, where she served as Chief Technology Officer of Morf3D, a qualified supplier of Additively Manufactured flight hardware to Boeing and other Aerospace and Defense companies. Hence, she has deep experience in technology development through the diverse frameworks of academia, small business, and large corporations. Orme received her PhD, M.S., and B.S. in Aerospace Engineering from the University of Southern California.

William F. Spriggs

Member

William Spriggs is a professor in, and former Chair of, the Department of Economics at Howard University and serves as Chief Economist to the AFL-CIO. In his role with the AFL-CIO he chairs the Economic Policy Working Group for the Trade Union Advisory Committee to the Organization for Economic Cooperation and Development, and serves on the board of the National Bureau of Economic Research. He is currently, the president-elect of the Labor Employment Research Association, and serves as the Vice Chair of the Board of MDC Inc (Durham, NC). He serves on the Advisory Boards of WorkRise (of the Urban Institute) and the Opportunity and Inclusive Growth Institute of the Federal Reserve Bank of Minneapolis. From 2009 to 2012, Bill was appointed by President Obama, and confirmed by the U.S. Senate, to serve as Assistant Secretary for the Office of Policy at the United States Department of Labor. Some of Bill's previous work experience includes serving as an Economist for the Democratic staff of the Joint Economic Committee of Congress; and, as staff director for the independent, federal National Commission for Employment Policy. He is a member of the National Academy of Public Administration and the National Academy of Social Insurance; and the 2016 recipient of NASI's Robert M. Ball Award for Outstanding Achievement in Social Insurance

John W. Sutherland

Member

Dr. John W. Sutherland is Professor and Fehsenfeld Family Head of Environmental and Ecological Engineering at Purdue University. Prior to assuming his present position in 2009, he was the Henes Chair Professor of Mechanical Engineering and Director of the Sustainable Futures Institute at Michigan Technological University. He received his B.S., M.S., and Ph.D. degrees from the University of Illinois at Urbana-Champaign. He is one of the world's leading authorities on the application of sustainability principles to design, manufacturing, and other industrial issues. He has contributed pioneering research and education achievements, and provided leadership to advancing the field of environmentally responsible design and manufacturing. He has served as an investigator on numerous government and industry research projects and has mentored more than one hundred students to the completion of their graduate degrees. He has published over 400 papers in various journals and conference proceedings. Sutherland is a Fellow of SME, ASME, CIRP, and AAAS. His honors and recognitions include the SME Outstanding Young Manufacturing Engineer Award, Presidential Early Career Award for Scientists and Engineers, SAE Ralph R. Teetor Educational Award, SME Education Award, SAE International John Connor Environmental Award, ASME William T. Ennor Manufacturing Technology Award, SME Gold Medal, and AEESP Frederick George Pohland Medal.

Karen A. Thole

Member

Karen A. Thole holds the title of University Distinguished Professor of Mechanical Engineering at the Pennsylvania State University where she directs the Steady Thermal Aero Research Turbine (START) Lab, which focuses on advancing gas turbines for power generation and for sustainable aviation propulsion. Her research is aimed at increasing turbine efficiencies through improving turbine cooling technologies. She uses additive manufacturing to more rapidly advance cooling technologies as well as integrate instrumentation to make measurements not previously possible. Dr. Thole formerly served as the Department Head of Mechanical Engineering at Penn State in which she led the initiation of an online Masters degree in Additive Manufacturing and Design. She is a Fellow of ASME and AIAA. ASME has recognized her impacts with the Heat Transfer Memorial Award and George Westinghouse Gold Medal. In addition, AIAA has recognized her with the Air Breathing Propulsion Award and Thermophysics Award. Dr. Thole holds a Bachelor of Science and Master of Science in Mechanical Engineering from the University of Illinois at Urbana-Champaign, and a Doctorate in Mechanical Engineering from the University of Texas at Austin. She has served on NASA’s National Aerospace Committee and has been a member of two National Academies of Sciences, Engineering, and Medicine studies including one on low carbon aviation and the other on identifying research needs to advance gas turbines.