

Symposium on Data Analytics for Advanced Manufacturing

IEEE Big Data 2016

Symposium Theme: From Sensing to Decision-Making

December 6, 2016

Time	Event
8:45 – 9:45	Conference Keynote Speech: <i>Database Decay and How to Avoid it</i> Dr. Michael Stonebraker, Paradigm4/MIT, USA
9:45 – 10:45	Conference Keynote Speech: <i>Leveraging High Performance Computing to Drive Advanced Manufacturing R&D at the US Department of Energy</i> Mark Johnson, Advanced Manufacturing Office, U.S. Department of Energy
10:45 – 11:05	<i>Coffee Break</i>
11:05 – 11:15	Opening Remarks: Sudarsan Rachuri, DOE
11:15 – 12:00	Symposium Keynote Speech: <i>An overview of Manufacturing USA Innovation Institutes and Collaboration Network</i> Dr. Frank W. Gayle, Advanced Manufacturing National Program Office (AMNPO), NIST
12:00 – 12:45	Symposium Keynote Speech: <i>The GE Brilliant Factory</i> Dr. Matteo Bellucci, GE Global Research Center, Niskayuna, NY
12:45– 14:00	<i>Lunch</i>
14:00 – 16:05	Panel: Big Data Analytics for Advanced Manufacturing: Challenges and Opportunities <i>Panelists:</i> Dr. Chaitanya Baru (NSF), Dr. Matteo Bellucci (GE), Dr. Valerie R. Coffman (Xometry), Dr. Sivaramakumar Gopalasundaram (Cognizant), Mr. Matthew Jacobsen (USAF), Prof. Soundar Kumara (Penn State), Prof. Sankaran Mahadevan (Vanderbilt University), Dr. Ram Sriram (NIST) <i>Panel Moderator:</i> Dr. Sudarsan Rachuri (DOE)
16:05 – 16:25	<i>Coffee Break</i>
16:25 – 18:05	Session 1 (<i>Session Chair: Dr. Ronay Ak</i>)
16:25 – 16:50	Max Ferguson, Kincho Law, Raunak Bhinge, Yung-Tsun Tina Lee, and Jinkyoo Park, <i>Evaluation of a PMML-Based GPR Scoring Engine on a Cloud Platform and Microcomputer Board for Smart Manufacturing</i>
16:50 – 17:15	Shakti Awaghad, <i>SCEM: Smart & Effective Crowd Management with a Novel Scheme of Big Data Analytics</i>
17:15 – 17:40	Dazhong Wu, Connor Jennings, Janis Terpenney, and Soundar Kumara, <i>Cloud-Based Machine Learning for Predictive Analytics: Tool Wear Prediction in Milling</i>
17:40 – 18:05	Alexander Brodsky, Mohan Krishnamoorthy, William Bernstein, and M. Omar Nachawati, <i>A System and Architecture for Reusable Abstractions of Manufacturing Processes</i>

December 7, 2016

Time	
8:45 – 9:45	Conference Keynote Speech: <i>Harnessing the Data Revolution: A Perspective from the National Science Foundation</i> Dr. Chaitanya Baru, National Science Foundation
9:45 – 10:45	Conference Keynote Speech: <i>On the Power of Big Data: Mining Structures from Massive, Unstructured Text Data</i> Prof. Jiawei Han, University of Illinois at Urbana-Champaign, USA
10:45 – 11:05	<i>Coffee Break</i>
11:05 – 11:10	Opening Remarks: Tina Lee, NIST
11:10 – 11:55	Symposium Keynote Speech: <i>From Sensors to Sensing- Industrial Data Mining at Bosch</i> Dr. Rumi Ghosh, Robert Bosch LLC
11:55 – 12:45	Session 2 (<i>Session Chair: Dr. Anantha Narayanan</i>)
11:55 – 12:20	Srinivasan Radhakrishnan, and Sagar Kamarthi, <i>Convergence and Divergence in Academic and Industrial Interests on IOT Based Manufacturing</i>
12:20 – 12:45	Srinivasan Radhakrishnan, and Sagar Kamarthi, <i>Complexity-Entropy Feature Plane for Gear Fault Detection</i>
12:45 – 14:00	<i>Lunch</i>
14:00 – 15:45	Session 3: Bosch Big Data Challenge (<i>Session Chair: Dr. Rumi Ghosh</i>)
14:00 – 14:05	Introduction to Bosch Data Challenge – Dr. Rumi Ghosh
14:05 – 14:30	Bohdan Pavlyshenko, <i>Machine Learning, Linear and Bayesian Models for Logistic Regression in the Failure Detection Problems</i>
14:30 – 14:55	Darui Zhang, Bin Xu, and Jasmine Wood, <i>Predict Failed Product Using Large-scale Data: A Two-stage Approach with Clustering and Supervised Learning</i>
14:55 – 15:20	Abhinav Maurya, <i>Bayesian Optimization for Predicting Rare Internal Failures in Manufacturing Processes</i>
15:20 – 15:45	Ankita Mangal and Nishant Kumar, <i>Using Big Data to Enhance the Bosch Production Line Performance: A Kaggle Challenge</i>
15:45 – 16:10	Invited Talk: <i>Advancing Additive Manufacturing Through Visual Data Science</i> Dr. Chad Steed, ORNL
16:10 – 16:25	<i>Coffee Break</i>
16:25 – 16:40	Closing Remarks
16:40	Closure and Open Discussion

Keynote Speeches

Keynote 1:

Speaker: Dr. Frank W. Gayle, Advanced Manufacturing National Program Office (AMNPO), NIST

Bio:

Dr. Frank Gayle is Deputy Director of the interagency Advanced Manufacturing National Program Office (AMNPO) which is headquartered at the National Institute of Standards and Technology (NIST). Dr. Gayle received an Sc.D. in Metallurgy from the Massachusetts Institute of Technology, as well as an M.S. in Mechanical Engineering and Materials Science and a B.S.E. in Civil Engineering, both from Duke University. Before joining the AMNPO in December 2012, Dr. Gayle worked in the NIST Metallurgy Division in positions from research metallurgist to Division Chief. As Division Chief, he was responsible for broad support of industry needs for measurements, standards, and data in the application of metals. Dr. Gayle developed major programs in energy, microelectronics, and metals for mechanical applications, focusing on measurement needs for industry. From 2002 through 2007, Dr. Gayle headed the NIST-led team of scientific experts investigating the steel forensics involved in the collapse of the World Trade Center towers during the September 11, 2001 attacks. He has twice won the Department of Commerce Gold Medal, the Department's highest award. As Deputy Director, Dr. Gayle is responsible for the operations of the AMNPO, and leads efforts to carry out the Congressionally mandated development of the Manufacturing USA program.

Keynote 2:

Speaker: Dr. Matteo Bellucci, GE Global Research Center, NY

Title: The GE Brilliant Factory

Abstract

With the increase in global competition for high-quality products and compressed development schedules due to shortened product lifecycles, Brilliant Factory allows early entry into the marketplace. The use of Brilliant Factory tools is essential for simulating individual manufacturing processes and the total manufacturing system. By driving compatibility between the product design and the manufacturing plants, these virtual tools and methods enable the early optimization of cost, quality, and time to help achieve integrated products, process and resource design, and affordability.

Brilliant Factory envisions an approach to enable digital manufacturing that brings total digital integration within and between every part of the value chain starting from the design phase all the way to supply chain and service. The digital thread connects product development and design, manufacturing system and process design, material flow systems, manual and automated fabrication and assembly processes, quality verification, distribution, service and lifecycle management. The Brilliant Factory concept allows for value to be realized in each of these parts of the value chain, where collaboration between designers, manufacturing engineers and operations, is enabled by a "Digital Thread".

Bio:

Dr. Matteo Bellucci joined GE Oil & Gas, Florence, Italy, in 2007 as NPI Program Manager, taking responsibility for the largest NPI undertaken by O&G at that time. He also led the development of the Boil Off product line. His last assignment was to develop the Train Configuration Tool that enabled to create a technical offer for a full train in hours Vs. weeks.

In 2011 Dr. Bellucci moved to GE Global Research, taking the lead of the Processes and System lab. He and his team are leading most of the Brilliant Factories across the companies, spanning virtual validation of new factories as well as processes such as Casting and Additive. His team also understand how to optimize maintenance, and increase automation and throughput of various manufacturing processes.

Prior to joining GE, Dr. Bellucci worked as Test Engineer in the Icing Wind Tunnel at the Italian Aerospace Research Center where he acted as focal point for the Airbus A380 and A400 Military icing test campaigns. Dr. Bellucci attended the University of Naples and graduated with a PhD, in Aerospace Engineering. As part of his education Matteo worked at the Von Karman institute of Fluid Dynamics in Belgium, and at Yale University, New Haven, CT.

Keynote 3:

Speaker: Dr. Rumi Ghosh, Robert Bosch LLC, CA

Title: From Sensors to Sensing- Industrial Data Mining at Bosch

Abstract:

In this talk I would begin with introduction to Bosch and data mining at Bosch. I would then touch upon a couple of successful use cases showcasing some of the key research challenges. These include causality, class imbalance problem and the idea of moving to tools from point solutions (eg. test time reduction tool). We would then focus on the barriers to the progress of industrial data mining with special emphasis on the need for standardization. I would highlight Bosch's effort in this direction.

Bio:

Dr. Rumi Ghosh is a senior data mining engineer at Robert Bosch, LLC. She received her Bachelors and Masters Degrees in Mathematics and Computing from Indian Institute of Technology, Kharagpur, India in 2007 and Ph.D. in Computer Science from University of Southern California in 2012. During her Ph.D. and post-doctoral research in HP Labs, she focused on devising algorithms for connected networks of people. When she joined Bosch, she forayed into internet of things. Her responsibilities at Bosch include development of algorithms for real data mining and machine learning problems for a wide spectrum of domains ranging from manufacturing to supply chain management to demand forecasting. She has 3 filed patents and has over 30 research papers in internationally reputed conferences and journals in Computer Science, Physics and Mathematics such as KDD, WWW, ICWSM, WSDM and Physical Review. She chaired workshops and symposiums in the field of data mining focusing on domains of advanced manufacturing and internet of things in conferences like ICDM and IEEE Big Data Conference. She has been in the program committee and reviewer for many international conferences and journals including IJCAI, KDD, TKDD, TKDE, ICDE, ICWSM and ACM Hypertext to name a few.

PANEL- Big Data Analytics for Advanced Manufacturing: Challenges and opportunities

Moderator: Dr. Sudarsan Rachuri, Federal Program Officer and Technology Manager, Advanced Manufacturing Office, Department of Energy

Panelists

Dr. Chaitanya Baru, NSF

Dr. Matteo Bellucci, GE Global Research

Dr. Valerie R. Coffman, Xeometry

Dr. Sivaramakumar Gopalasundaram, Cognizant

Mr. Matthew Jacobsen, Air Force Research Laboratory

Prof. Soundar Kumara, Penn State University

Prof. Sankaran Mahadevan, Vanderbilt University

Dr. Ram Sriram, NIST

BIOS

Chaitanya Baru is Senior Advisor for Data Science in the Computer and Information Science and Engineering (CISE) Directorate at the National Science Foundation. He is there on assignment from the San Diego

Supercomputer, UC San Diego, where he is Associate Director for Data Initiatives. At NSF, he coordinates the cross-Foundation BIGDATA research program, advises the NSF Big Data Hubs and Spokes program, assists in strategic planning, and participates in interdisciplinary and inter-agency Data Science-related activities. He co-chairs the Big Data Inter-agency Working Group, and is co-author of the US Federal Big Data R&D Strategic Plan released in May 2016 under the auspices of the Networking and Information Technology R&D (NITRD) group of the National Coordination Office, White House Office of Science and Technology Policy.

Valerie Coffman is a graduate of Johns Hopkins and received a PhD in Physics from Cornell where she wrote software for studying the fracture properties of materials. After graduation, she spent 5 years at the National Institute of Standards and Technology (NIST) writing open source software for materials science research. Valerie joined Xometry as Chief Technology Officer in 2014.

Sivaramakumar Gopalsundaram working as manager in Cognizant in the department of Data Analytics. Dr. Siva has a doctorate degree in Adaptive systems from Indian Institute of Science, Bangalore, India. He has worked in the area of Supply chain optimization, business forecasting and data analytics in various industrial sectors such as chemical processes, discrete manufacturing, health care, semiconductor, retail, automotive and communication.

Matthew Jacobsen is a project manager in the Manufacturing and Industrial Technologies Division of the Air Force Research Laboratory, where he leads efforts in data and value stream management, process optimization, and cyber-physical vulnerabilities analysis. Mr. Jacobsen's current focus is concerned with the modernization of shop floor and supply chain IT capabilities, in order to address emerging issues in Big Data Analytics, Cloud Services, and Internet of Things (IoT) technology. To this end, Mr. Jacobsen is leading an internationally recognized cyberinfrastructure development program within the area of Integrated Computation Materials Science and Engineering (ICMSE). This cyberinfrastructure employs state-of-the-art technologies to provide a complete suite of data management and machine integration capabilities to research and manufacturing organizations around the United States.

Soundar Kumara is the Allen, E., and Allen, M., Pearce Professor of Industrial Engineering at Penn State. He also holds a joint appointment with the Department of Computer Science. Has an affiliate appointment with the school of Information Sciences and Technology. His research interests are in Manufacturing Process Monitoring, IOT in Manufacturing and Service Sectors, Health Analytics, Graph Analytics and Large Scale Complex Networks. He is a Fellow of Institute of Industrial Engineers (IIE), Fellow of the International Academy of Production Engineering (CIRP), and Fellow of American Association for Advancement of Science (AAAS), and American Association of Mechanical Engineers (ASME). He has more than 200 publications to his credit and several of his papers have won best paper awards. 50 Ph.D., and 54 MS students graduated under his tutelage. His Erdős number is 3.

Sankaran Mahadevan is Professor of Civil and Environmental Engineering at Vanderbilt University, Nashville, Tennessee, where he has served since 1988. He also has a joint appointment as Professor of Mechanical Engineering. His research interests are in reliability and uncertainty analysis methods, material degradation, structural health monitoring, design optimization, and model uncertainty. The methods have been applied to civil, mechanical and aerospace systems. This research has been funded by NSF, NASA (Glen, Marshall, Langley, Ames), FAA, U. S. DOE, U. S. DOT, Nuclear Regulatory Commission, U. S. Army Research Office, U.S. Air Force, U. S. Army Corps of Engineers, General Motors, Chrysler, Union Pacific, Transportation Technology Center, and the Sandia, Los Alamos, Idaho and ORNL. Prof. Mahadevan has directed 30 Ph.D. dissertations and 20 M.S. theses, taught several industry short courses on reliability methods, and authored more than 300 technical publications, including two textbooks and 120 peer-reviewed journal articles.

Ram D. Sriram is currently the chief of the Software and Systems Division, Information Technology Laboratory, at the National Institute of Standards and Technology. Before joining the Software and Systems Division, Dr.

Sriram was the leader of the Design and Process group in the Manufacturing Systems Integration Division, Manufacturing Engineering Laboratory, where he conducted research on standards for interoperability of computer-aided design systems. He was also the manager of the Sustainable Manufacturing Program. Prior to joining NIST, he was on the engineering faculty (1986-1994) at the Massachusetts Institute of Technology (MIT) and was instrumental in setting up the Intelligent Engineering Systems Laboratory. Dr. Sriram has a B.Tech. from IIT, Madras, India, and an M.S. and a Ph.D. from Carnegie Mellon University, Pittsburgh, USA.