National Science Foundation

2014 National Workshop on Transportation Cyber-Physical Systems

Plenary Overview Session - Invited Speakers

John Capp is currently Director of Electrical & Control Systems Research at General Motors R&D and is responsible for the development of advanced electrical systems and is also the strategic lead for active safety, driver assistance, and automated driving technology. John holds a Master's Degree in Engineering from Purdue University and has nearly 30 years of experience at General Motors, primarily in product engineering.

David Kuehn is the Program Manager for the Federal Highway Administration (FHWA) Exploratory Advanced Research Program. The Program Manager serves as the senior advisor to agency leadership on the communication and coordination of exploratory advanced research activities and fosters partnerships with other Federal agencies, national scientific societies and organizations, and the academic community in support of the Program. The program focuses on longer term and higher risk research with the potential for transformational improvements to the transportation system. David entered federal service as a Presidential Management Fellow. Before working at the federal level, David worked in local government and as a consultant in southern California. He holds a Masters of Public Administration from the University of Southern California and a B.A from the University of California, Irvine.

(Workshop Chair)

Raj Rajkumar is a professor in the Department of Electrical and Computer Engineering at Carnegie Mellon University. He also holds a courtesy appointment in the Robotics Institute at Carnegie Mellon. In addition, he serves as Director, Real-Time and Multimedia Systems Lab; Co-Director, General Motors-Carnegie Mellon Information Technology Collaborative Research Lab and Co-Director, General Motors-Carnegie Mellon Autonomous Driving Collaborative Research Lab. He was a Primary Co-Founder or TimeSys Corporation and has served as a research staff member at IBM T.J. Watson Research Labs. He is interested in embedded systems, real-time systems, wireless sensor networks, resource management, cybersecurity and physical security, cyber-physical systems, networking and QoS. He is an ACM Distinguished Engineer, has won 5 Best Paper Awards, and has served as Vice-Chair, IEEE Technical Committee on Real-Time Systems.

Plenary Topic Sessions - Invited Speakers

Ruzena Bajcsy ("buy chee") was appointed Director of CITRIS and professor of the EECS department at the University of California, Berkeley on November 1, 2001. Prior to coming to Berkeley, she was Assistant Director of the Computer Information Science and Engineering Directorate (CISE) between December 1, 1998 and September 1, 2001. As head of National Science Foundation's CISE directorate, Dr. Bajcsy managed a $500 million annual budget. She came to the NSF from the University of Pennsylvania where she was a professor of computer science and engineering since 1972. In 2004 she became a CITRIS director emeritus and now she is a full time NEC Distinguished professor of EECS.

Hamsa Balakrishnan is an Assistant Professor of Aeronautics and Astronautics and of Engineering Systems at the Massachusetts Institute of Technology. She received her Ph.D. in Aeronautics and Astronautics from Stanford University in April 2006. Dr. Balakrishnan received her B.Tech in Aerospace Engineering from the Indian Institute of Technology (Madras) in 2000 and an M.S. in Aeronautics and Astronautics from Stanford University in 2002. Between May and December 2006, she was a Principal Development Engineer at the University of California, Santa Cruz and the NASA Ames Research Center, where she developed algorithms for the optimization of aircraft operations at airports.

Suhas N. Diggavi received a Ph.D. degree in electrical engineering from Stanford University, Stanford, CA. After completing his Ph.D., he was a Principal Member Technical Staff in the Information Sciences Center, AT&T Shannon Laboratories, Florham Park, NJ. After that he was on the faculty of the School of Computer and Communication Sciences, EPFL, where he directed the Laboratory for Information and Communication Systems (LICOS). He joined UCLA as Professor of Electrical Engineering in 2010. He is a co-recipient of the 2013 IEEE Information Theory Society & Communications Society Joint Paper Award and the 2013 ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc) best paper award. He has 8 issued patents.

Aniruddha S. Gokhale is an Associate Professor in the Department of Electrical Engineering and Computer Science, and Senior Research Scientist at the Institute for Software Integrated Systems (ISIS) both at Vanderbilt University, Nashville, TN, USA. He has over 150 technical articles to his credit focusing on topics pertaining to model-driven engineering (MDE), middleware solutions involving design patterns for quality of service (QoS) assurance, and correct-by-construction design and development of distributed real-time and embedded systems. His current research focuses on developing novel solutions to emerging challenges in cloud computing and cyber physical systems. Dr. Gokhale obtained his B.E (Computer Engineering) from University of Pune, India, 1989; MS (Computer Science) from Arizona State University, 1992; and D.Sc (Computer Science) from Washington University in St. Louis, 1998. Prior to joining Vanderbilt, Dr. Gokhale was a member of technical staff at Lucent Bell Laboratories, NJ.

Philip Koopman's background includes time as a submarine officer for the US Navy, a principal in a couple small startups, an embedded CPU architect for Harris Semiconductor, and an embedded system architect for United Technologies Research Center. At Carnegie Mellon, he worked in the broad areas of wearable computers, software robustness, embedded networking, dependable embedded computer systems, and autonomous vehicle safety. His current research interests focus on embedded systems, including the topics: dependability, safety, critical systems, embedded control networks, distributed embedded systems, secure embedded systems, and embedded systems education. Koopman is a senior member of IEEE, senior member of the ACM, and a member of IFIP WG 10.4 on Dependable Computing and Fault Tolerance.

Parimal Kopardekar (PK) serves as the Manager of the NASA's NextGen Concepts and Technology Development Project. He has published more than 40 articles. He enjoys initiating new concepts and technology ideas that increase airspace capacity and throughput, reduce delays, and reduce the total cost of air transportation. He is recipient of numerous NASA awards including Outstanding Leadership Medal and Engineer of the Year. He holds Ph.D. and M.S. degrees in Industrial Engineering and Bachelor's degree in Production Engineering.

Xenofon Koutsoukos is an Associate Professor in the Department of Electrical Engineering and Computer Science at Vanderbilt University. He is also a Senior Research Scientist in the Institute for Software Integrated Systems (ISIS).). Before joining Vanderbilt, Dr. Koutsoukos was a Member of Research Staff in the Xerox Palo Alto Research Center (PARC) (2000-2002), working in the Embedded Collaborative Computing Area. He received his PhD in Electrical Engineering from the University of Notre Dame in 2000. His research work is in the area of cyber-physical systems with emphasis on formal methods, distributed algorithms, diagnosis and fault tolerance, and adaptive resource management. He has published numerous journal and conference papers and he is co-inventor of four US patents. He is the recipient of the NSF Career Award in 2004, the Excellence in Teaching Award in 2009 from the Vanderbilt University School of Engineering, and the 2011 Aeronautics Research Mission Directorate (ARMD) Associate Administrator (AA) Award in Technology and Innovation from NASA.

Ulf Lindqvist manages R&D projects in infrastructure security and leads SRI's support for the U.S. Department of Homeland Security Cyber Security R&D Center. Dr. Lindqvist's expertise and interests are focused on the protection of critical infrastructure systems against electronic attacks, in particular analysis and detection of such attacks. He has more than twenty publications in the computer security area, many of which are bridging the gap between theoretical and applied research, and he holds one patent. He is the 2014-2015 Vice Chair and 2016-2017 Chair-elect of the IEEE Computer Society's Technical Committee on Security and Privacy. Dr. Lindqvist served for three years on the executive committee of the Institute for Information Infrastructure Protection (I3P), a consortium of leading national cyber security institutions, including academic research centers, government laboratories and non-profit organizations. He holds a Ph.D. in computer engineering and an M.S. in computer science and engineering, both from Chalmers University of Technology in Sweden.

Umit Ozguner is a professor of Electrical and Computer Engineering at The Ohio State University. His research interests include the following topics: large-scale, intelligent systems modeling and optimization, hybrid systems, decentralized control, automotive and transportation systems Automated Highway Systems and all aspects of ITS. Ozguner served as the President of the IEEE ITS Council in 1999 and 2000. His other activities include acting as the director for the OSU Center for Intelligent Transportation Research (CITR) and Technical Program Co-chairman for 9th IEEE International Symposium on Intelligent Control.

Jim Paunicka is a Boeing Technical Fellow and a senior researcher with Boeing Research & Technology, which is chartered with development and maturation of technology for Boeing's Defense, Space, Security, and Commercial Aircraft businesses. In the past seven years, Dr. Paunicka has served as Principal Investigator on over a dozen DARPA and Air Force Research Laboratory programs working technologies associated with UAV systems, embedded air vehicle software, verification and validation, and airborne networking. Dr. Paunicka is also an Associate Fellow of the American Institute of Aeronautics and Astronautics (AIAA), is currently serving as an officer in the AIAA Software Technology Committee, and is a founding member of the recently formed Aerospace Cybersecurity Working Group in AIAA.

Peter Seiler's research is in the area of control systems with applications to aerospace systems. Modern flight control systems are typically designed using a model of the aircraft dynamics. One aspect of Seiler's research is to develop tools to analyze the effect of model uncertainty and nonlinearities on system performance. He is currently applying modern control design and analysis tools to make wind energy more cost-effective. Advanced control algorithms can increase the power capture and reduced structural loads on large, industrial scale wind turbines. Another aspect of Seiler's research is to develop algorithms to increase the reliability of safety critical systems. He previously worked on the flight control electronics for the Boeing 787 aircraft.

Panagiotis Tsiotras is the College of Engineering Dean's Professor at the School of Aerospace Engineering at the Georgia Institute of Technology, and the Director of the Dynamics and Controls Systems Laboratory (DCSL) in the same department. He is a founding member of the Center for Space Systems and an affiliated member of the Institute of Robotics and Intelligent Machines at Georgia Tech. His research interests are in the dynamics and control of nonlinear systems, optimal and robust control, and ground, space and aerial vehicle autonomy. He has published over 250 journal and conference articles in these and related areas. He is a recipient of the NSF CAREER Award (1996), and the President's Award for Excellence in Research from the Sigma Xi Society. He is currently the lead PI of the ARO MURI project "Neuro-Inspired Adaptive Perception and Control for Agile Mobility of Autonomous Vehicles in Uncertain and Hostile Environments." He has served in the Editorial Boards of the AIAA Journal of Guidance, Control, and Dynamics, the IEEE Transactions on Automatic Control, the IEEE Control Systems Magazine and the Dynamics and Control: An International Journal. He is a Fellow of AIAA, and a Senior Member of IEEE.

Wei Zhao completed his undergraduate studies at Shaanxi Normal University, China, in 1977, and then received his MSc and PhD degrees in Computer and Information Sciences at the University of Massachusetts at Amherst, USA in 1983 and 1986, respectively. In 2008, Professor Zhao was appointed as the 8th Rector for the University of Macau. Prior to this position, Professor Zhao also served as the Director of the Division of Computer and Network Systems at the US National Science Foundation, the Dean of Science at Rensselaer Polytechnic Institute, and the Senior Associate Vice President of Research at Texas A&M University, making him one of the few scholars from Mainland China who have ever held such senior posts in the US federal government and high education institutions. An IEEE fellow, Professor Zhao is internationally acclaimed for his research in the areas of Internet of Things, distributed computing, real-time systems, and cyber-physical systems. His research team has won numerous awards from international research community. In recognition of his outstanding achievements in scientific research and contributions to higher education, he has been conferred honorary doctorate degrees by twelve world-renowned universities. In 2011, he was appointed by the Chinese Ministry of Science and Technology as the Chief Scientist of the Internet of Things - a national 973 project. In 2012, he was elected to be an Academician of the International Eurasian Academy of Sciences.

Government Sponsors

Keith Marzullo is currently the Division Director for the Computer and Network Systems (CNS) Division in the Computer and Information Science and Engineering (CISE) Directorate at the National Science Foundation. He is at NSF on leave from the Computer Science and Engineering Department at the University of California, San Diego. He has been on the UCSD faculty since 1993. He received his Ph.D. in Electrical Engineering from Stanford University in 1984; for his Ph.D. he developed the Xerox Research Internet Clock Synchronization protocol, which was one of the first practical fault-tolerant protocols that addressed this issue. In 1986, he left Xerox and joined the CS Department at Cornell University where with colleagues Ken Birman and Robert Cooper, he started the company ISIS Distributed Systems, which provided middleware for fault tolerant distributed applications; this software was used by financial and investment institutions. He served as a Professor at Large in the Computer Science Department at the University of Tromso from 1999-2003, was Chair of ACM SIGOPS from 2003-2007, and Chair of the CSE Department from 2006-2010. His current research focuses on issues in distributed systems and security.

D**avid Corman** is a Program Director and leader of the Cyber Physical Systems program at the National Science Foundation. Dr. Corman has a broad range of research interests spanning many technologies fundamental to CPS application areas including transportation, energy, medical devices, and manufacturing. Dr. Corman has extensive industrial experience in the development, design, and manufacture of CPS systems. Dr. Corman received PhD degree in electrical engineering from the University of Maryland.

Moderators

Saurabh Amin (MIT)

Christine Belcastro (NASA)

Ralph Birken (Northeastern)

Ken Butts (Toyota)

Paul Green (University of Michigan)

Tian He (University of Minnesota)

Marco Gruteser (Rutgers)

Joe Loyall (BBN)

Bill Milam (Ford)

Natasha Neogi (NIA Net)

Kagan Tumer (Oregon State)

Nalini Venkatasubramanian (UC-Irvine)

Shige Wang (General Motors)

Dan Work (UIUC)

S. Felix Wu (UC-Davis)

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Sumit Kumar Jha (Central Florida)

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