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IEEE SmartAg Initiative: Technology Applied to the Food Supply Chain

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Abstract: Food safety and security are among the most significant challenges facing the planet, with an expected nine billion people placing pressure on energy and water resources necessary for food production in an increasingly constrained environment by the year 2050. Furthermore, food waste is between 30-40% in both developed and developing nations, for different reasons. Cutting edge technologies, applied to the food supply chain from soil to table, can increase yields, reduce waste, and reduce water, energy, fertilizer, and pesticide usage, and provide real time monitoring of food quality and safety. SmartAg encompasses soil preparation, food production in agriculture and aquaculture, harvest, aggregation, processing, packaging, transport, wholesale/retail, and consumption. Sensing and tracking, deployed throughout the food supply chain, adds value by securely recording custody and handling, with real-time secure monitoring of food safety and quality. Variants of key technologies already exist in the IEEE portfolio, and can be specialized to this important new application, while others are ripe for new development. SmartAg can be viewed as an ecosystem of fog and cloud connected systems and devices interoperating to provide local and regional data for improved sensing, decision-making, and action. Connectivity throughout this ecosystem is crucial to its efficacy. The goal of the IEEE SmartAg initiative is to support and convene a community of technologists and subject matter experts from across the food supply chain, and facilitate and sustain the convergence of these areas via conferences, publications, educational courses and videos, and entrepreneurship opportunities.

This presentation outlines the IEEE SmartAg initiative, describes the partnerships with non-IEEE societies, and describes examples of technologies that can significantly impact food safety and security. The presentation will emphasize opportunities for networking and related transmission technologies for a variety of applications in challenging environments within the SmartAg ecosystem.

Biography: John P. Verboncoeur received a B.S. (1986) in Engineering Science from the University of Florida, M.S. (1987) and Ph.D. (1992) in Nuclear Engineering from the University of California-Berkeley (UCB), holding the DOE Magnetic Fusion Energy Technology Fellowship. After serving as a joint postdoc at Lawrence Livermore National Laboratory and UCB in Electrical Engineering and Computer Science (EECS), he was appointed Associate Research Engineer in UCB-EECS, and to the UCB Nuclear Engineering faculty in 2001, attaining full Professor in 2008. He served as the Chair of the Computational Engineering Science Program at UCB from 2001-2010. In 2011, he was appointed Professor of Electrical and Computer Engineering at Michigan State University, and added an appointment as Professor of Computational Mathematics, Science, and Engineering in 2015. His research interests are in theoretical and computational plasma physics, with a broad range of applications spanning low temperature plasmas for lighting, thrusters and materials processing to hot plasmas for fusion, from ultra-cold plasmas to particle accelerators, from beams to pulsed power, from intense kinetic nonequilibrium plasmas to high power microwaves. He is the author/coauthor of the MSU (formerly Berkeley) suite of particle-in-cell Monte Carlo (PIC-MC) codes, including XPDP1 and XOOPIC, used by over 1000 researchers worldwide with over 350 journal publications in the last decade. He has authored/coauthored about 400 journal articles and conference papers, with about 4000 citations, and has taught 13 international workshops and mini-courses on plasma simulation. He is currently an Associate Editor for Physics of Plasmas. He is Past President of the IEEE Nuclear and Plasma Sciences Society, a member of the IEEE TAB Management Committee, and IEEE Division IV Director-elect. He chairs the IEEE TAB SmartAg ad hoc committee. Appointed Associate Dean for Research in the College of Engineering in 2014, he oversees college research activities and strategy. He has been involved in a number of technology startup companies, including development of one of the big three consumer credit reports, work on the hardware and software of the US Postal Service Mail Forwarding System, command and control software in the defense sector, computerized exercise equipment, and a pioneering cloud based health care management system. He is a fellow of the IEEE.