

**FRI, APR 28, 2016**

**UH Hilton**

## The Global Impact of Electrical & Computer Engineering in Society



**Igor Alvarado**

*Business Development Manager for  
Academic Research  
National Instruments*

**Keynote  
Speaker**

### **Abstract:**

As a professional career, Electrical and Computer Engineering (ECE) is rapidly evolving as new technologies and applications demand an engineer capable of designing, building, maintaining and operating complex systems that are tightly coupled with mechanical engineering, software engineering, biomedical engineering and other disciplines. But not everything is about technology; the social component in the ECE student's education and professional career is also key; as part of the non-technical student outcomes, the Accreditation Board for Engineering and Technology (ABET) indicates that students should have the "ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability". Nowadays, ECE must be part of a "transdisciplinary integration of life sciences, physical sciences, engineering, and beyond through convergence, to form a comprehensive synthetic framework for tackling scientific and societal challenges that exist at the interfaces of multiple fields". Many of these complex systems can be considered "systems of systems" in which different distributed "agents" that conduct specialized tasks are simultaneously collaborating through wired/wireless communication channels to achieve a global objective. Examples of these systems include a whole new generation of Cyber Physical Systems (CPS) that intrinsically involve controls, communications and computing, together with sensing and actuation, cybersecurity, deep learning and data analytics; at this level, large, highly distributed but tightly integrated systems have made possible such concepts as Smart Cities in which technology can have a direct impact on our lives and on society in general. In this talk, we will take a journey across multiple scenarios in which the ECE professional could (and should) play a key role by designing, developing and deploying new technologies and complex bio-mechatronic systems that leverage emerging technologies such as neuromorphic and quantum computing, spintronics, 5G and mmWave wireless communications, metamaterials, human/brain-machine interfaces and many others.

### **Biography:**

Mr. Alvarado is a Mechanical Engineer (Kansas State University, 1984) and currently works with National Instruments (NI) as the Business Development Manager for Academic Research. He has been with NI since 1999, and has more than 30 years practical experience in the design, development and deployment of real-time, measurement and control systems that involve high-performance numerical methods in C, C++, FORTRAN and NI LabVIEW using PC-based and embedded technologies for a wide spectrum of academic research projects and industries including system-level solutions for the energy sector. Mr. Alvarado led the development and implementation of some of the first power sub-station monitoring and control systems using LabVIEW and NI data acquisition hardware on industrial computers in Latin America. He has also been involved in several research centers at leading universities in Texas and Oklahoma. On the STEM teaching/education side, Mr. Alvarado has been involved in the design and implementation of novel approaches for teaching/learning and scientific research in science/engineering with a special emphasis on hands-on learning and undergraduate research projects. He is an active member of several professional societies, including the Institute of Electrical and Electronics Engineers (IEEE), the Society of Industrial and Applied Mathematics (SIAM), the International Society of Automation (ISA), the American Physical Society (APS) and the Ibero-American Science and Technology Education Consortium (ISTEC). Mr. Alvarado has published papers in technical publications and has taught courses to engineers and scientists involved in instrumentation, control and automation applications in industry and academia. He has also been an invited speaker at numerous leading universities in the U.S. and Latin America, as well as national/international meetings. Over the past 28 years, he has served as a consultant or advisory board member for several institutes, colleges, universities, corporations and research laboratories and currently advises two international innovation institutes, and several colleges and universities in the U.S.