**Abstract:** Micro- and nano-sensors and systems have already begun to proliferate into our daily life in more ways than we currently fathom. As these technologies continue to evolve, such sensing systems continue to shape and contribute, not only to improving the quality of life but are also beginning to significantly impact the social behavior of humans. For example, with the slow but inevitable introduction of self-driving cars, we are already beginning to witness the emergence of new legal definitions and framework to deal with future liabilities and faults in the absence of a human driver. The rapid evolution in the field of representation of information, commonly titled as “big data systems,” allows us to visualize large quantities of information and make emergent predictions with a cerebral lucidity on which societies will make critical decisions. This is especially significant in slowly evolving and large capacity systems.

All these innovations inevitably depend on reliable and efficient sensors and systems that provide the information required to visualize and react. In this talk I will give an overview of why sensing systems are so critical in so many applications and their likely impact on human societies. The talk will provide examples of several smart microsensors and systems from my last several years of research. These include piezoelectric inertial sensors, Coriolis mass flow sensors, calorimetric and thermal sensors, and chemical and biochemical sensors and systems. Even as several sensing technologies have begun to mature, several more continue to pose formidable challenges. For example, imagine a world in which the brain can be continuously monitored and brewing epileptic electrical storms are foreseen and averted; signals from the motor cortex region drive and manipulate a prosthesis using a minimally invasive two-way brain computer interface (BCI); and monitoring brain functions provides us with tools for understanding the mind and thoughts. Imagine arrays of chemical and biochemical sensors that recognize the chemical composition of the ambient environment and monitor the status of human health through minimally invasive and unobtrusive sensors and smart clothing. These sensor systems are currently unavailable and continue to pose engineering challenges that are vastly more difficult than what has been thus far achieved and truly require engineering ingenuity and creativity of the highest quality. In this presentation I will highlight some of the continuing challenges and opportunities in the area of sensors and sensing systems.

**Biography:** Dr. Srinivas Tadigadapa is Professor of Electrical Engineering and Bioengineering at the Pennsylvania State University. He obtained his Ph.D. from Cambridge University, UK, in 1994. He served as Vice President of Manufacturing at Integrated Sensing Systems Inc., Michigan, from 1996 to 2000, where he pioneered the manufacturing of micromachined Coriolis mass flow sensors and pressure sensors. His current research interests include integrated heterogeneous materials-based microsystems, biological and chemical sensors, and exploring electric and thermal transport at the micro-nano interfaces. He has been awarded the Alexander von Humboldt Fellowship in Germany and the Walton Fellowship by the Science Foundation of Ireland. He is a Life Fellow of the Cambridge Philosophical Society and Fellow of the Institute of Physics, London, and of IEEE.