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*Electrical & Computer Engineering*  
**S E M I N A R**  
Louisiana State University

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**To See a World in a Grain of SAND\***

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**Abstract**—In this talk, I will present how to gaze at the health status of humanity and the Earth in a grain of SAND\* (Speedy Analytical Nano-optofluidic Diagnostic system), and find solutions in nature for predictive medicine and preventive healthy environment. Since the future of preventive health is in the palm of our hands, a few examples of integrated optofluidic platforms will be discussed along with the vision of smart digital healthcare systems for both developing and developed countries. Rapid precision integrated molecular diagnostic systems (iMDx) is recently developed for proactive personalized medicine. The smart mobile iMDx comprises three key elements of precision medicine: (1) ultrafast multiplexed photonic PCR for the early detection of DNA and RNA biomarkers in blood and signal amplifications of protein markers, (2) a self-contained sample preparation from whole blood on chip, which allows a sample-to-answer readout platform, (3) interactive e-healthcare IT with smart analytics. Smart SANDs' rapid and accurate molecular diagnostic network for human, agricultural, and environmental health will radically improve global healthcare and empower us to create a new proactive, predictive, and preventive paradigm for enhancing global biosecurity. If time permits, I will also discuss Microphysiological Analysis Platforms (MAP), or Integrated organs on Chip (IoC), which provide physiologically relevant microenvironments and innovative non-invasive real-time molecular and physiological imaging of pathogenesis dynamics of mini-brain model for systematic neuropathogenesis, personalized drug discovery, and therapeutics.

**Bio**—Prof. Luke P. Lee received both his BA and PhD from UC Berkeley. He joined the faculty at the UC Berkeley in 1999 after more than a decade of industry experience. He became the Lester John and Lynne Dewar Lloyd Distinguished Professor of Bioengineering in 2005. He also served as the Chair Professor in Systems Nanobiology at the ETH Zürich from 2006 to 2007. He became Arnold and Barbara Silverman Distinguished Professor at Berkeley in 2010 and was reappointed again 2015. He is the founding director of the Biomedical Institute for Global Healthcare Research & Technology (BIGHEART). He served as Associate President (International Research and Innovation) and Tan Chin Tuan Centennial Professor at the National University of Singapore. He is a Fellow of the Royal Society of Chemistry and the American Institute of Medical and Biological Engineering. His work at the interface of biological, physical, and engineering sciences for medicine has been recognized by many honors including the IEEE William J. Morlock Award, NSF Career Award, Fulbright Scholar Award, and the HoAm Prize. Lee has over 350 peer-reviewed publications and over 60 international patents filed. His current research interests are quantum biological electron tunneling in living organisms, advanced integrated microfluidics for the early detection of cancer and neurodegenerative diseases, and in vitro neurogenesis, and solving ill-defined problems of global healthcare.

**When:** Monday, 19 March 2018, 10:30 - 11:30

**Where:** Room 1100 Patrick F. Taylor Hall

**Info:** <http://www.lsu.edu/eng/ece/seminar>

