**Seminar Title:**

The World's Smallest Active Electronic System & Its Applications

**Abstract:**

Miniature Internet-of-Things (IoT) systems have unique feature sets that include wireless communication, energy harvesting, and a small form factor, thus enabling non-invasive, secure placement for biomedical, ecological, surveillance, and infrastructure applications, among others. There has been substantial research on the miniaturization of IoT systems. The size of the bare die is often only 1-2 mm; however, the associated systems are typically much larger than just the die, resulting in centimeter-size systems due to included peripherals such as batteries and casings. This leads to a design challenge for the electronics of miniaturized systems because the maximum physical battery size and battery storage capacity are severely limited. In this talk, I will discuss the challenges in developing miniature IoT systems and introduce a millimeter-scale system platform. The system has been developed as the world's smallest active electronic system. To optimize circuit performance, the system is constructed from die fabricated in different technologies which are then stacked and wire-bonded together. The stacked structure increases silicon area per unit volume and makes it easy to swap layers in and out for flexibility in system configuration. Additionally, I will highlight two intriguing use scenarios of miniature systems for ecological studies.

**Short Bio:**

Inhee Lee earned his B.S. and M.S. in electrical and electronic engineering from Yonsei University in 2006 and 2008, respectively. He obtained his Ph.D. in electrical and electronic engineering from the University of Michigan in 2014. From 2015 to 2019, he served as an assistant research scientist at the University of Michigan. In 2019, he became an assistant professor at the University of Pittsburgh. His research focuses on developing millimeter-scale or smaller sensing/computing systems for ecological, biomedical, and AI-of-things applications. Dr. Lee is currently serving as a Technical Program Committee (TPC) Member for IEEE VLSI Symposium, CICC, A-SSCC, CAS Analog Signal Processing, and ISLPED.