Speaker:
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Abstract:
I will present my work that showcases how silicon RF chips can be used not only for wireless RF applications, but also for biomolecular sensing aimed at low-cost disease screening. The main function of the RF chip is to manipulate and monitor the dynamics of protons in water via nuclear magnetic resonance (NMR). Target biological objects such as cancer marker proteins alter the proton dynamics, which is the basis for the biosensing. The high sensitivity of the RF chip made possible the construction of an entire NMR system around the RF chip in a 100-g platform, which is 1200 times lighter, yet 150 times more spin-mass sensitive than a state-of-the-art commercial benchtop NMR system. The system can become a useful addition in pursuing disease detection in a low-cost, hand-held platform.

Speaker Bio:
Nan Sun is an Assistant Professor in the Department of Electrical and Computer Engineering at the University of Texas at Austin. He received the B.S. degree from Tsinghua University, Beijing, China in 2006, where he ranked top in the Department of Electronic Engineering and graduated with the highest honor and the Outstanding Undergraduate Thesis Award. He received the Ph.D. degree from the School of Engineering and Applied Sciences at Harvard University in 2010.

Dr. Sun received the 1st-class Outstanding Student Award from Tsinghua University each year from 2003 to 2006. He won the Top Prize in the Intercollegiate Physics Competition in 2003. He is the recipient of Samsung Fellowship, Hewlett Packard Fellowship, and Analog Devices Outstanding Student Designer Award in 2003, 2006, and 2007, respectively. He also won Harvard Teaching Award in three consecutive years: 2008, 2009, and 2010. He was awarded National Science Foundation Early Career Award in 2013. He served in the Technical Program Committee of Asian Solid-State Circuit Conference in 2011.

His research interests include: 1) analog, mixed-signal, and RF integrated circuits; 2) miniature spin resonance systems; 3) developing micro- and nano-scale solid-state platforms (silicon ICs and beyond) to analyze biological systems for biotechnology and medicine; 4) low-cost medical imaging systems.