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*A New Frontier for Microwave Engineers:  
Terahertz Systems on Chip*

By

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**Abstract:**

There is a growing interest in terahertz and mm-wave systems for compact, low cost and energy efficient imaging, spectroscopy, and high data rate communication. In this talk, the recent advances in the realization of various building blocks for a complete THz system will be presented. First we show different high power sources at 480 GHz and 300 GHz on standard low cost CMOS. We also introduce a design using GaN HEMT devices that can generate and radiate 0.5 W at 500 GHz. Next, we show a novel high gain amplifier at around 300 GHz on 65 nm CMOS. We also show tunable high power signal sources between 300 GHz and 500 GHz based on the theory of coupled oscillators. Finally, we conclude with a terahertz imaging system with excellent noise performance in standard CMOS.

**Biography:**

Ehsan Afshari was born in 1979. He received the B.Sc. degree in Electronics Engineering from the Sharif University of Technology and the M.S. and Ph.D. degree in electrical engineering from the California Institute of Technology, Pasadena, in 2003, and 2006, respectively. In August 2006, he joined the faculty in Electrical and Computer Engineering at Cornell University. His research interests are mm-wave and terahertz electronics and low-noise integrated circuits for applications in communication systems, sensing, and biomedical devices.

Prof. Afshari serves as the chair of the IEEE Ithaca section, as the chair of Cornell Highly Integrated Physical Systems (CHIPS), as a member of International Technical Committee of the IEEE Solid-State Circuit Conference (ISSCC), as a member of the Analog Signal Processing Technical Committee of the IEEE Circuits and Systems Society, as a member of the Technical Program Committee of the IEEE Custom Integrated Circuits Conference (CICC), and as a member of Technical Program Committee of the IEEE International Conference on Ultra-Wideband (ICUWB).

He was awarded National Science Foundation CAREER award in 2010, Cornell College of Engineering Michael Tien excellence in teaching award in 2010, Defense Advanced Research Projects Agency (DARPA) Young Faculty Award in 2008, and Iran's Best Engineering Student award by the President of Iran in 2001. He is also the recipient of the best paper award in the Custom Integrated Circuits Conference (CICC), September 2003, the first place at Stanford-Berkeley-Caltech Inventors Challenge, March 2005, the best undergraduate paper award in Iranian Conference on Electrical Engineering, 1999, the recipient of the Silver Medal in the Physics Olympiad in 1997, and the recipient of the Award of Excellence in Engineering Education from Association of Professors and Scholars of Iranian Heritage (APSIH), May 2004.