



# SME

School of Microelectronics, SUSTech

Academic Frontier Lecture  
No. 017

## Title: Design of the Next-Generation Power Management ICs - Full Integration and Wireless Power Transfer

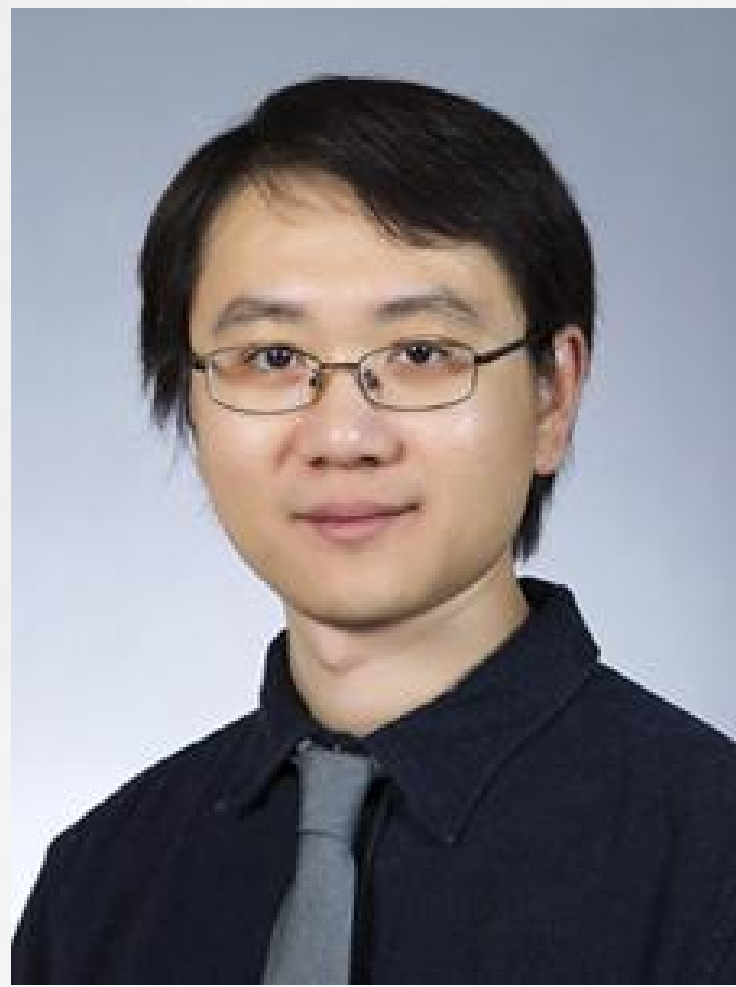
TIME: 10:00am-11:00am, Jun. 6, 2019

VENUE: Room 114, Taizhou Hall (台州楼114)

SPEAKER: Cheng Huang, Assistant Professor, Department of Electrical and Computer Engineering, Iowa State University, USA

HOST: Prof. Chenchang Zhan

### INTRODUCTION



Dr. Cheng Huang is currently a tenure-track Assistant Professor in the Department of Electrical and Computer Engineering of the Iowa State University. He received his PhD degree in Electronic Computer Engineering from the Hong Kong University of Science and Technology, Hong Kong, China, in 2014. During his PhD study, he joined Broadcom Corp., San Jose, CA, as an overseas intern in 2013. From 2014 to 2016, he was with Keio University as a postdoctoral research scientist. From 2016 to 2017, he was with Broadcom Ltd., San Jose, CA, as a Staff Scientist. Over the years, Dr. Huang has worked extensively on power management, analog, and mixed-signal IC designs, and published papers in top journals and conferences including ISSCC and JSSC.

### ABSTRACT

Power Management Integrated Circuits (PMICs) are becoming more and more important due to the higher demands from the emerging markets such as various smart portable/wearable devices and autonomous sensor nodes for Internet-of-Things (IoT). This seminar introduces two important trends of PMIC designs: full integration and wireless power transfer.

Full integration is one of the ultimate solutions to eliminate the bulky and expensive discrete passive components of switching power converters. In this seminar, two fully-integrated DC-DC converters with the power inductors and capacitors integrated at the package and chip level will be presented. In these works, package bondwires, which were usually considered as parasitic inductors, are used as high quality power inductors. Circuit design techniques such as precise discontinuous-conduction-mode (DCM) operation, multi-phase operation and flying-capacitor ripple cancellation will be presented to relax the bondwire inductance accuracy requirement, and help to achieve a higher efficiency and power density.

Wireless power transfer (WPT) is another important trend in PMIC designs. In this seminar, a complete WPT system with TX and RX designs will be presented. Comparing to state-of-the-art designs, the proposed constant-idle-time control and real-time delay calibration technique achieve a higher end-to-end power efficiency, a faster transient response and a higher level of integration with a much lower system and circuitry design complexity.



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