

## **THÔNG BÁO**

**Khoa Điện-Điện Tử tổ chức Seminar Khoa học và giới thiệu học bổng Tiến sỹ**

**Chủ đề: LED-Based Visible Light Communication Systems  
Driver SoC Design and Practical Applications  
Học bổng Tiến Sỹ cho SV xuất sắc tại HKUST**

**Người trình bày: Prof. C. Patrick YUE  
HKUST-Qualcomm Joint Research and Innovation Lab  
Department of Electronic and Computer Engineering, HKUST**

**Thời gian: 09:30 AM, thứ Ba, ngày 16-10-2018**

**Địa điểm: Phòng 403 - B4**

**Trân trọng kính mời quý Thầy/Cô và các bạn sinh viên, học viên cao học, NCS quan tâm đến dự.**

### **Abstract**

This talk presents two advanced visible light communication (VLC) modulator system-on-chips (SoCs). The first is an IEEE 802.15.7 PHY-I standard compliant VLC transmitter. The second is an active matrix LED microdisplay driver SoC with embedded VLC function.

Using ordinary LED lights for VLC has received a great deal of research interest over the past decade due to a number of novel applications including location-based wireless broadcasting through LED lightings, signs with LED backlights and digital LED displays. Most of the VLC SoCs development has focused on wireless optical receiver design including custom CMOS imager whereas VLC transmitters have been predominately based on discrete implementation until recently. More importantly, the power consumption of dedicated VLC transmitters is prohibitively high with bit efficiency in the 100 nJ/bit range. To overcome these issues, this work demonstrates the first fully integrated VLC transmitter SoC compliant with the IEEE 802.15.7 standard embedded with a built-in 8-W LED driver. Excluding the power consumed by the LED driver, the SoC achieves a record VLC transmission efficiency of 5nJ/bit. On the other hand, the miniaturization and integration of inorganic LED display modules have attracted significant research efforts due to their superior brightness and reliability compared to organic LED microdisplay. Combining these two technology trends, this paper also describes an active matrix LED (AMLED) driver SoC with built-in VLC modulation capability to demonstrate a WQVGA smart microdisplay featuring 1.25-Mb/s VLC for enabling LED digital signage as location-based information broadcaster and indoor positioning beacons.

## Speaker Biography



Prof. C. Patrick Yue (S'93–M'98–SM'05–F'15) received the B.S. degree from the University of Texas at Austin in 1992 with highest honor and the M.S. and Ph.D. degrees in Electrical Engineering from Stanford University in 1994 and 1998, respectively.

He is a Professor in Department of Electronic and Computer Engineering and the Founding Director of the HKUST-Qualcomm Joint Innovation and Research Lab at the Hong Kong University of Science and Technology (HKUST). Between 2014 and 2015, he served as the Associate Provost for Knowledge Transfer. His current research interests focus on optical communication and millimeter-wave system-on-chip design, visible and laser light communication systems, and wireless power transfer techniques for IoT applications.

In 1998, Prof. Yue cofounded Atheros Communications (now Qualcomm-Atheros). While working in Silicon Valley, he served as a Consulting Assistant Professor at Stanford. In 2003, he joined Carnegie Mellon University as an Assistant Professor. In 2006, he moved to University of California Santa Barbara and was promoted to Professor in 2010. He has contributed to more than 150 peer-reviewed papers, 2 book chapters and holds 15 U.S. patents. He is an editor of the Proceedings of IEEE. He has served as an editor of the IEEE Electron Device Letters and IEEE Solid-State Circuit Society Magazine and a guest editor for the IEEE Transactions on Microwave Theory and Techniques Society. He has served on the committees of IEEE Symposium on VLSI Circuits (VLSI- Circuits), IEEE European Solid-State Circuits Conference (ESSCIRC), IEEE MTT-S International Wireless Symposium (IWS), IEEE RFIC Symposium (RFIC), IEEE Asian Solid-State Circuits Conference (A-SSCC) and other IEEE-sponsored conferences. Together with his students, he has received the best student paper award at the IEEE International Solid-State Circuits Conference (ISSCC) in 2003 and the IEEE International Wireless Symposium in 2016 and the IEEE Circuits and Systems Society Outstanding Young Author Award in 2017. He is currently serving the IEEE Solid-State Circuit Society (SSCS) as the Membership Committee Chair. He was an IEEE SSCS Distinguished Lecturer in 2017 and an elected IEEE SSCS AdCom member from 2015 to 2017. In 2016, Prof. Yue was presented the 11th Guanghua Engineering Science and Technology Youth Award by the Chinese Academy of Engineering (CAE). Prof. Yue is an IEEE Fellow and a Senior Member of Optical Society of America.

**TM. KHOA ĐIỆN-ĐIỆN TỬ**  
**Phó Trưởng Khoa**

**Huỳnh Phú Minh Cường**  
(hpmcuong@hcmut.edu.vn)