

Ye-Sheng Kuo

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EDUCATION

University of Michigan, Ann Arbor - Ph.D. in EE (VLSI) *Sep. 2009 - Jan. 2015*

Research Area: Embedded Systems, Visible Light Communication, Sensor Networks

Dissertation: Software-Defined Lighting.

Committee Member: Prabal Dutta (Chair), David Blaauw, Zhengya Zhang, and James Cutler

National Taiwan University - B.S. in EE *Sep. 2004 - Jun. 2008*

GPA: 3.85 / 4.0

EXPERIENCE

Research Fellow *Mar. 2015 - Present*

University of Michigan

Design and implement **Triumvi**, a low-cost (<\$65), standalone, non-contact, energy harvest, true-power wireless power meter. Its small form factor, accurate, self-powered, easy to install make it suitable for panel level monitoring and significantly reduce the cost of installation and maintenance.

System Engineering Intern *May. 2013 - Aug. 2013*

Texas Instruments

Designed a visible light communication (VLC) transceiver system which provides data communication and limited ranging using low end MCUs. Designed a BootsterPack (hardware add-on) for the MSP430 Launchpad and implemented VLC on-off-keying in embedded C.

<http://e2e.ti.com/group/launchyourdesign/m/msp430microcontrollerprojects/665142>

Reference: Deric Waters, deric@ti.com

SKILLS

Skills System Research, Verilog, C/C++, Python, Circuit Design, PCB Schematic/Layout, Machine Learning

Tools Altium Designer, Matlab, Spice, Microsemi IDE, Eagle, SVN, Git

HONORS

HiJack, Overall winner, 2010 Michigan Mobile Challenge

HiJack, 1st place, *ISLPED '10* Design Contest

Presidential Award, National Taiwan University, 2004

PROJECTS

Triumvi, Standalone, Non-Contact True Power Metering

Design and implement a standalone, self-powered non-contact, true-power metering system that makes circuit-level metering affordable, accurate and reliable. Triumvi harvests energy to power itself, monitors current and voltage, calculates power, encrypts the data, and wirelessly transmits the result.

Luxapose, Accurate (10 cm), VLC-based Indoor Localization with Unmodified Phones

http://lab11.eecs.umich.edu/projects/vlc_localization/

Developed a novel indoor localization technique using off-the-shelf mobile phone and LED luminaires. Designed a wireless controlled LED lighting system that blinks LED to transmit location beacon, which is imperceptible to human. Developed an image processing and optimization technique in Matlab for solving angle-of-arrival location estimates.

μSDR, Low-Power, Low-Cost, and Portable Software Defined Radio (SDR)

<http://lab11.eecs.umich.edu/projects/usdr/>

Designed and implemented a SDR system that is low power (operates for 10s of hours on a few AA batteries), and low cost (\$150). Explored time synchronization protocol and concurrent wireless transmission using μSDR. Implemented the IEEE 802.15.4 physical layer and part of the MAC layer using Smartfusion FPGA, and wrote uClinux kernel driver for μSDR.

Mbus, Ultra Low-Power Serial Communication Protocol for Millimeter-scale Sensor Systems

<http://mbus.io/>

Helped design Mbus protocol and fully implemented/verified Mbus in Verilog HDL. Mbus has been synthesized and fabricated on a dozen different chips, including low-power processors, imagers, radios, and pressure sensors.

Opo, Low-Power, Wearable, and Scalable Human Interaction Detection

<http://lab11.eecs.umich.edu/projects/opo/index.html>

Helped design a low-power ultrasonic wakeup circuit and signal conditioning blocks to detect the presence of ultrasonic and further waking up the processor. This wearable sensor enables human interaction tracking using Time Difference of Arrival (TDoA) ranging.

HiJack, A Universal Mobile Phone Interface

<http://web.eecs.umich.edu/~prabal/projects/hijack/>

Designed and implemented analog circuitry that harvests energy from mobile phone's headset port to power external sensors and processor that enables an universal interface on mobile phones to external sensors.

SELECTED PUBLICATIONS

PowerBlade: A Low-Profile, True-Power Plug-Load Meter

Samuel DeBruin, Branden Ghena, **Ye-Sheng Kuo**, and Prabal Dutta
In *Sensys'15: Proceedings of the 13th ACM Conference on Embedded Networked Sensor Systems*
Seoul, South Korea, Nov. 1-4, 2015.

Opo: A Wearable Sensor for Capturing High-Fidelity Face-to-Face Interactions

William Huang, **Ye-Sheng Kuo**, Pat Pannuto, and Prabal Dutta
In *Sensys'14: Proceedings of the 12th ACM Conference on Embedded Networked Sensor Systems*
Memphis, TN, Nov. 3-6, 2014.

Mbus: A 17.5 pJ/bit/chip Portable Interconnect Bus for Millimeter-Scale Sensor Systems with 8 nW Standby Power

Ye-Sheng Kuo, Pat Pannuto, Gyouho Kim, Zhiyoong Foo, Inhee Lee, Ben Kempke, Prabal Dutta, David Blaauw, and Yoonmyung Lee
In *CICC '14: IEEE Custom Integrated Circuits Conference*
San Jose, CA, Sep. 15-17, 2014.

Luxapose: Indoor Positioning with Mobile Phones and Visible Light

Ye-Sheng Kuo, Pat Pannuto, Ko-Jen Hsiao, and Prabal Dutta
In *MobiCom '14: The 20th ACM Conference on Mobile Computing and Networking*
Maui, HI, Sep. 7-9, 2014.

System Architecture Directions for a Software-Defined Lighting Infrastructure

Ye-Sheng Kuo, Pat Pannuto, and Prabal Dutta
In *VLCS '14: The 1st ACM Workshop on Visible Light Communication Systems*
Maui, HI, Sep. 7, 2014.

An Energy Autonomous MM-Scale Wireless Imaging System with Continuous Motion Detection

Gyouho Kim, Zhiyoong Foo, Yoonmyung Lee, Pat Pannuto, **Ye-Sheng Kuo**, Ben Kempke, Mohammad Hassan Ghaed, Suyoung Bang, Inhee Lee, Yejoong Kim, Seokhyeon Jeong, Prabal Dutta, Dennis Sylvester, David Blaauw
In *VLSI '14: Symposium on VLSI Technology and Circuits*
Honolulu, HI, Jun. 11-13, 2014.

Reconfiguring the Software Radio to Improve Power, Price, and Portability

Ye-Sheng Kuo, Patrick Pannuto, Thomas Schmid, and Prabal Dutta
In *Sensys '12: Proceedings of the 10th ACM Conference on Embedded Networked Sensor Systems*
Toronto, Ontario, Canada, Nov. 6-9, 2012.

Hijacking Power and Bandwidth from the Mobile Phone's Audio Interface

Ye-Sheng Kuo, Thomas Schmid, and Prabal Dutta
In *DEV '10: Proceedings of the First Annual Symposium on Computing for Development*
London, United Kingdom, Dec. 17-18, 2010.

Putting the Software Radio on a Low-Calorie Diet

Prabal Dutta, **Ye-Sheng Kuo**, Akos Ledeczki, Thomas Schmid, and Peter Volgyesi
In *HotNets-IX: Proceedings of the Ninth Workshop on Hot Topics in Networks*
Monterey, California, Oct. 20-21, 2010.